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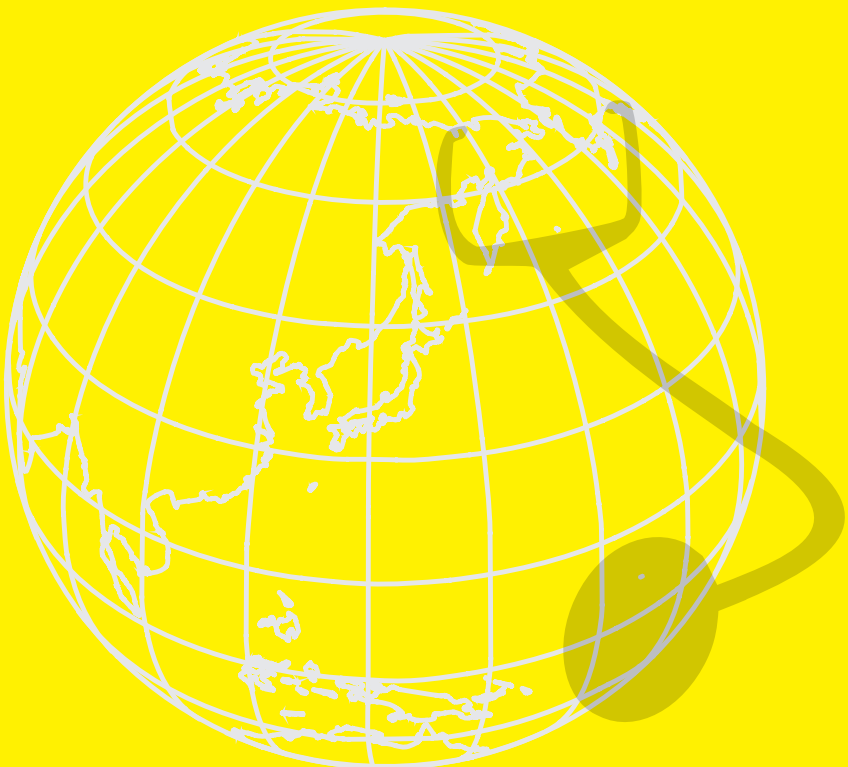

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Simple Visual Technique for Location of Anterior Vibrating Line (Posterior Palatal Seal Area)

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Abstract

The posterior palatal seal area has remained a subject of controversy as far as the marking of the anterior and posterior vibrating lines are concerned. Sometimes, the dentures are over extended or under extended which will either cause discomfort to the patient or will be less retentive to horizontal forces. Then in order to improve its retention the dentist has to perform various corrective measures. This technique describes the visual location of the anterior vibrating line by considering the difference in the colour and variations in the anatomic contour of the hard palate with the corresponding soft palate which is a very important step in the fabrication of a complete dentures or any removable prosthesis requiring post damming.

Key Words

Anatomic contour posterior, anterior vibrating line, colour, palatal seal.

Introduction

The prosthesis has to be retentive to function. Achieving this resistance against vertical dislodgment forces is a problem in maxillary denture because of gravity. It is achieved by intimate tissue contact and a complete border seal to allow physical forces to help retention.

The border seal on maxillary complete denture is accomplished by draping the lip or cheek over the denture border. But the posterior border is a problem because it terminates on a surface that is movable in varying degrees and does not presents as a turn of tissue as are the other denture borders. Due to this the posterior palatal seal area has always remained a subject of controversy as far as the location and marking of the anterior and posterior vibrating lines are concerned.

Deficiencies in achieving distal border seal may be either in terms of length (extension) of the denture base, in the depth (post dam) or in both. These errors usually manifest themselves as inadequate retention[1,9].

This article describes a technique of visually locating the anterior vibrating line precisely based on the colour contrast between the mucosa of hard and soft palate (due to difference in the type of covering epithelium, structure of lamina propria, its density, thickness and the presence or lack of elasticity, the form of junction between the epithelium and lamina propria, and the membrane's fixation to the underlying structures, loose or firm)[2].

Anatomic Considerations

Mucosa of oral cavity varies in terms of keratinisation, attachment to underlying bone because of functional adaptation. In hard palate it is tightly fixed to the underlying periosteum and thus immovable, the epithelium is uniform in appearance with well keratinized surface and pink;[3] In contrast the epithelium of soft palate is non keratinized, lamina propria with a distinct layer of elastic fibres separating it from the submucosa, highly vascularised and reddish in colour and hence visibly discernable from the comparatively paler colour of the hard palate[4].

Technique

The patient is seated with head tilted back and is asked to open the mouth while the operator stands in front. Carefully visualize and distinguish the colour difference between the hard and soft palate (figure 1). The tissues at the junction of the colour difference is palpated with

Figure 1: Visual examination of colour difference on palate.

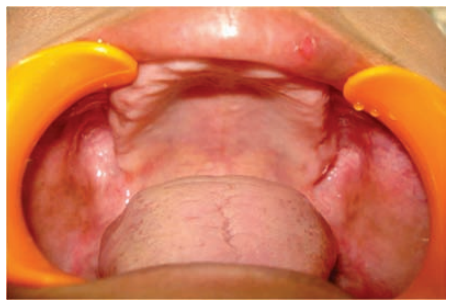


Figure 2: Palpation of hamular notch with T burnisher.

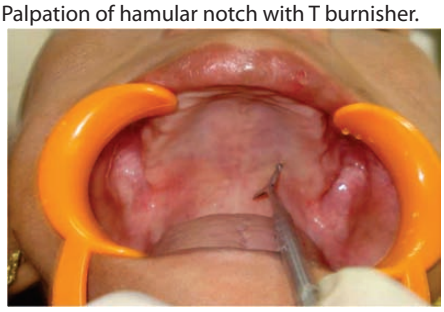


Figure 3: Palpation of the tissue at the junction of colour difference.

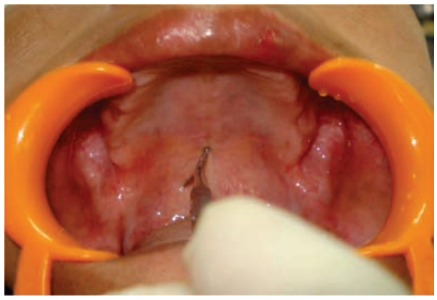


Figure 4: Palpation of tissue towards posterior nasal spine.

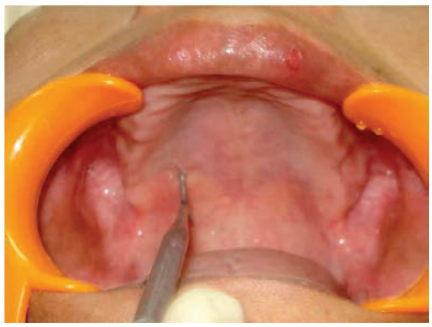
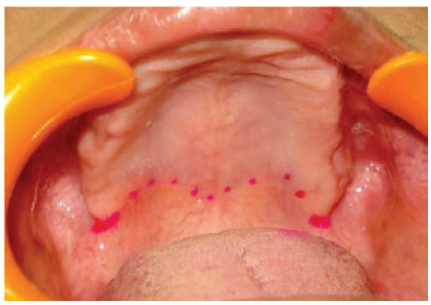


Figure 5: Marking of equally spaced dots on anterior vibrating line.



the "T" burnisher, taking into consideration the anatomy of the soft palate which depends on the form of the hard palate(figure 2,3 & 4). Now, equally spaced multiple dots are marked on the visualized and palpated anterior vibrating line (figure 5). Valsalva manoeuvre is performed to confirm the markings (figure 6). The dots are joined together to mark the anterior vibrating line(figure 7). The posterior vibrating line can then be marked behind the anterior vibrating line by instructing the patient to say "ah" in short bursts in a normal, unexaggerated fashion[8].

Discussion

The vibrating line delineates the junction of the movable and the immovable portion of the soft palate[5,10]. The tissues behind the anterior vibrating line are deeply yielding and are easily displaced. The course of the vibrating line from one side of the palate to the other is not of a definite pattern but varies with the shape of the hard palate[6]. A flat palatal vault will be associated with a relatively straight anterior vibrating line (class I soft palate). A medium depth palatal vault will be associated with a slightly curved anterior vibrating line towards the incisive papillae making a bow shape (class II soft palate).

Figure 6: Valsalva maneuver is performed to confirm the markings.

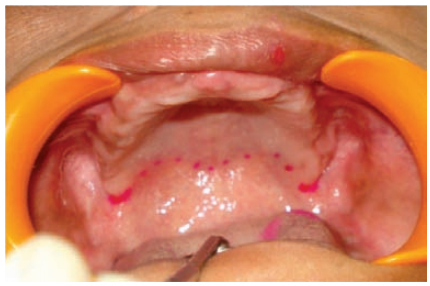
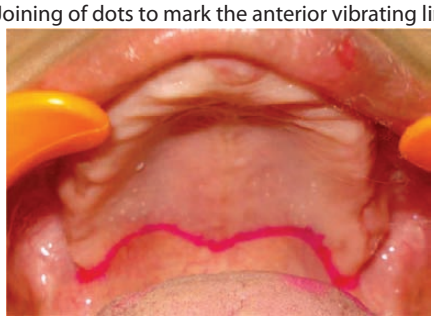


Figure 7: Joining of dots to mark the anterior vibrating line.



While a high V shaped palatal vault will be associated with the anterior vibrating line being acutely curved towards the incisive papillae making a broad "M"(class III soft palate)][7].

There is only one vibrating (flexion) line on the soft palate for normal functional movements,[5] which is demarcated by observing the movement of the soft palate, when the patient was repeatedly said "Ah"; The compressible area, posterior to this vibrating line demarcates the anterior aspect of the posterior palatal seal area.

Researchers have advocated techniques to record the posterior palatal seal area using various techniques/ methods of which the most widely accepted are, conventional technique, fluid wax technique and arbitrary scraping of master cast[8,10].

The difference between this visual technique over the conventional, fluid wax, or arbitrary scrapping of the cast is that:

It is a simple, time saving, single step technique, exact location can be ascertained easily as it is not patient dependant unlike the conventional technique and there is no repeated insertion of the tray and material unlike the fluid wax technique and there is no arbitrary scraping of the cast.

Though this technique offers distinct advantages over other techniques there is a chance that an inexperienced operator may go wrong due to variations in the soft palate form which he might not be able to appreciate for which he will have to keenly observe many patients before perfecting this technique.

Summary

The anterior vibrating line is certainly not an imaginary line, but can be visually discernable. The confusion with

regards to arbitrary marking of the anterior vibrating line now can be made exacting by the visualization of the junction of the keratinized (masticatory) & nonkeratinized (lining) mucosa the course of which varies in accordance to the shape of the hard palate & the associated inclination of the soft palate.

This technique is easy and does not require elaborate armamentarium and material. However, a follow up study involving a large population is required to ascertain the accuracy of posterior palatal seal area locating with this technique.

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Evaluation of Depth of Cure in Dental Composite Resins Photo-Activated Using Different Methods

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Abstract

Aim

The study was aimed at evaluating the depth of cure and of a composite resin that was photo-activated using different methods.

Summary

A composite curing test fixture was filled with composite resin and photo-activation was performed using three methods: (1) Intermittent method (2) Continuous method (3) Exponential method. Depth of cure was measured at the unexposed bottom surface of the specimen using vicat polymer softening apparatus.

The data was analyzed using Kruskal-Wallis test. Results showed that the depth of cure was highest with the intermittent method, followed by continuous method and the exponential method.

Key words

Composite, depth of cure, photo-activation methods.

Introduction

Light-activated composite resin restoratives have been widely applied in clinical dentistry, since their introduction in the 1970's, when significant changes with satisfactory application both in anterior and posterior teeth became possible. However, characteristics such as composition, light intensity and exposure time can modify the final properties of the material and thus restrict the clinical applications. Type, size, quantity and refractive index of the fillers into composite exert an influence upon light transmission across the material. Consequently, the light attenuation and the depth of cure may be altered[1,2]. With respect to the organic matrix, the nature of the involved monomer molecules and the degree of conversion obtained in composite resin have an important effect on the mechanical properties,[3] where the higher degrees of cure will improve the final properties of the material.

A higher degree of conversion can be obtained by using a high light intensity[4]. However, this higher intensity may result in greater polymerization shrinkage and greater marginal leakage[4]. Therefore, new photo-activation techniques have been proposed, such as the programmed use of low and high intensities that have shown to be more effective in decreasing the stress generated by polymerization shrinkage, whilst maintaining a high degree of conversion and satisfactory mechanical properties[5,6]. Since the introduction of this method, other photo-activation methods have been suggested, including intermittent light,[7] stepped light, exponential light[8]. However, these innovative techniques require further investigation before they can be effectively applied in dental practice.

The aim of the study was to evaluate the depth of cure of light cured composite resin using three different modes of light curing systems.

Continuous mode

Exponential mode

Intermittent mode

Material and Methods

The light curing systems used are as follows

The composite material used for testing

Fig. 1: 3M 2500 Curing Light System

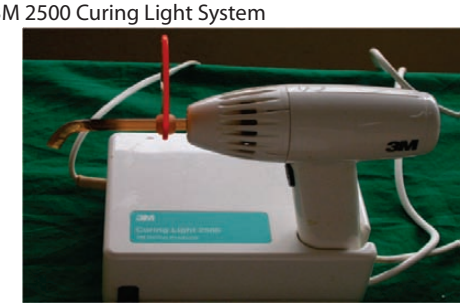


Fig. 2: Astralis 7 Light Cure System

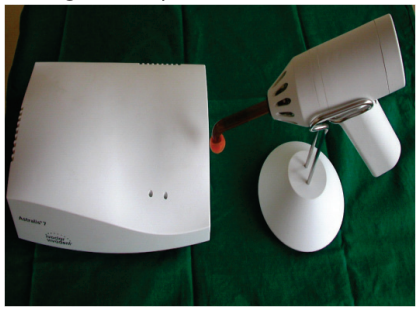


Fig. 3: Micro-Filled Hybrid Composite A3 Shade

Fig. 4: Composite Curing Test Fixture

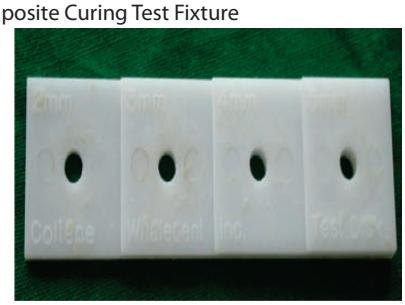


Fig. 5: Vicat Polymer Softening Apparatus

Vicat Polymer Softening Apparatus

The apparatus is used for measuring depth of cure in composite resins.

Different Types of Photo Activation Methods

1. Continuous mode: When the same light intensity is used throughout the photo-polymerization process for a period of 40 sec.

2. Exponential mode: When the light intensity is gradually increased from power output of 150 mw/cm2 to 750 mw/cm2 during the photo-polymerization process for a period of 40 sec.

3. Intermittent mode: When the photo-polymerization for the first 30 sec is done at a power output of 400mw/cm2 with a gap of 2 sec after each 10 sec duration. The photo-polymerization for the last 10 sec is done at a power output of 750mw/cm2

The 3 different modes of curing and corresponding light cure units are as follows.

1. CONTINUOUS MODE. (3 M ESPE 2500)

2. EXPONENTIAL MODE (ASTRALIS 7)

Fig. 6: Composite Material Being Light Cured.

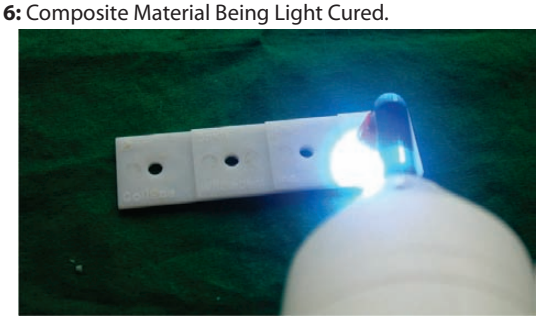
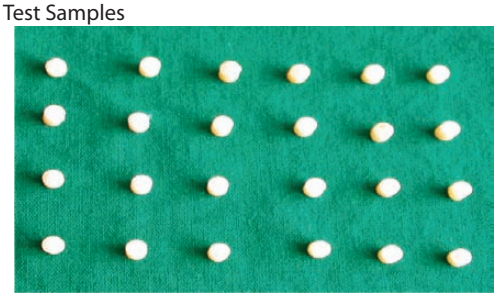


Fig. 7: Test Samples



3. EXPONENTIAL MODE (ASTRALIS 7)

The composite curing test fixture contains an aperture of dimensions 5mm, 4mm, 3mm and 2mm in depth and 4 mm in diameter.

The composite material used is micro-filled hybrid A3 shade

All the samples were cured keeping a constant distance from composite curing test fixture.

The total time of cure for each mode was 40 seconds.

After each sample is cured for 40 sec, the side of resin away from the light source was marked with a marker for identification

In total 3 groups of 6 samples each of height 5 mm and 1 control group of 6 samples each of height 2 mm was cured by all 3 modes of curing amounting to total of 24 samples.

The samples were then immediately taken to Department of Metallurgy and Material Science, National Institute of Technology, Surathkal.

Vicat Polymer Softening Apparatus

The apparatus is used for measuring depth of cure in composite resins.

The apparatus contains a needle, weight and a dial measuring the depth of penetration.

The weight applied for testing is 1250 gm.[9]

Depth Measuring Dial

The measuring dial consists of 100 divisions each division measuring 0.01 mm. The sample is kept under a needle with the uncured side facing the needle. The position

Fig. 8: The final position of the dial is noted after 10 minutes

Fig. 9: Needle Penetrating Composite Sample

just before the penetration of needle is noted on the measuring dial

Every sample is kept under the needle for 10 minutes

Vicat Polymer Softening Apparatus

The depth of uncured sample

Final Position Of Measuring Dial- Initial Position Of Measuring Dial

The depth of cure of sample

5MM (ORIGINAL HEIGHT OF SAMPLE)- DEPTH OF UNCURED SAMPLE

Results

The results of depth of cure showed that intermittent method had the highest depth of cure.

Inter group comparison using Kruskal-Wallis test showed group 1 had highly significant results compared to other groups.

The lowest depth of cure was showed by continuous mode of photo polymerization and had highly significant results when compared to intermittent and exponential.

Intermittent versus exponential showed statistically significant results.

No uncured resin was found in control group samples.

MODE	N	Mean	Standard deviation	H	P
Intermittent	6	4.977500	0.0154110		
Exponential	6	4.962500	0.0052440		
Continuous	6	4.941667	0.0060553	12.6260	0.002 hs

Intermittent vs Exponential

MODE	Mean
Z	-1.854
P	0.064

Intermittent vs Continuous

MODE	Mean
Z	2.822
P	0.005 hs

Exponential vs Continuous

MODE	Mean
Z	2.903
P	0.004 hs

Discussion

The development of new technologies for photoactivation of restorative composite resins has caused great interest among researchers.[1-3,5] However, the real advantages of these techniques are not yet totally known. Before these methods can be clinically applied, the final properties of photo-activated composites must be evaluated.

The results of this study showed that depth of cure is strongly affected by photo-activation methods. The intermittent, continuous and exponential light methods supply energy for photo-activation via halogen lamps, and white light must be filtered to emit only the blue spectrum of the visible light. To generate blue light, the lamps must be heated to very high temperatures,[4] resulting in emission of heat through the curing light tip.[5,7] This heat transmission to the material may be, in part, responsible for the higher depth of cure values achieved using these methods, because the heat may increase the mobility of the monomers, increasing the probability of occurrence of conversion.

Another factor that may have caused the difference between intermittent method and the continuous and exponential methods is the total amount of energy supplied to the composite for polymerization.[10] Maximum light intensity is achieved at 0.55 s and then it decreases, signifying that even with continuous method (750 mW/cm^2), the amount of energy supplied is not constant. Conversely, the intermittent method employs 2 s of light exposure followed by 2 s without light; that is, maximum light intensity peak is achieved every time the light is emitted. Since the polymerization process seems more dependent on the total energy available for photo-activation than the light intensity property,[11] this method may provide a higher amount of energy to the material, which may explain the higher depth of cure values achieved using the intermittent method.

The photo activation methods provides depth of cure values that fulfilled required for ISO 4049. However, there were differences observed between the methods at depths greater than 2 mm.

The difference observed between the methods was probably due to characteristics of each method such as light intensity, exposure time and heat generated.

Conclusion

To conclude, ideal situation as per ISO 4049, 2 mm still remains maximum thickness of composite to be cured.

However, when need arises to cure greater depths, the intermittent technique of curing can be used.

Further studies on the polymerization and polymerization shrinkage with this technique needs to be done.

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Prosthetic Treatment Modalities in Children

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Abstract

Prosthodontic management of child patients is often a challenge because the affected individuals are quite young. This is important that child patients to receive appropriate dental treatments at an early age for physiologic and psychologic reasons. The main objective of the prosthodontic treatment are to restore the deciduous arch, the appearance of the child and the peace of the mind of the patient and at the same time to educate the parents and child regarding regular dental care. This paper reviews the various prosthodontic treatment modalities in child patients.

Keywords

Ectodermal Dysplasia, Olgodontia, Anodontia, Groper appliance, Maryland Bridges.

Introduction

The prosthetic rehabilitation of children represents special challenges to the dental profession. A professional should be prepared to interpret the needs and desires of the child and parents and be able to use growth-adapted measures that are individually timed for the patient's situation[1].

The objective should be to establish an acceptable appearance at all developmental stages without jeopardizing the success of the final result. Different clinical interventions were adopted to suit the patient's dental and psychologic stage of development. The prosthodontic treatment, which took place at different ages, comprised several treatment modalities: composite-retained onlay fixed partial dentures, a removable partial denture, tooth supported and implant-supported fixed partial dentures, and laminate crown therapy. Extensive prosthodontic treatment eg.implant supported prosthesis in growing individuals should preferably be performed with a multidisciplinary team approach[1]. Treatment comprises many different treatment modalities and today often includes implant supported prostheses as the final link in a chain of prosthetic replacements for the missing teeth.

Consequences of premature tooth loss

The degree to which the development of the permanent dentition is affected by loss of teeth from the deciduous arch will depend upon the teeth extracted and the time at which they are lost. The premature loss of a deciduous incisor rarely results in a significant loss of space, whereas the loss of a second deciduous molar can produce a situation where the first permanent molar drifts mesially to contact the first deciduous molar[2]. This results in crowding in the buccal segments or vertical impaction of the second premolar.

Benefits of restoration of missing teeth

The short-term objectives are to restore the deciduous arch, the appearance of the child, and the peace of mind of the parents. The most important consideration is to educate the parents regarding dental disease and its prevention and to instruct them the methods of improving the child's oral hygiene.

The long-term objectives include the continued education of the parents and child, interceptive orthodontics to avoid crowding in the buccal segments of the permanent dentition, and developing the habit of regular dental care in both parent and child[2].

Pit and fissure sealant for young adults

Untreated dental caries in children can cause both pain and infection. The prevalence of dental caries is surprisingly high in children[3].

Fluoride therapy is a recognized method of reducing smooth-surface caries. Sealant therapy is intended to provide similar effects as flouride for the occlusal surfaces of teeth[4].

The high caries attack rate for posterior teeth soon after eruption is well documented. The attack rate for mandibular first molars decreases rapidly up to age 9.5 years and remains relatively constant thereafter. Apparently, sealants must be applied soon after tooth eruption to provide optimal protection[4].

Restoration of single tooth

It can be achieved by means of an all ceramic or metal ceramic crown. This can be carried out if the remaining tooth structure is sufficient enough to hold the ceramic crown.

If the tooth preparation is seriously compromised the use of metal ceramic crown is indicated instead of all ceramic crown.

Restoration of multiple teeth

Removable partial denture

These may serve as space maintainers in case of early loss of primary teeth. The paediatric patient should be properly educated about the insertion and removal of the partial denture. Proper instructions should be given regarding maintenance of the removable partial denture[5].

Indications: Removable prosthetic appliances may be indicated in the primary, mixed or permanent dentition when the teeth are missing. It may be utilized to maintain space, obturate congenital or acquired defects, establish esthetics or occlusal function, or facilitate speech development.

Contraindications

- A lack of suitable teeth in the arch to support, stabilize and retain the removable prosthesis.
- Rampant caries or severe periodontal conditions that threaten the remaining teeth in the arch.
- A lack of patient acceptance for esthetic reasons.
- Chronic poor oral hygiene.

Fixed partial denture

To improve esthetics and for retention in the anterior maxillary area, composite- retained onlay fixed partial dentures (FPD) can be made in the maxilla and mandible.

Management of carious primary molars involving two or more surfaces is done with the placement of a preformed metal crown (PMC) and investigate the survival of PMCs, placing by Hall technique, on carious primary molars6.

Indications: Fixed prosthetic restorations to replaces one or more missing teeth may be indicated for establishing esthetics, to maintain arch space or integrity in the developing dentition, to prevent or correct harmful habits or to improve function.

Contraindication: Fixed partial denture is usually not advocated in following situations:

Areas of high esthetic demand like anterior teeth,
Large pulp chamber,
Short teeth,
High caries index,
Extensive destruction,
Poor alignment,
Bulbous teeth.

Stainless steel crown: Primary (baby) molars with extensive decay, malformed enamel, advanced wear due to grinding, a missing replacement tooth, pulpotomy, or fracture may require coverage with a stainless steel crown in order to provide a durable restoration (filling).

A primary molar may be restored with a stainless steel crown during one appointment. The decay is removed, the tooth is shaped for a crown, the appropriate size crown is selected, and the crown is cemented. The crown must be brushed when brushing the other teeth. Sticky foods such as caramels and taffy can pull the crown off. If this should occur, your dentist can usually replace the same crown in a few minutes[7].

Fixed anterior retainer: The primary molars are banded and a lingual wires is soldered to the bands. On this wire a lug for each tooth to be replaced is soldered . this method is described by stephens et al in 1971.

Groper appliance: It is an adjustable, non breakable fixed anterior space maintainer. This appliance replace lost anterior teeth in very young children. It has a lingual stainless steel wire with an eyelet a diret bond pad soldered with a mesh base.

Maryland bridges: It is a perforated metal –resin bonded appliance. It provides excellent esthetics with minimal tooth preparation and should be the first choice whenever possible. these are indicated in following clinical situations.

1. Missing permanent anterior teeth due to trauma.
2. Congenital missing lateral incisor
3. Lost anterior teeth due to periodontal lesions or extensive caries.

Overdentures: Overdentures are defined as dentures which are fitted over retained roots and which derive some support from that coverage. The remaining teeth or treated root stumps serve as abutments for overdentures.

It become a popular treatment option with advantages of an overdenture is the proprioception, increased support and stability of the denture. The patient should be motivated to properly maintain the oral hygiene of retained teeth with home care and understand the importance of periodic follow-up care by the dentist8.

Advantages

1. Low cost in comparison to implants and other fixed prosthodontic options.
2. Simple
3. Completely reversible
4. Highly conservative
5. Improved masticatory efficiency, swallowing, speech, and esthetics.
6. Better proprioception, good periodontal support and stability compared to complete dentures.
7. It also improves the self esteem of the child.

It is important that the dentures are modified as the dentition develops, adding material as teeth exfoliate and creating concavities within the alveolar surface of the overdentures as teeth erupt.

Therefore regular follow up is of extreme importance.

Pedodontic complete denture

Complete dentures are a simple, inexpensive, and reversible prosthodontic option. This treatment analyzed the complete denture principles and techniques in

children and supports a simplified yet scientific approach in adopting these principles. The principles described can assist the clinician in using this simple therapeutic option to provide esthetic, functional, and psychological benefits for children and thus contribute to their overall development and well being[9].

It is indicated in following conditions

1. Hereditary Ectodermal dysplasia is an hereditary condition associated with the defective development of tissues of ectodermal origin. This syndrome is classified as hidrotic and anhydrotic. It manifests at least two of the following diagnostic features. It is a rare condition characterized by partial or complete absence of primary and permanent teeth. Ocasionally the teeth that are developed are conical in shape which may be utilized for abutments for overdentures.
2. Severe forms of dentinogenesis imperfecta – It is characterized by marked attrition of teeth and total loss of clinical crowns. The remaining roots stumps may require extraction and complete dentures fabrication.

Following factors are to be kept in mind while constructing a complete denture for a child patient:

1. The impression should record the entire vestibular sulcus reflection to enable a retentive denture base.
2. The trays needs to be modified according to the age of the child. For very small edentulous child a dental mirror head (maxillary impression) and 1.6 mm soft steel wire (mandibular impression) can be used as support for compound impressions.
3. Artificial primary teeth may be custom made fro
4. m a cast of natural primary teeth or a primary typhodont teeth.
5. The complete denture needs to be adjusted or trimmed whenever a permanent tooth erupts into the mouth.
6. The child may produce a copious amount of saliva and reassurance to the patient will restore the problem.
7. Replacement dentures should be made when growth has produced some overclosure or abnormal mandibular posture is observed.

Implants

The use of implants in children or in individuals whose growth is not completed is still controversial and clinical experience that implant will act as an ankylosed tooth when placed before the growth of the alveolar process has ceased. The two major factors considered in placement of implants before growth completion are:

1. The effect of growth on long term relative position of implant.
2. The effect of the implant supported prosthesis on future dental and skeletal growth.

Treatment with dental implants would need to be preceded by a bone-grafting procedure. The placement of endosseous implants in locations favorable for subsequent restoration placement may be difficult and require bone grafting. The use of dental implants to rehabilitate patients with congenitally missing teeth associated with ED[10]. It is possible to successfully place dental implants in male and female patients, of different ages, with ED and congenitally missing teeth. The clinical experience gained that a careful evaluation of each patient is necessary to determine the bone volume available for implant placement. Anatomical structures such as the maxillary sinus and the mandibular canal should also be considered before planning for implant placement.

Conclusion

There appears to be an increasing awareness of oral health among parents of all age groups of children, which is demonstrated by the reported tooth brushing behaviors and also the use of a range of oral hygiene products, and is a very positive development.

Premature loss of deciduous teeth can result in unsatisfactory dietary habits and crowding in the buccal segments of the permanent dentition. It may also affect the social development of the young child. For these reasons, the prosthetic restoration of the deciduous arch must be considered whenever teeth have been lost prematurely.

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Lasers: An Emerging Technology

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Abstract

Laser is one of the latest technologies which promise the dentist and patient to deliver superior quality of dentistry. The advantages of laser dentistry over conventional approach are several e.g minimal bleeding, surgeries with no or minimal use of anesthesia, tooth preparations without creating micro fractures etc. This article highlights different types of lasers used in dentistry with mechanism of action especially emphasizing on the use of lasers in Prosthodontics, its advantages, disadvantages and limitations. This article is an attempt to create more awareness about lasers amongst clinicians and to make use of it for better practice. The continued development of laser technology may lead in creating a different branch in dentistry "Lasers Dentistry".

Key Words

Lasers, Lasers in Prosthodontics, Laser Dentistry

Introduction

In the present era clinicians are keenly searching for better techniques, instruments and materials that allows the delivery of superior dental treatment with better patient comfort. Technologies like CAD-CAM restorations, digital radiography and photography, implantology, maxillofacial dentistry, etc are gaining tremendous amount of popularity by providing an efficient and beneficial alternative over the conventional dentistry. The use of lasers is one of these hallmark technologies that enables dentist to work faster, more precisely and more efficiently.

Laser can be described as Light Amplification by Stimulated Emission of Radiation.

Definition

LASER is defined as "A device that utilizes the natural oscillations of atoms or molecules between energy levels for generating coherent electromagnetic radiation usually in the ultraviolet, visible, or infrared regions of the spectrum." [1]

History

The use of laser in dentistry has been developed over the last three decades. Initially it was introduced as an alternative to traditional halogen curing light but now it has become the instrument of choice in many dental applications.

In 1916 Albert Einstein postulated photons and stimulated emission and won the Nobel prize for related research on the photoelectric effect[2].

In 1956 American physicist Townes first amplified microwave frequencies by the stimulated emission process and the acronym MASER (Microwave Amplification by Stimulated Emission of Radiation) came into use[3].

Term laser was coined by GORDON GOULD in 1957

In 1958, Schawlow and Townes discussed extending the MASER principle to the optical portion of the electromagnetic field. This became the principle of LASER[4].

In 1990, the FDA cleared for intra oral laser, a pulsed Neodymium:Ytrium – Aluminium, Garnet laser (Soft tissue laser) developed by Myers and Myers, called "d lase 300" [5].

On May 7, 1997 FDA approved Er:YAG laser, the first laser used for treating human dental cavities. It was reported to cause some damage to the tooth structure but currently available lasers are safer[6].

Development of laser

- 1991 Soft tissue Laser
- 1993 Nd:YAG Laser
- 1993 Kinetic Cavity Preparation
- 1994 CO_2 Laser, Argon Laser
- 1996 Laser welder
- 1997 Nd:YAG Laser
- 1998 Er:YAG Laser and Er: CrYSGG

Classification

Lasers can be classified:

(A) According to lasing medium

1. Gas (argon, co2)
2. Semi-conductor (diode)
3. Liquid
4. Doped insulator laser[solid] (Nd:YAG, holmium YAG, Erbium based lasers)

(B) Lasers according to pumping scheme
1. Optically pumped laser
2. Electrically pumped laser

(C) Lasers according to operation mode
1. Continuous wave lasers
2. Pulsed lasers

(D) Lasers on basis of application in dentistry[7,8]
1. Soft tissue lasers
2. Hard tissue lasers

Lasers Used In Dentistry[6]

1. Argon ion laser (wavelength of 488 (blue) and 514 nm (blue green)
2. Carbon dioxide laser (10, 600 nm)
3. Diode laser (810, 940 and 980 nm, infra red spectrum)
4. Neodymium;ytrium-aluminium-Garnet laser (1064 nm, infra red)
5. Erbium; Ytrium-Aluminium-Garnet laser (2780, 2940 nm)
6. Holmium; ytrium-aluminium-Garnet laser (2100 nm)
7. Helium-Neon[He-Ne] laser (670 nm)

Laser Components

Lasers are generically named for the material of the active medium, which can be a container of gas, a crystal or a solid state semiconductor. There are two mirrors, one at each end of optical cavity, placed parallel to each other. Surrounding the core is an excitation source, either a flash lamp device or a electrical coil, which provides the energy into the active medium. A cooling system, focusing lenses, and delivery system complete the mechanical components1.

There are two gaseous active medium lasers used in dentistry: Argon and carbon di oxide[9]. The remainders that are available are solid state semiconductors wafers made with multiple layers of metals such as Gallium and Aluminum.

After the stimulation of active medium by the excitation source, the photons are amplified by the mirrors and emerge as laser light.

How does it work?

The principle effect of laser energy is photothermal (i.e., the conversion of light energy into heat). This thermal effect of laser energy on tissue depends on the degree of temperature rise and the corresponding reaction of the interstitial and intracellular water. The first event, hyperthermia, occurs when the tissue is elevated above normal temperature but is not destroyed. At temperatures of approximately 60°C, proteins begin to denature without any vaporization of the underlying tissue. The tissue whitens or blanches[10].

This phenomenon is useful in surgically removing diseased granulomatous tissue because if the tissue temperature can be controlled, the biologically healthy portion can remain intact.

Soft tissue edges can be "welded" together with a uniform heating to 70°C to 80°C where there is adherence of the layers because of stickiness due to the collagen molecule's helical unfolding and intertwining with adjacent segments. When the target tissue containing water is elevated to a temperature of 100°C, vaporization of the water within the tissue occurs[7], a process also called "ablation". Because soft tissue is composed of a high percentage of water, excision of soft tissue commences at this temperature. The apatite crystals and other minerals in dental hard tissue are not ablated at this temperature, but the water component is vaporized, and the resulting jet of steam expands and then explodes the surrounding matter into small particles. This mixture of steam and solids is then suctioned away. This micro-explosion of the apatite crystal is termed **"spallation"**.

Where to use what?

- Erbium (wavelength above 2700 nm) and CO_2 wavelength are well absorbed by tissues with high water content[6].
- Shorter wavelength (500-1100 nm) as Argon, Diode & Nd:YAG are well absorbed by blood component i.e Haemoglobin and tissue pigments like melanin therefore best used to treat soft tissues[1]. They also have good haemostatic property.
- Erbium wavelength is also absorbed by apatite crystals[3]. Therefore can be used for the treatment of hard tissues like enamel, dentin and bone. Newer lasers with radial firing tips have excellent cutting efficiency and can be used for root canal preparations as well.

LASER in Prosthodontics

Lasers in Removable Prosthodontics

Lasers can be used for treatment of unsuitable alveolar ridges i.e. for alveloplasty (Sculpting the alveolar ridges) or vestibuloplasty[11].

Figure 1a: Pre Surgical

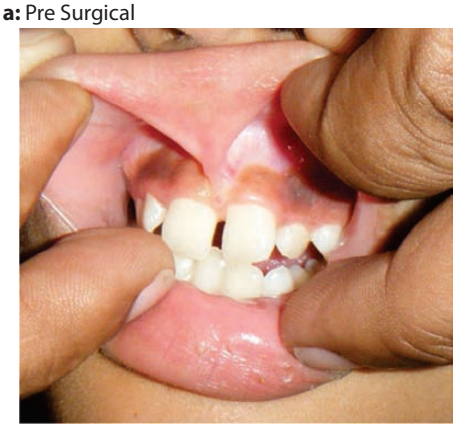


Figure 1b: Post Surgical

It can be used for frenectomies (Figure 1a & 1b) in the cases of high frenal attachments, epulis fissuratum e.t.c. to provide better support for removable prosthesis. Unsupported soft tissue can also be surgically removed by the lasers to provide healthy foundation for the prosthesis. The enlarged maxillary tuberosity, tori, and exosotoses can also be reduced[12]. Soft tissue lesions such as oral submucous fibrosis can be treated with good success, faster healing and longer relapse time than conventional therapy. Pain from ulcers can be relieved immediately. Tooth preparation for cast partial dentures can be done with the help of lasers.

Lasers in Fixed Prosthodontics[10]

Lasers can be used for crown lengthening procedures very efficiently. The tooth can be prepared immediately after crown lengthening as there is no pain or bleeding during the procedure. Removal of gingival overgrowth before recementation of fixed prosthesis can also be done by lasers[3]. It is also useful for the sculpting of soft tissue to fabricate ovate pontic for better esthetics. Gingival recontouring can also be done to gain symmetry and thus the esthetics. Another very useful use of laser is in gingival troughening, painful and time consuming procedures like cord packing are replaced by laser troughening. It is painless, bloodless, very less time consuming and troughening can be controlled by operator for better margin exposure.

Lasers in Dental Implatology

Uncovering the implant with Laser

1. Salvaging ailing implants by decontaminating their surfaces with laser energy. Not all lasers are recommended for this purpose as they can cause surface changes on the implant surface. Diode lasers at low power and controlled energy are considered best for this purpose[13].
2. During second stage surgery, when performed with lasers, the impression for the final prosthesis can be made immediately after exposing implant. There is no need to wait for the emergence profile to be formed with gingival formers. Thus saving important time of both doctor and the patient[14].
3. It has been proved that a low level laser therapy immediately following implant placement can reduce osseointergation time as less as by 25%.
4. Welding of titanium framework by using lasers. No waxing, investing, casting and devesting is required. The framework can be prepared in much lesser time than with conventional method. Minimal finishing and polishing are required[15].

Lasers in Maxillofacial Prosthodontics

1. Topologic data of the patient's deformity were acquired using laser surface digitizing[11].
2. It also aids in creating a visually realistic prosthesis that can provide an illusion of normal appearance.

Laser Welding

Excellent weldability can be achieved for Co- Cr alloy and titanium alloy. Maximum depth of weld which can be achieved is 2mm. Welding can be done directly on master cast. It is possible to weld near acrylic resin or ceramic parts without causing any harm to the materials as they do not contain water in them. No welding intermediate is required when lasers are used for welding[16]. Some of the disadvantages which are encountered with laser welding are that microstructural changes occur due to rapid solidification stage. Microcracks and localized corrosion is also observed.

Lasers in Disinfection

Photoactivated Disinfection (PAD)[17]: It can be defined as "A method of disinfecting or sterilizing a hard tissue or soft tissue site by topically applying a photosensitizing compound to the site and then irradiating this with laser light at a wavelength absorbed by the photosensitizing compound, so as to destroy microbes at the site".

Commonly used photosensitizers

1. Tolonium Chloride
2. Methylene blue
3. Azure dye
4. Crystal violet
5. Hematoporphyrins.
6. Luminium disulphonated phthalocyanine
7. Chlorines

Lasers used in PAD

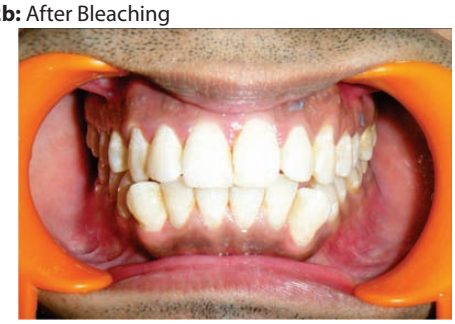
The laser types most commonly used for PAD operate in the red visible portion of the electromagnetic spectrum and include Gallium Aluminum Arsenide diode lasers and Helium-Neon gas laser.

Prosthodontic Applications of PAD

1. Treating plaque infected cervical regions of teeth and dental implants.
2. Disinfecting oral tissues prior to surgical procedures.

Figure 2a: Before Bleaching

Figure 2b: After Bleaching



3. Treating oral candidiasis in immune compromised patients.
4. Treating denture stomatitis.

Other Uses

Lasers can be used for the curing of dental materials like composites[18]. For this purpose argon laser is the laser of choice. Prosthesis and ID discs can be marked with laser [Nd:YVO4 laser engraving unit], ID markings were done on the metal parts of prosthesis and prefabricated stainless steel crown[19]. Bleaching is another important treatment which can be accomplished by lasers (figure 2a & 2b). gingival enlargements during and post orthodontic treatment can be treated effectively with lasers (figure 3a & 3b)

Advantages

1. No high pitched sound. Only slight puffing or crisp popping sound can be heard.
2. No vibration or pressure is felt.
3. No microfractures were observed in enamel during cavity preparation.
4. No smear layer or debris is left behind.
5. Stronger bonding strength.
6. No pulpal hyperemia, useful in deep carious lesions.
7. Less bleeding
8. Suturing is generally not required.
9. Little or no use of injectable anesthesia.

Disadvantages

1. Relatively slower in cutting hard tissue.
2. Difficult to prepare ideal cavities.
3. Crown preparation is very difficult.
4. Technique-sensitive.
5. Tissue damage can occur through lateral heat dissipation if the laser settings are inappropriate.
6. Costly equipment.

Figure 3a: Pre Surgical

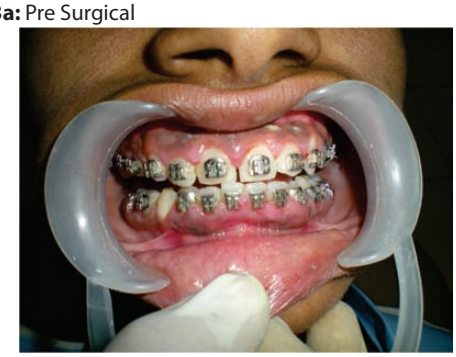


Figure 3b: Post Surgical

Post Operative Instructions

1. Warm saline water rinses are advised morning & night for 5-7 days.
2. Use an ultra soft brush to the affected area.
3. Use the modified bass technique for sulcular brushing.
4. Brush that evening and twice daily no matter how tender the area is.

Sterlization and Infetction Control[20]

Steam sterilization is the standard of care. The small flexible optic fibers, handpieces, or tips must be steam sterilized in separate sterilization pouches after each use. They should be kept in the sterilization pouch until ready for use. It is essential that when using fiber-optically delivered lasers, the port (connecting) end remains clean and oil-free. Therefore, never run the fiber in a sterilizer cycle alongside a high-speed turbine with lubricant. The protective housing around the laser, including the control panel and articulating arm (if applicable) should receive the spray disinfectant.

Further Scope of research

Hard tissue laser applications like crown preparations, bone recontouring and implant placement are undergoing rapid changes in technologic advances. An evolution is occurring as dentists move from simple mechanics to boundless area of photonics. Through the continued development of laser technology, laser dentistry may become a separate branch in dentistry.

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Intentional Replantation of Oblique Crown-Root Fracture - A case report

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Abstract

The purpose of this case presentation is to review the clinical procedures involved in intentional replantation of a maxillary central incisor following a complicated crown-root fracture. The treatment of complicated crown-root fractures is often compromised by a fracture below the gingival margin and/or bone. This makes isolation difficult and comprises the hermetic seal that is critical for a successful endodontic treatment. Orthodontic or surgical extrusion with gingivectomy has been suggested; however, these approaches can be expensive, time-consuming, esthetically compromising, and unsatisfactory when the fracture line is deep below the gingiva. Our presentation will discuss the treatment options for such cases and introduce the concept of intentional replantation as an option to manage oblique crown-root fractures in permanent anterior teeth.

Key Words

Biological width, Crown root fracture, Intentional replantation, Root resoption, Semi rigid retention.

Introduction

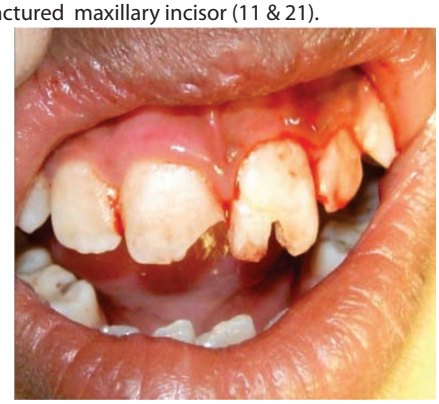
Crown-root fracture is defined as fracture involving enamel, dentin and root cementum. Maxillary incisors are the most common teeth involved in dental trauma and, most of the times, the crowns are damaged. According to the system adopted by the World Health Organization in its application of International Classification of Diseases to Dentistry and Stomatology (N.502.54), crown-root fractures have been classified as complicated and uncomplicated[1]. Frontal and horizontal impacts can result in fracture line starting at some point on the crown and extend longitudinally with or without involving pulp reaching the mesial or distal subgingival area[2]. The occurrence of these fractures might compromise esthetics, function, occlusion and periodontal health through invasion of biological width. The biological widths are distances covering from gingival margin to crestal bone, involving biological gingival sulcus, junctional epithelium and conjunctive attachment (structures of the protection periodontum). Those zones represent the biological seal, i.e., the protective barrier against the penetration of microorganisms and their products (toxins, enzymes and by products) in underlying conjunctive tissue and support tissues (supporting periodontum)[3]. The invasion of biological width is a factor that induces the establishment of inflammatory process, by interfering in seal, causing an imbalance in bacterium-host relationship and attachment loss with apical migration of junctional epithelium.

Case Report

A 16 -year old girl was referred to the Department of Prosthodontics, Babu Banarasi Das college of Dental Sciences, B.B.D University, Lucknow, with a history of trauma to her upper front tooth a day before following a fall during cycling. She complained of throbbing and continuous pain of the traumatized tooth and was unable to eat properly. Initial investigation revealed a slight swelling on the left side of her upper lip and bruising on the inner aspect of her lower lip. No other abnormalities were detected. No clicking of the temporomandibular joints or deviation of the mandible was observed. Medical history of patient was non contributory. Intra-oral examination revealed permanent dentition status with fair oral hygiene.

Examination at the area of complaint showed vertical crown fracture lines on the labial surface of the left permanent maxillary incisor (21) that extended from the incisor edge to 4 to 5 mm supragingivally on labial aspect and 6 to 7 mm subgingivally on palatal aspect. The fractured fragments were held together although they were mobile. the coronal fragment was firmly held in position by intact epithelial attachment. Bleeding was observed between the fracture lines and gum

Fig. 1: Fractured maxillary incisor (11 & 21).



surrounding[21]. Right permanent maxillary incisor (11) has enamel fracture only [fig 1]. Intra-oral radiograph revealed fracture lines that extended below cementoenamel junction of the traumatised tooth. The root formation of 21 was almost complete [fig 2]. Clinical and radiographic examinations were suggestive of vertical crown root fracture of 21 that involved the enamel, dentine, pulp and cementum.

The extent of fracture and the location of the fracture led us to select the Intentional Replantation technique along with endodontic and restorative procedure. The adolescent's mother was informed about the risks and benefits from procedure and she assigned an informed consent authorizing the procedure. Initially, it had been placed reversed bevel intra-sulcus incision, with preservation of papillae. The tooth removal was performed by gentle rotation motions in order to avoid pressing periodontal ligament against the wall of socket by buccal-palatal dislocation. After extraction the mobile coronal tooth fragment was removed [fig 3]. Endodontic intervention was initiated immediately, access cavity was prepared and root canal pulp extirpation and canal preparation was performed using the standard step-back method. Irrigation done with 3% sodium hypoclorite solution. The prepared teeth were dried with paper-points and filled with laterally condensed gutta-percha and zinc oxide eugenol root canal sealer. After obturation immediate esthetics was achieved by reuniting the fracture fragment . The tooth was isolated, rinsed thoroughly with physiological saline and dried.

Fig. 2: Intra-oral radiograph (11 & 21)

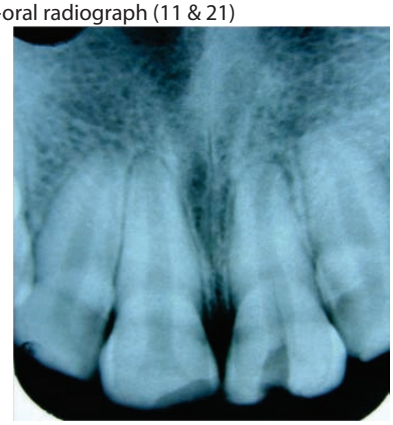


Fig. 3: Extracted tooth with fragment.

Fig. 4: Inter Proximal Wiring.

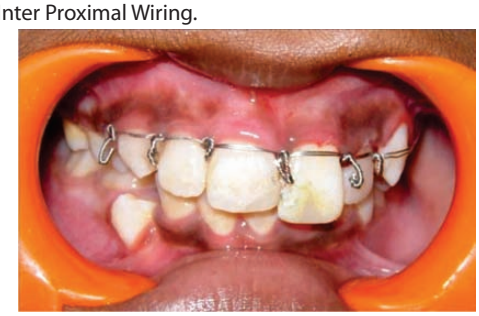
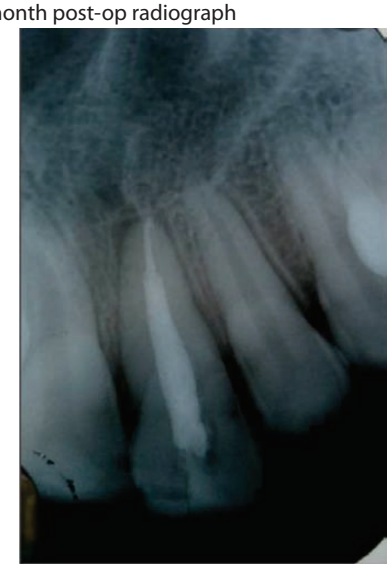


Fig. 5: Six month post-op radiograph



Internal bevels were made in the fractured fragments, which were coated with dentin bonding agent .Internal strengthening of the tooth buccally and palatally was carried out by placing vertical grooves 1 mm on either side of the cleavage line and saucerization at the interface of the fractured fragment, which was reinforced with flowable resin composite (X-flow, Dentsply). During all above procedure extraoral time is always very important factor. The tooth was immediately replanted followed by single interproximal sutures. The retention of replanted teeth was made from 26 gauge stainless steel wire with interproximal wiring method [fig 4] , which remained for 15 days. The semi-rigid retention is the more indicated because it allows small motions, which on healing may avoid or minimize small ankylosis areas.The protocol used includes antibiotic therapy for 7 days, and the choice medication was amoxicillin 500 mg. The sutures were removed after 1 week.

Patient was recalled six months later and the tooth was assessed clinically for gingival sulcus depth and mobility, radiographically for signs of inflammatory root resorption and alveolar crest integrity, all of which were found to be satisfactory [fig 5].

Discussion

Dental traumas due to crown-root fracture are rarely seen when compared to crown fractures. It is even rare to see

a complicated crown –root fracture[4]. Complicated crown-root involves tooth structures such as enamel, dentine, cementum and pulp. The severity of presentation also varies depending on the strength of the impact force and its vector. Some cases may present as vertical crown root fracture, oblique crown-root fracture or with multiple crown- root fractures. Success of treatment of complicated crown –root fracture is generally based on the degree of impact of the trauma to the tooth supporting structures especially the periodontium, root-crown length ratio and extent and complexity of the fracture[5].

There are few treatment options available in treating complicated vertical crown root fractures[2].

- Removal of the fractured coronal fragment and restoration of tooth if the fracture line has not encroached into the biologic width
- Removal of the coronal fragment and supplemented with gingivectomy and osteotomy to expose the fracture in order to establish biologic width prior to restoration
- Removal of the coronal fragment and initiation of endodontic treatment and restoration of tooth with post crown
- Removal of the coronal fragment and initiation of endodontic treatment and later by orthodontic or surgical extrusion of the apical fragment prior to restoration with post crown.
- In severe crown –root fracture, the tooth may have to extracted and replaced with removal or fixed prosthesis.
- By intentional replantation with endodontic treatment and coronal fragment restoration

The intentional replantation was first performed by Lesgsj¨o et al, and may be indicated in cases of crown-root fractures, cervical caries, root resorptions or perforations. Usually the risks of root resorption, inflammatory or by substitution are associated with the dental replantation procedures. It is important to point out that the presence of an intact and feasible periodontal ligament on root surface is a key factor to secure the healing of the periodontal ligament with no root resorption[6]. Taking care about the control of extra-alveolar time, the absence of contamination and the tooth extraction technique with minor trauma to periodontal ligament, these risks are remote. The selection of case, based on clinical and radiographic evaluations, must be judicious to analyze the possibility of tooth extraction to be performed with no greater risks of root fracture and extensive damage to periodontal ligament. Therefore, the Intentional Replantation is contraindicated for teeth with divergent roots or lacerations. With respect to prognosis, Kahnberg 7observed patients treated with Intentional Replantation with root rotation for 5 years period, as for two aspects: healing of the periodontal ligament and teeth survival. For the ligament, there was a complete re-establishment in 75% of the cases, being that the remainder showed small areas with self-boundary, surface resorption, and spontaneous healing sites. For the teeth survival, after 5 years all of teeth which undergone that type of procedure were present in oral cavity, aesthetically and functionally rehabilitated, demonstrating that the long-term prognosis is excellent. In association with care cited above, the treatment with antibiotic reduce the likelihood of root resorption because eliminates the variable related to contamination[8]. It is important also the adequate instructions to patient as for the plaque control, since the protective periodontum on healing is more susceptible to periodontal disease. The gingival attachment appears complete after one week the replantation when the sutures are removed. The healing of periodontal ligament begins after one week, and with two weeks, two third of periodontal fibers already is formed, allowing the stabilization of the tooth in alveolus. Hence the semi-rigid retention usually is removed after two weeks[9].

Conclusion

For treatment of vertical crown-root fractures, should to have knowledge about the more safe alternatives, which present a better prognosis, in order to maintain the damaged structures at health condition, aesthetically and functionally. The intentional replantation for treatment of that type of fracture may be employed successfully and safely by dental practitioner since correctly indicated and performed.

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An Innovative Design for Mandibular Repositioning Appliance in Treating Obstructive Sleep Apnea and Snoring

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Abstract

Snoring and Sleep related problems disturb the personal & family life of an individual. Further, it adversely affects the quality of life and efficiency of the person. Obstructive sleep apnea syndrome & associated snoring since long had been taken care of by various removable appliances made for mandibular repositioning and maintaining the patency of airway.

This article describes one such appliance (NKOSA appliance) which gradually shifts the mandible in anteroinferior direction, and was well accepted by the patients and proved to be effective.

Key Words

Mandibular repositioning appliance, Monoblock appliance, nCPAP, NK OSA appliance, Obstructive sleep apnea, OSAS, Snoring.

Introduction

Obstructive sleep apnea syndrome (OSAS) is a serious condition that afflicts a substantial number of individuals. It is characterized by disruption of normal sleep architecture by complete or partial obstruction of respiratory airflow[1]. Airflow obstruction results in a reduction of blood oxygen saturation know as hypoxemia. It produces arousal in an attempt to reopen the airway. These recurring arousals disrupt sleep architecture, which diminishes the quality of sleep. This cycle results in excessive daytime somnolence, which is one of the hallmark features of this disease condition. Excessive daytime somnolence greatly diminishes the quality of life by diminished productivity, impaired cognition, greater accident rates, and multiple medical-dental disorders. Snoring being one of the cardinal symptoms of OSAS, not only disrupts individual's sleep pattern, but also affects the other's sleep as well and may affect relationships with the spouse.

If, untreated, obstructive sleep apnea syndrome greatly shortens the expected life span from many associated co morbidities, such as increased rates of cardiovascular and pulmonary disease and obesity-related diabetes mellitus. Obstructive sleep apnea syndrome (OSA) is a multifactorial disease process with complex etiology which has profound negative health and quality of life effects. Ongoing research of obstructive sleep apnea syndrome continues to demonstrate the effect that dentofacial support of the airway has on this disease[3]. Modern imaging techniques of the airway have great promise to more clearly define this disease process and the possible effect of mandibular advancement in this condition[1]. Dental practitioners can play a significant role in the treatment of obstructive sleep apnea syndrome. It is imperative that the dental community continues to participate in the research and treatment of this serious and pervasive health problem.

Evidence-Based Oral Appliance Therapy

Since the 1980s, oral appliances were used as a primary treatment modality for adult patients with OSA as well as an alternative approach for those who cannot tolerate nasal continuous positive airway pressure (nCPAP)[7]. There has been a great deal of research in this field and thorough studies conducted to determine patient selection, success criteria, polysomnographic and patient-based outcomes, appliance effectiveness and tolerance of oral appliance therapy. Two recent well-researched systematic review articles analyzed a total of 103 studies. The data was pooled and analyzed to study various parameters which supported evidence based clinical practice in using oral appliances for managing mild to moderate OSA[3,4].

Mode of Action of Oral Appliance

Systematically reviewed data indicate a direct relationship between the degree of mandibular advancement and reduction in AHI (apnea-hypopnea index), suggesting that mechanical manipulation of airway size has an effect on reducing apnea by enlarging the airway and/or improving the muscle tone. However, evidence on tongue protrusion and its effects on genioglossal tone are conflicting. Placebo studies using oral appliances suggest that mandibular advancement in apneic patients does result in AHI reduction and improvement in arterial oxygen saturation. Three-dimensional imaging and endoscopic studies have shown increased cross-sectional dimensions of the hypopharyngeal, oropharyngeal, and velopharyngeal areas with forward mandibular displacement[5]. The soft palate, suprahyoid muscles and the genioglossus are displaced anteriorly together with

mandibular advancement. Other than positional changes, mandibular displacement also stretches the palatoglossal and palatopharyngeal arches which increases upper airway muscular activity[6].

Sleep nasoendoscopy identifies the level of and the degree of obstruction when the patient is asleep.

Obstructions are classified as palatal, multilevel, or tongue based with a grading system[9]:

Grade 1—palatal snoring;
Grade 2—palatal level obstruction;
Grade 3—multisegmental involvement with intermittent oro- and hypopharyngeal collapse;
Grade 4—sustained multilevel collapse; and
Grade 5—tongue base obstruction.

Objective

The present study was an attempt to develop an intra oral device which gradually shifted the mandible downward as well as forward, hereby increasing the oropharyngeal space, to prevent the obstruction of breathing. Further, to assess the effect of gradual shifting of mandible by the appliance on neuromuscular adaptation.

A medical evaluation by a sleep physician or ENT surgeon should precede any dental intervention for OSAS.

Clinical Approach to Obstructive Sleep Apnea

The following treatment guidelines are based on recommendations from the American Sleep Disorders Association[16].

1. The physician has the responsibility to diagnose OSA and recommend an appropriate course of treatment. Diagnostic criteria include clinical signs, symptoms, and results of polysomnography. The medical provider should be aware of basic dental conditions suitable for oral appliance therapy.
2. The patient is referred to a dentist or dental specialist who practices in this field. A prescription requests further evaluation of the dental status and fabrication of an oral appliance, if appropriate. A diagnostic report is also forwarded.
3. At the initial dental evaluation, medical and dental histories should be taken. The clinician should explain the rationale, advantages, and disadvantages of treatment, together with a review of informed consent.
4. During the initial appointment, a clinical examination notes:
   a. Soft tissue facial features and facial type.
   b. Physiologic activity including abnormal habits.
   c. Temporomandibular joint health, occlusion, range of mandibular movement, and abnormal attrition.
   d. Teeth present and restorations with special attention to full coverage crowns.
   e. Periodontal status assisted by full mouth series or panoramic radiograph no more than 6 months old.
   f. Intraoral soft tissue health and presence of abnormal muscle attachments.

Although records may be included in this appointment, many clinicians and patients prefer to wait until consideration of the advantages and the disadvantages of home treatment are known.

5. A records appointment is scheduled to take impressions for study, and work models, photographs, a mandibular advancement registration, and an optional cephalometric radiograph.
6. The clinician selects the appliance for laboratory fabrication and delivers the completed appliance with home care instructions according to the manufacturer's specifications.
7. Following placement of the chosen appliance patients should be seen after 1 week, after 1 month, and as required for progress evaluations that include notation of symptoms, sore spot adjustments, and modifications of the advancement position.
8. The patient should return to the physician for follow-up assessment when the patient and/or bed partner reports a subjective improvement in sleep quality or after no longer than several months. Follow-up polysomnography is not indicated for patients with either primary snoring or mild OSA, if symptoms improve. As the degree of improvement varies and some patients show no improvement or worsen, the appliance may need to be modified, refabricated with an alternate design, or discontinued.

Material and Methods

- The present study was carried out in eleven volunteers with a history of loud snoring, age ranging from 35 to 55 years and selected at random.
- Patients with severe periodontal diseases, an edentulous arch or too few teeth were not included in the study.
- Each individual undergone for health history, physical and dental examination.
- Individuals with chronic illness, systemic diseases (other than OSAS) and mental retardation were excluded.
- After taking consent for the study and thorough clinical examination, diagnostic impressions were made and dental casts were prepared for study of the occlusion and device/ appliance alteration.

Appliance design

Each intraoral appliance was designed to keep the airway open by increasing the oropharyngeal space, by repositioning the mandible in anteroinferior position[13,15]. Before fabricating this NK OSA appliance (figure 1&2), bite registration with Alu wax sheet was done in protrusion

with opened vertical dimension at 50% of maximum protrusion with 4mm opened vertical dimension[11,13].

With this protrusive record horizontal condylar inclination was established. The maxillary and mandibular models were articulated on semiadjustable Hanau Articulator using bite registration. Two separate occlusal splints were made on each models with clear acrylic resin providing full occlusal coverage, designed not to encroach on tongue space.

The medium size jack orthodontic expansion screws were placed on both buccal sides in premolar region joining upper splint with lower splint only through the screws. The screws were placed at an angle predetermined by anteroposterior condylar inclination, so that when the screws were activated the appliance opened in forward and downward direction simultaneously. Quarter turn opened the appliance 0.25 mm. Regular patient monitoring was done by the dentist and sleep physician.

Subjects were advised to wear the NK OSA appliance during night. For 14 days the appliance was used without activation. Then, gradually the screws were opened for quarter turn every alternate day, till it reached the 75% of maximum protrusion. Then the appliance was used regularly during nights.

Patients continuing with the appliance were assessed at compulsory recall checkups after 1day, 1week, 15 days, 1 month, and at six month intervals thereafter to assess the structural integrity, comfort of the patient and the effect of appliance on the symptoms. Any time in between if in discomfort patients were allowed to report.

Various scores were given to assess the appliance efficacy as below:

No improvement	0
Mild improvement	1
Moderate improvement	2
Major improvement	3

Figure 1: Appliance mounted on the articulator

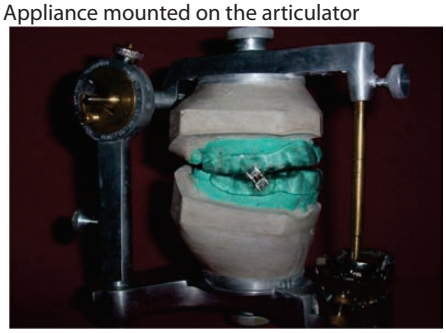
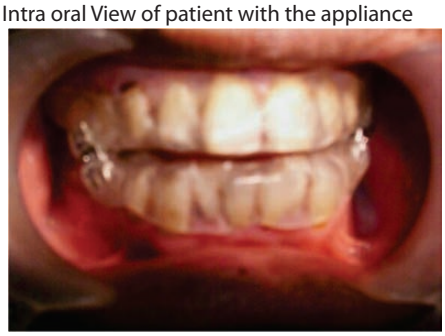


Figure 2: Intra oral View of patient with the appliance



The observations were tabulated (Table 1).

Observations

During 3 Years of this study, out of 11 subjects, 3 of the patients reported more discomfort in terms of TMJ pain than snoring by putting the appliance in mouth, they were reassured, medicated and then continued with the treatment. 2 subjects withdrew for various reasons, yet completed the trial of nearly 6 weeks. 8 subjects out of 9

Table 1: Improvement in symptoms of patients with the use of NKOSA appliance

Recall after	1 Day	1 Week	3 Weeks	6 Weeks	6 Months	1 Year	11/2 Year	2 Years	21/2 Years	3 Years
Patient 1	1	1	1	1	2	3	3	3	3	3
Patient 2	0#	0	0	0	0	1	1##	-	-	-
Patient 3	0	0	2	2	2	2	2	2	3	3
Patient 4	1	1	1	1	2	2	3	3	3	3
Patient 5	0	1	1	2	2	3	2**	3	3	2
Patient 6	1	1	1	1	2	3	3	3	3	3
Patient 7	0#	0	1	1*	-	-	-	-	-	-
Patient 8	1	1	1	1	2	2	3	3	2	3
Patient 9	1	2	2	2*	-	-	-	-	-	-
Patient 10	1	1	1	1	2	2	2	2	3	3
Patient 11	0#	0	1	1	2	3	3	3	3	3

Patient had discomfort hence reassured and given medication.

* Patient did not turn up after 6 weeks.

** Patient got screw broken, which was repaired and appliance reinserted.

Patient did not improve considerably and hence was referred to other specialist.

showed an improvement in the Epworth Sleepiness Scale (ESS) scores[15]. One subject could not get improvement. He was referred for further ENT checkup for other treatment modalities. 1 patient got the screw broken after 11/2 years which was later repaired. NK OSA Appliances in all 11 subjects were accepted well with reasonable comfort, especially during initial phase of appliance wearing, probably due to gradual change in position of mandible.

Discussion

Mandibular repositioning appliances are a treatment option in the management of sleep apnea syndromes in mild to moderate cases[5,6,13]. While many patients experience a complete or partial resolution of their symptoms, some do not improve or may even become worse. It is therefore imperative that physicians conduct progress evaluations while the respective dental care provider continues to make adjustments to optimize the effectiveness of the chosen appliance[10]. Since the first nonadjustable, hard acrylic appliances were developed to treat OSA, a variety of removable devices have been designed to provide improved patient comfort and hence, hopefully, patient compliance[15]. The trend has been toward adjustable devices[10], while the materials that are now being used to construct mandibular repositioning devices include heat-softening acrylics and plastics with soft liners. It should be noted, however, that in a recent randomized trial, patients preferred a single- piece Monoblock appliances[12] to a continuously adjustable Herbst constructed of the same hard acrylic composition. It is not always the case that hard acrylics are necessarily more uncomfortable than heat-softening acrylics and plastics with soft liners. This innovative NK OSA appliance which is a modified version of Herbst appliance[12,14] is easy to construct using simple jack expansion screws and is easy to handle.

This NK OSA appliance had repositioned the mandible at 75% of maximum protrusive limit, the protrusive shift and openings were gradual and simultaneous, which was well accepted by the patients and hence associated with better patient compliance[16].

The orthodontic screws were placed at the same angle of horizontal condylar inclination which was achieved by patient's protrusive records, thereby giving simultaneous antero-inferior movement of mandible, which were comfortable to the patients.

The appliance was fabricated using clear self cure acrylic resin, giving the better esthetics.

One piece appliance was better than two piece because of less encroachment of tongue space, appliance only covered the occlusal surfaces of maxillary and Mandibular teeth and not the lingual vestibule[14].

No doubt the opening of screw was patient dependent and hence the efficacy of the appliance was according to patient's compliance to instructions, but on the other hand it was beneficial in the sense that patient in case of discomfort could return back to his previous comfort level. Initially some of the patients were apprehensive and were not comfortable with the appliance, but later all the patients got relief in their snoring/sleep problems.

Hence, this monoblock gradually repositioning NK OSA appliance is a little more comfortable, effective, easy to fabricate & maintain and able to alleviate patient's sleep and snoring problems.

Summary

Mandibular repositioning appliances are proven to be effective in helping the patients in snoring/apnea associated sleep problems. This NK OSA appliance is a proven effort to help such patients. At our end patients are adding to the list but further trials will help to establish the success of the appliance in long term studies.

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Apexification – A case report

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Abstract

Endodontic management of immature non vital permanent teeth in young pediatric patients is a great challenge to dentists. The walls of the root canals are frequently divergent and open apexes make debridement and obturation difficult. Thus closure of root apex is very essential for success of the endodontic treatment. Although different materials are used for the apexification procedure, calcium hydroxide is the material of choice for apical barrier formation and healing. There are different opinions regarding frequency of CaOH dressing change to induce complete closure of the apex. Literature suggests that dressing should be changed frequently. Therefore the aim of the present article is to report the successful closure of root apex in pulpless permanent incisors with wide open apices in a pediatric patients using CaOH dressing.

Keywords

Calcium hydroxide, apical closure, open apex, immature teeth.

Introduction

The term apexification refers to that method of treatment, aimed at inducing apical repair as a hard tissue barrier across an open apex. This technique usually refers to endodontic management of the pulpless permanent tooth with an open or even 'blunderbuss' apex[1]. The procedure requires the chemomechanical debridement of the canal followed by placement of an intracanal medicament to assist or stimulate apical healing and formation of an apical barrier. The most common material used in apexification is calcium hydroxide[2].

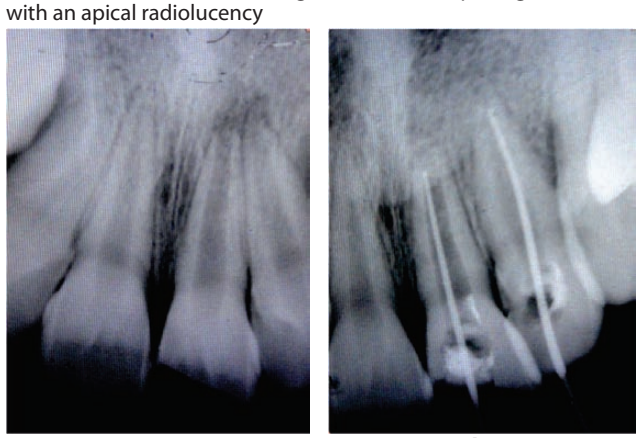
Present case report is an example of different levels of success with apexification and apexogenesis using Calcium hydroxide in a patient.

Case Report

A 10-year-old male patient was admitted to the clinic complaining of an intense pain and oedema on the anterior facial region, compatible with an acute dentoalveolar abscess. There was a previous history of trauma 6 months back during a sports activity in his school.

On clinical examination, the patient had suffered direct injury to 21 and 22 resulting in fracture of enamel, dentin, and exposing pulp; only tooth 21 was negative to pulp vitality tests. Radiographically, tooth 21 exhibited incomplete root formation, characterized by a wide root canal, thin and fragile dentinal walls, and an extensive, divergent foraminal opening associated with an apical radiolucency as shown in image 1(a & b).

Image 1 a & b: Showing a wide root canal, thin and fragile dentinal walls, and an extensive, divergent foraminal opening associated with an apical radiolucency



(a) (b)

On the first appointment the teeth were isolated with rubber dam and using large round carbide bur access cavity was prepared and entire pulpal and necrosed tissue from coronal and radicular part of the tooth was removed. Apexification treatment commenced at the second session after 2 days, by means of chemo-mechanical debridement throughout the entire root canal, using K-files and irrigation with a 2.5% sodium hypochlorite solution. Subsequently, a medium thick paste of calcium hydroxide/ calform-RC (Amdent) was pushed in the canal. The patient was kept under observation and a follow up was planned after 1, 3, 6, and 12 months respectively as shown in image 2, 3, 4, 5, and CaOH was replaced by fresh CaOH at every follow up.

Radiographic examination revealed complete closure of the foraminal opening and resulting in resolution of the periapical radiolucency. The root canal was obturated by lateral condensation of gutta-percha and endomethasone sealer. A 1-year follow-up revealed normal periapical tissues and the absence of symptoms shown in image 6.

Follow up after 1, 3, 6, and 12 months was done and radiographs were taken as shown in image 2, 3, 4, 5, respectively.

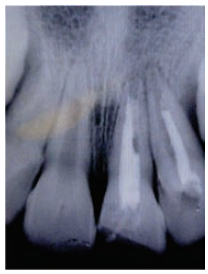


Image 2

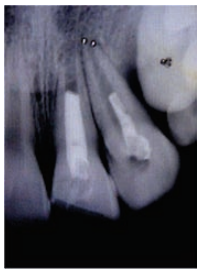


Image 3

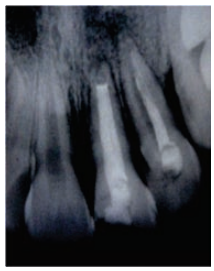


Image 4

A 1-year follow-up revealed normal periapical tissues and the absence of symptoms shown in image 5 the tooth was then obturated image 6.

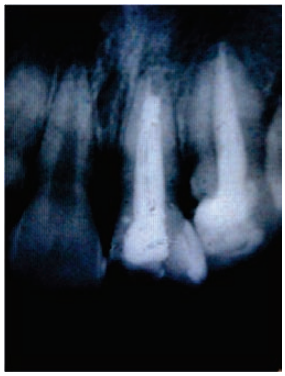


Image 5

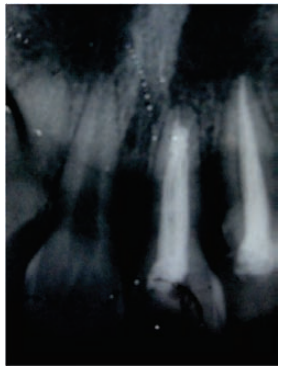


Image 6

Discussion

The composition of the apical barrier seems to vary. Cementum can form the apical bridge, 3 and has been reported to deposited along the walls of the root canal even to the junction of the middle and cervical thirds[4]. Dentine and bone also reported to have formed5 but the most common result seems to be a combination of all three tissues[6,7,] with connective tissue and calcium hydroxide sometimes mixed in with them[8].

Based on the clinical and radiographic judgment, the teeth can be considered for apexogenesis and/or apexification. Routinely if the patient reports within 24 hrs after injury with pulp exposure apexogenesis can be attempted and it works fantastic. If apexogenesis is not possible due to pain or abscess, apexification is the next option left. Many materials are recommended for these procedures with Calcium hydroxide being the most widely used and readily available materials[7]. Other materials recommended are MTA[8], MTA in association with a matrix of calcium sulfate hemihydrate and de-mineralized bone particles (Type-I collagen)[9], BMP, Hydroxyapatite, collagen etc which have been tried with varying levels of success. MTA has currently been the most upcoming materials for apexification.

In the literature many other materials have been used for apexification, such as calcium hydroxide in. combination with sterile water, saline, local anesthetic, camphorated parachlorophenol, zinc oxide paste with cresol and iodoform[10], polyantibiotic paste[11] and tricalcium phosphate[12] . There are new strides in the apexification procedure with mineral trioxide aggregate (MTA)[2]. But the use of CaOH in apical barrier formation has shown promising results. Because of its enhanced success rate, easy availability for clinician and affordability for patients, it has gained widest acceptance in the literature.

The alkalinity of non setting CaOH is used to stimulate the formation of mineralized and fibrous tissue by the granulation tissue cells in the apical part of the root canal[14]. It stimulates the physical barrier and also acts as disinfectant. The resultant mineralized tissue can be composed of osteocementum, osteodentine, or bone or some combination of the three. The calcific bridge can be a complete or an incomplete hard tissue bridge at the root end or a few millimeters short of it. Chawla[15] has suggested that the amount of CaOH in the single root canal dressing was sufficient to initiate and complete the bridge in 92.3% of the teeth in his study. Chosack et al[16]. suggested that repeated root filling are not required as CaOH is only required to initiate healing process. They also reported that the CaOH has to be replaced if there are any symptoms or displacement of the medicament.

The frequency of CaOH dressing change is one of the few variables within the operator's control, which also has an effect on the speed of barrier formation. There are number of studies[14,17] showing that, when the frequency of change was low, rapid barrier formation was seen and there were also some studies where the frequency of change was high, there was slow barrier formation. Hence it is confirmed that, if the root apex is disturbed by repeated instrumentation and dressing changes, then the time required for apex formation prolongs[18]. Thus a single dressing is enough to induce the apical barrier formation.

The present case report throws light on apical end closure in immature non-vital permanent incisors using a simple technology of CaOH apexification. It is concluded that single application of CaOH dressing is sufficient to induce apical barrier formation in young pediatric patients having pulpless teeth with wide open apices.

Conclusion

In young patients, dental trauma may cause pulp necrosis and arrest of root formation. Under certain circumstances, chemo-mechanical debridement, including the use of a calcium hydroxide paste, is a valid alternative to mineral trioxide aggregate and or surgery for root-end closure. In teeth with incompletely formed roots associated with periapical lesions, calcium hydroxide can induce periapical repair through the closure of the foramen and apical root development, since Hertwig's epithelial root sheath is not completely destroyed when the pulp

becomes nonvital in the forming tooth. Thus apexification procedures stimulate the further function of the sheath to continue apical development[19].

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Revascularization & Regenerative Endodontics: A review of current status

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Abstract

Revascularization is a surgical procedure for the provision of a new, additional, or augmented blood supply to a body part or organ. Regenerative endodontics is the creation and delivery of tissues to replace diseased, missing, and traumatized pulp. This review provides an overview of revascularization and regenerative endodontics and its goals, the origin of stem cells, their properties, characteristics, current research, and their potential applications. The potential approaches include root-canal revascularization, postnatal (adult) stem cell therapy, pulp implant, scaffold implant, three-dimensional cell printing, injectable scaffolds, and gene therapy. These regenerative endodontic techniques will possibly involve some combination of disinfection or debridement of infected root canal systems with apical enlargement to permit revascularization and use of adult stem cells, scaffolds, and growth factors. Tissue engineering therapy offers the possibility of restoring natural function instead of surgical placement of an artificial prosthesis.

Key Words

Pulp regeneration; Scaffolds; Stem cell; Growth factors; Tissue engineering.

Introduction

The earliest[1] studies were aimed at determining how periodontal tissue would react, if the entire pulp was removed from the main canal and the apical part allowed to be filled with blood. In avulsion, blood vessels slowly grow from the apex towards the pulp horn by replacing the necrosed pulp left behind after the avulsion injury[2]. The absence of bacteria is critical for successful revascularization because the new tissue stops where it meets bacteria in the canal space.

Adult Stem Cells

All tissues originate from stem cells. A stem cell is commonly defined as a cell that has the ability to continuously divide and produce progeny cells that differentiate (develop) into various other types of cells or tissues. Stem cells are commonly defined as either embryonic/fetal or adult/postnatal[3].

Researchers had traditionally found the plasticity of embryonic stem cells to be much greater than that of postnatal stem cells, but recent studies indicate that postnatal stem cells are more plastic than first imagined[4].

Stem cells are also commonly subdivided into totipotent, pluripotent, and multipotent categories according to their plasticity, as shown in Table 1.

Bone marrow harvesting of a patient's own stem cells and their reimplantation back to the same patient represents one clinical application of autogenous postnatal stem cells. Stem cells could be taken from the bone marrow peripheral blood fat removed by liposuction, the periodontal ligament[5] oral mucosa, or skin.

Pulp Stem Cells

The dental pulp contains a population of stem cells, called pulp stem cells[6] or, in the case of immature teeth, stem cells from human exfoliated deciduous teeth[7] Sometimes pulp stem cells are called odontoblastoid cells, because these cells appear to synthesize and secrete dentin matrix like the odontoblast cells they replace[8]. For endodontic regeneration, the most promising cells are autologous postnatal dental stem cells because there are less chances of immune rejection[9] They show more striking odontogenic capability (typical tooth-shaped tissue with balanced amelogenesis and dentinogenesis) as compared to non-dental stem cell population like bone marrow stromal stem cell[10], Various sources for postnatal

Table 1: Types of stem cells

Stem cell type	Cell Plasticity	Source of stem cell
Totipotent	Each cell can develop into a new individual	Cells from early (1-3 days) embryos
Pluripotent	Cells can form any (over 200) cell types	Some cells of blastocyst (5-14 days)
Multipotent	Cells differentiated, but can form a number of other tissues	Fetal tissue, cord blood, and post natal stem cells including dental pulp stem cells

dental stem cells have been successfully studied:

- Permanent teeth - Dental pulp stem cells (DPSC): derived from third molar[9]
- Periodontal ligament - Periodontal ligament stem cells (PDLSC)[12]
- Stem Cells from apical papilla (SCAP)[13]
- Stem cells from supernumerary tooth – Mesiodens[14]
- Stem cells from teeth extracted for orthodontic purposes[15]
- Dental follicle progenitor cells.[16]
- Stem cells from human natal dental pulp- (hNDP)[17]

Growth Factors

Growth factors are proteins that bind to receptors on the cell and induce cellular proliferation and/or differentiation. Many growth factors are quite versatile, stimulating cellular division in numerous cell types, while others are more cell specific.

A summary of the source, activity and usefulness of common growth factors is shown in Table 2.

Potential Technologies for Regenerative Endodontics

Several major areas of research that might have application in the development of regenerative endodontic techniques have been identified. These techniques are (a) root canal revascularization via blood clotting, (b) postnatal stem cell therapy, (c) pulp implantation, (d) scaffold implantation, (e) injectable scaffold delivery, (f) three-dimensional cell printing, and (g) gene delivery.

Root Canal Revascularization

Basically, body tissue is composed of two components: cells and the surrounding environment. Several case reports have documented revascularization of necrotic root canal systems by disinfection followed by establishing bleeding into the canal system via over instrumentation[18].

The revascularization studies have established following prerequisites:

- Revascularization occurs most predictably in teeth with open apices and necrotic pulp secondary to trauma
- Apex open > 1.5 mm.
- Bacteria should be removed from canal by any of the following methods:
  - '3 mix-MP' triple antibiotic paste consisting of ciprofloxacin, metronidazole and minocycline[19]
  - Calcium hydroxide, formocresol.
- Effective coronal seal.
- Matrix into which new tissue can grow.
- Patients should be young.
- Use of anaesthetic without a vasoconstrictor when trying to induce bleeding[20].
- No instrumentation of the canals.
- Sodium hypochlorite is used as an irrigant.
- Formation of a blood clot probably serves as a protein scaffold permitting 3-dimensional ingrowth of tissue.

The success of root canal revascularization is mainly due to the following facts: firstly, the immature avulsed tooth has an open apex, short root and intact but necrotic pulp tissue. Therefore, the new tissue has easy access to the root canal system and a relatively short distance for proliferation to reach the coronal pulp horn. The speed with which the tissue completely revascularizes the pulp space is important because bacteria from outside are continually attempting to enter the pulp space. The ischemically necrotic pulp acts as a scaffold into which the new tissue grows, and the fact that the crown is usually intact slows bacterial penetration because their only access to the pulp is through cracks or enamel defects. Thus, the race between proliferation of new tissue and infection of the pulp space favors the new tissue. Secondly, minimum instrumentation preserves viable pulp tissue which contributes to further development of open apex root. Thirdly, young patients have greater healing capacity and more stem cell regenerative potential[21].

Table 2: A summary of the source, activity and usefulness of common growth factors

Abbreviation	Factor	Primary Source	Activity
BMP	Bone morphogenetic proteins	Bone matrix	BMP induces differentiation of osteoblasts and mineralization of bone
CSF	Colony stimulating factor	A wide range of cells	CSFs are cytokines that stimulate proliferation of specific pluripotent bone stem cells.
FGF	Fibroblast growth factor	A wide range of cells	FGF promotes proliferation of many cells.
IGF	Insulin like growth factor-I or II	I - liver II–variety of cells	IGF promotes proliferation of many cell types
IL	Interleukins IL-1 to IL-13	Leukocytes	IL are cytokines which stimulate the humoral and cellular immune responses.
PDGF	Platelet derived growth factor	Platelets, endothelial cells,placenta	PDGF promotes proliferation of connective tissue, glial and smooth muscle cells
TGF- á	Transfroming growth factor – alpha	Macrophages, brain cells and keratinocytes	TGF-á may be important for normal wound healing
TGF-â	Transforming growth factor-beta	Dentin matrix, activated TH1cells (T-helper cells) and natural killer (NK) cells	TGF-â is anti-inflammatory, promotes wound healing, inhibits macrophage and lymphocyte proliferation.

The simplest method to administer cells of appropriate regenerative potential is to inject postnatal stem cells into disinfected root canal systems after the apex is opened. Postnatal stem cells can be derived from multiple tissues, including skin, buccal mucosa, fat, and bone[22].

There are several advantages to an approach using postnatal stem cells. First, autogenous stem cells are relatively easy to harvest and to deliver by syringe, and the cells have the potential to induce new pulp regeneration. Second, this approach is already used in regenerative medical applications, including bone marrow replacement, and a recent review has described several potential endodontic applications. However, there are several disadvantages to a delivery method of injecting cells. First, the cells may have low survival rates. Second, the cells might migrate to different locations within the body[23], possibly leading to aberrant patterns of mineralization. A solution for this latter issue may be to apply the cells together with a fibrin clot or other scaffold material. This would help to position and maintain cell localization. In general, scaffolds, cells, and bioactive signaling molecules are needed to induce stem cell differentiation into a dental tissue type[24]. Therefore, the probability of producing new functioning pulp tissue by injecting only stem cells into the pulp chamber, without a scaffold or signaling molecules, may be very low. Instead, pulp regeneration must consider all three elements (cells, growth factors, and scaffold) to maximize potential for success.

Pulp Implantation

In pulp implantation, replacement pulp tissue is transplanted into cleaned and shaped root canal systems. The source of pulp tissue may be a purified pulp stem cell line that is disease or pathogen-free, or is created from cells taken from a biopsy, that has been grown in the laboratory. The cultured pulp tissue is grown in sheets in vitro on biodegradable polymer nanofibers or on sheets of extracellular matrix proteins such as collagen I or fibronectin[25].

Scaffold Implantation

To create a more practical endodontic tissue engineering therapy, pulp stem cells must be organized into a three-dimensional structure that can support cell organization and vascularization. This can be accomplished using a porous polymer scaffold seeded with pulp stem cells[26]. A scaffold should contain growth factors to aid stem cell proliferation and differentiation, leading to improved and faster tissue development[27]. The scaffold may also contain nutrients promoting cell survival and growth[28] and possibly antibiotics to prevent any bacterial in-growth in the canal systems. The engineering of nanoscaffolds may be useful in the delivery of pharmaceutical drugs to specific tissues[29].

The types of scaffold materials available are natural or synthetic, biodegradable or permanent. The synthetic materials include polylactic acid, polyglycolic acid and polycaprolactone, which are all common polyester materials that degrade within the human body[30]. The principal drawbacks are related to the difficulties of obtaining high porosity and regular pore size. This has led researchers to concentrate efforts to engineer scaffolds at the nanostructural level to modify cellular interactions with the scaffold[31].

Injectable Scaffold Delivery

Hydrogels are injectable scaffolds that can be delivered by syringe[32]. Hydrogels have the potential to be noninvasive and easy to deliver into root canal systems. In theory, the hydrogel may promote pulp regeneration by providing a substrate for cell proliferation and differentiation into an organized tissue structure[33]. Past problems with hydrogels included limited control over tissue formation and development, but advances in formulation have dramatically improved their ability to support cell survival3[4]. Despite these advances, hydrogels at are at an early stage of research, and this type of delivery system, although promising, has yet to be proven to be functional in vivo. To make hydrogels more practical, research is focusing on making them photopolymerizable to form rigid structures once they are implanted into the tissue site[35].

Gene Therapy

The use of gene delivery in endodontics would be to deliver mineralizing genes into pulp tissues to promote tissue mineralization. Ferret pulps were transfected with cDNA-transfected mouse BMP-7 that failed to produce a reparative response, thus suggesting that further research is needed to optimize the potential of pulp gene therapy36. Because of the apparent high risk of health hazards, the development of a gene therapy to accomplish endodontic treatment seems very unlikely in the near future.

Challenges and future direction

Despite the impressive progress in tissue engineering approaches to regenerative pulp therapy, numerous challenges remain. The associated broad spectrum of responses in pulp includes neural and vascular regeneration.

(a) Nerve regeneration:

Pulpal nerves play a key role in regulation of blood flow, dentinal fluid flow, and pressure. The innervation of the pulp has a critical role in the homeostasis of the dental pulp. The pulpal nerve fibers contribute to angiogenesis, extravasation of immune cells and regulate inflammation to minimize initial damage, maintain pulp

tissue, and strengthen pulpal defense mechanisms. The increasing interest in tissue engineering of tooth must take into account neuro-pulpal interactions and nerve regeneration.

(b) Vascular regeneration:

Pulp vasculature plays an important role in regulating inflammation and subsequent repair and regeneration of dentin. There is an intimate association of the neural elements with vascular supply of the dental pulp suggesting the interplay of neural and vascular elements and involvement in pulp homeostasis. The vascular endothelial growth factor (VEGF) is an excellent regulator of angiogenesis and is known to increase vascular permeability. VEGF induces chemotaxis, proliferation and differentiation of human dental pulp cells. The utility of gene therapy in stimulation of vascular growth permits local stimulation of vascularization during regeneration[37].

The recent advances in vascular biology and VEGF and techniques of gene transfer and gene therapy will be of potential clinical utility in dentistry, specially in endodontics. Statin, 3 hydroxy-3-methy glutayl coenzyme A reductase inhibitor, is known to promote bone formation.

Pulp tissue contains a large amount of blood vessels and peripheral nerves. Statin is known to induce angiogenesis and to regulate the survival and increase neurogenesis of neuronal cells, indicating the possible effectiveness of statin in pulp regeneration along with dentin regeneration.

(c) To measure appropriate clinical outcomes we have to find out the following:

- Vascular blood flow
- Mineralizing odontoblstoid cells
- Intact afferent innervations
- Lack of signs or symptoms

Conclusion

The clinical success rates of endodontic treatments can exceed 90%. Regenerative endodontic methods have the potential for regenerating both pulp and dentin tissues and therefore may offer an alternative method to save teeth that may have compromised structural integrity. Several developmental issues have been described to accomplish endodontic regeneration. Each one of the regenerative techniques has advantages and disadvantages, and some of the techniques are hypothetical,or at an early stage of development. The available case reports of pulp revascularization were generally reported on young patients (with high stem cell populations) and teeth with open apices. However, for regenerative endodontic procedures to be widely available and predictable, endodontists will have to depend on tissue engineering therapies to regenerate pulp dentin tissue. The proposed therapies involving stem cells, growth factors, and tissue engineering all require pulp re-vascularization, in itself an enormous challenge. The future development of regenerative endodontic procedures will require a comprehensive research program directed at each of these components and their application to our patients. The authors believe that regenerative endodontics is an inevitable therapy, and they call for action from scientists, funding agencies, and the endodontic profession to pool resources to hasten its development. The unleashed potential of regenerative endodontics may benefit millions of patients each year.

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Dentin Hypersensitivity: An enigma

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Abstract

The objective of this review is to provide a general view of the aetiology, characteristics and treatment of dentinal hypersensitivity, so that professionals can use this information in the therapeutic management of this clinical condition. The presenting symptoms of sensitive teeth are multi-factorial, and from the perspective of restorative dentistry, makes a differential diagnosis of true dentine hypersensitivity a challenge. Dentin hypersensitivity is diagnosed after elimination of other possible causes of the pain. Desensitizing treatment should be delivered systematically, beginning with prevention and at-home treatments. The latter may be supplemented with in-office modalities. The prevalence of dentin hypersensitivity varies widely, depending on the mode of investigation.

Key Words

Dentin Hypersensitivity, Desensitizing Agents, Home-care.

Introduction

During routine dental examinations, our patients frequently enquire about dentine hypersensitivity that was episodic or was chronic and recurring due to a given action, e.g., drinking cold beverages, eating hot foods, breathing in and out. This common complaint is defined as dentine hypersensitivity, but it is also known as dentine sensitivity, dentinal hypersensitivity, cervical hypersensitivity/sensitivity, root hypersensitivity/sensitivity, cemental hypersensitivity/sensitivity, or just sensitivity. Patients describe this phenomenon as sharp, short-lasting tooth pain, irrespective of the stimulus.

Definition

Holland et al.[1] described dentinal hypersensitivity as "characterized by short, sharp pain arising from exposed dentin in response to stimuli typically thermal, evaporative, tactile, osmotic or chemical and which cannot be ascribed to any other form of dental defect or pathology". The first part of the definition provides a clinical description of dentine hypersensitivity whereas the second part aids in its differential diagnosis.

In dentine hypersensitivity, the definition highlights different stimuli inducing pain. Of these, cold or evaporative stimuli are usually identified as the most problematic for sufferers. Heat is not commonly reported perhaps because it is the exception to stimuli evoking pain, causing relatively slow inward movement of dentinal fluid.

Differential Diagnosis

It is important to distinguish sensitivity pain, that of short duration, from pain of longer duration not treatable with desensitizing agents. A number of other dental conditions can give rise to pain symptoms similar to those of dentine hypersensitivity. A definitive diagnosis of dentine hypersensitivity is reached through exclusion of the following conditions, which need a variety of treatment options for resolution.

1. **Cracked tooth syndrome:** Pain typically occurs on release of biting or tapping of a single cusp.
2. **Abscessed or non- vital tooth:** With periapical radiolucency or draining fistula; necrotic with sensitivity to occlusion; partially necrotic in one canal, with vital tissue elsewhere (in which case tooth tests vital to stimuli). Pain typically occurs spontaneously or upon occlusion or tapping.
3. **Pulpal response to dental caries:** Greatest degree of sensitivity experienced when dental decay passes the dentine-enamel junction. As caries penetrates further into the tooth, sensitivity lessens until pulp becomes involved.
4. **Gingival recession:** Often occurs post-periodontal surgery, when a large portion of the root is exposed, or due to ageing, mechanical trauma, frenum attachment pull or occlusal trauma.
5. **Toothbrush abrasion:** Caused by use of a hard or a soft toothbrush with abrasive toothpaste or by aggressive brushing, and generally located on the side opposite the dominant hand. Abrasion may either instigate gingival recession or stem from greater accessibility to softer root surfaces from recession.
6. **Abfraction lesions:** Generally associated with occlusal trauma where the anatomic crown of the tooth has flexure. Although non-carious, these lesions can become very sensitive and even progress into the pulp. They may be multifactorial where abrasion and erosive forces combine to produce

tooth surface loss.

7. **Erosive lesions:** Associated with acid reflux, hiatus hernia, purging, bulimia (intrinsic causes), and diet (extrinsic causes). Intrinsic acid lesions typically occur on the palatal surfaces, while extrinsic acid lesions tend to occur on the buccal surfaces. Consuming large quantities of carbonated cola drinks and fruit drinks, which have a very low pH, causes tooth surface loss, as does toothbrushing following an acidic assault, which removes the acid-softened enamel or dentine.
8. **Diet sensitivity:** Generally associated with a low pH material, such as fresh tomatoes, orange juice, cola drinks.
9. **Genetic sensitivity:** Patients reporting history of sensitive teeth. It is not known whether sensitivity correlates to the 10% of teeth that do not have cementum covering all the dentine at the dentinoenamel junction, or is a factor of lower overall patient pain threshold values.
10. **Restorative sensitivity:** Triggered following placement of a restoration for several possible reasons: contamination of composites during placement or improper etching of the tooth on composites, which results in micro-leakage; incorrect preparation of glass ionomer or zinc phosphate cements; general pulpal insult from cavity preparation technique; thermal or occlusal causes; galvanic reaction to dissimilar metals that creates a sudden shock or 'tin foil' taste in the mouth.
11. **Medication sensitivity:** Due to medications that dry the mouth (e.g. antihistamines, high blood pressure medication), thereby compromising the protective effects of saliva and aggravating diet-related trauma or proliferating plaque. Even a reduction in salivary flow due to ageing or medications can lower the pH of the saliva below the level at which caries occurs (6.0–6.8 for Dentine caries; < 5.5 for enamel caries) and increase erosive lesions to exposed dentine.
12. **Bleaching sensitivity:** Commonly associated with carbamide peroxide vital tooth bleaching and thought to be due to the by-products of 10 % carbamide peroxide (3% hydrogen peroxide and 7 % urea) readily passing through the enamel and dentine into the pulp in a matter of minutes. Sensitivity takes the form of a reversible pulpitis caused from the dentine fluid flow and pulpal contact of the material, which changes osmolarity, without apparent harm to the pulp. Sensitivity is caused by all other forms of bleaching and depends on peroxide concentration.
13. Fractured restorations and incorrectly placed dentine pins.
14. Palatogingival groove and other enamel invaginations.
15. Chipped teeth causing exposed dentine.

Aetiology

Dentinal hypersensitivity can have multiple aetiologies. It is important that the patient's medical and social history, lifestyle, medications and supplements being taken, diet and food habits, and oral hygiene be thoroughly reviewed. Before making a diagnosis of dentinal hypersensitivity, other oral conditions must be ruled out.

The primary cause of dentin hypersensitivity is loss of enamel on the crown and gum recession exposing the root. Tooth wear due to the irreversible loss of tooth structure and includes conditions such as abrasion, erosion, attrition, and abfraction. Enamel can also be lost as a result of aggressive or incorrect tooth brushing, overconsumption of acidic food, and tooth grinding caused by stress and parafunctional behaviours and iatrogenic during restorative procedures, tooth preparation and after external tooth bleaching. The frequent intake of food and beverages such as fruits, lemon tea, fruit juice, and soft drinks can cause tooth erosion and dentine hypersensitivity.

Mechanism of Sensitivity

The most widely accepted mechanism of dentinal sensitivity is the hydrodynamic theory, first described by Brännström. In this model, the aspiration of odontoblasts into the dentinal tubules, as an immediate effect of physical stimuli applied to exposed dentin, results in the outward flow of the tubular contents (dentinal fluids) through capillary action. The changes to the dentinal surface lead to stimulation of the A-type nerve fibers surrounding the odontoblasts. For there to be a stimulus response, the tubules must be open at both the dentinal interface and within the pulp. Sensitive teeth have up to eight times the number of open dentinal tubules per surface area compared to nonresponsive teeth. Another theory is an alteration in pulpal sensory nerve activity. The treatment of exposed, open dentinal tubules is based upon the physiology of the stimulus response.

Episodic Nature of Dentine Hypersensitivity

For dentine hypersensitivity to occur, not only does the dentine need to become exposed (lesion localization) and but the tubules need to be patent to the pulp (lesion initiation). Many people have dentine exposed to the oral environment owing to loss of cementum and⁄or enamel, but clinical experience indicates that only a proportion of those people suffer from dentine hypersensitivity. In vitro studies indicate that erosion from acidic soft drinks causes rapid loss of the smear layer resulting in the wide opening of tubules,[2] and similarly most toothpastes readily remove the smear layer to expose tubules.[2] However, toothbrushing can also replace the smear layer, creating a dynamic environment.[2]

The width of the tubule is very important, as the rate of fluid flow is dependent on the fourth power of the radius. If the tubule diameter doubles, a 16-fold increase in fluid flow results. Sensitive teeth have many more (8 times)

and wider (2 times) tubules at the buccal cervical area compared with nonsensitive teeth.[3] A higher velocity of fluid flow also occurs in tubules of smaller diameter, possibly provoking pain sensations. Dentine will only be sensitive if the tubules are patent from the pulp to the oral environment, and this patency will change with production and removal of the smear, hence resulting in an episodic condition.[3]

Behavioral Changes

Patients with unresolved hypersensitivity over many years provide the dental professional with varied behavioral and postural clues, some of which are easily recognized. These include avoidance of routine dental exams, necessary treatment and follow-up care, reluctance to schedule planned treatment or follow-up care, insistence on the use of local anesthesia for even the most minor of dental treatments, tense facial muscles, tooth clenching, a rigid torso, holding hands tightly on the arm rest, crossed arms, an awkward head position and an inability to follow routine instructions for head and body positioning.[4]

Epidemiology

The prevalence of dentine hypersensitivity ranges from 4% to 57%. Although the age range for dentin hypersensitivity varies from 15-70 years, the peak incidence is between 20 to 40 years.5

The highest incidence of dentine hypersensitivity has been reported on the buccal cervical area of teeth. The teeth most commonly affected are canines> premolars> incisors> molars.[5]

Women are more frequently affected and at a younger mean age.[6]

A significantly higher proportion of left vs right contralateral teeth was reported in right-handed patients with dentine hypersensitivity.[5]

Addy and his colleagues7 reported that all sensitive teeth have very low plaque scores, suggesting that toothbrushing with dentifrice may facilitate the development of dentin hypersensitivity.

Management

The development of a sound treatment plan for any oral health condition should consider causative factors. Similarly, any treatment plan for dentine hypersensitivity should include identifying and eliminating predisposing etiologic factors such as endogenous or exogenous acids and toothbrush trauma.

After observing the severity and number of teeth involved, an active approach to dentine hypersensitivity can begin in the cases of generalized dentine hypersensitivity, by a home method followed by in-office treatment when the first option is not successful. However, when dentine hypersensitivity is restricted to a few teeth, one can opt for an in-office method as initial treatment.

I. Preventive management recommendations[8]:

Suggestions for patients:

1. Avoid using large amounts of dentifrice or reapplying it during brushing.
2. Avoid medium- or hard-bristle toothbrushes.
3. Avoid brushing teeth immediately after ingesting acidic foods.
4. Avoid brushing teeth with excessive pressure or for an extended period of time.
5. Avoid excessive flossing or improper use of other interproximal cleaning devices.
6. Avoid "picking" or scratching at the gumline or using toothpicks inappropriately.

Suggestions for dental professionals:

1. Avoid over-instrumenting the root surfaces during scaling and root planing, particularly in the cervical area of the tooth.
2. Avoid over-polishing exposed dentine during stain removal.
3. Avoid violating the biological width during restoration placement, as this may cause recession.
4. Avoid burning the gingival tissues during in-office bleaching, and advise patients to be careful when using home bleaching products.

II. At- Home Treatment Procedures:

Desensitizing agents intended for at-home use by patients generally are simple to administer.

Desensitizing toothpastes/dentifrices: Toothpastes are the most widely used dentifrices for delivering over-the-counter desensitizing agents. The first desensitizing toothpastes to appear on the market claimed either to occlude dentinal tubules (those that contained strontium salts and fluorides) or destroy vital elements within the tubules (those that contained formaldehyde). Now, most desensitizing toothpastes contain a potassium salt such as potassium nitrate, potassium chloride or potassium citrate, though it has been reported that a remineralizing toothpaste containing sodium fluoride and calcium phosphates reduced dentine hypersensitivity.[9]

Toothpaste application: Practitioners should educate patients on how to use dentifrices and monitor their toothbrushing techniques. Dentifrices should be applied by toothbrushing. There is no evidence to suggest that finger application of the paste increases effectiveness. Many patients habitually rinse their mouths with water after toothbrushing. Rinsing with water may cause the active agent to be diluted and cleared from the mouth and, thus, reduce the efficacy of the caries reducing effect of fluoride toothpastes.[10]

Mouthwashes and chewing gums: Studies have found that mouthwashes containing potassium nitrate and sodium fluoride[11], potassium citrate or sodium fluoride or a mixture of fluorides[12] can reduce dentine

hypersensitivity. Another study[13] concluded that a chewing gum containing potassium chloride significantly reduced dentine hypersensitivity, but the study did not include a control group.

Dentine hypersensitivity severity should be reassessed two to four weeks after commencement of treatment to determine the effectiveness of the first level of desensitizing treatment. If at-home care fails to reduce dentine hypersensitivity compared with baseline levels, the next level of treatment, an in-office method, should be started.

In-Office Treatment Procedures[14]:

Dental professionals can deliver a wider range of more complex and more potent desensitizing treatment.

1. Nerve desensitization: Potassium nitrate
2. Anti-inflammatory agents: Corticosteroids
3. Cover or plugging dentinal tubules;
   a. Plugging (sclerosing) dentinal tubules
   - Ions/salts
     i. Calcium hydroxide
     ii. Ferrous oxide
     iii. Potassium oxalate
     iv. Sodium monofluorophosphate
     v. Sodium fluoride
     vi. Sodium fluoride/stannous fluoride combination
     vii. Stannous fluoride
     viii. Strontium chloride
   - Protein precipitants
     i. Formaldehyde
     ii. Glutaraldehyde
     iii. Silver nitrate
     iv. Strontium chloride hexahydrate
   - Casein phosphopeptides
   - Burnishing
   - Fluoride iontophoresis
     b. Dentine sealers
     i. Glass ionomer cements
     ii. Composites
     iii. Resins
     iv. Varnishes
     v. Sealants
     vi. Methyl methacrylate
   c. Periodontal soft tissue grafting
   d. Crown placement/restorative material
   e. Lasers

If the symptoms still persists, then the offending tooth is either root canal treated or extracted.

Several criteria are recognized as constituting an ideal desensitizing agent. These include not irritating the pulp, being relatively painless to apply, easily applied, rapid action, permanently effective and should not discolour the teeth. Overall, patient responses are very subjective and thus treatment results are largely dependent upon the individual's pain threshold.

Conclusion

As part of the routine dental examination and during every recall appointment, dental professionals should include in their patient questions queries about whether there are any sensitive teeth. There are many causes of and treatments for dentine hypersensitivity. Patients with dentinal hypersensitivity should be evaluated based upon risk factors and a proper diagnosis made, after which a treatment plan can be outlined for the patient. In most circumstances, the least invasive, most cost-effective treatment is the use of an effective desensitizing toothpaste. Based on the identified cause, a combination of individualized instructions on proper oral health behaviors, use of self-care products, and professional treatment, including recent and novel technologies that have been introduced may be required to manage the problem.

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Management of Veau Group III Defect – A velopharyngeal obturator

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Abstract

Treatment of cleft lip and palate requires multidisciplinary management but the patient usually becomes a prosthodontist's responsibility, once all the surgical treatments have been attempted or discussed. The final onus lies on prosthodontist to compensate for remaining oral deficiencies.

This article describes and discusses the fabrication of Velopharyngeal obturator (using cast metal framework, heat cure acrylic resin and silicone soft liner) wherein an interim obturator was delivered before the final prosthesis was fabricated.

Impression technique for recording the defect required intraoral extension of loop tray in the mouth as reduced mouth opening contraindicated dual impression technique. Due the non availability of retentive features in the mouth i.e. short teeth, parallel walled extensive defect a cast metal framework was fabricated so as to achieve retention, stability and support for the prosthesis.

Keywords

Velopharyngael obturator,Cleft lip and palate.

Clinical Report

Management of Veau Group III Defect - A Velopharyngeal Obturator

Introduction

Rehabilitating a patient of cleft lip and palate is a challenge for the prosthodontist as there are multiple problem areas to be addressed such as hyper nasality, decreased intelligibility of speech and nasal regurgitation of fluid apart from social stigma due to cosmetic and dental abnormalities. Patients even exhibit hearing difficulties as there may be Eustachian tube dysfunction due to abnormal insertion of levator and tensor veli palatini. Such defects can best be managed successfully through a multidisciplinary approach. Surgical reconstruction is the treatment of choice in cases of small defects but large soft palatal defects are difficult to restore in order to obtain normal function[1].

Although many classification systems have been proposed for cleft lip and palate abnormalities but none of them have found universal acceptance. Veau in 1931 gave morphological classification based on the site and extent of the cleft: Group I –cleft of the soft palate; Group II – cleft of the hard and soft palate till incisive foramen; Group III-unilateral cleft of the soft palate, hard palate, the alveolar ridge and the lip on one side; Group IV –bilateral cleft of the soft palate, hard palate, the alveolar ridge and the lip[2].

Obturator is a maxillofacial prosthesis used to close, cover or maintain the integrity of the oral and nasal compartments resulting from a congenital, acquired or developmental disease process (GPT 8). Velopharyngeal inadequacy is a malfunction of velopharyngeal mechanism; where there is a lack of effective closure between the soft palate and one or more of the pharyngeal walls during swallowing or speech sounds that require high intraoral pressure i.e. palatopharyngeal inadequacy (GPT 8).

So both the terms have been collectively coined as velopharyngeal obturator in this paper. This article describes and discusses the fabrication of velopharyngeal obturator using cast metal framework, heat cure acrylic resin and silicone soft liner for a patient with Veau III defect.

Clinical Report

A male patient aged 21 years reported to the Department of Prosthodontics, Uttar Pradesh Dental College &Research Centre, Lucknow with the chief complaint of nasal regurgitation, decreased intelligibility of speech and hyper nasality. General examination and medical history revealed that the right side cleft lip was surgically repaired at the age of six.

Intraoral examination showed reduced mouth opening of approx. 25 mm with Veau Group III defect (Figure 1).

Fig. 1: Veau Group III defect

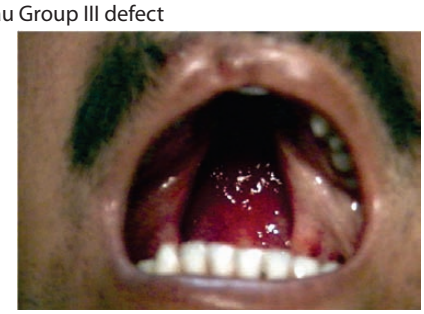
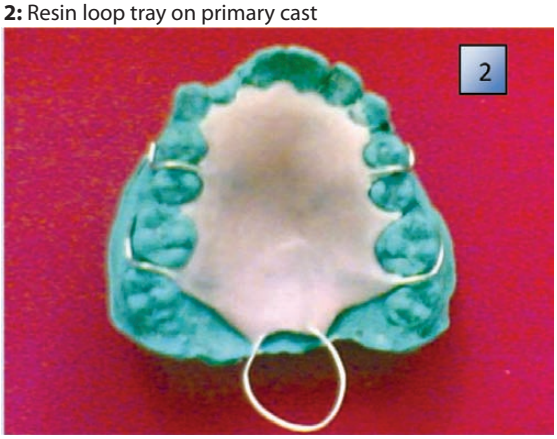


Fig. 2: Resin loop tray on primary cast



The walls of the intraoral defect were nearly parallel to each other. Full set of teeth with short axial height were present in mandibular arch with missing right maxillary right lateral incisor.

The treatment included prosthodontic rehabilitation by Velopharyngeal obturator followed by speech therapy.

Procedure

Due to restricted lateral stretching of mouth compounded with extensive soft palate defect, only hard palatal defect was recorded in primary impression made with alginate (Septalgin, Septodont Healthcare India Private Limited, Maharashtra, India). A self cure resin (DPI, The Bombay Burmah Trading Corporation, Mumbai, India) tray with loop for recording soft palate defect was fabricated (Figure 2). The loop was so adjusted that no contact occurred with the lateral and posterior wall as the patient pronounced "ah".

Fig. 3(A,B): Impression of the defect with intraorally extended loop tray to record the teeth

Low fusing impression compound (DPI Pinnacle, The Bombay Burmah Trading Corporation, Mumbai, India) was gradually added to the tissue side of tray to record and effectively seal the hard palate defect till a dull surface was achieved indicating tissue contact (Figure 3a). Subsequently ,the Velopharyngeal palatal defect was recorded by instructing the patient to move his head in a circular manner from side to side and to extend his head as far forward and backward as possible to activate the remaining palatopharyngeal musculature[3] and also to speak consonants as p,t,f,s,b,d,g, and swallow frequently.

This loop special tray was extended intraorally (Figure 3b) in the patient's mouth to record the edentulous area as insertion of another tray for making dual impression with teeth as well was not possible due to restricted lateral stretching of mouth. Self cure acrylic resin (DPI, The Bombay Burmah Trading Corporation, Mumbai, India) in early dough stage was applied over the teeth with the loop tray in mouth to extend the tray for recording the teeth. Care was taken

*To minimize the heat of polymerization by cooling the area with water

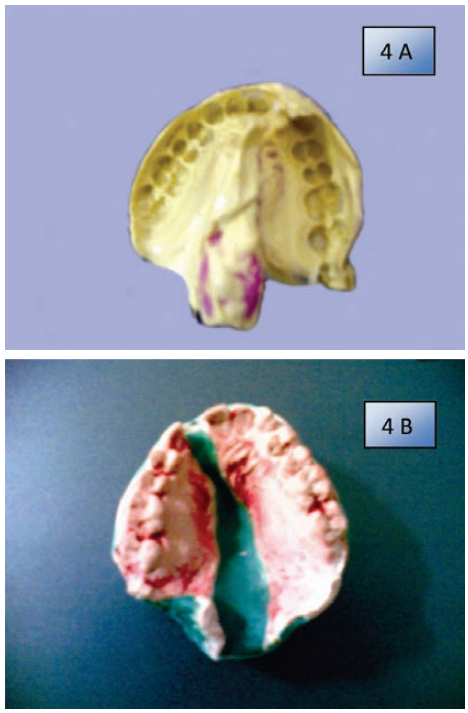
*To avoid the tray getting locked around the teeth

With the relieved intraorally extended tray, the first stage final impression was recorded in alginate and an interim obturator with cold cure resin was fabricated and delivered to the patient. This was done as it is difficult to adjust a cast metal framework as compared to cold cure resin obturator and also to enable the patient to adjust to the prosthesis.

After a period of three weeks, during which some adjustments were required in the interim obturator mouth preparation of teeth was done for final fabrication of cast metal framework. Rest seats were prepared in distal fossa of maxillary first molar and mesial fossa of maxillary second molar on both sides. For indirect retention, rest seats were prepared in distal fossa of maxillary first and mesial fossa of second premolar.

The second stage final wash impression (Figure 4) was recorded with light body silicone (Express XT, 3M ESPE, St Paul, MN) impression material on interim obturator after extending it to cover the dentulous area in the mouth as done earlier. On the master cast, a cast metal framework (Wironium plus, Bego, Germany) was fabricated with embrasure clasps and rests on distal rest seat of first molar and mesial rest seat of second molar with indirect retainers on first and second premolar. A modified complete palate major connector with mesh bordering the teeth to achieve retention and support from teeth via heat cure acrylic resin (DPI heat cure, The Bombay Burmah Trading Corporation, Mumbai, India) and a cast metal mesh loop for speech bulb lined with silicone soft liner (Molloplast B, Detax, Germany) was fabricated.

Fig. 4(A,B): Second stage final impression on interim obturator



The final prosthesis with two components: Palatal obturator and speech bulb (Figure 5) on a cast metal framework was delivered to the patient (Figure 6).

Discussion

Management of maxillofacial defect cases have certain guidelines to follow but almost each case requires certain degree of custom made management.

In the case of palatal defect with Velopharyngeal

Fig. 5(A,B): Final obturator: Palatal obturator and speech bulb

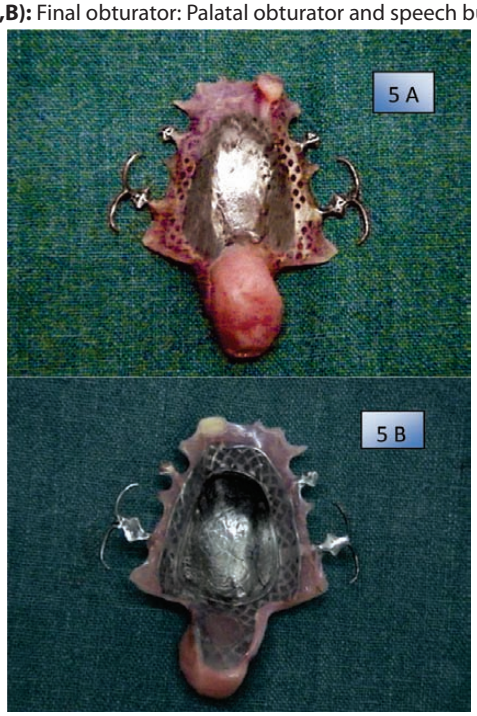
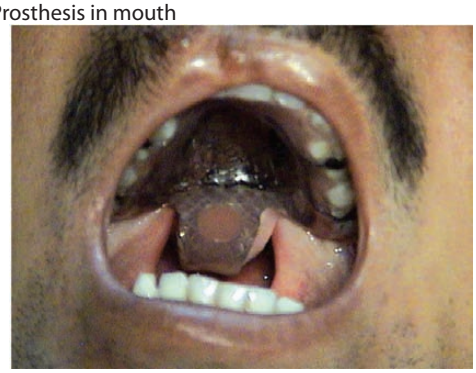


Fig. 6: Prosthesis in mouth



inadequacy discussed here, there were certain unfavorable features such as limited lateral stretching of mouth, parallel walled defect, extensive defect involving hard and soft palate, short axial height of teeth, compressible\ displaceable tissue bordering the defect. Limited lateral stretching of mouth negated the use of dual impression technique using two trays in the mouth simultaneously and therefore, required intra oral extension of loop tray to record the impression of the teeth.

It is more difficult to insert the tray than to remove it from the mouth.

When the tray is placed in the mouth, the operator usually stretches one corner, making the oral opening still smaller. During removal the orbicularis oris can be stretched beyond the limit of the patient's the limit of the patient's normal function. In this situation, the muscle's sphincteric shape allows the operator additional maneurverability.[4]

Usually, modeling plastic[5] is used to record the defect but due to highly compressible tissue, low fusing green stick was used to record the defect. As the final prosthesis comprised of cast metal framework the intermediate step of delivering an interim obturator was added to the procedure for it:

*Helped in checking the functional accuracy of impression.

*Provided an opportunity for correction of under extended borders.

*Minimal post insertion adjustment required for final cast metal prosthesis and above all enhances patient's confidence.

There are many articles in the literature dealing with conventional removable partial denture designs[6,7] but only a few of them have addressed the problems of framework design for maxillary obturator[8,9].

Aramany[10,11] described classification and design principles for maxillary obturator design, based on which, the cast metal framework in this case was fabricated so as to minimize undue stresses on teeth and soft tissue structures. The cast metal framework was designed based on quadrilateral configuration to facilitate wide distribution of support on premolars and molars. Maximum support was planned through utilization of

full palatal coverage[10] Wide distribution of occlusal rests helped to counteract occlusal vertical forces activated during mastication and swallowing.

Retention was derived from the buccal surfaces via direct retainers and also by adaptation of acrylic resin around the cervical portion of teeth on the palatal slide. In the framework designing, components were placed on both sides of the dental arch to achieve cross arch stabilization. This aid in allocation of proportionate sharing of stress sustained by abutment teeth and thus increases their longevity[11].

Conclusion

Custom made prosthesis to address individual problems require meticulous planning and careful execution and hence, the design or the technique modifications should best be decided by taking prevailing condition into account rather than the theoretical protocol.

With the prosthesis in place, problem of fluid leakage through the nose i.e. nasal regurgitation was completely rectified. It is to be borne in mind that adaptation to hypernasality developed over the years precludes the production of normal speech even in the presence of adequate obturation therefore speech therapy is necessary to improve speech and provide optimal functional rehabilitation.

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Management of Ocular Defect by Maxillofacial Prosthesis - A case report

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Abstract

Eye defects constitute a major portion of maxillofacial defects which require prosthetic correction for esthetic and social rehabilitation of the afflicted patient. Treatment modalities include implant and acrylic prosthesis. Although implant eye prosthesis offer superior results, they may not be economically viable for all patients. A custom made ocular acrylic prosthesis is a good alternative. A case report of patient with acquired ocular defect who was treated with a custom made ocular acrylic prosthesis which had enhanced fit, retention and facial esthetics to a greater degree.

Key words

Eye Defect, ocular acrylic prosthesis, retention.

Introduction

A considerable number of people have various maxillofacial defects as a result of malignancy, trauma, congenital deformities and infection. Among these, eye defects are common and seen in younger age group. The eye is a vital organ not only in terms of vision but also in being an important component of facial expression. Defects of the eye, thus pose a serious setback to the patient in terms of facial esthetics, social acceptance and psychological well being. Thus ocular prosthesis should be provided as soon as possible to raise the spirit and ease the mind of the afflicted. These patients can be treated with custom made ocular prosthesis that has been adapted to accommodate the specific situation. One such case, reported to Government Dental College, Indore to seek maxillofacial rehabilitation.

Case Report

A 9 years old female patient having defect in the right eye reported to College of Dentistry, Indore. On taking detailed history it was found that patient lost his right eye due to infection (differential diagnosis – Sympathetic Opthalmitis, Panopthalimitis, Congenital Glaucoma, Retinoblastoma) when she was 3 years old. Since then patient was having defect in the right eye. The patient was unaware of custom made ocular prosthesis and she has been put up with a lot of psychological trauma due to eye defect. The patient was made aware of custom made ocular prosthesis, its advantages of exact fit and improved esthetics.

History – Review of Literature

The art of making artificial eye has been known to man from the days of the early Egyptian and the Peruvian Indian, but not until the time of World War II, and the development of the refined plastics which came then, has there been a satisfactory esthetic ocular prosthesis.

The origin of maxillofacial prosthesis is difficult to trace, but it may be assumed that the prosthetic restoration of missing part of the face was practiced before surgical procedures became feasible. According to Popp (1939), artificial eye, nose, and ear were found on Egyptian Mummies. Dating from very early times in Egypt (i.e. pre dynastic period, before 3000 B.C.) simple inlaid eyes consisting usually of whitish shell beads, have been found and human figures bearing such eyes are to be seen in Cairo Museum.

Ambroise Pare, a Frenchman (1510-1570) was the first medical writer on the subject of the maxillofacial prosthesis. He suggested the use of prosthesis as valid alternative to surgical reconstruction. He was the first to use both glass and porcelain eyes and was first to use an obturator to close palatal clefts.

The physiologic ocular prosthesis as fabricated in the dental corps of United States Navy and by others was documented by Murphy et al (1944) and by Niiramen (1947). Two acrylic ocular prostheses were made by Sykes L.M. (1966).

Clinical and Laboratory Procedures

Patient's Examination

At the first appointment the patient was seated in the dental chair. Eye socket was examined for degree of healing, tonicity of ocular muscles and need for surgery. His medical records were inspected at this time and his psychological attitude towards wearing ocular prosthesis was evaluated. The patient was reassured about the esthetic results and was convinced there will be no pain and discomfort in the procedure.

Fabrication of Stock Tray for Anatomic Impression

A hollowed needle cover was used as a handle. Auto

polymerising resin was mixed in adequate consistency and given approximate shape of the eye and was attached to one end of the hollow needle cover.

Anatomic Ocular Impression

Patient was positioned upright in the chair and trained in maintaining a fixed gaze on a point directly in front of him and in midline position. A piece of a tape placed on the wall at the desired spot will aid the patient in maintaining correct line of vision. Anaesthesia was not considered necessary in this case and was not used.

KY jelly was used as surface lubricant to reduce the irritation and facilitate lubrication while taking impression.

A modified impression technique, where an impression tray is in the shape of an ocular prosthesis. The impression tray was placed within the socket to support the eyelid and provide a normal contour. The tray adhesive was applied over the surface that will carry impression so that it flows easily and was injected into the socket with a syringe through the hollow handle of the impression tray. The socket may be momentarily overfilled with the thin mix of impression material, but the tissues pressed the excess out through both the hollowed handle and periphery and allowed only the optimally needed volume to remain. The operator stabilized the tray throughout the impression procedure. This allowed the impression material to flow over the underlying muscle bed and the anatomic details to be recorded accurately. Once the impression material was set the patient was instructed to blink the eyes to break the air seal and impression was carefully removed from the socket and visualized for any void or other defects. Trimming of the excess impression material was done.

Fabrication of custom tray for functional impression

The split two piece dental stone muold was prepared. The dental stone was poured to immerse the lower half of impression after boxing. Once the stone sets keyholes were cut, separating medium was applied and the mould was completed with a second mix of stone. The prepared mould was used in construction of custom tray.

Self cure is mixed in dough consistency and inserted into the base part of the mould and then counter part of the mould is lubricated and then resin is inserted in it. Then both the base part and counter part of the mould were approximated then excess resin material was removed. The prepared custom tray was removed from mould and finished.

Fig. 1: Impression of ocular defect.

Functional ocular impression

All the pre procedures were applied as like primary impression. Then tray adhesive was painted over the custom tray to carry the impression material. Light body silicon impression material applied on the tray and gently inserted into the socket. The operator stabilized the tray throughout the impression procedure at that time the patient was instructed to blink the eye and right and left movements of eyeball.

Stone Mould Fabrication

The split two piece dental stone mould was prepared in a manner discussed previously. The prepared mould was used in the construction of wax conformer. The stone mould was lubricated with petrolatum and a medium hard dental wax was poured to prepare the wax conformer.

G. Altered Wax Conformer Fabrication

Altered wax conformer is now tried in eye and lid contour was evaluated and addition and reduction of the wax was done till the satisfactory lid contour was achieved and then iris is located.

Iris Location

Patient was instructed to stand in a relax position and to look at a distant point during this procedure patient's

Fig. 2: Functional ocular impression.

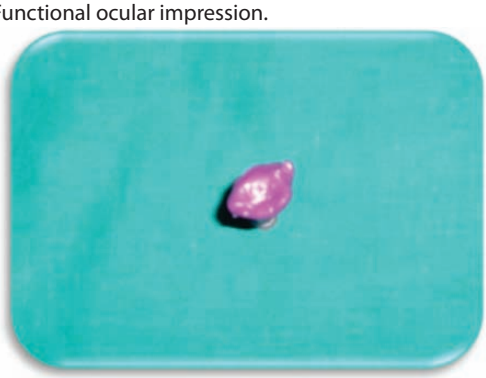

Fig. 3: Stone mould.

Fig. 4: Wax conformer try in.

right eye with wax conformer in it was compared with patient's left natural eye. The central of the pupil of the conformer was located and marked with pointed applicator stick dipped in waterproof ink. Iris corneal button from commercial available stock shell eye was selected to match the diameter and colour of the natural eye. The wax inside the circle was removed to the depth of 2-3 m and iris corneal button was inserted in this circle. Iris corneal button was waxed in position and was inserted to the socket to verify its position. This wax conformer with iris button was tried and checked for its accuracy in term of position and all the possible movements in comparison to the left eye and the necessary corrections were done till satisfactory results are achieved.

H. Preparation of mono-poly

Mono-poly is made by combining 10 parts heat-cure acrylic monomer to one part clear acrylic polymer by weight to combine the monomer and the polymer a pan of water is heated and brought to a light boil. The monomer is then poured into a Pyrex beaker. The beaker is placed in the pan of boiling water and when the monomer is warm, the polymer is sifted slowly into the monomer while stirring continuously with a glass rod until it reached the medium viscosity.

I. Replication in scleral coloured acrylic resin

White acrylic resin was selected the wax conformer was flasked and dewaxed in conventional manner. Iris corneal button was removed and placed back in the stone mold. When white acrylic resin reached in dough stage then packed in mold. Trial pack was taken and excess flash was removed. After heat curing, ocular prosthesis was removed from mold and finished.

From this ocular prosthesis 0.5-1 mm acrylic was reduced in the anterior scleral region around the iris corneal button then the monopoly was given colour according to the patient's left eye sclera. The acrylic ocular prosthesis was fitted on the tissue side mold with reduced position upward and the prepared monopoly was applied on the reduced surface. Red fibers of the veined acrylic powder were added to give vein effect of sclera. This layer of monopoly applied over reduced surface is cured partially with the help of light cure gun. Then the mold with ocular prosthesis was packed over the counter part and processed.

J. Delivering the ocular prosthesis

Properly finished and polished ocular prosthesis was inserted in the eye socket and examined for aesthetics and degree of various movements. Minor corrections were done as required and the ocular prosthesis was again finished and polished before insertion.

K. Patient instruction

Method of inserting and removing the prosthesis and its care are demonstrated to the patient. The prosthesis should be removed at least once a day for cleaning. The prosthesis should not be allowed to come in contact with alcohol or solvent of any kind as this would cause crazing of the acrylic resin. It should be washed with mild soap once every 1 or 2 weeks. More frequent cleansing would be indicated if particularly or dirty conditions were encountered. With the prosthesis removed, the soft tissues of the socket are rinsed with an ophthalmic irrigation solution.

Discussion

Till date health practitioners especially ophthalmologists are not successful in restoring the function of the lost eye and we satisfy the patient and try to rehabilitate him only esthetically and psychologically. But this is a great challenge to the skills of the prosthodontists and material available. The eye defects especially ocular, present some limitations to the rehabilitation abilities. Ocular defects can be managed wonderfully along with appreciable

Fig. 5: Pre operative

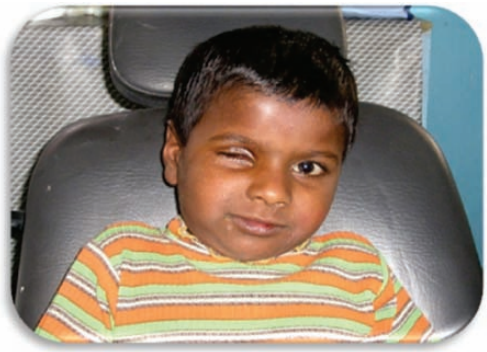

Fig. 6: Post operative

movement of prosthetic simulating natural eye.

Best prosthesis would be one, which is not recognizable by anybody. Orientation of correct gaze and camouflaging the borders of the prosthesis and achieving perfect or near perfect texture and colour helps to offer better results to the patients.

Conclusion

The use of stock ocular prosthesis of an appropriate size and colour adapted by selective grinding or addition of acrylic resin in tissue contact surface is advocated to facilitate seating of prosthesis. Standard technique can produce excellent results for most patients provided the operator has done an appropriate selection of the prefabricated eye. However, because of extreme individual variation and diverse nature of ocular injuries certain patients would benefit more from custom made ocular prosthesis that are modified to individual needs. The aesthetic and functional results justify the extra effort fabricating custom made ocular prosthesis.

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A Study on Nutritional Profile of Textile Workers and Non Textile Workers of Uttar Pradesh

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Abstract

Background

Man needs a wide range of nutrients to lead a healthy and active life and these are derived through the diet they consume daily. Good nutrition is a basic component of health. The present paper assesses the Nutritional Profile of Textile Workers and Non Textile Workers of Uttar Pradesh.

Methods

Out of total 920 subjects studied, 463 Textile Workers and 457 Non Textile Workers were randomly selected and interviewed for the purpose of study; Tools used were three days home visits and group meetings. Anthropometric measurements taken were height and weight. Dietary data was collected using standardized cups methods.

Results

The findings depict that most of the Textile Workers and Non Textile Workers were basically non-vegetarian and majority of the Textile Workers and their families mostly missed regular pattern of three meals a day. Chronic Energy Deficiency (CED) was found to be more prevalent in Textile Workers as compared to Non Textile Workers but the prevalence of over weight/obesity was seen more in Non Textile Workers.

Conclusions

The nutritional status of the Textile Workers and their families was not an excellent one.

Keywords

Textile Workers, Non-Textile Workers, Chronic Energy Deficiency (CED), Nutritional Status.

Introduction

Man needs a wide range of nutrients to lead a healthy and active life and these are derived through the diet they consume daily. The components of their diet must be chosen judiciously to provide all the nutrients needed in adequate amounts and in proper proportion. The amount of each nutrient that is required by man depends upon his age and physiological status. Adults need nutrients for maintaining constant body weight and ensuring proper body function. Infants and young children who are growing rapidly require nutrients not only for maintenance but also for growth. They require relatively more nutrients (2-3 times) per kg body weight than adults (Malhotra, 1997). In special physiological conditions like pregnancy and lactation, adult woman needs additional nutrients to meet the extra demand for foetal growth and maternal tissue expansion in pregnancy and milk secretion during lactation. These extra intakes of nutrients are essential for the normal growth of an infant in vitro and during the early postnatal life (Gomez, 1997).

Nutritional status refers to the health of an individual as it is affected by the intake and utilization of nutrients. Nutritional health can be described at several levels. Normal nutrition implies a sufficiency of nutrients and energy intake, neither deficiency nor excess, that affords the highest level of well-being.

The relationship between biological and cultural factors is well exhibited by nutritional aspects under the rubric of different ecosystems. The nutritional aspect mainly covers foods, nutrients and related other substances there in their action, interaction and balance in relationship to health and diseases. Nutrition is concerned to a certain extent with social, economic, cultural and physiological implications of food and dietary habits.

A number of studies have been made on dietary aspects and assessment of nutritional status of different populations by different authors, viz Dandekar and Patwardhan, 1971; Gopalan et.al, 1974,1984; Sukhatme, 1977; Chaudhry and Visweswara, 1983; Dasgupta, 1989; Prabhakara et.al, 1993; Rao, 1995; Krishnaswamy and Kumar, 1997; Hiwarkar et.al, 1998; Vijayaraghavan and Rao, 1998; Sharma and Jain, 2004; Barker et.al, 2006; Tungdim and Kapoor, 2008 and many others.

Here, an attempt has been made to assess the Nutritional Profile of Textile Workers and Non Textile Workers of Uttar Pradesh.

Methodology

The present study is conducted among the Textile Workers and Non Textile Workers of Uttar Pradesh. A total

of 920 people from 17 different textile industries and 183 household formed the sample size of the study. From this household and industries, a total of 463 Textile Workers (TW) were interviewed and measured, this group has been treated as test group and 457 people residing in the same area but not working in the textile Industries were taken as Non Textile Workers (NTW) and have been referred to as control group. The Workers whose duration of work and exposure was more than 3 months were matched for age, sex and socio economic status.

Anthropometric measurements taken were height and weight using standard techniques of Weiner and Lourie (1981). In order to assess the dietary intake, as accurately as possible, the researcher concerned used a standardized cups methods (weighing method) of diet sur¬vey, the intake of an individual in a family is assessed by asking the housewife about the type of preparations made for the family as a whole and the ingredients that are used in each preparation, together with raw amounts. Then the total cooked amount of each preparation as well as the intake of an individual in the family is assessed by exhibiting a set of standardized cups before her, to help her assess amounts properly.

The cups may vary in sizes, with a set of about 10 or 12 in number, and may be standardized for raw rice volume. Standardization of cups in terms of raw rice would help the investigator to assess the cooked intake of an individual directly in terms of raw amounts of rice. This is done mostly because, the type of prepa¬ration of rice is almost uniform in most of the families, i.e. boiled, which is the major cereal preparation.

But the preparations, other than rice such as dal, sambhar, vegetables, tea etc., cannot be standardized in terms of raw amounts since the consistency of each preparation differs from family to family depending on amount of water used. So the cups have to be stan-dardized for volume to assess the total cooked amount, as well as the intake of an individual. In that way, the standardization of cups for volume would also help the investigator to assess the differences in the amounts of same type of preparations from family to family, though the raw amounts used may be the same.

1. Standardization of cups for raw rice
2. Standardization of cups for volume
3. Teaspoons, tablespoons, tea cups, glasses etc. may also be standardized for volume.
4. Standard¬ization of certain foodstuffs such as green leafy vegetables, other vegetables and flesh foods

Because of day to day variation in the diet, at least 3 con¬secutive days survey was conducted. Using the standard value of National Institute of Nutrition and Indian Council of Medical Research for each food, the calorific value was calculated and hence the nutritional intake of each worker was obtained.

Results

Table 1 reveals information regarding dietary habit among Textile Workers and Non Textile Workers. It can be observed from the table that maximum percent of Textile Workers and Non Textile Workers were non vegetarian (88.12% and 93.00% respectively) and consume the meat of goat, sheep, buffalo and chicken etc.

Table 2 shows distribution of Textile Workers and Non Textile Workers in different BMI categories. 160 (65.84%) male Textile Workers and 134 (60.91%) female Textile Workers had normal BMI. Chronic Energy Deficiency (CED) was seen in 72 (29.63%) male Textile Workers and 71 (32.27%) female Textile Workers. Obesity(Grade I&II) was seen in 15 (6.82%) female Textile Workers and 11 (4.53%) male Textile Workers.

While 156 (66.38%) male Non Textile Workers and 125 (56.31%) female Non Textile Workers had normal BMI. Chronic Energy Deficiency (CED) was seen in 65 (27.66%) male Non Textile Workers and 54 (24.32%) female Non Textile Workers. Obesity was seen in 43 (19.37%) female Non Textile Workers and 14 (5.96%) male Non Textile Workers.

Table 3 reflects the mean and standard deviation of daily

Table 1: Distribution of Textile Workers (TW) and Non Textile Workers (NTW) according to dietary habit

Dietary habit	TW		NTW	
	NO.	%	NO.	%
Non vegetarian	408	88.12	425	93.00
vegetarian	55	11.88	32	7.00
Total	463	100.00	457	100.00

Table 2: Distribution of Textile Workers (TW) and Non Textile Workers (NTW) according to Body Mass Index (BMI) categories

BMI	Males (TW)		Females (TW)		Males (NTW)		Females (NTW)	
	No.	%	No.	%	No.	%	No.	%
<18.5 (Chronic Energy Deficiency)	72	29.63	71	32.27	65	27.66	54	24.32
18.5-25 (Normal)	160	65.84	134	60.91	156	66.38	125	56.31
25-30 (Grade -I Obesity)	10	4.12	13	5.91	12	5.11	34	15.32
>30 (Grade-II Obesity)	1	0.41	2	0.91	2	0.85	9	4.05
Total	243	100.0	220	100	235	100.0	222	100.0

*Source: W.H.O. 2000

energy consumption of the subjects. As against the figure of 2875 kcal of energy for males and 2225 kcal for females (RDA values) the energy consumption was 2593± 104 kcal per day among male Textile Workers while 1905±114 kcal per day among female Textile Workers respectively. Higher percentage of females Textile Workers (87.73%) in comparison to males Textile Workers (58.85%) consumed inadequate amount of energy by RDA standards.

The respective values of energy intake among male Non Textile Workers and female Non Textile Workers were 2662±126 kcal and 2048±146 kcal per day. A higher percentage of females Textile Workers (84.68%) consumed inadequate amount of energy when compared to males Textile Workers (44.68%).

Table 4 reflects the consumption of various Food items by the subjects. A higher percentage of males Textile Workers (34.2%) in comparison to females (32.77%) consumed inadequate amount of cereals and millets by RDA standards, similar observation was made for pulse consumption also.

A higher percentage of females Textile Workers (41.34%) in comparison to males (34.0%) consumed inadequate amount of milk and milk product by RDA standards. Whereas a higher percentage of males (69.84%) when compared to females (67.7%) consumed inadequate amount of vegetables by RDA standards.

Higher percentage of males Textile Workers (28.53%) when compared to females (10.2%) consumed inadequate amount of sugar and jaggery RDA standards, both male and female Textile Workers consumed fats and oils more than RDA.

Similarly, higher percentage of females Textile Workers (10.67%) when compared to males (6.0%) consumed adequate amount of meat, fish and eggs RDA standards.

Higher percentage of males Non Textile Workers (32.1%) when compared to females (26.24%) consumed inadequate amount of cereals and millets RDA standards, similar observation was made for pulse consumption also.

Higher percentage of males Non Textile Workers (18.93%) when compared to females (5.84%) consumed inadequate amount of sugar and jaggery RDA standards, both male and female Non Textile Workers consumed fats and oils more than RDA.

Table 3: Energy Consumption and distribution of Textile Workers (TW) and Non Textile Workers (NTW) according to RDA: A comparison

Energy(kcal) consumption/day			Less than RDA				*RDA	
Subjects	Males	Females	Males		Females		Males	Females
	Mean±SD	Mean±SD	N	%	N	%		
TW	2593±104	1905±114	143	58.85	193	87.73	2875	2225
NTW	2662±126	2048±146	105	44.68	188	84.68	2875	2225

*ICMR (1995).

Table 4: Consumption of Food items by the Textile Workers and Non Textile Workers: A comparison

Subjects	Food items	RDA*		Amount consumed				% consumed Less than RDA	
		Males	Females	Males		Females		Males	Females
				Mean	%	Mean	%		
Textile Workers	Cereals & Millets	480	360	315.8	65.79	242.7	67.22	34.21	32.78
	Pulses	90	75	59.35	65.94	28.32	37.77	34.06	62.23
	Milk & milk Products (ml)	300	300	198	66	176	58.66	34.0	41.34
	Vegetables	400	300	120.6	30.16	96.88	32.29	69.84	67.71
	Fruits	100	100	26.4	26.4	22.8	22.8	73.6	77.2
	Sugar & Jaggery	40	25	28.59	71.47	22.45	89.8	28.53	10.2
	Fats & Oils	35	30	48.8	139.4	42.5	141.6	More than RDA	
	Meat, fish, Eggs	30	30	28.2	94	26.8	89.33	6	10.67
Non Textile Workers	Cereals & Millets	480	360	325.9	67.9	265.5	73.76	32.1	26.24
	Pulses	90	75	68.45	70.05	42.35	56.46	23.95	43.54
	Milk & milk Products (ml)	300	300	204	68	188	62.66	32	37.34
	Vegetables	400	300	185.4	46.35	116.7	38.90	53.65	61.10
	Fruits	100	100	38.8	38.8	36.4	36.4	61.2	63.6
	Sugar & Jaggery	40	25	32.43	81.07	23.54	94.16	18.93	5.84
	Fats & Oils	35	30	48.5	138.6	42.5	141.6	More than RDA	
	Meat, fish, Eggs	30	30	29.2	97.33	27.8	92.66	2.67	7.34

*ICMR (1998).

Similarly, higher percentage of females Non Textile Workers (7.34%) when compared to males (2.67%) consumed adequate amount of meat, fish and eggs RDA standards.

Discussion

Main finding of this study

Nutritional survey of the subjects revealed that majority of the Textile Workers missed regular pattern of three meals a day where as most of the Non Textile Workers followed the regular pattern of three meals a day. Majority of Workers in Textile Industry and Non Textile Workers engaged in agricultural activities had heavy breakfast cum lunch and dinner as a meal pattern. Almost all the Textile Workers and Non Textile Workers engaged in agricultural activities began their day's activity by 6 a.m., breakfast cum lunch was consumed outside their homes prepared early in the morning. Dinner was mainly consumed in their homes and was usually prepared by other members of the family.

Most of subjects were non vegetarian with few exceptions (12%) but the consumption of the same was once or twice a week. Their staple cereal was ragi or rice. The general observations were that the Textile Workers used higher amount of mustard oil in their diet. Consumption of vegetables and fruits were low which could be due to their poor socio-economic status.

In the present study, as against the figure of 2875 kcal of energy for males and 2225 kcal for females (RDA standards) the energy consumption was 2593± 104 kcal per day among male Textile Workers while 1905±114 kcal per day among female Textile Workers. More females Textile worker (87.73%) as against their counterpart males (58.85%) consumed inadequate calories than RDA. The inadequacy of food energy consumption among female textile workers was more marked as compared to males. The respective energy intake among male Non Textile Workers and female Non Textile Workers were 2662±126 kcal and 2048±146 kcal per day.

Higher percentage of males Textile Workers (34.2%) when compared to females Textile Workers (32.77%) consumed inadequate amount of cereals and millets as against RDA standards. They also consumed inadequate amount of milk and milk product similar observation was made for pulse consumption also. A higher percentage of males (69.84%) as against females (67.7%) consumed inadequate amount of vegetables, sugar and jaggery in comparison to the RDA, both male and female Textile Workers consumed fats and oils more than RDA. Similarly, higher percentage of females Textile Workers (10.67%) as compared to males (6.0%) consumed less amount of meat, fish and eggs then RDA. Similar results were observed in the case of Non Textile Workers but their percentages were lesser.

As a whole it has been found that both Textile Workers and Non Textile Workers of both the sexes were consuming most of the important nutritive substances much below the average Recommended Dietary Allowances (RDA).

Body mass index was used to assess the nutritional status of Textile Workers and Non Textile Workers as it is most commonly used index of obesity or overweight, underweight and normal weight. The BMI increased with age in females but showed an irregular trend in males. The inconsistency of any particular trend may be attributed to cross sectional nature of data, variation in nutritional status, physical activity level or energy expenditure.

Chronic Energy Deficiency (CED) was seen in 29.63% of male Textile Workers and 32.27% of female Textile Workers. Obesity was seen in 6.82% of female Textile Workers and 4.53% of male Textile Workers. More or less similar result was also found among Non Textile workers but of lesser magnitude.Chronic Energy Deficiency (CED) was found to be more prevalent in Textile Workers than Non Textile Workers.

Among present Textile Workers and Non Textile Workers of both the groups, more than 60% males and 55% females had normal BMI as per the classification of WHO (2000).

It is evident that differences between Textile Workers and Non Textile Workers in anthropometric measurements and indices are due to variations in socio-economic and nutritional status and the differences were statistically nonsignificant.

The prevalence of undernutrition and overweight or obesity as studied with the help of BMI differed among Textile Workers and Non Textile Workers but was not statistically significant.

What is already known on this topic

The variations in nutritional status due to income and education are well studied (Chaudhry and Visweswara, 1983; Gopalan, 1987; Rao, 1995). Tungdim and Kapoor, (2008) showed the relationship between nutritional status and tuberculosis treatment. There is hardly any study on the variations in nutritional status among subjects in different sectors of work, different populations and gender.

Prabhakara et.al,(1993) while studying food consumption in urban slums workers found calorie consumption was 94 percent of RDA. Vijayaraghavan and Rao, (1998) studying diet and nutrition in rural India, found 48.3 per cent of the population of Karnataka to be inadequate for calorie and protein. Their diets were also deficient in iron, calcium and vitamins. In their diet survey of a rural population, found 83.33 per cent of families were consuming diets less in proteins and calories (Hiwarkar et.al, 1998).

Barker et.al, (2006) found women to have a significantly lower BMI than their male peers. Women were thinner in joint land-owning families, where the main occupation

was farming, than those in non farming families. Women were more likely to work full time in farming than men, to carry the burden of all household chores, to have less sleep, and to eat less food away from home than men.

What this study adds

Thus the study reveal that inspite of poor economic conditions they manage their food items from their available income. Still, their nutritional status is not an excellent one. It has been observed that poor nutritional status is one of the most serious health problems, especially among female. The problem of poor nutritional status is severely influenced by poverty, illiteracy and unawareness regarding basic nutrients. To eliminate the problem of poor nutritional status, source of income generation should be enhanced, educational standard must be uplifted along with awareness regarding nutrients, daily allowances of low budget and local resources based balanced diet.

Limitations of this study

Confined mainly to Textile Industry of Varanasi Bhadohi belt
Non Cooperative Attitude of the Factory Owners
Non Cooperative Attitude of the member of the family

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Tele-Health Medical Diagnostics System with Integrated Electronic Health Records

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Abstract

Providing affordable and quality Education and Healthcare are the current challenges in the developing and densely populated countries, such as India and China. The Healthcare Delivery Systems are overloaded because of the inefficient expensive systems, processes and resources. Use of Information Technology in Healthcare, especially a Tele-health medical diagnostics system, can potentially improve healthcare. The system developed offers medical diagnosis, ongoing patient care and has an ability to monitor patients remotely. This system unifies diagnostic hardware like Microscope and Vital Signs Monitor with the diagnostic software. The software consists of modules for Electronic Health Record and Disease Identification. The software has the ability to automatically identify the vital parameters and transmit the parameters to the remote doctor through broadband or wireless connectivity. The system offers simplicity and cost efficiency making it an ideal solution for use in rural areas. Currently the system is being used at few locations in India on a pilot basis and the results are very encouraging.

1. Introduction

The healthcare industry in India which comprises hospital and allied sectors is projected to grow 23 per cent per annum to touch US$ 77 billion by 2012 from the current estimated size of US$ 35 billion (₹1610 Billion) in 2009. The central and state governments are responsible for the provision of primary healthcare in the country. A spending of 1% of the GDP (effectively about Rs. 1050 per capita) on public health is not only dismally low but most of the expenditure is on staff salaries leaving little for facilities, drugs and other consumables. This is very low compared to countries like US - 16%, UK - 7.8%, Germany - 10.8%, France - 10.4% and Japan - 8%[1]. Though there is a large network of public primary care facilities in India for the healthcare delivery with numerous secondary and tertiary care facilities, the effectiveness of healthcare delivery is questionable in the public primary care facilities. Building better forward and backward linkages through a superior referral system would cause the secondary and tertiary care facilities to be more manageable and prevent them from being over burdened. Healthcare is also people / professional driven and depends on the competencies of the professional staff rather than the physical infrastructure. But this does not undermine the importance of physical infrastructure needed at many of the care centers.

In a large, overpopulated country like India with its complex social structure and economic extremes, the effect on health system is multifold[2]. Government supported healthcare delivery follows a three tier system and is the primary responsibility of each state. Majority of the hospitals in the country are rooted in manual processes, which are unable to cope with the volume of data generated[3]. According to WHO, technologies form the backbone of the services to prevent, diagnose and treat illness and disease[4]. Rural India consists of approximately 638,000 villages inhabited by more than 740 million individuals. A network of government-owned and operated sub-centers, primary health centers (PHCs) and community health centers (CHCs) is designed to deliver primary health care to rural folks. Sub-centre is the first contact point between the community and the primary health care system. Current norms require one sub-centre per 5,000 persons, one PHC per 30,000 people and one CHC per 120,000 people in the plains. Smaller populations qualify for each of these centers in the tribal and hilly areas. Each PHC serves as a referral unit to six sub-centers and each CHC to four PHCs. A PHC has four to six beds and performs curative, preventive and family welfare services. PHCs in India service more than 30,000 people each without a telephone connection and state quota of medicines of less that US$ 0.10 a year per person in their jurisdiction area[5].

This extremely poor infrastructure in terms of communication, patient care and human resources is a serious bottleneck to attempts at reforms since people are working everyday with little incentives, time or resources to try and embrace new technologies and new approaches to healthcare[5]. In addition, the inefficient use of resources adds to the problems in India's healthcare delivery mechanism[6]. Unequal distribution of resources is a reflection of this inequality and adversely affects the health of under-privileged population. The under-privileged are unable to access the healthcare due to geographical, social, economic or gender related distances[2]. Reliable information and effective communication are crucial elements in public health practices. The use of appropriate technologies can

increase the quality and the reach of both information and communication[7]. An implementation of the system demonstrated that electronic summary utilization data could provide daily information that would support the improvement of health care outcomes and efficiency[8]. It was also shown in this study that this approach could be implemented in a simple, direct manner with minimal expenses. The benchmark suggests that well functioning health centers can take care of the vast majority of patients' problems[9].

After decades of traversing a snail-like adoption curve, computerization is on the verge of altering medical practice fundamentally, partly because of the quality revolution. The labor costs of retrieving and reviewing medical records to gather the required quality data and the ineffectiveness of non–systems-based solutions for improving performance are driving institutions to recognize the need to track clinical processes and outcomes and to prompt clinicians via computerized systems[10]. A further study determined that there is a need to create viable IT-based services, among others, with regard to micro-enterprises in rural areas[11]. Barriers to implementation of IT in Healthcare Delivery can be classified as situational barriers (including time and financial concerns), cognitive and/or physical barriers (including users' physical disabilities and insufficient computer skills), liability barriers (including confidentiality concerns), and knowledge and attitudinal barriers[12].

Healthcare Information and Management Systems Society (HIMSS) under the aegis of its Global Enterprise Task force headed by Dr. Steve Arnold was asked to investigate efforts to implement the EHR in a host of countries around the world[13]. The countries covered by this study were Netherlands, Greece, England, Wales, Denmark, Norway, India, New Zealand, Malaysia, Hong Kong, Singapore, Israel, Canada and USA. According to this study local and nationwide efforts to realize EHR systems were intermittently reported. In India, the IT adoption in Healthcare is estimated to be only five percent[13]. To gain insight into the functioning of the healthcare centers with respect to use of information technology and their effectiveness in healthcare delivery, a survey was done. This survey was undertaken in Gadag and Bagalkot districts to assess the ground realities in healthcare centers by evaluating various parameters that would influence the quality of healthcare delivery.

2. Material and Methods

The details of the district healthcare facilities - the District Hospitals (DH), Taluk Hospitals (TH), Community Healthcare Centers (CHC), Primary Healthcare Centers (PHC), Primary Healthcare Units and National Leprosy Control Center (NLCC) - were obtained from the District Health Department. Out of the total 107 facilities, 83 facilities participated in the assessment that accounts to 77.6 % of assessment coverage.

A questionnaire consisting of a set of 86 questions related to patient load, medical record formats, hospital infrastructure and staffing information was used for this assessment. Responses to the questionnaire were tabulated. The responses were used to depict the results and draw inferences.

3. Results of the Survey

On an average 70 patients per day use the healthcare centers. The variance in this number is significant with some interior HCs having less than 10 patients per day visiting them and more than 100 patients per day visiting the THs. The average Inpatient to Outpatient ratio is 1:10, with the average duration of stay of inpatients being 2-3 days. The hospitals surveyed had an average of 10 beds for inpatients in the hospital. Each HC, on an average has two full-time doctors and between 11-20 additional employees. The average age range of full time doctors working in these HC is 30-35 years. HCs reportedly have an average of 15 paramedical staff. Quality of healthcare depends on the efficiency of the doctors as they have to attend to at least 35 patients on an average daily. Use of health information technologies has the potential to improve.

3.1. Patient Records

All the HCs surveyed used paper to maintain patient medical records and spent a lot of efforts (time/money) on maintenance.

3.2. Quality of Care

As many as 49 out of 83 HCs responded that they fell far behind on the use of proper technology in treating patients. They also felt that they could have treated patients better if they had access to quicker and more accurate information.

3.3. Patient Referrals

Each HC refers 5 to 10 patients to other HCs every month. Patients are referred from one HC to another predominantly (77%) by using paper documents and the rest are referred over telephone. In the case of referral based on paper documents, the quality of information flow depended on the past history of the patient and the respondents further conveyed that an accurate record of patient history was not available in most of the cases. In the case of telephone referral, the quality of referral is based on the doctor's knowledge about patient medical history and also depends on the extent of time spent on phone to provide the history. As doctors keep treating on an average of 70 patients per day, it will be difficult to convey accurate diagnostic information during the referral. In both cases, the quality of referral suffers leading to repetition of the same treatment or ineffective treatment at the secondary Healthcare center. This reduces the quality of Healthcare and increases the cost of treatment.

3.4. Improvement of Operating Efficiency

Of the total 83 respondents, 69 respondents (83%) felt that implementing an IT Solution would improve Patient Care and Administration. While most respondents agreed that an IT solution promises more results than it can deliver, on an interesting note, most respondents also thought that implementation of an IT solution would affect all stakeholders within the HC.

4. Tele-Health Medical Diagnostics System

From the literature survey, it is evident that there is very less work done to increase the effectiveness of the Healthcare Delivery System in Rural India. There is a need for systematic evaluation of the requirements and conditions of Rural India for better and affordable Healthcare. The use of Information Technology in this area will help.

The system developed is a tele-health medical diagnostic system which will be useful in mitigating the current issues and challenges. The solution comprising of both hardware and software addresses the pressing needs of today like introducing Electronic Health Records and helping control Disease Outbreak. The system enables multi-point, multi-referral consultation and one to one consultation between patient and doctor as well as doctor and doctor.

4.1. Hardware

The hardware is packaged into a "box" powered by an Intel Processor and Solar Panel / UPS as shown in Fig.1

4.1.1. Details of Hardware

- Intel Embedded Processor (Dual Core)
- Keyboard / Mouse / Web-Cam
- Vital Signs Monitor
- Wireless Connectivity
- Microscope with Camera
- Powered by Solar Panel/UPS

4.2. Software

The Software has the following modules:

4.2.1. Medical Diagnostics Kit

This is a software with necessary interfaces and algorithms to diagnose disease conditions. Capturing the patient symptoms, providing differential diagnosis, measurement of vital signs and analyzing patient samples for various diseases are the key functions of this software.

Fig. 1: Tele-Health Kiosk

- The patient is registered during the first visit and the symptoms are recorded.
- Integrated Vital Signs Monitor: A single point capturing of vital signs of a patient like body temperature, non-invasive blood pressure (NIBP), pulse rate, SPO2, electro cardiogram (ECG) and heart rate. These vital signs are captured and automatically uploaded to the patient electronic health record.
  - The ECG can be viewed as a 3/5 - channel waveform with 13 arrhythmia classification. The software will be able to calculate Heart Rate, identify and judge lead off and detect ST segment. The depressed or elevated ST segment helps in the diagnosis of ventricular ischemia or hypoxia.
  - Non-Invasive Blood Pressure (NIBP) can be measured in different modes from Neonatal to Adult mode. Manual, Automatic, Continuous measurement modes can also be used. Calibration and Leakage air checking can be performed.
  - The pulse oximeter (SPO2) provides the non-invasive measurement of arterial blood oxygen saturation and pulse rate. Measurement modes can be set from neonatal to adult. It is a single channel plethysmogram.
  - Respiration rate is calculated with one channel respiration waveform and provides apnea alarm.
  - Temperature data can be obtained from two channels.
- Integrated Disease Identification using Image Processing & analyzing algorithms: This module provides a cost effective means to diagnose disease through automated blood test procedures. Absence of a disease / health condition is indicated clearly by using the blood / sputum smear. Possible presence of an indication of a disease / health condition is flagged by the system for further analysis. Tele-Health Kiosk software is capable of supporting tele-pathology through
  - Dynamic Imaging – enables a doctor to view the real time pathological images. A technician places the prepared smear slide under a microscope integrated with a digital camera. Doctor from a remote place can send a request to view the slide / smear to a technician. On technician accepting the request, doctor will be able to view the slide / smear in real-time & will be able to make annotations of the image.
  - Static Imaging – Allows a technician to upload the stored pathological images into the patient EHRs. Doctor will be able to view these stored images at a time convenient.

The software modules help the doctor / technician to measure DBC (Differential Blood Count), detect malarial parasites and recognize tuberculosis bacilli automatically.

- CytoSight: A digital microscopy product that can analyze blood smear slides to get differential blood count (DBC) using image processing.
- Malaria Detect: Analyses blood samples to detect RBCs affected with malaria parasites.
- Tuberculosis Detect: Analyses the sputum samples to detect tubercle bacilli (Mycobacterium tuberculosis).
- TomoSight: This allows a technician to upload the radiology images from different modalities viz X-Ray, CT-Scan & MRI that will be transmitted to a remote doctor for consultation. Advanced image compression makes the image transfer with a low internet bandwidth possible.

4.2.2. Integrated Electronic Health Records (EHR)

EHR is an integral part of Tele-Health Kiosk software. Every activity that is carried out by a technician or a doctor in relation to a patient is recorded in digital format. The key features of EHR software:

- Patient Registration with patient unique ID.
- Creation of multiple visits against a patient unique ID to maintain the patient history.
- Recording the patient illness details and treatment given for future use
- Captures the symptoms & complaints of visit
- Maintains the history of patient images (Viz., Wounded body part, Broken leg)
- Maintains the history of Pathology images with the annotations
- Maintains the history of Radiology images with the annotations
- Captures prescriptions by a doctor.
- The captured information is available to view during the patient's subsequent visits that aid a doctor in decision making & thus providing quality care.
- Transfer patient data between PHC, CHC and District Hospitals (during patient referral)
- Patient referral for higher medical care is enabled electronically thus improving the quality of referrals.

4.2.3. Telemedicine

Network Software to connect various nodes for exchange of visual image, audio and data between the PHCs and District / City Hospital

The above solutions transform the PHC into a center providing powerful healing to rural patients. It can treat those in need, save their data, share their data for expert consultation, save a lot of time in administering care and also network between all the healthcare centers. Tele-Health Kiosk can enable treatment to a patient by helping a trained non doctor at PHC collect patient information and make information available to doctor at remote location to provide treatment or advise. This can be enabled on an online or offline mode.

5. Conclusion

By implementing such a system healthcare awareness of patient increases and demographic information will be available for planning better healthcare delivery. The system with online information removes the need for patient mobility and provides flexibility to doctor by enabling a doctor to attend to patients at his / her convenient time. By deploying such Tele-Health Kiosks in different healthcare centers in rural India and interconnecting them, efficiency of Healthcare Delivery can be increased thereby reducing cost of healthcare. Currently the Tele-Health Kiosk is operational in few healthcare centers in Karnataka. The initial response from rural patients and doctors is encouraging.

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A Potential Role of Apo B in the Risk Stratification of Type 2 Diabetic Patients with Dyslipidemia

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Abstract

Background

Dyslipidemia matters in type 2 diabetes and appreciation of the lipid abnormalities in diabetes has changed with time. There are few data on Apo B levels in these patients and consequently there is little information on the frequencies of the various dyslipidemic phenotypes.

Methods

Plasma lipids and Apo B were measured by standardized methods. The patients were categorized by two different methods. The first was based on triglyceride (<150mg/dl) and LDL cholesterol (<100mg/dl), and the second was based on triglyceride (<150mg/dl) and Apo B (<137mg/dl).

Results

As overall, plasma triglycerides were elevated, total and LDL cholesterol were normal and HDL was decreased. Results of the phenotyping analysis were, using the conventional approach; only 20% has elevated LDL cholesterol. Using the new approach, 63% has an elevated Apo B and therefore an elevated LDL particle number. The mean LDLc for hypertriglceridemic-hyperapo B group was 120.4mg/dl, whereas the mean Apo B for the same was 239mg/dl, indicating its significance over LDL cholesterol.

Conclusion

Diagnosis based on triglycerides and Apo B revealed more number of patients with atherogenic, dyslipidemic status rather than by diagnosing on triglycerides and LDL cholesterol levels. Apo B is a better cardiovascular risk marker and can replace LDL cholesterol in maintaining statin therapy in type 2 diabetic patients.

Key Words

Apo B, dyslipidemia, cardiovascular risk, type 2 diabetes.

Introduction

Diabetic patients are vulnerable to different lethal diseases including cardiovascular disease, which is still ranked as the number one killer disease in the world[1]. Diabetes is not just dysglycemia; particularly type 2 diabetes is also dyslipidemia[2]. Dyslipidemia that frequently occur in type 2 diabetes might play a critical role in producing the accelerated macro vascular atherosclerotic disease, that is, unfortunately, so common. Their features need to be understood in detail[3].

Recent studies have shown that the lipid abnormalities associated with diabetic dyslipidemia begin to develop prior to the clinical onset of type 2 diabetes, at a time when blood glucose concentrations are relatively normal. It followed that the implementation of effective antihyperlipidemic treatment to the diabetic population requires an intensive approach[1].

In diabetes, given the frequency of hypertriglyceridemia, small dense Low Density Lipoproteins (LDL) are common and their feature is now generally included in the definition. It is still not widely appreciated that not only is LDL composition altered in patients with type 2 diabetes, but LDL particle number is frequently increased as well, the combination resulting in hypertriglyceridemia, hyper Apolipoprotein B, one of the commonest, most atherogenic dyslipoproteinemias[2]. Apo B is the major apolipoprotein of Very Low Density Lipoprotein (VLDL), Intermediate Density Lipoprotein (IDL) and LDL particles. In line with non- High Density Lipoprotein (Non-HDL), plasma levels of Apo B represent all atherogenic lipoproteins in the circulation; however because every atherogenic particle contains a single Apo B molecule, Apo B levels also provide an accurate reflection of the number of atherogenic particles[4].

The Quebec cardiovascular study is the most up to date, prospective, epidemiologic investigation of the risk factors responsible for coronary artery disease. It is also the first study in which Apo B was measured in all subjects, and it is worth noting that Apo B was found to be the single most important lipid parameter for influencing outcome[5]. Not only is Apo B a better index than LDL cholesterol (LDL c) to predict risk, it is also a more accurate guide to the adequacy of statin therapy 5. Because there is one Apo B molecule per particle of LDL, IDL, and VLDL, total Apo B levels highly correlate with non-HDL cholesterol levels. Non-HDL cholesterol provides the total cholesterol of LDL, IDL, VLDL, but Apo B reflects the total particle number in these lipoproteins6. Although

growing evidence suggests that non-HDL c, and Apo B are stronger predictors of Cardio Vascular Disease (CVD) than LDL c alone in the general population, epidemiologic data among diabetic individuals are limited.

Hence we conducted a prospective study to determine the prevalence of dyslipidemic phenotypes, including Apo B in type 2 diabetic patients and consequently to evaluate their cardiovascular risk.

Material and Methods

A total of 150 type 2 diabetes patients were selected from medicine clinic aged between 35 and 70 yrs. The study was conducted at Sree Siddhartha Medical College and Research Centre, Sree Siddhartha University, Tumkur, Karnataka. Type 2 diabetic patients under medication that affect lipoprotein metabolism were excluded from this study. The protocol was approved by the local ethical committee of our hospital and patients gave their informed consent.

The clinical data was collected. Anthropometric measurements were taken and BMI (kg/m2) was calculated. Blood samples were obtained after an overnight fast (10-12 hrs). The blood was left at room temperature for 30min and the serum was separated. Total cholesterol (Tc), Triglyceride (Tg), HDL-c and Apo B were immediately analysed from total serum. Tg and Tc were measured by commercially available fully enzymatic method. HDL –c was measured directly by a commercial kit by an end point method. Serum LDL-c was measured indirectly using the following equation.

[LDL-c] = [Tc] – [(HDLc + TG/5)]

The factor [TG/5] is an estimate of VLDL c concentration and is based on the average ratio of TG to cholesterol in VLDL. Serum Apo B was measured by an end point method, using commercial kit. The reference values are provided now for Apo B. The patients were categorized into four groups based on triglyceride and Apo B levels, and were also divided into four groups based on LDLc and triglyceride levels.

Statistical analysis: student's t test was performed as the test of significance. $P < 0.05$ was considered statistically significant.

Results

Of the 150 subjects, 97(64.66%) were men and 53(35.33%) were women. None were taking any medication that was known to affect lipoprotein levels. The features of the cohort are shown in table 1. Obesity was a common factor. There were no significant differences between males and females. The mean values for Apo B and lipids are shown in table 1. Total and LDL cholesterol were normal, triglycerides were elevated, and HDL cholesterol was decreased. The average Apo B is discordant with the average LDL cholesterol, thus suggesting that small LDL particles are present.

In our study, dyslipidemia was more pronounced in women than men, as evidenced by significant increase in total cholesterol, triglyceride and Apo B. But the average HDL cholesterol was same in both men and women.

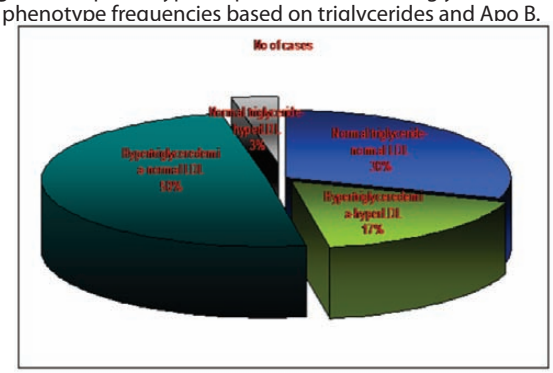
Based on plasma triglyceride and LDL-c, the cohort was divided into four phenotypes, normal, normal triglyceride-increased LDLc, increased triglyceride-normal LDLc, and increased triglyceride- increased LDL. Using the conventional classification, these correspond to normal, type IIA hypercholesterolemia, type IV hyperlipoproteinemia, and type IIB or combined hyperlipidemia[3].

These findings were compared with those obtained with phenotypes based on triglyceride and Apo B. There were four phenotypes again, normal, normotriglyceride- hyper Apo B, increased triglyceride- normo Apo B, and increased triglyceride- increased Apo B.

Fig 1 A shows the phenotype frequencies based on triglyceride and LDL c, whereas Fig 1B shows the phenotype frequencies, which are based on triglyceride and Apo B,. Using the conventional approach, 30% were normal, 03% had type IIA, 50.0% had type IV hyperlipopoteinemia, and 17% had IIB. In total 20% had abnormal LDL, evidenced by increased LDL c.

The corresponding results using triglyceride and Apo B, 18% were normal, 13% were normotriglyceridemic-hyper Apo B, 50% were hypertriglyceridemic- hyper Apo

Figure 1: A: phenotype frequencies based on triglycerides and LDL. **B:** phenotype frequencies based on triglycerides and Apo B.



A

B

Table 1: Characteristics of the cohort

Criteria	Total	Women	Men	P-value
n	150	53	97	
Age(yrs)	52.5	52.5	52.5	
Total cholesterol(mg/dl)	204	205	194	HS P<0.001
Triglycerides(mg/dl)	233	236	235	HS P<0.001
LDL cholesterol(mg/dl)	101.6	101.6	104.9	HS P<0.001
HDL cholesterol(mg/dl)	38	38	38	HS P<0.001
Apo B(mg/dl)	220.6	229	208.3	HS P<0.001
BMI(kg/m^2)	31.5	32	31.8	HS P<0.001

Data are means(SD)

Table 2: Variables by triglycerides/Apo B phenotype

	Hypertriglyceride-hyper apo b	Hypertriglyceride-normo apo b	Normotriglyceridemic-hyper apo b	Normotriglyceridemic-normo apo b	P
Total cholesterol (mg/dl)	201.2	245.8	182.7	187.4	HS P<0.001
Triglyceride (mg/dl)	246.7	274.5	138	130	HS P<0.001
LDL (mg/dl)	120.4	105	111	136	HS P<0.001
HDL (mg/dl)	37	37.8	38	39.4	HS P<0.001
Apo B (mg/dl)	239	111.6	168	108.7	HS P<0.001
BMI (kg/m^2)	32.4	31.7	31.1	29.5	HS P<0.001

Data are means(SD)

B, 19% were hypertriglyceridemic-normo Apo B. In total, 63% had hyper Apo B.

Thus, the conventional approach suggested that only 20% had abnormal LDL, and the approach based on Apo B indicated that 63% had hyper Apo B, suggesting that small dense LDL particles are present. Hence, it is a better approach, to evaluate the small LDL particles.

The lipids, Apo B and BMI results for the phenotypes based on the triglyceride and Apo B group are depicted in table 2. The results for the normal group for lipids and Apo B were well within normal limits. In both hypertriglyceridemic groups, HDL was reduced. The mean LDL cholesterol for hyper triglyceridemic- hyper Apo B group was 120.4 mg/dl. In contrast the mean Apo B for the same group was 239mg/dl, indicating its significance over LDL cholesterol.

Discussion

A history of diabetes is equivalent in risk for death to a history of myocardial infarction, and the combination compounds the risk[7]. The United Kingdom Prospective Diabetic Study found that better glycaemic control reduced the frequency of microvascular disease, but the trend toward a reduced frequency of macrovascular disease was not stastiscally significant. In addition, the frequency of macrovascular disease in patients with type2 diabetes varies geographically, suggesting that factors like dyslipoproteinemias play an important role in the pathogenesis of the vascular disease[7].

LDL particles in diabetic patients are more likely to be glycated, and in vitro studies indicate that glycated LDL particles are more likely to be oxidised. The collagen and elastin within the arterial wall are also more likely to be glycated; in vitro studies suggest that such changes are likely to entrap LDL particles that enter the vessel wall. Thus, diabetes may magnify the atherogenic potential of dyslipoproteinemias[7]. The combination of hypertriglyceredemia, hyper Apo B, increased number of small, dense LDL particles, and low levels of HDL-cholesterol, the atherogenic lipoproteins profile is not restricted to persons with type 2 diabetes mellitus; it is also common in persons with insulin resistance, those who will develop diabetes, and those with coronary disease[7].

Apo B synthesis is required for the hepatic secretion of VLDL, and Apo B remains associated with the particle during the triglyceride hydrolysis and lipid exchange cascade until its clearance from the circulation as IDL or LDL particles. Measuring Apo B in plasma is roughly equivalent to quantifying the number of Apo B containing lipoproteins secreted by the liver, because there is systematically only one Apo B molecule per particle secreted[8]. The amount of cholesterol per LDL particle can vary substantially; LDL cholesterol is not a reliable index of LDL particle number[7]. Of the total Apo B, >90% are LDL particles or more precisely, IDL and LDL particles, as LDL cholesterol is the sum of the cholesterol in the IDL and LDL fractions. This remains true even in hypertriglyceredemia; therefore, total plasma Apo B is a reliable surrogate for LDL particle number[7].

Much more attention in type 2 diabetes has been paid to VLDL and HDL particles than to LDL particles. The major findings of our study oppose this view. In the present study, 63% of our patients had hyper Apo B and therefore elevated LDL particle number. In contrast, based on conventional LDL cholesterol approach, only 20% of our cohort had increased LDL cholesterol, a major difference for the therapeutic outcome. The present study supports the reports of Wagner et al[9], who were the first to study dyslipidemic phenotypes in type 2 diabetes, incorporating Apo B. Studies have shown that small dense LDL particles are common in type 2 diabetes[7] and that Apo B levels, on average, are elevated in type 2 diabetes[9]. The overall results of our study are in accord with other reports.

There is abundance evidence from case control reports to support the role of Apo B as an important risk factor for Ischemic Heart Disease (IHD). Prospective data from the British United Provident Association study showed that Apo B was most strongly associated with IHD even after adjustment for total cholesterol and triglyceride levels in the multivariate analysis 8.In youth with type 1 diabetes, elevated Apo B and dense LDL are not highly prevalent, whereas elevated Apo B and dense LDL were common lipoprotein abnormalities in youth with type 2 diabetes[10]. The intensive lipid lowering therapy targeted to patients with elevated Apo B levels not only diminished the rate of progression of coronary artery disease but also induced a net regression in angiographically determined coronary lesions[8]. Taiwanese type diabetic patients – suggests that Apo B containing lipoproteins could also initiate early glomerular injury leading to incipient diabetic nephropathy with micro albuminuria[11]. It is arguably, even more urgent to implement apoproteins into the clinical practice in the developing countries in which the healthcare infrastructure are less developed[12].

With respect to LDL c, Non- HDL c and Apo B in relation to cardiovascular event occurrence, the current literature consists primarily of a series of epidemiological studies, both Non- HDL c and Apo B were found to be more accurate risk predictors than LDL c, Apo B being superior[4]. Apo B is an extension of what came before, a more precise and more practical measure to improve clinical practise and treatment outcomes[12]. We do not fully assess the lipoprotein status of patients with type 2 diabetes if Apo B is not measured. That means we will assess risk less well and will likely treat patients less effectively[13]. One management options for high risk patient is to measure Apo B during statin therapy to make sure that the total number of atherogenic particles is reduced[14].

Statins are becoming an increasingly popular therapy for patients with type 2 diabetes because their LDL cholesterol levels, although normal, are above target levels[3]. The treatment of the dyslipidemia of the metabolic syndrome should be focused on lowering LDL c and Apo B and increasing HDL. The percent reduction in LDL c and Apo B by statin medications is similar, but Apo B may be a better marker of treatment efficacy in metabolic syndrome patients with normal LDL cholesterol 15.For highest risk individuals those with known clinical CVD and those who do not have clinical CVD but who have diabetes and one or more other cardio metabolic risk factors beyond their dyslipidemia, the recent ADA/ACC consensus statement suggested a target level of LDL c <70mg/dl, Non-HDL c <100mg/dl, and Apo B < 80mg/dl[16].

Apo B will be particularly useful in assessing patients who are hypertriglyceredemic, with either mixed hyperlipidemia or as an isolated abnormality. Thus, Apo B should be measured in dyslipidemias associated with metabolic syndrome, obesity, type 2 diabetes, chronic kidney diseases and familial hyperbetalipoproteinemia, since all such patients have elevated plasma Apo B[17].

In line with recently adopted Canadian guidelines, the addition of Apo B represents a logical next step to National Cholesterol Education Program Adult Treatment Panel III (NCEPATP III) and other guidelines in US. It appears prudent to consider, using Apo B along with LDL c to assess LDL related risk for an in term period until the superiority of Apo B is generally recognised[18].

To conclude, the abnormalities in LDL composition are frequently present in patients with type 2 diabetes, and the extent of which is evident only if Apo B is measured in addition to the standard lipid profile. Apo B is a better cardiovascular risk marker and can replace LDL cholesterol in maintaining statin therapy in type 2 diabetic patients.

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Studies on Nicotinic Acetylcholine Receptor (nAChR) and Acetyl Cholinesterase (AchE) Inhibitors and their similar structure for Alzheimer's disease Using Hex

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Abstract

Alzheimer's disease (AD) is the most common cause of dementia among older people, but it is not a normal part of ageing. It is established that a definite relationship between AD and Acetylcholinesterase (AChE) and nicotinic acetylcholine Receptor (nAChR). Acetylcholinesterase inhibitors are employed to reduce the rate at which acetylcholine (ACh) is broken down, thereby increasing the concentration of ACh in the brain and combating the loss of ACh caused by the death of cholinergic neurons. There are many drugs available to counter act the complications of AD. This paper aims to find out the difference between the available drugs and their similar structures to combat the modification nAChR and AchE by docking studies using Hex so as to pin point the best one among the various drugs and their similar structure for better treatment of AD. We observed that similar structure of Rivastigmine. (Bambuterol, Estramustine); Donepezil (Tetrabenazine, Benzquinamide) and Galantamine (Marinol and Deserpidine) are better on the ground better docking result. We studied 14 drugs and similar structures of some of the drugs by Hex docking method. The result showed that all these drugs are not docked well with nAChR having low negative energy. But the docking between AchE and all the drugs selected shows better docking with high negative energy but the similar structure of some of the drugs (Rivastigmine, Donepezil and Galantamine) are better than the mother drugs. Thus we conclude that an immediate drug development research project is needed to produce new generation drugs for AD at the genetic level with caution should be taken to diet factors in the proper age groups to prevent the onset of the disease in the bud condition.

Keywords

Alzheimer's disease, nicotinic acetylcholine Receptor, Acetylcholinesterase, DrugBank, Drugs for AD

Introduction

Alzheimer's disease, hereafter called AD, is a disease of old age that starts with mild memory problems and ends with severe brain damage. AD is the most common cause of dementia among older people, but it is not a normal part of ageing. Generally, it is diagnosed in people over 65 years of age (Brookmeyer, et.al., 1998) although the less-prevalent early-onset alzheimer's can occur much earlier. As of September 2009, this number is reported to be 35 million-plus worldwide (http://health.yahoo.com/news/ap/us_med_more_alzheimer_s.html).The prevalence of Alzheimer's is thought to reach approximately 107 million people by 2050 (Brookmeyer, et .,al. 2007) AD starts in a region of the brain that affects recent memory, then gradually spread to other parts of the brain. Although treatment can slow the progression of AD and help manage its symptom, in some people, currently there is no cure for this devastating disease. The major focus of AD therapeutic research is now disease modification that slowing the progression of the underlying neurobiology of AD (Vellas, et., al, 2008). Today's research aim to find out biochemical pathways leading to amyloid accumulation, variation in Acetylcholine receptors and Acetylcholine esterase (Nashmi at., al, 2003). Current nAChR research studies the characteristic role of nAChR, as well as the ways they are modified by drugs and chemicals. It is shown that beta-amyloid can bind to nAChR and impair their function (Pittit ,et. .,al, 2001). Application of certain drugs can minimize the negative effect of beta-amyloid that is they could serve as treatment for AD. The other approach to treat AD is directly modifying the nAChR. Another major feature of AD is decreased cholinergic (Acetylcholine-based) activity in the brain. AD had up to 90% decreases in acetylcholine esterase activity (Small and Fodero, 2002). Acetylchloineseterase involved in the degradation of acetylcholine. It is mainly found at neuromuscular junctions and cholinergic synapses in the central nervous system, where its activity serves to terminate synaptic transmission. AChE has a very high catalytic activity — each molecule of AChE degrades about 5000 molecules of acetylcholine per second. The choline produced by the action of AChE is recycled — it is transported, through reuptake, back into nerve terminals where it is used to synthesize new acetylcholine molecules (Purves ,et.,al, 2008). Acetylcholinesterase is the target of many Alzheimer's Dementia drugs, Rivastigmine, Donepezil, Galantamine etc. Four medications are currently approved by regulatory agencies such as the U.S. Food and Drug Administration (FDA) and the European Medicines Agency (EMEA) to treat the cognitive manifestations of AD: three are acetylcholinesterase inhibitors and the other is memantine, an NMDA receptor antagonist. No drug has an indication for delaying or halting the progression of the disease. Reduction in

the activity of the cholinergic neurons is a well-known feature of Alzheimer's disease (Geula and Mesulam,1995) Acetylcholinesterase inhibitors are employed to reduce the rate at which acetylcholine (ACh) is broken down, thereby increasing the concentration of ACh in the brain and combating the loss of ACh caused by the death of cholinergic neurons (Stahl 2000).) As of 2008, the cholinesterase inhibitors approved for the management of AD symptoms are donepezil (brand name Aricept) (US National Library of Medicine (MedlinePlus).2007-01-08. http://www.nlm.nih.gov/medlineplus/druginfo/medmaster/a697032.html.) galantamine (Razadyne) (US National Library of Medicine (Medline Plus). 2007-01-08. http://www.nlm.nih.gov/medlineplus/druginfo/medmaster/a699058.html)and rivastigmine (branded as Exelon (US National Library of Medicine (Medline Plus). 2007-01-08. http://www.nlm.nih.gov/medlineplus/druginfo/medmaster/a602009.html.) and Exelon Patch (US National Library of Medicine (Medline Plus). 2007-01-08. http://www.nlm.nih.gov/medlineplus/druginfo/medmaster/a607078.html. Retrieved 2008-03-20.). There is evidence for the efficacy of these medications in mild to moderate Alzheimer's disease (Birks, 2006) and some evidence for their use in the advanced stage. Only donepezil is approved for treatment of advanced AD dementia (Birks and Harvey, 2006). The use of these drugs in mild cognitive impairment has not shown any effect in a delay of the onset of AD(Raschetti, et..,al, 2007) The most common side effects are nausea and vomiting, both of which are linked to cholinergic excess. These side effects arise in approximately 10-20% of users and are mild to moderate in severity. Less common secondary effects include muscle cramps, decreased heart rate (bradycardia), decreased appetite and weight, and increased gastric acid production. Glutamate is a useful excitatory neurotransmitter of the nervous system, although excessive amounts in the brain can lead to cell death through a process called excitotoxicity which consists of the overstimulation of glutamate receptors. Excitotoxicity occurs not only in Alzheimer's disease, but also in other neurological diseases such as Parkinson's disease and multiple sclerosis (Sastre, et..,al, 2004) Memantine (brand names Akatinol, Axura, Ebixa/Abixa, Memox and Namenda) (US National Library of Medicine (Medline). 2004-01-04. http://www.nlm.nih.gov/medlineplus/druginfo/medmaster/a604006.html.) is a noncompetitive NMDA receptor antagonist first used as an anti-influenza agent. It acts on the glutamatergic system by blocking NMDA receptors and inhibiting their overstimulation by glutamate (Lipton, 2006). Memantine has been shown to be moderately efficacious in the treatment of moderate to severe Alzheimer's disease. Its effects in the initial stages of AD are unknown (Sastre, et.., al, 2004) Reported adverse events with memantine are infrequent and mild, including hallucinations, confusion, dizziness, headache and fatigue. The combination of memantine and donepezil has been shown to be "of statistically significant but clinically marginal effectiveness". (Raina ,et .,al, 2008)Antipsychotic drugs are modestly useful in reducing aggression and psychosis in Alzheimer's patients with behavioural problems, but are associated with serious adverse effects, such as cerebrovascular events, movement difficulties or cognitive decline, that do not permit their routine use (Sink, et.,al, 2005; Ballard, et.,al, 2009) When used in the long-term, they have been shown to associate with increased mortality(Ballard, et..,al 2009). This paper aims to find out the difference between the available drugs and their similar structure to combat the modification nAChR and AchE by docking studies using Hex so as to pin point the best one among the various drugs and their similar structure to treat AD.

Material and Methods

Searching drugs for AD drugs

The DrugBangk was searched for the keyword Alzheimer's disease, (http://www.drugbank.ca/search/search?query=Alzheimer%92s+disease). Itreturned 299 results. By therapeutic scrutiny selected 14 drugs that specially designed for AD only. The similar approved structure was then retrieved and their durgcard for further details of the drugcard was searched for further details concerned. The details of the drugs like formula, molecular weight, drugbank ID were noted. The drugbank was also searched for nAChR and AchE.

Construction of drug structure

The Canonical SMILES for ache drug with their similar structure was copied from drugcard and constructed the 3Dstructure using ACDlab. The PDB ID was noted for each drugs, their similar structure and nAChR and AChE. The 3D structure was retrieved by PDB format file. The PDB files are used for docking experiment.

Docking method

The docking was done with Hex using various parameters mentioned in the (table 1). Hex is an interactive molecular graphics program for calculating and displaying feasible docking modes of pairs of protein and DNA molecules.

Table1: The parameters used for Docking study

Correlation type	**Shape only**		
FFT Mode	3D fast lite		
Grid dimension	0.6	Solution	2000
Receptor range	180	Step size	7.5
Ligand range	180	Step size	7.5
Twist range	360	Step size	5.5
Distance range	40	----------	----------
Scan step	0.75	Substeps	2
Steric scan	25	----------	----------
Final scan	25	----------	----------

Table 2: Docking of Nicotinic Acetyl Cholin Receptor

	Drugs	Drugbank ID	Formula	Mol.wt	pdb ID	E-Value With AChE	E-Value With nACR
1	**Rivastigmine**	DB00989	$C_{14}H_{22}N_2O_2$	250.3367	181829525473	-132	-25.29
	A. Bambuterol	DB01408	$C_{18}H_{29}N_3O_5$	367.4400	185814071309	-249.92	-34.36
	B. Estramustine	DB01196	$C_{23}H_{31}Cl_2NO_3$	440.4030	908475224834	-200.65	-50.32
2	**Donepezil**	DB00843	$C_{24}H_{29}NO_3$	379.4920	1955615691309	-120.28	-43.32
	A. Tetrabenazine	DB048	$C_{19}H_{27}NO_3$	317.4226	57094718248	-195.78	-49.87
	B. Benzquinamide	DB00767	$C_{22}H_{32}N_2O_5$	404.4999	497529052	-195.78	-45.89
3	**Galantamine**	DB00674	$C_{17}H_{21}NO_3$	287.3535	5208775324834	-137.74	00.00
	A. Marinol	DB00470	$C_{21}H_{30}O_2$	314.4617	7259701924834	-147.26	00.00
	B. Deserpidine	DB01089	$C_{32}H_{38}N_2O_8$	578.6527	1057364725473	-227.11	-64.98
4	**Memantine**	DB01043	$C_{12}H_{21}N$	179.3018	98946041309	-117.92	-23.47
	A. Decamethonium	DB01245	$C_{16}H_{38}N_2$	258.4863	9889681224834	-69.95	00.00
	B. Mecamylamine	DB00657	$C_{11}H_{21}N$	167.2911	770850261309	-108.61	-22.97
5	**Tacrine**	DB00382	$C_{13}H_{14}N_2$	198.2637	1018893624834	-101.57	00.00
	A. Frovatriptan	DB00998	$C_{14}H_{17}N_3O$	243.3043	145138571309	-153.74	-19.71
6	**Phosphatidylserine**	DB00144	$C_{13}H_{24}NO_{10}P$	385.3041	9149560425493	-208.36	-26.52
7	**NADH**	DB00157	$C_{21}H_{29}N_7O_{14}P_2$	665.4410	5709471824834	-200.58	00.00
	A. Reserpine	DB00206	$C_{33}H_{40}N_2O_9$	608.6787	7090618324834	-187.89	-52.71
	B. Risperidone	DB00734	$C_{23}H_{27}FN_4O_2$	410.4845	784144811309	-137.93	-44.45
8	**Rosiglitazone**	DB00412	$C_{18}H_{19}N_3O_3S$	357.4270	2952292424834	-142.10	-29.60
9	**Ergoloid mesylate**	DB01049	$C_{33}H_{45}N_5O_5$	591.7409	6379163824834	-253.04	-43.05
	A. Dihydroergotoxine	DB01287	$C_{34}H_{41}N_5O_8S$	679.7830	433056222942	-232.2	-98.13
	B. Dihydroergotamine	DB00320	$C_{33}H_{37}N_5O_5$	583.6774	445242324834	-196.04	00.00
10	**L-Glutamic Acid**	DB00142	$C_5H_9NO_4$	147.1293	4474104424834	-115.29	00.00
11	**Vitamin E**	DB00163	$C_{29}H_{50}O_2$	430.7061	99781570204834	-202.57	-38.85
12	**Choline**	DB00122	$C_5H_{14}NO$	104.1708	9966721621773	-80.08	00.00
13	**Lipoic Acid**	DB00166	$C_8H_{14}O_2S_2$	206.3260	54755337124834	-148.68	00.00
14	**Choline alfoscerate**	DB04660	$C_8H_{21}NO_6P$	258.2292	31193381824834	-136.13	40.33

Hex can also calculate protein-ligand docking, assuming the ligand is rigid, and it can superpose pairs of molecules using only knowledge of their 3D shapes. In Hex's docking calculations, each molecule is modelled using 3D expansions of real orthog-onal spherical polar basis functions to encode both surface shape and electrostatic charge and potential distributions. Essentially, this allows each property to be represented by a vector of coefficients (which are the components of the basis functions). Hex represents the surface shapes of proteins using a two-term surface skin plus van der Waals steric den-sity model, whereas the electrostatic model is derived from classical electrostatic theory. By writing expressions for the overlap of pairs of parametric functions, one can obtain an overall docking score as a function of the six degrees of freedom in a rigid body docking arch (Ritchie, 2003; Ritchie and Kemp 2000). After the total dock the energy was note and comparative interpretation was done.

Result and Discussion

Docking result tabulated between nAChR, AChE and drubank drugs and their similar structure was tabulated (Table 2). The structure of various drugs and their similar structure was depicted (Figure 1a-1x). The energy value of docking nAChR and conventional drugs and their similar structure shows many fold lower than that with AChE. The energy range with nAChR varies from zero to -50.32. and that with AChE range from -69.95 to -249.92. The leas docking energy was found with Galantamine, tarcine, NADH, L-Glutamic acid, Choline and lipoic acid where it is zero. nAChR may exist in different inter convertible conformational states. Binding agonist stabilizes the open and desensitized state. The nAChR are non –selective cation channel, meaning that several different positively charged ions can cross through (Purves et., a l, 2008). The low negative energy with nAChR may be due to the fact that AChR can some times open with only one agonist bound and in rare cases with no agonist bound, and they can close spontaneously even when Ach is bound. Therefore, Ach binding only creates a probability of pore opening, which increases as more Ach binds (Colquhoun and Sivilotti2004). Therefore at present we can say that the fourteen drugs and their similar structures are not

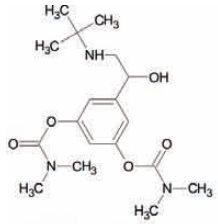


Fig1a :Rivastigmine

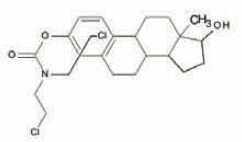


Fig1b :Estramustine

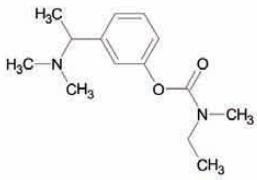


Fig1c:Bambuterol

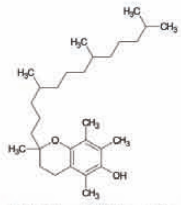


Fig1w:Vitamin E

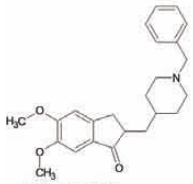


Fig1d:Donepezil

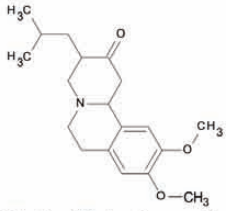


Fig1e:Tetrabenazine

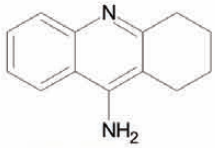


Fig1f:Tacrine

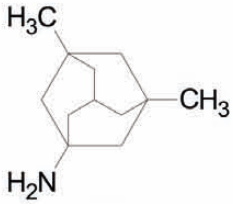


Fig1j :Memantine

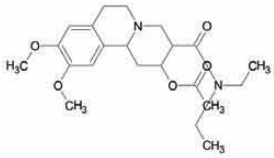


Fig1g :Benzquinamide

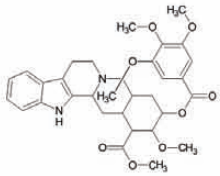


Fig1i :Deserpidine

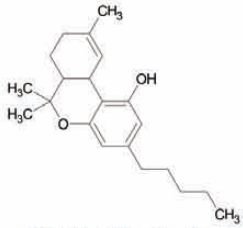


Fig1h:Marinol

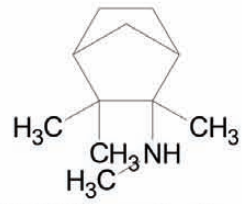


Fig1l:Mecamylamine

Fig1k:Decamethoniums

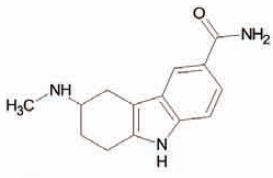


Fig1m: Frovatriptan

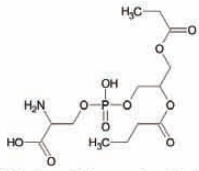


Fig1n:Phosphatidylserine

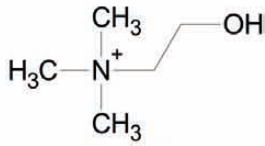


Fig1x:Choline

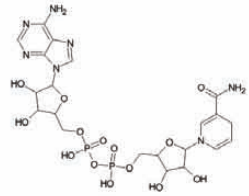


Fig1o: NADH

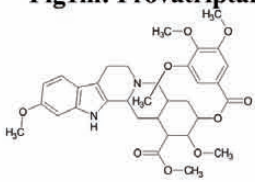


Fig1p: Reserpine

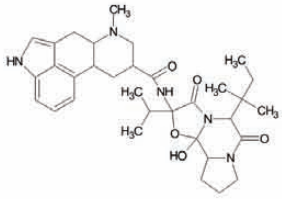


Fig1q:Ergoloid mesylate

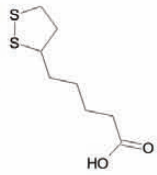
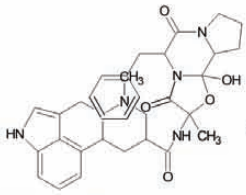
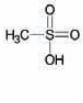


Fig1v:Lipoic acid





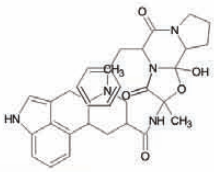


Fig1r:Dihydroergotoxine Fig1s:Dihydroergotamine

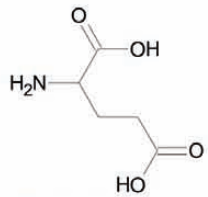


Fig1t:L-Glutamic Acid

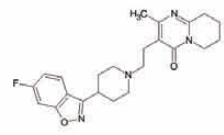
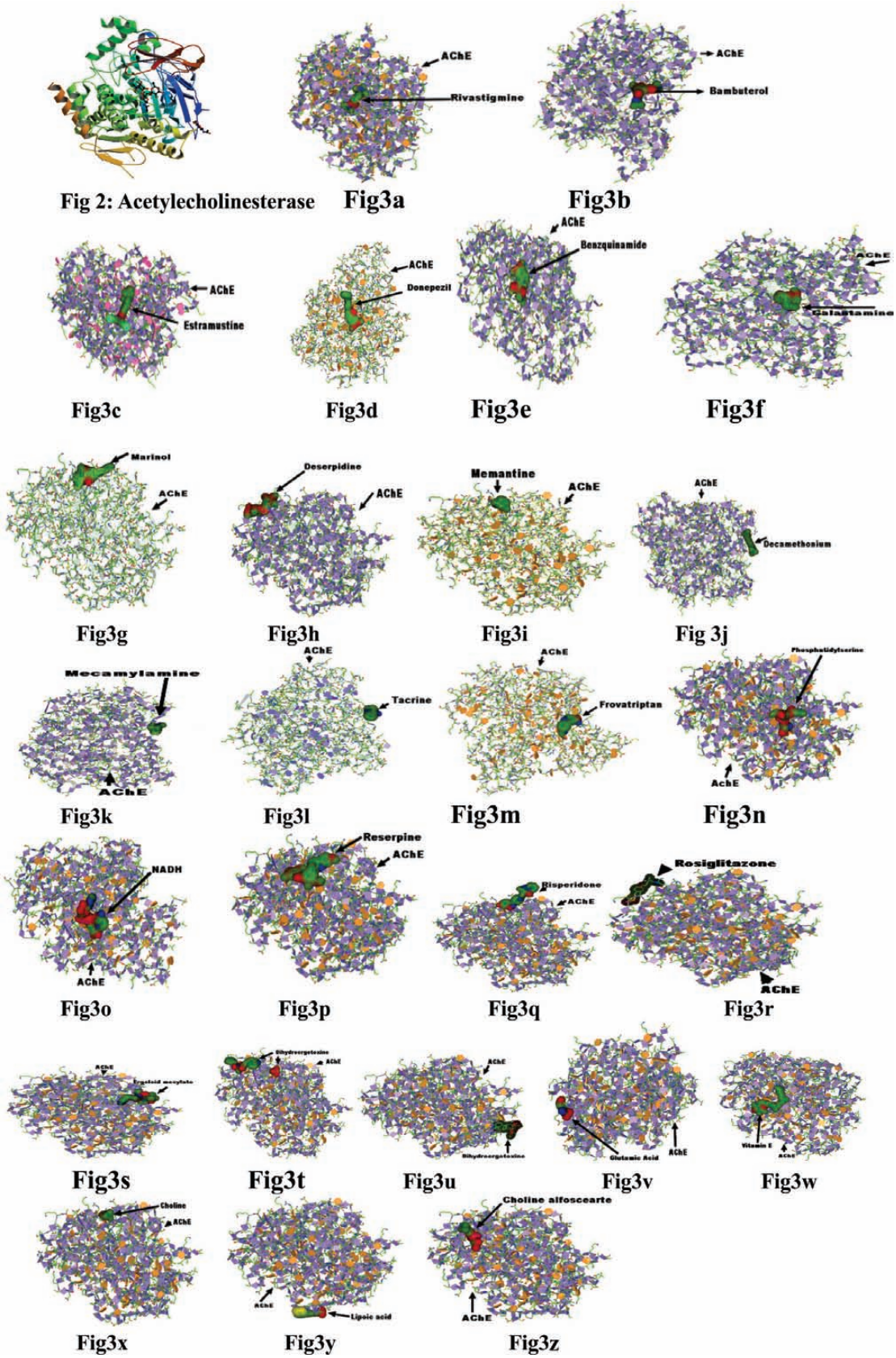


Fig1u: Risperidone

suitable for the treatments of Alzheimer's disease at any stage by nAChR theory.

The disproval of nAChR theory by our docking study prompts us to undertake the other possible treatment of AD by cholinergic hypothesis. AChE has a very high catalytic activity — each molecule of AChE degrades about 5000 molecules of acetylcholine per second. The choline produced by the action of AChE is recycled — it is transported, through reuptake, back into nerve terminals where it is used to synthesize new acetylcholine molecules (Purves, et..,al, 2008). Acetylcholinesterase is the target of many Alzheimer's Dementia drugs like



Rivastigmine,Bambuterol, Estramustine; Donepezil, Tetrabenazine, Benzquinamide; Galantamine, Marinol, Deserpidine; Memantine, Decamethonium, Mecamylamine; Tacrine, Frovatriptan; Frovatriptan; NADH, Reserpine, Risperidone; Rosiglitazone, Ergoloid mesylate, Dihydroergotoxine, Dihydroergotamine; L-Glutamic Acid; Vitamin E; Choline; Lipoic Acid and Choline alfoscerate (Table 2). The structure of AchE (Fig

2) and the docked structure was depicted in the figures (Fig 3a-z). The docking study shows highest negative energy was obtained by docking AchE with Ergoloid mesylate (253.04) and Bambuterol. Bambuterol (-249.92) is an approved similar structure to Rivastigmine (-132). Similar trend was observed with Estramustine (-200.65), Tetrabenazine (-195.78), Benzquinamide (-195.78) similar structure of Donepezil (-120.28), Deserpidin (-227.11) shows about two time more negative energy than its mother structure Marinol (-147.26). Memantine, Tacrineand Ergoloid mesylate showed a different trend of having more negative energy than its similar structures (Table 2). The high negative energy with Vitamin E prove that antioxidant have some influence on the improvement of AD. Vitamin E has antioxidant activity. It may also have anti-atherogenic, antithrombotic, anticoagulant, neuroprotective, antiviral, immunomodulatory, cell membrane-stabilizing and antiproliferative actions (Miller 3rd, et.,al, 2005). The lowest negative energy in the case Decamethonium may be due its influence on neuromuscular junction only. Decamethonium is a short acting depolarizing muscle relaxant or neuromuscular blocking agent, and is used in anesthesia to induce paralysis. It is similar to acetylcholine and acts as a partial agonist of the nicotinic acetylcholine receptor (Imming, et.,al, 2006).

The ambiguity of the drug against the AD is still not solved completely. There should be a new generation drugs to prevent the plaque formation at the genetic level with cation should be taken to diet factors in the proper age groups to prevent the onset of the disease in the bud condition. We can predict at this stage that Ergoloid mesylate and a similar structure of Rivastigmine i.e. Bambuterol is better for the treatment to AD patients than the commonly prescribed Galantamine in all the stages of the AD (Greenblatt, et..,al, 1999); and Rivastigmine(Rosler, et .,al, 1999) and Donepezil (Yesavage, et., al, 2002).

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Pilot Study of Laparoscopic Cholecystectomy in LLRM Medical College, Meerut

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Abstract

Before 1987, when Mauret from France performed the first human Laparoscopic Cholecystectomy, open Cholecystectomy was considered the gold standard for performing Cholecystectomy. But as the technique grew & with wide acceptance of laparoscopy, Laparoscopic Cholecystectomy became the gold standard for Cholecystectomy. This study is done to evaluate our technique of Laparoscopic Cholecystectomy in terms of hospital stay, post-op pain & complications in patients of acute/chronic Cholecystitis with Cholelithiasis. All case of acute/chronic Cholecystitis with Cholelithiasis who presented in emergency/O.P.D of Surgery from July 2004 to 30th June 2010 (n= 141). Data regarding age group, sex, acute versus chronic, time taken(average operative time), conversion rate & reason for conversion, complications were obtained during the hospital stay & subsequent follow up of patients. Cholelithiasis was more commonly found in middle age group (4th decade) & majority of patients were female. Majority of patients had chronic Cholecystitis with Cholelithiasis (Acute : Chronic = 1: 10.75). Average operative time was one to one & half hour in the initial years & it decreased to thirty minutes in non acute eases & about one hour in acute cases. Ten(10) cases were converted to open Cholecystectomy due to bleeding & major complication^) like bile duct injury was observed in two{2} patients. This study suggests that Laparoscopic Cholecystectomy is far more superior to open Cholecystectomy in terms hospital stay, post-op pain, return to work & lesser incidence of wound infection.

Key Words

Cholelithiasis, Cholecystitis, Laparoscopic Cholecystectomy.

Introduction

Cholelithiasis is a very common disease seen particularly in females in 3rd & 4th decade. Initially open Cholecystectomy was considered the gold standard for performing Cholecystectomy but as the technique grew Laparoscopic Cholecystectomy became the gold standard for Cholecystectomy because of lower incidence of wound infection, lesser hospital stay, lower post – op pain, early return to work[1]. Hence the present study is undertaken to review the advantages of Laparoscopic Cholecystectomy over open Cholecystectomy.

Material and Methods

This study was conducted on patients with acute / chronic cholecystitis with Cholelithiasis who presented in emergency / OPD of surgery from year 2004 to 20th July 2010. The patients were divided into two groups. Those who underwent open Cholecystectomy (Group I) and those who underwent Laparoscopic Cholecystectomy (Group II). In group II cases with both acute and chronic Cholecystitis with Cholelithiasis were taken but acute cases were considered from year 2009 to 20th July 2010. In acute cases Laparoscopic Cholecystectomy was done after resolution of acute attack but within the same hospitalization period. Laparoscopic Cholecystectomy was started first by creating pneumoperitoneum with CO2 by closed method (Veress needle). Then 10 mm port was introduced through incision given on upper margin of umblicus and laparoscope was inserted through it. Then under vision another 10 mm port was inserted through incision given in epigastric region just left to the midline. Two 5 mm ports were introduced, one through incision given in subcoastal region in mid clavicular line and another through incision given in anterior axillary line at the level of umblicus. Dissection was started initially in posterior Calot's and completed with separation of gallbladder from liver. In group 1, operative time was calculated from the time at which subcostal incision was given till closure of skin. In group II operative time was calculated from the time of insertion of ports till incisions were closed. In the post-op period, all the patients were observed for post-op pain, incidence of wound infection, days of hospitalization and return to work.

Results

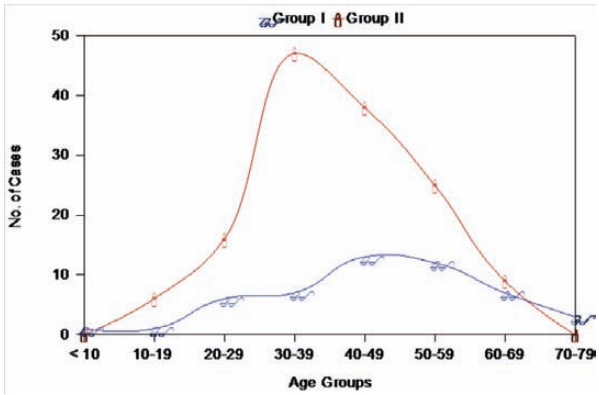
During this study a total of 151 patients were operated by Laparoscopic Cholecystectomy (Group II) of which 10 were converted to open Cholecystectomy. In group I 50 patients were operated by open cholecystectomy. The age distribution of the two groups is shown in the table 1. There was no significant difference in the age distribution of two groups. Majority of patients in both groups were female. Majority of patient of group II (chronic cases) presented with pain in right hypochondrium with dyspepsia. The patient with acute cholecystitis presented most commonly with severe pain, tenderness in right hypochondrium with fever, nausea & vomiting. In group

II, the operating time in case of chronic cases was one to one and half hr. in initial years and it decreased to 30 to 45 minutes, and in case of acute cases it is about one hour. In group I, the operating time was about thirty minutes. 10 cases which were converted to open Cholecystectomy due to bleeding which obstructed the vision were operated successfully. In group II bile duct injury was observed in two patients in post op. period. One patient was reoperated for cautery injury on common hepatic duct for which roux-en-y hepatico jejunostomy was done. In second patient CBD injury was repaired over T-tube but later on this patient lost in the follow up. In the post op period in group I significant pain was observed in 33 patients which needed inj. tramadol iv. BD, while mild to moderate pain was observed in 14 patients and 3 patients felt very mild pain. In group II, significant pain was observed in 12 patients which needed inj. tramadol iv. BD, while mild to moderate pain was observed in 99 patients and 30 patients felt no pain.

Wound infection was observed in 0 patients in group I and mild discharge was seen in 5 patient in group II. The average hospital stay was 8 days in group I and 4 days in group II. The average number of days for return to work is 18 in group 1 & 10 in group II.

Table 1: Distribution of cases according to age

Age Group (in yrs)	No. of cases in Group I	No. of cases in Group II
< 10	1	–
10-19	1	6
20-29	6	16
30-39	7	47
40-49	13	38
50-59	12	25
60-69	7	9
70-79	3	–



Discussion

Cholecystectomy is among the most common operations performed.[2] It can be performed by both open and laparoscopic technique. In our study, Laparoscopic Cholecystectomy was done on 141 cases and open Cholecystectomy was done on 50 cases. The post op pain was significant only in 0.08% of patient who underwent Laparoscopic Cholecystectomy, while it was 0.66% in case of patients who underwent open Cholecystectomy[3]. Wound infection in form of discharge was observed in 0.035% of patients who underwent Laparoscopic Cholecystectomy[4], while it was observed in 0% of patients who underwent open Cholecystectomy. The average hospital stay was 3 days for group II and 7 day for group I[5]. The average number of days for return to work is 18 in group 1 & 10 in group II[5]. So we conclude that Laparoscopic Cholecystectomy is far more superior than open Cholecystectomy in term of post op pain, hospital stay, wound infection and time to return to work.

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Distribution of Blood Groups Among Patients with Diabetes Mellitus and Their Secretor Status

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Abstract

Variety of diseases has been studied in relation to ABO blood groups and secretor status of blood group antigens. There is ample justification for probing into relation between blood groups, secretor status and diabetes mellitus because genetic, environmental factors etc. play important role in etiology of diabetes mellitus. Number of workers have tried to study the relationship between diabetes mellitus, secretor status and blood groups, but results have been variable. Although some workers have found definite preponderance of particular blood group, it has been concluded that so far no convincing association between blood groups, secretor status and diabetes mellitus has been established. There are few studies involving Indian origin on distribution of blood groups and secretor status among patients with diabetes mellitus. Therefore, distribution of blood groups (ABO) and secretor status were studied in 105 diabetic patients and compared with age and sex matched normal healthy controls. Only confirmed diabetic patients were included in this study. Blood group was determined by slide agglutination method. Secretor status was determined by haemagglutination inhibition technique using saliva. The study showed no statistically significant correlation in distribution of blood groups (ABO) and secretor status among diabetics as compared to controls.

Key Words

ABO blood group, Secretor status, Haemagglutination inhibition technique, Saliva, Diabetes Mellitus.

Introduction

The landmark discovery of Karl Landsteiner described the existence of serological differences among the individuals. He said that, people of this world, irrespective of age, sex, caste, color etc. can be broadly divided into 4main groups - A,B,AB and O. The basis for classification was antigenic character present on RBC membrane. Studies of Gupta Y N et. al[1],1981, has shown that blood group antigens are not only present on RBC membrane, but also secreted in various body fluids like saliva, gastric juice, semen, amniotic fluid, sweat, urine, tears [except CSF]. Such individuals who have ability to secrete blood group substances in body fluids are called "secretors" constituting about 70% of total population. Remaining individuals are called "non-secretors". According to Tandon OP et.al[2], 1979, secretion of group specific substance is controlled by pair of alleles ---- Se and se. Individuals can be homozygous (SeSe), heterozygous (Sese) or homozygous (sese). Person who posses Se gene are secretors and who carry se gene or a recessive one in homozygous state is non-secretor.

Non-secretor status is a health disadvantage as it appears to increase its susceptibility to number of diseases. Earlier studies of Patick AW et. al[3], 1989, have indicated that non-secretors are more prone for Tuberculosis, Rheumatic fever, Juvenile Diabetes & Auto-immune diseases. Inability to secrete the blood group substances in gastrointestinal mucus has also been associated with Peptic ulcer, Gastric malignancy, Pernicious anemia.4 On other hand, secretors are prone to Hemolytic anemia, Oral cancer and viral infections.5 Information about the influence of secretor status on diabetes mellitus is not readily available in Indian population. Various genetic, environmental, dietary factors etc act as predisposing factors for the occurrence of diabetes mellitus. Since genetic inheritance of diabetes mellitus is accepted widely, the genes for ABO blood groups and secretor 'Se' gene along with other genetic and environmental factors might influence the degree of penetrance of a gene or genes responsible for diabetes mellitus. There are only few reports involving subjects of Indian origin in this field. Hence this study is done to find cause effect relationship of secretor status and diabetes mellitus which can give a clue towards the obscure role played by genetic and familial factors in etiology of diabetes mellitus.

Material and Methods

Study Group consisted of 105 diabetes mellitus patients in the age group of 17-65 years attending diabetic clinic at B.L.D.E.A'S Sri B.M. Patil's Medical College, Bijapur. Of this 54 subjects were males & 51 subject's females.

Control Group [105 subjects] consisted of normal healthy subjects and were age & sex matched. Diabetes status of patients was determined by using the criteria of National Diabetes Data Group of National Institute of Health.[6] Blood group was determined by Slide agglutination method.[7] Secretor status was determined by Haemagglutination inhibition technique using saliva which was introduced

by Weiner and later modified by Roy M.N. and Chatterjee.[8] Serum glucose estimated by GOD-POD methodology by end point test.[9]

Subjects with history of recently transfused non-specific group blood and bone marrow transplantation leading to presence of two separate populations were excluded from study. Similarly, subjects with malignancies like Leukemia which leads to weakening or loss of blood group antigens on cells and subjects associated with gram negative septicemia, intestinal obstruction and carcinoma of colon or rectum leading to acquired "B" antigen like activity was excluded from study.[10]

Statistical analysis is done by chi-square test for finding association between attributes like blood groups, secretor status, age etc.

Results

Table 1 shows predominant blood group in both control and study group was 'B' and least predominant was 'AB'. Table 2 shows no significant difference in distribution of secretor and non-secretor status in diabetic group when compared with controls.

Table 3 shows there were little differences in secretor and non-secretor status among 'A', 'B' and 'AB' blood groups in diabetic patients when compared to controls and was statistically not significant.

Table 4 shows the frequency of ABO blood groups among control and patients with diabetes mellitus in males and females.

Table 5 shows secretor and non-secretor status in controls and diabetic patients according to sex. Distribution was statistically not significant in both males and females.

Discussion

Variety of diseases has been studied in relation to ABO blood groups and secretor status of blood group antigens.

Table 1: Distribution of ABO Blood Groups Among Controls and Diabetic Patients

Blood group	CONTROLS		PATIENTS		P value*
	Total subjects	Percentage	Total subjects	Percentage	
O	31	29.52	30	28.5	0.094
A	29	27.61	27	25.71	0.269
B	37	35.23	40	38.10	0.436
AB	8	7.61	8	7.62	0.614

*No statistically significant distribution of ABO blood groups observed between controls and diabetic patients.

Table 2: Comparision between Total Number of Secretor and Non Secretor in Controls and in Patients with Diabetes Mellitus

Group	Total no: of subjects	Secretors	Percentage	Non secretor	Percentage
Control	105	81	77.14	24	22.86
Patients	105	74	70.48	31	29.54

P-Value ≥ 0.27

Difference is not statistically significant.

Table 3: Secretor and Non-Secretor Status in Controls and Patients with Diabetes Mellitus According to Blood Groups

Blood groups	CONTROLS				PATIENTS					
	Secretors	%	Non secretor	%	Secretors	%	Non secretor	%	x^2	P value*
A	22	75.86	7	24.14	23	85.19	4	14.81	0.76	0.38
B	27	72.97	10	27.03	22	55	18	45	2.68	0.10
AB	5	62.5	3	37.5	3	37.5	5	62.5	1.00	0.31
O	27	87.1	4	12.9	26	86.67	4	13.33	0.42	0.51

*Difference is not statistically significant.

Table 4: Frequency of ABO Blood Groups Among Control and Patients with Diabetes Mellitus in Males and Females

Blood groups	CONTROLS				PATIENTS					P value*
	Total	Males	Females	%	Total	Males	Females	%	x^2	
A	31	18	13	29.52	30	11	19	28.5	2.79	0.094
B	29	14	15	27.61	27	17	10	25.71	1.22	0.2693
AB	37	18	19	35.23	40	23	17	38.10	0.60	0.436
O	8	4	4	7.61	8	3	5	7.62	0.25	0.6143

*Difference are not statistically significant.

Table 5: Secretor and Non Secretor Status in Controls and Diabetic Patients According to Sex

	MALES				FEMALES			
	CONTROLS	%	PATIENTS	%	CONTROLS	%	PATIENTS	%
SECRETORS	43	79.62	41	75.92	38	74.5	33	64.7
NON SECRETORS	41	20.38	13	24.08	13	25.5	18	35.3

No statistically significant difference between secretor and non secretor status of male controls & diabetics.
X^2=0.214, p value ≥ 0.6434.
No statistically significant difference between secretor and non secretor status of female controls & diabetics
X^2=1.158, p value ≥ 0.2818

Table 6: Studies Carried Towards ABH Secretion and its Relation to Diabetes Mellitus.

S. No	Workers	Results
1	Buckwalter Ja (1964)	No Significant Difference was Observed from Controls
2	Macafee (1964)	No Significant Difference was Observed from Controls
3	Peter Wh, Gohler (1986)	Higher Non Secretor Status in Diabetes Mellitus

Buchanan and Higley[11], 1921, from Mayo clinic were the first to have attemped to find out a relationship between ABO blood group and susceptibility to diseases. Since then much work has been done in this field and there are conflicting reports by various authors. Studies of Aird I et.al[12], 1954, have shown that, occurrence of peptic ulcer is much higher in blood group 'O'. Similarly Cancer of stomach[13], tumors of salivary glands[14], and leprosy[15] are more frequent in "A" blood group.

Though some workers found definite preponderance of a particular blood group, but so far no convincing association between blood group and diabetes mellitus has been established. In the present study, though occurrence of diabetes mellitus is more in "B" blood group patients [Graph I], it is not statistically significant when compared to controls. Mc Connel et al[16] , 1956, observed increase of group "A" among diabetic patients. Finding of Macafee[17], 1964, are of special interest as these workers found no difference from controls which is in agreement with our study. Non-association of ABO blood groups was also studied by Sidhu et.al[18], 1988, Iyengar et.al[19]1989 and Quereshi et. al.[20]

Present study does not show any statistically significant difference in ABO group and secretor status of control and study group when both males and females were compared. Mc Connel (1956) observed increase of group "A" among male diabetics. Jolly JG et al[21], 1969, got significant increase in group "O" male diabetics.

Table 6 shows results of various studies carried towards ABH secretion and its relation to diabetes mellitus. According to Buckwalter JA[22], 1964, there is no co-relation between secretion of ABH substances and diabetes mellitus. The same was proved by Macafee AL (1964) and Doll et.al[23],1961. In the present study, no statistically significant difference was observed between secretor and non-secretor status of the control population and diabetic patients.

Earlier studies of Peters WH et.al, 1986 have shown that, ABH non secretors and especially Lewis negative individuals are at greater risk of developing diabetes (especially adult onset diabetes). The Lewis negative (Le a-b-) red blood cell appear to confer greater risk of diabetes mellitus[24]. Among individuals with juvenile diabetes mellitus, the prevalence of severe retinopathy (a side effect of diabetes) is lower in ABH sectors than in non-secretors.[25] Blackwell CC et.al,[26] have found that in individuals with insulin dependent diabetes mellitus, the mean level of C 3C for non-secretors is significantly lower than that found for secretors. The levels of C4 among ABH non-secretors were also significantly lower than that of ABH secretors.

Diabetes mellitus is a multi-factorial trait. The etiology of diabetes mellitus is complex and appears to involve inter-actions of genetic, immunological and environmental factors. However much remains unclear concerning the genetic and other factors involved in etiology of diabetes mellitus. The significant findings of various workers are conflicting and no uniform association has been found between distribution of blood groups, secretor status and diabetes mellitus, although preponderance of one or other blood group has been reported from time to time. The results of attempts to elucidate genetic background of diabetes mellitus by means of blood group studies are so conflicting and inexplicable. However, they lead to conclusion that, no regularity has been demonstrated in the relationship between diabetes mellitus and ABO blood group system. The fact that, occurrence of diabetes mellitus is independent of ABH secretion is in agreement with this study. When the analysis of secretor status was done on different blood groups, on-secretors of "B" blood group were more prone to diabetes mellitus.

The absence of local immunity and lack of innate defense mechanism in non-secretors can act as a predisposing factor for development of diabetes mellitus. Looking at the conflicting results, it is inevitable that, any difference from control is only a chance finding and there is no association between ABO blood group, Secretor status and diabetes mellitus.

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Rehabilitation using Morse Taper Design Implant Abutment Connection– A case report

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Abstract

Tooth replacement with dental implants not only restores function and esthetics but also improves confidence and self esteem. Success and predictability of dental implants depends on appropriate case selection, good occlusal harmony, and careful management of hard and soft tissues and maintenance of good oral hygiene. A 35 year old male with a missing 12 was rehabilitated with an ankylose implant which has a unique morse taper connection abutment. The resultant implant gave excellent esthetics function.

Key Words

Morse taper connection, Micro gap, cone attachment mechanism.

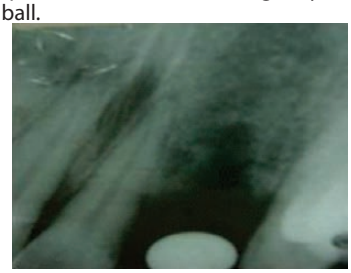
Introduction

Impalnt abutment connections are mainly of three type's i.e external hex, internal hex and morse taper connection. Internally connected implants also provide superior strength for the implant/abutment connection[1,2,3]. Since the introduction of the internal connection concept, further design enhancements have been made in an attempt to enhance the implant/abutment connection. Included in such efforts is the "Morse" taper, wherein a tapered abutment post is inserted into the non threaded shaft of a dental implant with the same taper[4,5]. The Taper creates a sealing effect of the connection to the internal aspects of implants; therefore, fewer lateral stresses are transferred to the abutment screw, resulting in a less frequent incidence of screw loosening and fracture[6].

Case History (Fig.1)

A 35 years old male patient reported with a chief complaint of loose prosthesis in his upper anterior teeth region. After careful evaluation of the patient's history, examination and radiographic evaluation, the patient was diagnosed with a faulty restoration in relation to right upper lateral incisor. It was decided that the faulty restoration will be replaced by an implant as the patient was sceptical about wearing removable prosthesis or a crown or bridge prosthesis since he did not want to involve the adjacent healthy teeth.

Fig.1: Radiograph of the site (11) to be surgically treated with radio opaque metal ball.



Therefore, faulty restoration was removed and the patient was recalled after a week. After a week, a dentascan was done to access the bone density and bone width and we came to a conclusion that implant placement was ideal for the case. With the help of the dentascan, it was decided that 11mm length and 3.5mm wide Morse taper (Ankylos) implant be placed.

Surgical & Prosthetic Procedure (Fig. 2,3,4,5,6,7,8)

Following all the aseptic surgical protocols the implant operation theatre was prepared. The patient was premedicated with antibiotic (amoxicillin 500mg TDS).A crestal incision was given on the surgical site and the osteotomy was prepared till 11mm and 3.5mm wide followed by placement of 11mm, 3.5mm implant. Sutures were placed and the patient was discharged with post operative medications, instructions and asked to report after a week. The sutures were removed in the next appointment.

Fig. 2: Gingival former placed after 3 months of surgery.

Fig. 3: Well formed gingival collar formed after removal of gingival former

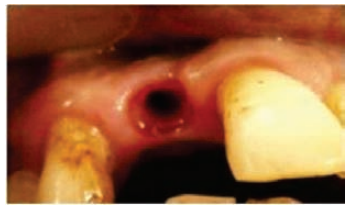


Fig. 4: Impression post placed

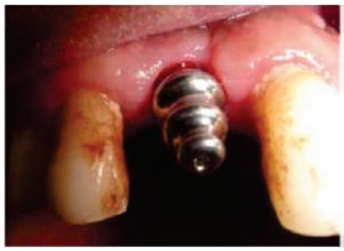


Fig. 5: Putty impression taken and implant analogue and impression post placed

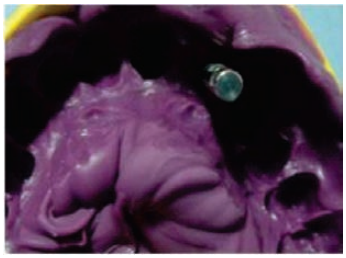
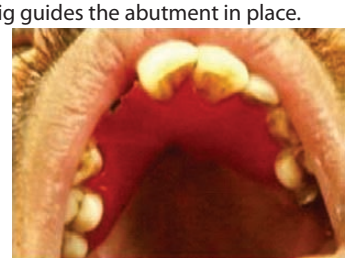


Fig. 6: Acrylic jig guides the abutment in place.



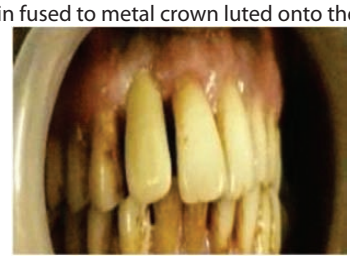
The patient was recalled after 3 months (osteointegration period) and a surgical re-entry was made for the placement of gingival former. The former was kept in place for a period of 10 days so that the soft tissue (gingiva) could configure itself around the former and give beautiful esthetics. On the next appointment, a repositioning post (impression post) was placed, keeping in mind the angulation, esthetics and path of insertion of the prosthesis followed by the putty impression. Then the cast was poured and an acrylic jig was fabricated to maintain the exact position of the abutment. On the next appointment the acrylic jig was placed in the patients mouth which guided the abutment in place and the porcelain fused to metal crown was luted in place.

Discussion

The use of morse taper connection implant represents a successful procedure for the rehabilitation of partially and completely edentulous arches. The absence of an implant-abutment interface (microgap) is associated with minimal crestal bone loss. The high mechanical stablity significantly reduces prosthetic complications. The microgap is much narrower between the two parts having a Morse Taper. The smaller gap reduces the potential "dead" space found between other mating metal surfaces. As well, with the other hex type joint. In Morse taper connection implant less evidence of cementation failure and screw loosening has been registered.The

Fig. 7: Implant abutment placed in patients mouth.

Fig. 8: Porcelain fused to metal crown luted onto the abutment.



marginal bone loss was not frequently observed and happened in smaller magnitude when compared to other implants systems. Morse taper-connection implants represent a good solution for single-tooth restorations, with a very low incidence of abutment loosening (0.66%). Alteration of the Morse taper with an internal octagon indexing does not significantly reduce the strength of the implant connection. Sufficient strength was exhibited, which would indicate this implant-abutment design for anterior as well as posterior edentulous sites[7].

Conclusion

In this case, successful treatment can be attributed to Ankylos implant with its new and innovative morse taper design, which gives excellent esthetics and osseintegration for long lasting implant treatment.

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Laparoscopic Cholecystectomy v/s Open Cholecystectomy: A comparative study at LLRM Medical College & Hospital, Meerut

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Abstract

Cholecystectomy is the surgical removal of the gallbladder. It is the most common method for treating symptomatic gallstones. Surgical options include the standard procedure, called laparoscopic cholecystectomy, and an older more invasive procedure, called open cholecystectomy. A traditional open cholecystectomy is a major abdominal surgery in which the surgeon removes the gallbladder through a 8-10 cm incision. Laparoscopic cholecystectomy has now replaced open cholecystectomy as the first-choice of treatment for gallstones unless there are contraindications to the laparoscopic approach. The operation usually requires general anaesthesia and is subject to the same risks and complications as open cholecystectomy. However, patients have little pain after the operation, and hospital stays (1-2 days) and recovery (1-2 weeks) are usually shorter than after open cholecystectomy. So, the purpose of the study is the usefulness of laparoscopic cholecystectomy in the treatment of symptomatic cholelithiasis in present set up of LLRM Medical College & Hospital, Meerut. Operations were performed by consultant surgeons or senior residents under their direct supervision, all having sufficient skills and experience in both types of procedures. Laparoscopic cholecystectomy did not differ much from open cholecystectomy regarding mortality, major complications and bile duct injuries. However, laparoscopic cholecystectomy leads to shorter incisional wounds; lesser incidence of post operative wound infections and seems to be associated with a shorter hospital stay and hence faster return to work. These seems the reasons for laparoscopic cholecystectomy being the preferred method of choice above open cholecystectomy

Keywords

cholelithiasis, cholecystitis, open & laparoscopic cholecystectomy.

Introduction

Cholecystectomy means excision of gallbladder by abdominal incision or laparoscopically[1]. Until a decade ago, the prevailing surgical treatment of symptomatic gallstones was an open operation through an abdominal 8-10 cm long incision that cuts the majority of the rectus muscle to remove the gallbladder. In 1882, Carl Langenbuch of Berlin performed one of the first cholecystectomies[2]. Surgical removal of gallbladder thus became the gold standard treatment for management of billiary calculus disease. Another operation in which by decreasing the incision to 4-7cm, preserving the rectus muscle, using headlights, and small right transverse incision given so called mini-cholecystectomy, which was first described more than two decades ago by Dubois & Berthelor[3].

Finally, laparoscopic cholecystectomy was introduced, in which patients were given an option of a treatment that managed their disease definitely without the morbidity of a surgical incision. Laparoscopic cholecystectomy is a minimally invasive surgical technique that is performed using laparoscopic visualization of the gallbladder and surrounding vital structures. The first laparoscopic cholecystectomy was performed by Philipe Maurete from Lyon, France in 19874. The operation usually requires general anaesthesia and is subject to the same risks and complications as open cholecystectomy. However, patients have little pain after the operation, and hospital stay (1-2 days) and recovery (1-2 weeks) are usually shorter than after open cholecystectomy.

So, the purpose of the study is the usefulness of laparoscopic cholecystectomy in treatment of symptomatic cholelithiasis in present set up of LLRM Medical college & Hospital, Meerut.

Aims & Objectives

1. To study common difficulties encountered in laparoscopic cholecystectomy
2. To study the conversion rate of laparoscopic cholecystectomy to open cholecystectomy.
3. To evaluate usefulness of laparoscopic cholecystectomy in terms of duration of i.v. treatment, removal of drain, morbidity, hospital stay, bile leakage, complications & cost of treatment.
4. Measures to improve the result of laparoscopic cholecystectomy in our institute.

Material & Methods

This study was done on 46 patients undergoing laparoscopic cholecystectomy for symptomatic gallstone

disease in surgical wards of SVBP hospital affiliated to LLRM medical college, Meerut from August 2007 to August 2008.

Inclusion criteria

All patients suffering from symptomatic gallstone disease admitted in the ward for elective surgery, by laparoscopic cholecystectomy, were included in the study. Patients evaluated by clinical examination, routine investigations, liver function tests & by ultrasonography. Once diagnosed the patients were prepared for surgery if they were fit for general anaesthesia (GA).

Exclusion criteria

- All those cases having lump in abdomen, acute cholecystitis and jaundice.
- Patients not fit for GA
- Patients suspicious of having gallbladder malignancy
- Current pregnancy
- Patients with coexisting morbid conditions like CVS or respiratory diseases.

Operations were performed by consultant surgeons or senior residents under their direct supervision, all having sufficient skills and experience in both types of procedures. For our surgical technique, we use an open insertion of the laparoscope port, placed supra-umbilically; the other three ports are placed under direct vision. We use a 10 mm port at the epigastrium and two 5-mm ports; one placed at the mid- clavicular line about three finger breadths below the costal margin and the other placed at the mid-axillary line five finger breadths below the costal margin or midway between 12th rib & anterior superior iliac spine on right side. Calot's triangle is dissected using hook diathermy at low voltage. No clipping is done until all anatomical structures have been identified. The specimen is routinely delivered through the epigastric port and sent for histopathological examination. Drains are placed depending on surgeons choice varying from case to case. Post operatively patients were followed for complications specifically wound infections, jaundice, bilioma formations, intra abdominal abscesses and port site hernia.

Observation & Analysis

1. Age Distribution

Age group	No. of patients	Percentage
11-20 yrs	2	4
21-30	7	15
31-40	21	46
41-50	5	11
51-60	6	13
61-70	5	11
Total	46	100%

2. Sex Distribution

	No.	Percentage
Female	42	91
Male	4	9
Total	46	100%

3. Conversion To Open Cholecystectomy

Reason of conversion	No. of pts.
Bleeding	2
Unable to display anatomy	0
Adhesions	1
Bile duct injury	1
Others	2

4. Perforation Of Gallbladder

No. of cases	Perforations
40	7

5. Operative Time

Duration (in minutes)	No. of pts.	Percentage
40-50	11	27.5
50-60	11	27.5
60-70	15	37.5
70-80	3	7.5
>90	0	0
Total	40	100%

6. Duration Of Iv Antibiotics

Duration in days	No. of pts.	Percentage
2	5	12.5
3	21	52.5
4	12	30
5	2	5
	40	100

7. Day Of Drain Removal

No. of pts.	Drain(Y/N)	Day of removal (mean)
25	Yes (62.5)	3.39 days
15	No(37.5)	
Total 40	100	

8. Length Of Hospital Stay

Day of discharge	No. of pts.	Percentage
2nd day	0	0
3rd	7	17.5
4th	11	27.5
5th	17	42.5
6th	4	10
7th	1	2.5
Total	40	100

9. Complications

Pain abdomen	5
Tenderness	3
Fever	1
Nausea & vomiting	10
Shoulder pain	4
Ileus	1
Urinary retention	5
Bile leak	2

Review of Literature

Jean-Louis Petit, the founder of gall bladder surgery in 1733, suggested the removal of gallstone and drainage of the the gallbladder, thus creating fistula in patients with empyema, which he successfully performed in 17435. Marion Sims6 must be credited with designing, perfecting and performing first cholecystostomy on a 45 yrs old woman with obstructive jaundice in 1878; and it paved the way for Theodor kocher to perform the first successful cholecystostomy in June 1878. Carl Johann August Langenbuch6 who observed that these measures were only temporary and rely to find a definite solution for the disease. He developed the technique of cholecystectomy through cadaveric dissection and on July 15, 1882, he successfully removed the gallbladder of a 43 year old man who was suffering from the disease for 16 years. Langenbuch's open cholecystectomy remained the gold standard for symptomatic cholelithiasis for over a century; however, in last two decades, introduction of laparoscopic cholecystectomy has revolutionized the procedure. Philip mouret, lyon from france performed the first human laparoscopic cholecystectomy7. In 1990, 10% of cholecystectomies were performed laparoscopically in U.S. and by 1992, this percentage had risen to 90%. Never before has a surgical revolution occurred so fast. Prof. Tehempton E. Udwadia8 from Mumbai, performed the first laparoscopic cholecystectomy & presented his work during 10th world congress of digestive surgery at New Delhi in 1990.

Discussion

Peak incidence of gallstone disease is in the 4th decade (46%) followed by 3rd & 5th decade (15% & 11%). In our study majority of the cases were females, with M:F ratio of 1:10.5. In this study 6 patients had to undergo conversion to open cholecystectomy due to various reasons, commonest reason being bleeding, either from a cystic artery or from the liver bed. Perforation of gall bladder with bile or stone leakage can be nuisance but should not ordinarily require conversion to open cholecystectomy. Duration of iv antibiotics was on an average 3 days, which was less than that of converted open cases in which it was on an average 4 days. Drain was placed in 25 out of 40 pts. & was removed on an average 3.39 days postoperatively and majority of the pts have had minimal drainage (10-30ml). In 6 converted cases drain was essentially put and removed on an average 3.8 days post operatively & drainage was 50-100 ml. Incidence of wound infection was found to be 3% in laproscopic cholecystectomy pts. While it was 17% in pts. who underwent converted open cholecystectomy. Of all the pts. undergoing laproscopic cholecystectomy, all were ambulatory on day of surgery and return to full activity within 4 to 10 days. In this study average length of hospital stay in laproscopic cholecystectomy was 4.68 days and those converted cases were of 7.5 days, indicating slightly shorter hospital stay in the former group. Over all non fatal but significant complications like bile leak / CBD injury in laproscopic cholecystectomy were 5% compared to open cholecystectomy in which it was just 0.1%.

Summary & Conclusion

This study was done on 46 patients undergoing laparoscopic cholecystectomy for symptomatic gallstone disease in surgical wards of SVBP hospital affiliated to LLRM Medical College, Meerut from August 2007 to August 2008. All data were kept prospectively and analyzed retrospectively. All patients suffering from symptomatic gallstone disease admitted in the ward for elective surgery, by laparoscopic cholecystectomy, were included in the study.

Laparoscopic cholecystectomy did not differ much from open cholecystectomy regarding mortality, major complications and bile duct injuries. However, laparoscopic cholecystectomy leads to shorter incisional wounds; lesser incidence of post operative wound infections and seems to be associated with a shorter hospital stay and hence faster return to work. These seems the reasons for laparoscopic cholecystectomy being the preferred method of choice above open cholecystectomy.

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Lasers-changing the Face of Dentistry

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Abstract

Laser have been well accepted by the various disciplines of the dentistry as a useful adjunct to the care of the patient as standard surgical instrument. Hard tissue application has been more difficult to develop and the search for a satisfactory alternative to the high speed dental drill continues. The application of laser technology to medicine and dentistry has entered the age of sophisticated and rationale treatment. It is important for the dental practitioner to become familiar with these principles, and then choose proper lasers for the intended clinical applications. The scientific basis and tissue effects of dental lasers must be known to accomplish a specific treatment objective.

When the first lasers were introduced, they were projected as miracle treatment. As more wavelengths and different lasers appeared, more claims followed. However, the dental fraternity soon realized that some of the claims were unsubstantiated. Thanks to the tremendous amount of research and education, clinicians now know the limitations and advantages of lasers. Laser technology for soft tissue surgery, hard tissue surgery, caries removal and cavity preparation is in a high state of refinement, having several decades of research behind it. Used in conjunction with or as a replacement for traditional methods, it is expected that specific laser technologies will become an essential component of contemporary dental practice over the next decade .Let's hope that dramatic improvements in laser devices and techniques in the coming decades, will open a new era of sophistication in the dental procedures.

Introduction

Laser stands for light amplification by stimulated emission of radiation and is a device for generating a high intensity, parallel beam of monochromatic electromagnetic radiation. The first working laser was demonstrated by Theodore Maiman at Hughes Research Labs on May 16th, 1960. In may, 1990, Myers and Myers developed the first dental laser (neodymium-doped yttrium aluminium garnet; Nd: Y3Al5O12Nd: YAG), called as dLase 300(manufactured by sunrise technology).In 1997 Er: YAG lasers (erbium-doped yttrium aluminium garnet (Er:$Y_3Al_5O_{12}$) were introduced.

Dental Lasers are generally named after the composition of the excitable medium from which the laser beams emerge e.g. .carbon dioxide (co2), argon (Ar), etc. Laser consists of an active lasing medium which can be solid, liquid or gas and is enclosed within a laser cavity bounded by two perfectly parallel reflectors(mirrors).High energy radiation is pumped into the active medium by means of pump source, which gets initiated by an intense optical or electrical discharge.

All Dental Lasers emit light energy that is either visible or invisible thermal radiation of wavelength range from 350nm to 10,600 nm. These radiations are non-ionizing radiations which does not damage the cellular DNA. Initially these lasers were mainly used for the surgical treatment of tumors in the oral cavity, but now dental lasers have evolved a lot and in general provide comparable or superior results than many conventional techniques. A wide range of different lasers are used in modern dentistry nowadays.

The present article aims at reviewing various types of lasers currently used in dentistry with all their indications, contra indications and clinical implications in general.

There are 3 types of laser that are important in laser surgery: Q-switched, pulsed and continuous wave (CW). Pulsed laser emits radiation continuously while Continuous wave laser emits radiation in short bursts. Q switch laser produce a pulsed output beam. The technique allows the production of light pulses with extremely high (gigawatt) peak power, much higher than would be produced by the same laser if it were operating in a continuous wave (constant output) mode.

Mechanism of action of lasers

Different types of lasers react differently with tissue. The wavelength of the laser is of primary importance. However the power density and exposure time also play a critical role in determining tissue interaction.

Laser light may be reflected, scattered, absorbed or transmitted to surrounding tissue. The type of interaction that occurs depends on factors, such as -the properties of the laser system, the treatment regimen, the optical properties of the tissues and the healing and immune response of the patient. Dentists can control some of the interaction that occurs between laser light and patient

tissue. The most important factor is the wavelength of laser light used for a treatment. The wavelength in combination with the optical properties of the tissue determines whether the laser light is absorbed.

The laser light shows any of these four phenomenon when it comes in contact with tissues and that is it can be either reflected, absorbed, transmitted or scattered. Absorption is mainly dependent on Laser Wavelength, Tissue Composition, Pigmentation and Water Content. All the action of laser is due to the phenomenon of absorption. Absorption acts by thermal,chemical,acoustic and biostimulation means. The primary interaction of a laser and dental structures is photo thermal; that is, laser light is absorbed and raises the temperature of the target tissue. At 100°C the inter- and intracellular water boils away, causing either soft-tissue ablation or explosive expansion and disruption of hard tissue. The laser energy expands the cell until it vaporizes. This process is called ablation. The vaporized cellular material will be found in the air in the form of a "plume" that is formed by the ablated cell debris. High volume vacuum must be used for plume removal whenever tissue contact laser treatment is performed. If the laser energy continues to be absorbed by the tissue, carbonization occurs and with it the possibility of significant tissue damage. The laser parameters—energy, beam diameter, and duration of exposure—must be carefully monitored to produce a successful treatment result.

Type of lasers

According to the power/intensity of the laser beam, they can be divided in two types

A. High level lasers
B. Low level lasers

High level lasers

They are indicated for periodontal surgeries as lasers can remove diseased gingival and bone tissue by reducing the bacterial count and promoting reattachment. These are used in implant surgeries, Caries removal/cavity preparation. Erbium lasers selectively remove caries[1]. Minimally invasive procedure is followed. The Erbium family of lasers is highly absorbed in water and, to a lesser extent, in tooth mineral. Because a carious lesion contains significantly more water than healthy enamel or dentin, the laser can offer some selectivity in removing the diseased tooth structure. High level lasers can be used in Endodontics 2 for disinfecting the root canals. These are suitable for treating young children[3], because unexpected movements of the patients are much less risky in lasers as compared to rotary instruments. Lasers allow pediatric dentists to provide optimal care without many of the fear factors that result from conventional dental techniques. Er lasers generally do not require anaesthesia for caries removal, eliminating the possibility of inadvertent lip and cheek biting. These are widely used in oral surgical procedures for soft tissue incision and ablation.

Low Level Lasers

These lasers operate in the milliwatt range (1-500 milliwatts). The therapy performed with such lasers is called Low Level Laser Therapy (LLLT) or just laser therapy and the lasers are called therapeutic lasers. Low level laser therapy (LLLT) is a light source treatment that generates light of a single wavelength. LLLT emits no heat, sound, or vibration. Instead of producing a thermal effect, LLLT acts via nonthermal or photochemical reactions in the cells, also referred to as photobiology or biostimulation.

Gallium arsenide (GaAs), gallium aluminum arsenide infrared semiconductor (GaAlAs), and helium neon (HeNe) lasers are used. The physiological effects[4] include biostimulation, improved blood circulation and vasodilatation, analgesic effect, anti-inflammatory and anti-edematous effects and stimulation of wound healing[5].

Along with the primary benefit of being non-surgical, it promotes tissue healing and reduces edema, inflammation, and pain

The applications include using it for Temporomandibular disorders, Mucositis, Pain,Paresthesia, Trigeminal neuralgia, Management of precancerous lesions and detection of caries.

Some important laser systems used in dentistry are

1. CO2 lasers.

CO2 lasers operate at a wavelength of 10.6 nm.These can be used for a variety of soft tissue applications.

The CO2 laser characteristically is highly absorbed by water, so it is well absorbed by the oral soft tissue, regardless of pigmentation and therefore provides excellent hemostasis and removes tissue efficiently. Postoperative pain usually is minimal[8].

Disadvantages

Delayed wound healing for a few days. There is a lack of tactile feedback, because only the laser light (not the fiber tip) impinges on the tissue. However, feedback to the clinician is visual and typically excellent, because of the dry field of operation.

Dentists should be aware that CO2-treated tissue will have a black/brown appearance, which is caused by a carbon residue that will easily rinse off within the first few days after the procedure.

2. Nd; YAG. The Nd; YAG laser operates at a wavelength of 1.064 µm.

Like the CO2 laser, the Nd; YAG laser can be used to perform a variety of soft-tissue applications[9].

The Nd; YAG laser offers good hemostasis during soft-tissue procedures, which facilitates a clear operating field. In addition, the Nd; YAG laser offers a flexible fiber delivery system, eliminating the need for cumbersome articulated arm delivery systems.

Disadvantages

It has the greatest depth of penetration of all the available dental surgical laser systems, which means that tissues under the surface are exposed to laser energy. Because of this, there is a risk of unwanted collateral damage, especially in the underlying bone or the dental pulp, as well as the associated postoperative morbidity. In addition, the diminished localization of the energy on the tissue surface makes vaporization of soft tissue slower than with the better-absorbed laser wavelengths, ex.CO2 laser. Direct exposure of the pulp by Nd; YAG laser light can occur when this wavelength of energy is directed at either the crown or the root of the tooth. Pulpal damage can occur[10,11,] which is associated with decreased teeth sensitivity. However many researches have refuted this claim12, finally, wound healing in soft tissue can be delayed for a few days or more when the Nd; YAG laser is used.

3. Er: YAG. The Er: YAG laser operates at a wavelength of 2.94 µm. It can be used on both soft and hard tissues.

The Er: YAG laser produces clean, sharp margins in enamel and dentin. In addition, pulpal safety is not a significant concern[13], because the depth of energy penetration is negligible. When the Er: YAG laser is used for caries removal, the patient usually does not require local anesthesia[14]. The laser is antimicrobial when used within root canals and on root surfaces. Vibration from the Er: YAG laser is less severe than that from the conventional high-speed drill, and it is less likely to provoke discomfort or pain. The laser has shown potential for removing calculus during root debridement[15,16,] and compares favorably with conventional root planing.

Disadvantages

The Er: YAG laser does not selectively remove calculus on root surfaces; it removes calculus, cementum and dentin together.

4. Er, Cr: YSGG

The Er, Cr: YSGG operates at a wavelength of 2.78 µm.

It has several hard-tissue applications like Enamel etching, Caries removal, and Cavity preparation, In vitro bone cutting with no burning, melting or alteration of the calcium: phosphorus ratio and Root canal preparation.

The Er, Cr: YSGG laser is safe for the pulp. When using the Er, Cr: YSGG laser, the dentist often does not need to administer local anesthetic for caries removal and cavity preparation.

Disadvantages

With this laser, enamel etching produces bonds with a wide range of strengths, which can be unreliable. To minimize leakage in resins, clinicians may need to acid-etch enamel after preparing cavities with the Er, Cr: YSGG laser.

5. Argon

The argon laser operates at a wavelength of 457 to 502 nanometers. In addition, this laser has a number of soft-tissue applications, including gingival troughing, esthetic contouring of gingiva, treatment of oral ulcers, frenectomy and gingivectomy. The primary advantage of the argon laser is that the laser operates at a wavelength that is absorbed by hemoglobin, which provides excellent hemostasis. The argon laser can be used for a variety of applications, including resin curing and tooth bleaching[17]. In addition, some resins contain multiple initiators that activate at different wavelengths. This suggests that the relatively narrow spectrum of a laser might not be the best approach to activate the initiators.

6. Gallium-arsenide (or diode)

The diode laser operates at a wavelength of 800-980nm. The diode laser is useful in soft-tissue procedures. These lasers are poorly absorbed by the tooth structure, so soft tissue surgery can be performed safely in close proximity to enamel, dentin and cementum. The main advantage of this laser is the small size of the instrument. The units are portable and compact, can be easily moved with minimum setup time and are the lowest priced lasers available.

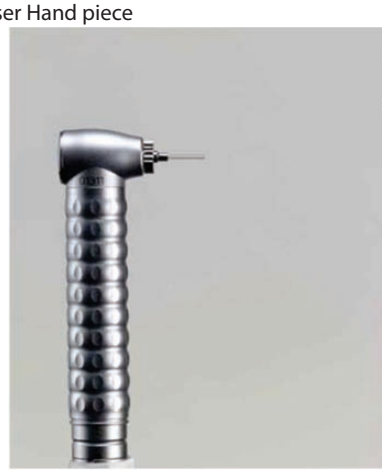
Laser Hand piece

For proper delivery of the laser beam to the intended site laser hand pieces or laser

scalpels are used (fig.1). The laser is conducted through a fiber optic cable and resembles a standard handpiece. This maintains a water-coolant and/or air-coolant system.

LASER SAFETY—laser safety is of paramount importance. An oral environment with limited access and minimal reflective surfaces should be there. The use of wavelength specific protective eyewear for the surgical team, the patient, and any observer should be provided. High-volume evacuation of laser plume should be maintained. Fire and explosion hazards

Figure 1: Laser Hand piece



Only wet and fire retardant material should be used in the operative field. Alcohol based topical anesthetics should be avoided. Alcohol moistened cotton or gauze should be avoided. Fire extinguisher should be present. The clinician should be well informed.

Sterilization and infection control

Fiber optic cables and hand pieces can be autoclaved in pouches. Oil based aerosols should not be used. The wires and protective casing should be wiped clean and not autoclaved.

Conclusion

With the exception of few procedures, little evidence exists to support the notion that lasers currently produce superior results than the conventional procedures. Some of the features of laser are attractive with regard to patient appeal. For example, postoperative healing after soft-tissue surgery with the CO2 laser typically involves less pain and swelling as compared to traditional scalpel surgery. Many procedures might not require local anaesthesia administration. The advent of the Er, Cr: YSGG laser, which is used with a water spray, has been a breakthrough though. It can work equally well with soft tissue as well as the hard tissue. Its low penetration in the tissue minimizes the risk of collateral damage. However, traditional methods of performing the same procedures still are more economical. Recent innovations, constant efforts with further research and economic feasibility is required to broaden the area of laser application in dentistry.

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An Investigation on Dynamic Alterations in Antioxidant Enzymes in Tumor Tissue and Blood of Oral Squamous Cell Carcinoma Patients

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Abstract

Background

Oral squamous cell carcinoma is a devastating disease accounting for 50-70% of total cancer mortality in India. The disease is mediated by a diversity of endogenous and environmental stimuli. "Free radicals" are postulated to be involved in pathogenesis of oral squamous cell carcinoma. The antioxidant defence system of the body protects cell injury induced by these free radicals. Oxidative damages or alterations occur when there is imbalance, between free radicals production and cell's oxidant capacity. Such types of oxidative stress may lead to cytotoxicity, mutation and change in genetic expression resulting in carcinogenesis.

Objectives

To investigate the dynamic alterations of antioxidant level in tumor tissue and blood of oral squamous cell carcinoma patients.

Material and Method

Levels of antioxidants such as reduced glutathione (GSH) and ascorbic acid (AA) and the activities of Antioxidant enzymes superoxide dismutase (SOD), glutathione peroxides (GPx), glutathione reductase (GR), were estimated in the tumor tissue and blood of 40 oral squamous cell carcinoma (OSCC) patients and in 20 healthy subjects as control.

Results

Significantly, increased levels of GSH, GPx, GR and AA, and significantly decreased activity of SOD was observed in tumor tissue ($p < 0.001$) and in tumor-free tissue of oral sqamous cell carcinoma patients, as compared with healthy subjects. In contrast, decrease in antioxidants (GSH, GPx, GR and AA $p < 0.001$, SOD $p < 0.05$ respectively) was observed in the blood of oral squamous cell carcinoma patients, as compared with healthy subjects.

Key Words

Antioxidant enzymes, Free radicals, Oxidative stress, Oral squamous cell carcinoma (OSCC).

Introduction

0ral squamous cell carcinoma is a devastating disease accounting for 50-70% cancer mortality in India[1]. It is a disease process mediated by a diversity of endogenous and environmental stimuli. It is strongly related to the habits of using tobacco, betel nuts, alcohol and, diet low in fresh fruits and vegetables[11]. Many literatures have emphasized an important role of free- radicals (ROS) in pathogenesis of oral cancer[2]. ROS are generated endogenously and exogenously as a by-product of normal respiration and as a function of biochemical reactions using oxygen[3]. ROS at high levels are toxic to the cell but at low levels, ROS have physiological functions, including activation and modulation of signal transduction pathways, modulation of activities of redox-sensitive transcription factors, and regulation of mitochondrial enzyme activities[4-5]. Cells have an elaborate defiance system against ROS, consisting of antioxidant enzymes and micromolecules, capable of scavenging different ROS[6]. In the system, super oxide dismutase (SOD) converts super oxide radical (O_2-) into H_2O_2 whereas, glutathione peroxidase (G P x) and catalase convert H_2O_2 into water[7]. The removal of H2O2 or other hydro-peroxides by GPx requires reduced glutathione (GSH) as co-factor. GPx converts H_2O_2 to H_2O and catalyzes GSH to oxidized glutathione (GSSG) simultaneously. GSSG is restored to a reduced form by glutathione reductase (GR); this reaction serves in maintaining a high GSH/GSSG ratio in the cell. GR do not act on ROS directly but enables GPx to function[3]. Ascorbic acid (AA), a radical scavenger antioxidant in cells can also act as a reducing agent. AA and GSH have actions in common sparing each other under appropriate conditions[8]. Oxidative stresses are the result of imbalance between ROS production and cell's antioxidant capacity. Such stresses may cause mutagenesis, cytotoxicity and changes in genetic expression that initiate or promote carcinogenesis[9]. Polyunsaturated fatty acids (PUFA) are bio-molecules susceptible to oxidative damage by lipid peroxidation[11]. Since the deleterious effects produced by ROS depend upon the balance between the oxidant and antioxidant capacity of the cells, the aim 0f our study was to investigate the dynamic alterations of the antioxidants in OSCC patients.

Material and Methods

Forty newly diagnosed OSCC patients (12 females and 28

males) from Dental College and Hospital Azamgarh (U.P.) and associated Mahamritunjay Hospital, who had not been previously treated for their tumors were enrolled for the study. The tumors were clinically charecerized as stage I/II/III and histopathologically confirmed as; well and moderately differentiated OSCC. The control group comprised 20 healthy subjects (12females and 8 males) and their tissues were taken during tooth extraction. Informed consent was obtained from all the participants.

Biological Material

Neoplastic and tumor-free tissue samples were obtained at biopsy incision and divided into 2 groups. The first group was frozen in liquid nitrogen and stored at (-80°c) until assayed for GPx, GR, SOD, levels of GSH and AA cytosolic and total protein. The second portion was used for histological analysis. Heparinized blood was withdrawn from the patients and control preoperatively. After centrifugation at 2000 × g (10min), erythrocytes were washed three times in 5 ml of 9 g/l NaCl solution, haemolysed, and stored at (-80°c) until analyses. Hemoglobin concentration was determined by Cyanmethemoglobin method[12].

Glutathione Assay

Total GSH levels in cytosol and in whole blood were analyzed as described by Tietze[13]. Tissue was homogenized in EDTA K-phosphate buffer, ph 7.4 at 0° C, and 1 ml sample was added to an equal volume of 25% tricloroacetic acid. After centrifugation at 2000 × g for 15 minutes (0° C), the supernatant was washed with diethyl ether. In the remaining aliquot, proteins were assayed following Lowry's method[14]. GPx and GR assessment, and GPx activity in cytosol, and haemolysate was measured according to Paglia and Valentine using hydrogen peroxide; and the rate of disappearance of NADPH was recorded spectrophotometrically (340 nm) at 37°C[15]. GR activity in cytosol and haemolysate was analysed as described by Goldenberg and Spooner[16]. The catalytic activity were measured spectrophotometrically at 340nm following the decrease in absorbance due to the oxidation of NADPH. To measure cytosolic enzyme activity, the samples of oral tissues were homogenized in volumes of cold 0.25Msucrose in 0.1M K-phosphate buffer pH 7.4.The homogenates were centrifuged at 40,000×g for 20 min at 4° C and the supernatants were used for GPx and GR assays[16]. The cytosolic protein concentration was determined using the Lowry et al. method with BSA as standard[14].

Superoxide Dismutase Assay

Total superoxide dismutase (Cu/Zn-SOD and Mn-SOD) in cytosol and haemolysate was assayed spectrophotometrically17.The tissue was homogenized in three volumes of 25 nM triethanolamine-diethanolamine buffers, pH7.4, and centrifuged at 40,000× g at 4°C(60min). The supernatant was dialysed against a cold homogenization buffer and used for assay.

Ascorbic Acid Assay

Oral tissues were homogenized in EDTAK-phosphate buffer pH 7.4(0°C). 0.5 ml of the sample (tissue or plasma) was added to an equal volume of 10% metaphosphoric acid. The samples were centrifuged at 2000×g at 0°C (10min). The supernatants were filtered and injected (20 ml) in to HPLC column and analyzed as described by Ross[18].

Statistical Analysis

The significance of difference was assessed by Student's "t" test and probabilities of less than 0.05 ($p < 0.05$) were accepted as significant. The values are expressed as mean (SD).

Observation and Result

Table 1: Distribution of squamous cell carcinoma patients

Age	Sex	Sites	Clinical stages
35-75 years	Males- 28 Females- 12 Total= 40 Patients,	Tongue-8 Cheek--12 Alveolar mucosa-14 Floor of mouth---- 06	Stage-1(T1N0M0) 17 Stage-2(T2N0M0) 13 Stage-3(T3N1M0) 09 Stage-4(T3N2M0) 01

Table 2: Levels of antioxidant enzyme in Healthy, Tumor and Tumor-free tissues

Antioxidant enzymes	Healthy	Tumor	Tumor-free
SOD u/mg protein	18.23 ± 3.29	07.55±1.203A	16.72± 2.772CD
GPx u/mg protein	12.76±2.143	26.89± 5.001A	14.463±3.169BD
GR u/mg Protien	11.20±1.438	23.22± 5.001A	17.5 ±5.243 BD
GSH u/mg Protien	14.39± 0.899	25.71± 4.976A	13.58± 2.209AD
AA nmoli/g tissue	62.59±11.974	435.80± 80.962A	214.43± 44.192AD

A = as compared with healthy tissue P<0.001; B= as compared with healthy tissue P< 0.01;
C = as compared with healthy tissue P<0.05; D = as compared with tumor tissue p<0.001.

Table 2 shows significantly increased level of G S H in tumor tissue by 6-fold (P<0.001) and in tumor-free tissue by 2.5-fold (P<0.001) compared with healthy tissue. The activities of G Px and G R were significantly increased (+110.4%and+107.4%) in tumor and in tumor-free tissue (+20.6%and+56.6%) respectively when compared with healthy tissue (P<0.001) for tumor tissue and tumor-free Vs healthy (P<0.01) whereas SOD was significantly decreased in tumor and tumor-free tissues (-55.8%, P<0.001and-12.8%,P<0.05%respectively) compared with healthy tissue.

Table 3: Levels of antioxidant enzyme in blood of oral squamous cell carcinoma patients and in Healthy subjects.

Antioxidant enzymes	Healthy	OSSC patients
SOD U/mg Hb	3.51 ± 0.424	2.84± 0.927 C
G Px U/mg Hb	16.56 ± 2.523	2.41± 1.673 A
GR U/mg Hb	18.17 ± 3.104	7.37 ± 0.861A
GSH µmol/ml	2.47 ± 0.331	0.109A
AA nmol/ml	56.79 ± 9.478	18.03 ± 3.372A

A = as compared with blood of healthy subjects $p < 0.001$; C = as compared with blood of healthy subjects $p < 0.05$.
Table 6 shows significantly lowered GSH, GPx, GR and SOD levels (-71.6%,-32.1 %,-58.3 %,P<0.001and-9.4%, P<0.05 respectively) and AA(-67.3%,P<0.001) in OSCC patients compared with control.

Fig. 1: Photograph of the patient showing squamous cell carcinoma of cheek mucosa

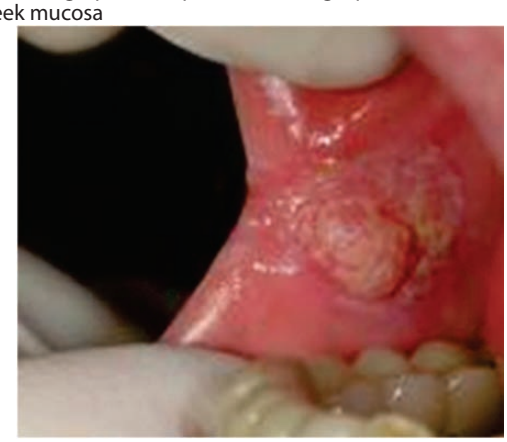
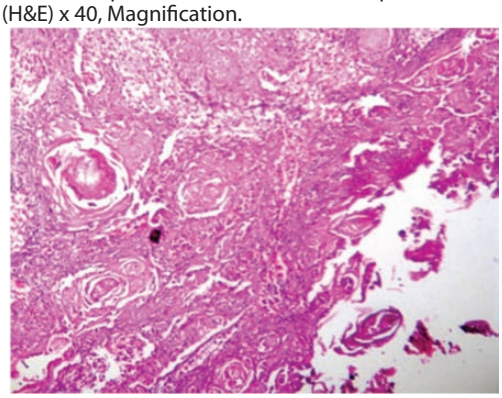


Fig. 2: Photomicrograph of the same patient showing Malignant proliferations of epithelial tissue and 'Keratin pearl' in connective tissue. (H&E) x 40, Magnification.



Disccusion

Oxidative bombards on cells by free radicals are normal physiologic phenomena in the body. In oxidative stress, there is an excessive production of ROS and/or a significant decrease or lack of antioxidant defiance. Low titre oxidative stress, stimulate cell proliferation and higher levels can damage protein, nucleic acid, cell membrane, and induce cytotoxicity and cell death[19].

Our study observed low levels of SOD in OSCC tissue compared with Control. SOD is proposed to be a new type of tumor suppressor gene and it's over- expression leads to reversion of tumourogenicity in vivo or of the malignant phenotype in vitro[20].

Transfixion of the human MnSOD cDNA into SCC-25 oral squamous carcinoma cells suppresses their malignant phenotype, leading to lower clonogenicity and growth suppression[21]. The inhibition of proliferation and reversal of the malignant phenotype is attribution to an increase in H_2O_2 production, because of the dismutation reaction.

Hydrogen peroxide reacts with biologic molecules and the potential targets are DNA and sulfhydryl group on protein[4]. The mechanism by which hydrogen peroxide might inhibit tumor cell growth is still unknown.

SOD converts O_2- into H_2O_2, whereas GPx and catalase convert H_2O_2 into water[7].

G Px is a master antioxidant alleviating lethal oxidative stresses in body[22]. Higher activity of GPx results in decreased levels of ROS[23]. In addition, over expression of GPx rescues the growth suppression by MnSOD-over expression[24]. In present study, we hypothesized that higher activity of GPx in tumor tissue protects cells against oxidative bombards; causing increased tumor cell growth. The removal of hydro-peroxides by GPx requires GSH as cofactor. GPx converts H_2O_2 to H_2O and catalyzes GSH to GSSG simultaneously. GSH in cells has a potent electron-donating capacity and high redox potential that renders it both, a potent antioxidant and a convenient cofactor for enzymatic reaction. GSH conjugates and Detoxify the compounds that cause carcinogenesis[3].

Because GPx requires GSH as a cofactor to function, we hypothesized that higher activity of GPx can influence the levels of GSH. Our results show significantly increased GSH in tumor tissue compared with Tumor-free and Healthy tissue.

Conversion of GSH to GSSG occurs during GPx-catalyzed reduction of peroxides and in spontaneous reactions with free radicals[26]. GSSG is restored to a reduced form by GR; this reaction serves to maintain a high GSH/GSSG ratio in the cell[27]. In our study, peroxidase and reductase activities appears to be enhanced in the tumor tissue.

AA (vitamin c) is a radical scavenger antioxidant in cells which can act as a reducing agent. AA and GSH have actions in common, sparing each other[8]. The increased AA levels in Tumour tissue compared to Control may be due to further protection against ROS.

These results suggest that decreased SOD activity and increased AA, GSH, GPx and GR enzymes in OSSC may be a consequence of an increased detoxification capacity, an adaptive mechanism by which tumor cell gain a selective advantage over their surrounding normal cells[25].

Decreased SOD activity with increased GPx and GR activities in tumor tissue observed in the present study is in line with similar findings in oral and in other human tumors[27,28,29].

In our study, GPx, GR, GSH and AA levels are increased and SOD activity is decreased in tumor-free if compared with healthy tissue. Such findings in tumor-free tissue; reflects

the metabolic changes against pro-oxidant event.

In contrast to tumor tissue, we found antioxidants depletion in the venous blood of OSCC patients compared to control. The erythrocytes are susceptible to ROS-induced lipid peroxidation. This decrease in antioxidant enzymes, GSH and AA levels in blood of OSCC patients may be due to increased scavenging of lipid peroxides as well as sequestration by tumor cells[8].

Tumor cells sequester GSH to meet the demands of a growing tumor[27]. Administration of AA significantly reduces the concentration of the lipid peroxide and enhance GSH level in blood[26]. Moreover, the regeneration of AA requires GSH; deficiency of GSH in blood of OSCC patients may be responsible for low level of AA in plasma[25]. In conclusion, our results show the following: an increase in the levels of GSH and GSH-system (AA, GPx and GR) in tumor tissue, which suggests that enhanced antioxidant capacities in tumor tissues made them less susceptible to oxidative stress, conferring a selective growth advantage on tumor cells. Second, an increase in the levels of GSH-system in both; tumor tissue and adjacent tumor-free tissue. Such increase in tumor-free tissue reflects an enhanced detoxification capacity. Third, the decreased antioxidant activity in blood of OSCC-Patients may be caused due to increased sequestration by tumor cells. Thus, if antioxidants are important in oral squamous cell carcinoma, normalization of the levels of these antioxidants might be used to reduce oral malignancy.

Conclustion

The low levels of antioxidants in the blood of oral squamous cell carcinoma patients may be due to their increased utilization to scavenge lipid-peroxides as well as their sequestration by tumor cells. The enhanced antioxidant capacities in tumor tissues make them less susceptible to oxidative stress, granting a selective growth advantage on tumor cells. These finding suggest that normalization of the levels of antioxidants might be used to reduce oral malignancy. Moreover, the detection of antioxidant enzymes may be a future marker for diagnosis and possibly; a monitor for therapeutic effectiveness and recurrences in oral cancer patients.

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Mouth Mirrors Systemic Diseases

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Abstract

The oral cavity is an important anatomical location with a role in many critical physiologic processes, such as mastication, digestion, respiration, and phonation. It is unique for the presence of exposed hard tissue surrounded by mucosa. The oral cavity might well be thought as window to the body because oral manifestations accompany a wide array of systemic diseases. In many instances, oral involvement precedes the appearance of other symptoms or lesions at other locations. These oral manifestations must be properly recognized if the patient is to receive appropriate diagnosis and referral for further treatment. This article is intended to highlight the lesions of oral mucosa, dentition, salivary glands, facial skeleton, extra-oral skin and other related structures that also involve some systemic diseases.

Key Words

Oral cavity, Oral manifestations, Systemic diseases.

Introduction

Oral cavity(mouth) is an important anatomical location with a role in many critical physiologic process, such as mastication, digestion, respiration, and phonation. It is unique in the presence of exposed hard tissues, extremely sensitive proprioceptors in periodontal ligament, and temporomandibular joint. TMJ is a special articulation because: 1) it is, in effect, two joints 2) the only articulation in the body where the right joint must always know what the left is doing, and 3) the only joint in the body which is at mercy of the teeth[1]. Functionally, healthy oral tissues are unique in coping with trauma compared to most of the body tissues[2]. Thus, even a slightest systemic imbalance leads to changes in mouth before lesions will be demonstrable elsewhere.

Oral cavity contains derivatives of all of the primary germinal layers, and includes many tissues not demonstrable anywhere else in the body. Therefore, diseases which affect other regions can also involve the oral tissues. A disease, in general, is a function of the products of an appropriate systemic substrate and local irritating factors. Oral lesions play an important role in diagnosing a number of systemic diseases[1,2]. In a sizable number of instances, the oral clues are the first and sometimes even the only evidence of a disturbed state[2]. Among the classic examples are Koplik's spots in the buccal mucosa which precede, by about 24 or so hours of the cutaneous eruption of measles[3]. It follows that the recognition of this prodromal picture is highly pathognomonic and helpful in the early detection of measles. Sometimes, the oral symptoms and/or signs may parallel the complaints and clues elsewhere in the body. The simultaneous development of an erosive lesion on the buccal mucosa near the angle of the lip along with a butterfly dermatosis on the face is certainly presumptive proof for lupus erythematosus[4]. Still, in other situations, the oral reflections follow the evidences in other parts of the body. For example, the bullae in pemphigus may erupt on the skin days, weeks, or months before oral ulcers can be demonstrated[5]. Thus, it is clear that the examination of the oral cavity as diagnostic zone can indeed contribute to the detection of systemic disease.

A wide array of systemic diseases encountered in Internal Medicine have oral manifestations, and alerts the clinicians to the possibility of concurrent or latent systemic disease that may develop subsequently. Some diseases identified in oral cavity are extremely specific6. Animal and population-based studies suggest that periodontal diseases may be linked with systemic diseases and conditions including CVS, DM, Respiratory diseases, adverse Pregnancy outcomes, and osteoporosis[7,8,9]. Many time investigators have emphasized the proper recognition of oral manifestations to deliver appropriate treatment and referral[10].

This article is a brief overview of the oral manifestations caused by some of the more common hereditary disorders, acquired metabolic-bone disorders, hematologic disorders, and the disorders of unknown etiology.

Hereditary Disorders

Ascher's syndrome presents double lip, reduplication of the upper lip's vermillion border and sometimes associates colloidal goiter. Sometimes maxillolabial sulcus remain absent or shallow or multiple frenula coexists[11].

Chondroectodermal dysplasia frequently shows total or partial anodontia and shortened long bones along with congenital defects in the hair, skin, sweet glands, and cartilage[12].

A high palatal vault and enamel hypoplasia in Turner's syndrome or in congenital gonadal dysgenesis of females is characterized by XO chromosome karyotype, infertility, pterygium colli, coarctation of the aorta, a shield chest, and many other developmental defects. A high-arched soft palate and hypermobility of TMJ is associated in the autosomal-dominant Marfan's syndrome, a generalized disorder of connective tissue with skeletal, ocular, and cardio-vascular malformations. Other marfanoid syndromes are also Associated with a high-arched palate and crowding of the teeth[13].

The Ehlers-Danlos syndrome is a group of 11 inherited metabolic disorders of connective tissue, which share phenotypic expressions of Marfan's syndrome in addition to extreme laxity of the skin and joints and easy bruisability. Type VIII Ehlers-Danlos disorder is also characterized by severe periodontal disease and early loss of permanent teeth[14]. Children with Down syndrome frequently have macroglossia as well as midface hypoplasia, a cleft or high-arched palate, and atrophy of fungiform papilla on tongue[15].

Hereditary hemorrhagic telangiectasia is a autosomal dominant inheritance characterized by telangiectasia of the tongue and oral mucosa, which becomes apparent at puberty and increases with the patient's age. This is also associated with multiple telangiectasia of the gastrointestinal tract causing severe blood loss, AV malformations of the liver, cirrhosis, and occasionally AV malformations of the lung[16].

A peculiar syndrome called phlebectasia of the jejunum, oral cavity, and scrotum; is characterized by caviar spots on the tongue, Fordyce spots on the scrotum, and a propensity for gastrointestinal bleeding caused by jejunal varicosities[17].

Von Recklinghausen's syndrome reflects fibromas of the maxilla, mandible, or tongue and is associated with congenital Neurofibromas[18].

The peculiar Cowden's disease is dominantly inherited and is characterized by wartypapules on the face, arms, and mucous membrane of the mouth. This syndrome has apropensity for the development of carcinomas of the breast, thyroid, endometrium, and cervix[19].

The Melkersson-Rosenthal syndrome is a developmental abnormality with unilateral facial paralysis and edema of the periorbital skin, which often progresses to granuloma. The tongue is fissured and has papillary projections, which reveal fibromas at biopsy[20].

Mucopolysaccharidosis type I (Hurler's syndrome), characteristically shows macroglossia, hypoplastic teeth, corneal degeneration, and mental retardation[21].

Albright's disease (the syndrome of precocious puberty, polyostotic fibrous dysplasia of bones, and "coast of Maine" café-au-lait spots) may also display Melanosis and migration the gingiva and mobility of teeth, secondary to jaw involvement with the fibrous dysplasia. An important disorder to recognize is melanosis of particularly the skin, lips, and gingiva - the Peutz-Jeghers syndrome - associated with hamartomas of the small bowel[21,22].

Tangier disease, a peculiar disorder of lipoprotein metabolism, is associated with pathognomonic xanthomas, particularly of the soft palate and tonsils, that appear as yellow tonsil or yellowish white to gray spots in the soft palate. Patients also appear with hepatosplenomegaly and peripheral neuropathy[23].

Histocytosis X (Letterer-Siwe disease, Langerhans' cell eosinophilic granuloma, and Hand-Schüller-Christian disease) are associated with infiltrative-destructive lesions of the jaw-bone secondary to overgrowth of histiocytes and may appear as gingival epulis, loose teeth, and mucosal erosions[24].

Gaucher's disease, an inborn error of lipid metabolism is frequently associated with radiolucencies of jaw bones, teeth mobility and gingival recession[25].

Orodigitofacial dysostosis is characterized by a short upper lip, hypertrophy of the frenula of the lips and tongue, and clefts of the hard and soft palates. Systemic findings include polycystic kidneys and liver and mental retardation[26].

Marble bone disease, a congenital disorder of bony osteoclastic function; leads to bone marrow insufficiency, and can be associated with jaw-bone hyperostosis resembling Paget's disease, fibrous dysplasia, histiocytosis-X and acromegaly[24].

Osteogenesis imperfecta manifests in the mouth on alveolar sockets and dentin, and presents opalescent, freely movable teeth and frequent pathologic fractures of jaw bones. Abnormalities of both the dental and skeletal systems are also seen in cleidocranial dysostosis. Abnormalities include the absence of clavicles, dolichocephaly, and supernumerary as well as malformed teeth[27].

The unique congenital abnormality Epidermolysis-Bullosa, presents bullous lesion on facial skin and oral mucosa and the Patients with the severe form, are continually disabled with secondary infections and sepsis[28].

congenital erythropoietic porphyria is characterized by erythrodontia secondary to porphyrin deposits in the gums and teeth. Porphyria cutanea tarda, an acquired form, is associated with photosensitive vesicles of the skin and oral mucous membranes[31].

Acquired metabolic- endocrine disorders[31]

Paget's disease is a disorder of anarchic resorption and deposition that frequently involves Skull and maxillae, and presents with maxillary deformity, enlargement as well as spacing, and mobility of the teeth[29].

Hyperparathyroidism secondary to parathyroid adenomas and hyperplasia can appear as a brown tumor of von Recklinghausen in jaw bones, a localized area of intense osteoblastic-osteoclastic activity, and hemorrhage into a fibroangiomatous matrix.

Hypoparathyroidism of idiopathic, pseudo-, or surgical form, or chronic malabsorption of calcium may present oral manifestations as moons face, angular cheilitis, xerostomia and enamel hypoplasia.

Graves disease leading to hyperthyroidism, is an autoimmune disease characterized by hyperplasia of all lymphoid tissue, including lymph nodes and spleen. It manifests in the mouth as hyperplasia of all the lymphoid tissue-bearing areas in the Oro-pharynx and tonsillar regions along with hypomotility of tongue.

Hypothyroidism, whether caused genetically, surgically, or as part of burned-out Hashimoto's disease may appear as macroglossia as well as disorders of deglutition caused by skeletal muscle weakness.

In Diabetes mellitus, a high incidence of gingivitis, periodontitis and alveolar bone loss at clinical level; and microangiopathic changes in oral-biopsies is reported. Uncontrolled cases report for xerostomia due to osmotic diuresis, and oral candidiasis.

Addison's disease, mostly an immunologic polyendocrine glandular failure; presents with bronzed skin and diffuse or localized hyperpigmentation of the oral mucosa, which may be the first sign of this disease.

Acromegaly reflects oral signs as mandibular overgrowth resulting in prognathism, spacing between the teeth, macroglossia and diffuse enlargement of the jaw bones. Prepubertal hypopituitarism appears as micrognathia, difficult tooth-eruption and malocclusion of teeth.

The appearance of Pregnancy tumor in first trimester of pregnancy is well known, an inflammatory gingival hyperplasia caused by increased gingival reactivity to local irritants. It is maintained throughout the pregnancy. Menopause may be associated with a number of oral manifestations, the most common being desquamative gingivitis and generalized atrophic alterations of the oral mucosa[30,31].

Hematological Disorders

The mouth may be the site of the earliest signs of blood dyscrasias[32]. The Plummer-Vinson syndrome or sideropenic dysphagia, is a symptom complex caused by iron deficiency which produces mucosal pallor, atrophic glossitis, angular cheilitis, and pharyngoesophageal mucosal web causing dysphagia. Mucosal webs are considered to be a premalignant change. Clinically, patients with Megaloblastic anemia have painful atrophy of the oral mucosa as well as recurrent aphthous ulcers. The sore, clinically normal but burning toungue is sometimes a precursor of anaemia. "Magenta tongue" is said to be rather characteristic, may herald a B12 deficiency[30,32].

Leukemia's reflect in oral cavity as pallor, bleeding and petechial hemorrhage, ulceration, gingival swelling and increased predisposition to candidosis and herpes infections[33]. Multiple Myeloma is a disseminated neoplasm of plasma cells, and it gives rise to secondary manifestations in oral cavity. These lesions cause swelling of the jaws, pain, numbness, mobility of teeth, and pathological fractures. Punched out lesions of the skull and jaw are characteristic radiographic findings. Since multiple myeloma results in immunosuppression, a variety of infections may be present, including oral hairy leukoplakia and candidiasis. Amyloid deposits in the tongue can lead to macroglossia[33].

Disorders of unknown etiology

Wegener's granulomatosis is a rare disorder, histologically characterized by vasculitis and granulomatous inflammation. It manifests in the oral cavity as multiple petechiae, mobility and loss of teeth; and failure of the wound healing. The disease may remain localized to the oral cavity for unusually long periods of time before multiorgan involvement occurs. A "strawberry gingival hyperplasia" is pathognomonic of the disease. Lethal midline granuloma is an extreme clinical variant leadings to destruction and mutilation of the upper respiratory tract and the face. This disease resembles Wegener's granulomas, except that it does not show vasculitis or involvement of lungs, kidneys, or skin. Mycobacterium and fungal culture are negative. Untreated cases lead to massive destruction and deformation of the face and upper respiratory tract[34].

Crohn's Disease, a chronic granulomatous disorder of unknown etiology is now well recognized as affecting entire GIT from mouth to anus. Oral manifestations includes deep and extensive recurrent aphthous ulceration; thickened, edematous buccal mucosa producing a cobble stone appearance, swollen and fissured lip, and granulomatous cheilitis. Oral lesions usually predate the bowel symptoms and it may be used as marker in this disorder. Ulcerative colitis may also manifest as pyostomatitis[30].

The acute and chronic renal failure from diverse etiologies produce dyskeratotic changes in the oral cavity and eye, resulting in xerostomia and kerato-conjunctivitis to such an extent that simulates Sjögren's syndrome[35].

Conclusion

* Disease is a product of a suitable systemic substrate and an appropriate local factor. Since trauma is ordinarily high in the mouth, it follows that oral symptoms and/or signs may be the first evidence of a systemic disturbance.

* There is a wide array of systemic diseases which are

accompanied by oral symptoms and/or signs. The oral reflections may precede, parallel, or follow symptoms and signs elsewhere.

*Many lesions identified in oral cavity are extremely specific in terms of diagnosing systemic diseases.

As the mouth presents an easy window for observation of systemic diseases, Better understanding of this correlation will help both dental and medical professionals to determine best approach to patients care.

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35. Uremic stomatitis associated with undiag

Sero-prevalence of Rubella Infection

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Abstract

Background

The burden of rubella infection in most of the developing countries especially in Africa is not well documented because of limited epidemiological studies. Congenital rubella syndrome (CRS) in the newborn is one of the important complications of rubella infection. Many countries have introduced MMR (measles, mumps and rubella) vaccine to control CRS. Measles has been successfully controlled in many countries by vaccination centered measles control program. However, most of the African countries have not included MMR vaccine in their national immunization program.

Objective

The exact magnitude of Rubella cases in this geographic area is not known.

The availability of an effective vaccine to prevent Rubella infection and therefore CRS, has made it necessary to evaluate the burden of disease in a country where MMR vaccine is not covered in the immunization schedule or in vaccination strategy. A retrospective study was undertaken to find out the seroprevalence of rubella infection in Eritrea.

Material and Methods

This study was done in the Immunoserology section of National Health Laboratory of Eritrea which is also National Reference Laboratory. The results of earlier years were collected from the National Measles reference Laboratory and this data is primary and reliable. Rubella specific IgM kit was used using Dade-Behring, Germany ELISA kit. Specimen collection, handling, transport and processing were done as per the instructions given by the manufacturer.

Results

The seroprevalence of rubella cases (69) were high in the year 2006, when compared to other years. Like in most of the studies, the distribution of Rubella cases was maximum in children of below 14 years. Seasonal distribution of the rubella cases shows, 96% were recorded in January to May 2006 with highest number occurring in the month of April.

Conclusion

The results analysis indicate the prevalence of Rubella virus in this geographic area and in the absence of MMR vaccine in the immunization schedule there is every possibility of acquiring Rubella infection during pregnancy and therefore CRS.

Key Words

Rubella, Seroprevalence, Congenital rubella syndrome.

Introduction

In viral disease control measures, killer diseases of children that are preventable by vaccination are given top priority. These include diseases like Polio, Hepatitis,Measles, and Rubella. Rubella has a worldwide distribution. Before the introduction of vaccination, outbreaks tend to occur in spring and summer. Children of 3-10 yrs are most frequently affected. Rubella is generally mild childhood viral disease. The disease is of very important public health problem because infection acquired during early pregnancy often results in number of fetal malformations called as Congenital Rubella Syndrome (CRS). Despite the vaccination program 5-10 % of women of child bearing age are susceptible to rubella infection. Many nations have not introduced MMR vaccination and as a result, protection against Rubella is not provided to children. Thus making children vulnerable for Rubella infection[1]. Congenital rubella is a major global cause of preventable hearing impairment, blindness and intellectual disability. The incidence rate of CRS is estimated to be 0.5 to 2.2 per 1000 live births in developing countries. Only 28 % of developing countries vaccinate against Rubella[2]. In countries where vaccination is uncommon, the incidence of rubella infection is high and epidemics are frequent. Serology is the mainstay of diagnosis of rubella infection. A reliable method of diagnosing rubella infection in a laboratory is by detection of rubella-specific IgM antibodies.

Rubella has been a special concern of ophthalmologists for more than 60 years. In 1941, Greg reported cataracts in 78 infants, many of whom were also affected by

congenital heart disease and failure to thrive. Subsequent studies confirmed that the risk of rubella defects was high in infants whose mothers were infected by rubella virus in the first 16 weeks of pregnancy[3]. WHO estimates that, worldwide, more than 100000 children are born with CRS each year, most of them in developing countries[4].

Eritrea is situated in the horn of Africa with an area of 122,000 sq.kms, with a population of ~3.5 million. To the east, the country is bordered by the Red Sea, Djibouti borders in the South-East, Ethiopia in the South, the Sudan in the North & West. As per demographic & Health Survey, 2002, published by the National Statistics and Evaluation Office, Asmara, Eritrea, May 2003, the infant mortality rate is 48 and 93 per thousand live births.

Like any part of the world, Rubella cases are reported in Eritrea. In Integrated Disease Surveillance and Response Program, which was adopted n 1998 and implemented in 2001, Measles is one of the priority diseases. Rubella is not included in the priority diseases. A Measles Reference Laboratory, aided by WHO was established within National Reference Health Laboratory, in the year 2002. In Eritrea, Surveillance on the prevalence of Rubella by immunoserological studies, guides ministry of health in intervention measure. When referred to data available on measles and rubella, it appeared that measles cases are on down trend and rubella cases on up trend. The actual burden of rubella infection in most of the developing countries especially in Africa is not well documented. The availability of an effective vaccine to prevent Rubella infection and therefore CRS, has made it necessary to evaluate the burden of disease in a country where MMR vaccine is not covered in the immunization schedule or in vaccination strategy. This prompted us to take up this research study to find out the reality of rubella cases in Eritrea by taking immunoserological prevalence as a parameter.

Material & Methods

This study was done as part of senior research paper of second author in the Immunoserology section of National Health Laboratory of Eritrea which is also National Reference Laboratory. The Measles Reference laboratory is located within National Health Laboratory and conducts tests for Measles and rubella suspected cases. The results of the other years were collected from the National Measles reference Laboratory and this data is primary and reliable. In brief, 5 ml of Blood specimen from each suspected patient was collected and serum was separated using biocentrifuge. Rubella specific IgM kit was used using Dade-Behring, Germany ELISA kit. Elisa test was done using standard protocol given by the manufacturer. Specimen collection, handling, transport and processing were done as per the instructions given by the manufacturer.

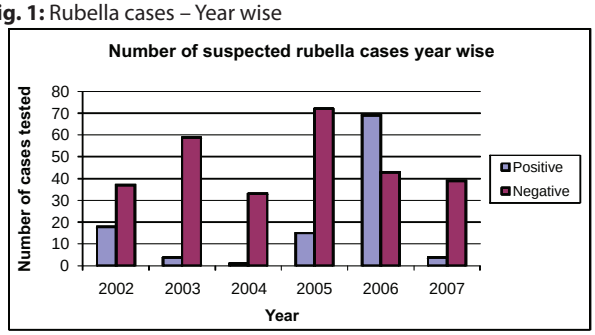
Results

The number of suspected rubella cases ranged from 43 to 112 per year over the years 2002 to 2007 (Table 1 & Fig 1). The maximum number was in the year 2006. Of the112 cases, 69 were laboratory confirmed rubella cases. However, trend was different in the year 2007, where the number of cases were 4. For the last 6 years, maximum of 69 cases were detected in 2006. These are confirmed cases of Rubella and usually referred to Measles Reference Laboratory for the detection of measles. Thus, clinical cases which were not referred to the reference center are likely to be high.

Table 1: Number of cases of Rubella - year wise

Year	Positive	Negative	Total
2002	18	37	55
2003	4	59	63
2004	1	33	34
2005	15	72	87
2006	69	43	112
2007	4	39	43
	111	283	394

Fig. 1: Rubella cases – Year wise



In the year, 2006, a total of 127 suspected measles cases were investigated by immunoserology section and found 3 confirmed cases of measles by ELISA IgM specific for measles. On the other hand, of the 128 cases; 69 cases were confirmed by immunoserology laboratory as rubella. From the year 2006 data, it is evident that there is widespread presence of rubella in the community. 60 of the 65 cases were of below 14 years age group(Table 2 & Fig. 2). Seasonal distribution of the rubella cases shows, 96% were recorded in January to May 2006 with highest number occurring in the month of April (Table 3 & Fig 3). The number of measles cases was 11,16, and 3 for the years 2004, 2005 and 2006, respectively.

Table 2: Rubella Cases – Age wise (Year 2006)

Age Group	Positive	Negative	Total
Less than 9 months	1	3	4
9 to <12 months	0	3	3
24 to < 60 months	10	7	17
5 to <14 years	49	21	70
14 years and above	5	3	8
Missing	4	6	10
Total	69	43	112

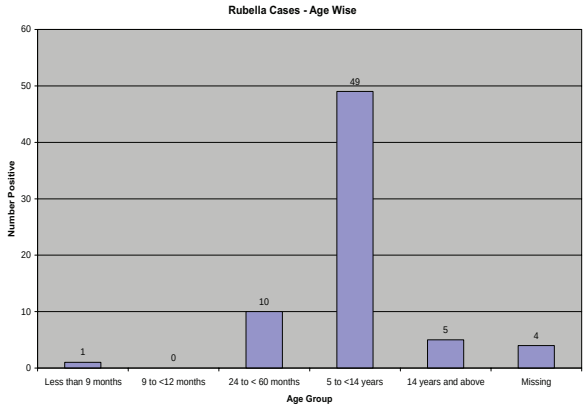
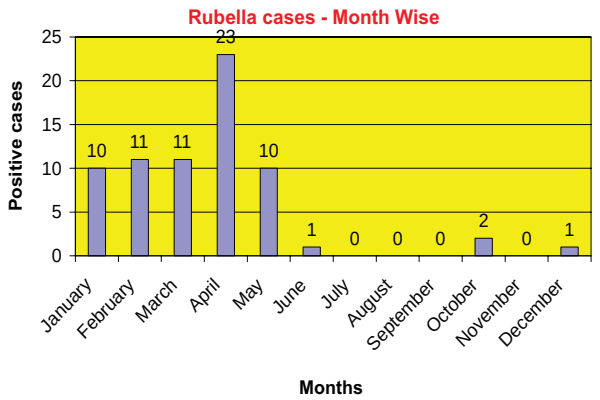


Table 3: Rubella cases – Month wise (Year 2006)

Month	Positive	Negative	Total
January	10	6	16
February	11	9	20
March	11	5	16
April	23	6	29
May	10	4	14
June	1	2	3
July	0	1	1
August	0	1	1
September	0	1	1
October	2	4	6
November	0	2	2
December	1	2	3
	69	43	112



Discussion

Like in most of the studies[4,5,6] the distribution of Rubella cases was maximum in children of below 14 years. Most of the cases recorded were in the months of January, February, March, April and May. It is difficult to draw any conclusion about seasonal distribution, just based on one year data. However, in many studies[7,8], most of the rubella cases were recorded in winter. In the present study most of the cases were recorded in January to May period. In one of the studies involving screening 2300 cases for rubella infection, no seasonal pattern was observed[9].

In a unvaccinated case low seroprevalences and late encounter of mumps and rubella was observed[10]. In another study, CMV infection was prevalent in a significantly higher number of children with hepatospleenomegaly than rubella while in infants with congenital malformations a significantly higher number had rubella infection. It is concluded that rubella and CMV infections are commonly seen in children with intrauterine infections[11]. In a study, involving 917 women and 99 newborn babies who were jaundiced, or who died within a few days of birth or who showed gross congenital abnormalities, IgM antibodies to cytomegalovirus (CMV), Herpes simplex virus type 2 (HSV-2) and rubella virus were detected indicating the importance of this virus in intra-uterine infection[12]. Congenital rubella syndrome (CRS) and congenitally infected babies were born from 12 high-risk mothers in Japan and authors strongly advocated more intensive immunization to eradicate CRS completely in Japan[7]. An outbreak of Rubella was recorded in Brazil and an attempt was made to prevent by vaccination[8].

The epidemiology of rubella and CRS has changed significantly in the last decade. These changes and molecular typing suggest that the United States is on the verge of elimination of the disease. This is mainly achieved by vaccination program. During the 1990s, the incidence of rubella in children younger than 15 years decreased (0.63 vs 0.06 per 100 000 in 1990 vs 1999), whereas the incidence in adults aged 15 to 44 years increased (0.13 vs 0.24 per 100 000). 23 CRS infants were born to foreign-born mothers. The findings indicate sustained low incidence of rubella and CRS since 1992[13,14]. Rubella vaccine has emerged as the most effective public health measure against the well known crippling consequences of congenital rubella infection (CRI). After the devastating pandemic of rubella between 1962 and 1965, United States licensed the use of vaccine in 1969, which resulted in 99% reduction of cases[15]. In 1996, the Immunization Working Group of the Mexico-United States Binominal Commission was established to enhance coordination of disease surveillance, assure high vaccination coverage in both countries, and hasten the elimination of vaccine-preventable diseases. The United States and Mexico share the Pan American Health Organization (PAHO) goal of measles elimination by 2000[16].

No country in sub-saharan Africa vaccinate against rubella. It is recommended that countries wishing to undertake prevention program for CRS should either mount vaccination programs for adolescent girls or women of reproductive age or offer universal vaccination in infancy as part of routine childhood immunizations, accompanied by serological surveillance of women of reproductive age[17]. In this laboratory of Eritrea, the number Rubella cases detected in 2006 was 69 and measles 3. At outset, it appears that the number of Rubella cases is on the rise, while the number of measles

cases is on decline. The cases were referred as suspected measles cases which were also tested for rubella antibodies to detect rubella infection. Therefore it is likely that the actual number of rubella cases in the community could be higher than actual numbers reported. This indicates the vaccine against measles is effective. Many studies[18,19,20,21,22] conducted recently in different countries around the globe, emphasize the need for a continued strong public health commitment to increase the proportion of vaccinated individuals and with priority to immunize women of child bearing age.

Conclusion

Introduction of Measles vaccine and control program successfully controlled the cases of Measles in Eritrea but not Rubella. Many countries have adapted MMR vaccine (Mumps, Measles, and Rubella) and successfully controlled Rubella cases. Rubella causes periodic outbreaks. In Eritrea, effective Measles control program by vaccination resulted in decrease in number of measles cases in children. Results of this study strongly advocate the introduction of MMR vaccine and effective surveillance of Rubella cases. The presence of Measles Reference Laboratory which also screens specimens for rubella makes surveillance and detection effective. Although exact picture of Rubella cases in community and incidence of CRS in infants is not known, all these cases can be prevented by effective vaccination.

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Speciation and Antibiogram of Coagulase Negative Staphylococci (CONS) from Various Clinical Specimens

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Abstract

Background

CONS are the major nosocomial pathogens. These undoubtedly need more recognition. Susceptibility testing should be done on any isolate considered to be a pathogen as multidrug resistance is common among them.

Aims

- Isolation, identification and speciation of CONS.
- To identify their pathogenicity markers, antibiogram with special emphasis on methicillin resistance.

Settings and Design

This cross sectional study was conducted at a government tertiary healthcare teaching center for a period of one year.

Material and Methods

Totally 2361 clinical specimens were processed. All specimens were subjected to gram's staining and cultured for isolation. The organisms were identified and speciated by standard biochemical reactions. Antibiogram was formed by Kirby-Bauer disk diffusion method.

Statistical Analysis

The data entry was carried out using Microsoft office Excel worksheet and was statistically analyzed by WINKS SDA6 software.

Results

A total of 150 strains of CONS were isolated from 2361 clinical specimens. Majority of CONS were isolated from urine (44.67%), followed by exudates (33.33%), and blood (22%). Most common species isolated was S.epidermidis (50.67%), followed by S.saprophyticus (22%) and S.hemolyticus (18%). Slime production (38.67%) and methicillin resistance (54.67%) was detected respectively. Vancomycin and amikacin were the most effective antibiotics.

Conclusion

S.epidermidis can cause a number of human infections and should no longer be considered as a harmless commensal. S.saprophyticus is proven pathogen in man. The antibiotic resistance pattern in CONS is a great threat to clinicians combating such infections.

Key Words

CONS, Methicillin, S.epidermidis, Slime Production, Vancomycin.

Introduction

CONS regarded as saprophytes, is well known pathogen under appropriate conditions. CONS are opportunistic pathogens in debilitated patients, often by colonizing biomedical devices[10,22].

S.epidermidis is frequently isolated, and remarkably quoted as primary nosocomial pathogen[6]. S.saprophyticus is common cause of urinary tract infections in young females[12]. Multidrug resistance is common indicating its potential pathogenicity[5]. Methicillin resistance among CONS is important due to cross resistance to all beta lactam agents[3]. Working knowledge of biology and antibiogram of CONS is necessary to distinguish pathogens from contaminants and to device appropriate therapy[1].

Methods

Study design and settings: This cross sectional study was conducted at a government tertiary healthcare teaching center for a period of one year (October 2004 to September 2005).

Study population: A total of two thousand three hundred and sixty one specimens were collected from both out patients and in patients of tertiary care hospital formed the subjects for the study.

Fifty healthy carriers were also included in the study (Health care workers namely doctors, technicians, group D workers).

Data collection

Clinical specimens: Out of the total two thousand three

hundred and sixty one samples, one thousand two hundred and forty seven urine samples, six hundred and sixty seven exudates and four hundred and forty seven blood samples were collected from patients clinically diagnosed as urinary tract infections, septicemia, peritonitis, cervicitis, conjunctivitis, pyogenic infections namely post-operative wound infections, burn wound infections, pyoderma, osteomyelitis, chronic suppurutive otitis media, Corneal ulcer, diabetic ulcer etc.

Swabs were collected from anterior nares, skin and finger nails from 50 healthy carriers.

Examination and history taking: A proforma was filled for each patient documenting age, sex, address and clinical information including, chief complaints, duration of symptoms and any previous history of treatment.

Collection and Processing of the samples: Specimens were collected according to standard recommended methods[4]. All the specimens were brought to the laboratory within two hours of collection and further processed.

All the samples were subjected to Gram's staining, inoculated onto nutrient agar, blood agar and MacConkey agar plates. These plates were incubated aerobically at 37 o C overnight and observed for the growth, colony morphology and pigment production after 24 hours. Specific identification of CONS was done based on catalase test and coagulase test and speciation was done based on biochemical reactions[11]. (Table – 1)

Antimicrobial susceptibility testing of the isolated strain was carried out according to Kirby-Bauer disc diffusion method[2].

Data management and statistical analysis: The data entry was carried out using Microsoft office Excel worksheet and was statistically analyzed by WINKS SDA6 software. Variables were categorized in a biologically meaningful way where applicable. To analyze data, mean and standard deviation for continuous variables and proportion for categorical variables were computed. Crude associations of the binary outcome variable with each independent variable were assessed by chi-square test. The level of statistical significance was set as $P \leq 0.05$.

Ethical considerations: The protocol for this study was approved from the Chairman, and the secretary, institutional ethical committee (IEC). The approval was on the agreement that patient anonymity must be maintained, good laboratory practice/ quality control ensured, and that every finding would be treated with utmost confidentiality and for the purpose of this research only. All work was performed according to the international guidelines for human experimentation in biomedical research[28].

Results

Majority of CONS were isolated from urine 67 (44.67%), followed by exudates 50 (33.33%) [Pus 35 (23.33%), cervical swab 3 (2%), catheter tip 3 (2%), ear swab 3 (2%), vaginal swab 2 (1.33%), corneal scrapings 2 (1.33%), ascetic fluid 1 (0.67%), pleural fluid 1 (0.67%)] and blood 33 (22%). [Table 2]

The most common CONS species isolated were S.epidermidis 76 (50.67%), followed by S.saprophyticus 33 (22%), S.haemolyticus 27 (18%), S.xylosus 10 (6.67%) and S.capitis 4 (2.66%). Maximum number of S.epidermidis were isolated from exudates 33 (66%) followed by urine 28 (41.79%) and blood 15 (45.45%). [Table 3]

Out of 150 CONS isolated, 58 (38.67%) were slime producers, of which 60.60% were isolated from blood, followed by 54% from exudates and 16.42% from urine. [Table 4]

Slime production was seen in S.epidermidis 42 (55.26%), followed by S.haemolyticus 8 (29.63%) and S.saprophyticus 5 (15.15%). [Table 5]

Out of 150 CONS isolated, 82 (54.67%) were methicillin resistant and 68 (45.33%) were methicillin sensitive. [Table 6]

Table 1: Speciation based on biochemical reactions 3

Species	Oxidase	Urease	Phosphatase	Sugars				
				Glu	Suc	Man	Mal	Xyl
S. epidermidis	-	+	+	+	+	-	+	-
S. haemolyicus	-	-	-	+	+	V	+	-
S. saprophyticus	-	+	-	+	+	V	+	-
S. capitis	-	-	-	+	+sl	+	-	-
S. xylosus	-	+	V	+	+	+	+	+
S. cohnii	-	-	-	+	-	Vsl	Vsl	-
S. simulans	-	+	V	+	+	+	+sl	-
S. warneri	-	+	+	+	+	V	+sl	-
S. hominis	-	+	-	+	+sl	-	+	-

Note: + = >90% of strains positive; - = > 90% of strains negative; V = 11-89% 0f strains positive; Vsl = 11-89% 0f strains positive, reaction slow; +sl = >90% of strains positive, reaction slow.

Table 2: Showing distribution of CONS by individual specimen wise

Specimen	Number	%
Urine	67	44.67
Exudates	50	33.33
a. Pus	35	23.33
b. Cervical swab	3	2.00
c. Catheter tip	3	2.00
d. Ear sswab	3	2.00
e. Vaginal swab	2	1.33
f. Corneal scrapings	2	1.33
g. Ascitic fluid	1	0.67
h. Pleural fluid	1	0.67
Blood	33	22.00
Total	150	100.00

All the strains were (100%) sensitive to Vancomycin. However, they were resistant to nalidixic acid 91.29%, ampicillin 78.67%, trimethoprim 67.33%, and ciprofloxacin 55.33% and low resistance to amikacin 24%. [Table 7]

Of the 50 healthy carriers, the common site of colonization was anterior nares (33), followed by skin (23) and finger nails (7). The most common CONS isolated were S.epidermidis 39 (61.91%), followed by S.hominis 17 (26.98%) and S.saprophyticus 7 (11.11%). [Table 8]

Discussion

Since 1950, infection with these organisms has been reported with increasing frequency. Their role in human pathology has now been largely accepted 27. Taking into consideration the increased frequency of isolation of CONS from clinical specimens, they must now be individually evaluated as potentially true pathogens.

Specimen wise distribution: In the present study out of 150 CONS isolated majority were from urine 67(44.67%), followed by exudates 50(33.33%) and blood 33(22%). These findings are in correlation with Narayani et. al[17], Goel MM et al.[9], Mohan U et al 15. However Charles M Sewell et al[21], Gayakwad SS and Deodhar LP 7, Fule RP et al.6, Shrikhande S et al. 24, have reported majority of isolates from exudates, and Vijayalakshmi N et al 27, have reported majority of isolates from blood and exudates.

Species wise distribution: In the present study majority of CONS species isolated were S.epidermidis 76(50.67%), followed by S.saprophyticus 33(22%), and S.haemolyticus 27(18%). This is in correlation with Lindsay E Nicholle et al.[18], Gaikwad et al.[7], Pal N et al.[19], Narayani et al.[17], Seetha KS et al.[22], Mohan U et al.[15], Ritusinghal et al.[20].

Table 3: Showing different species of CONS from various clinical specimens

Species of CONS	Specimens						Total	
	Urine		Exudates		Blood			
	No.	%	No.	%	No.	%	No.	%
S. epidermidis	28	41.79	33	66	15	45.45	76	50.67
S. saprophyticus	19	28.36	9	18	5	15.16	33	22.00
S. haemolyticus	8	11.94	6	12	13	39.39	27	18.00
S. xylosus	10	14.93	-	-	-	-	10	6.67
S. capitis	2	2.98	2	4	-	-	4	2.66
Total	67	100	50	100	33	100	150	100

Table 4: Showing slime production by CONS

Slime production	Specimens						Total	
	Urine		Exudates		Blood			
	No.	%	No.	%	No.	%	No.	%
Positive	11	16.42	27	54	20	60.60	58	38.67
Negative	56	83.58	23	46	13	39.40	92	61.33
Total	67	100	50	100	33	100	150	100

$X^2 = 29.62$; $p < 0.001$

Table 5: Showing slime production by various species of CONS

Slime Production	Species of CONS										Total	
	S.epidermidis		S.saprophyticus		S.haemolyticus		S.xylosus		S.capitis			
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Positive	42	55.26	5	15.15	8	29.63	2	20.00	1	25.00	58	38.67
Negative	34	44.74	28	84.85	19	70.37	8	80.00	3	75.00	92	61.33
Total	76	100	33	100	27	100	10	100	4	100	150	100

Table 6: Showing resistance to methicillin

Total number of CONS	Methicillin resistant CONS		Methicillin sensitive CONS	
	No.	%	No.	%
150	82	54.67	68	45.33

Table 7: Showing antibiogram of CONS

Antibiotic	Resistant		Sensitive	
	No.	%	No.	%
Ampicillin	118	78.67	32	21.33
Erythromycin	64	42.67	86	57.33
Trimethoprim	101	67.33	49	32.67
Vancomycin	-	-	150	100.00
Ciprofloxacin	83	55.33	67	44.67
Amikacin	36	24.00	114	76.00
Gentamicin	59	39.34	91	60.66
Tetracycline	49	32.63	101	67.37
Nitrofurantoin	43	28.65	107	71.35
Nalidixic acid	137	91.29	13	8.71

Table 8: Carrier study showing distribution of CONS species from various sites

Species	Anterior nares (50)		Skin (50)		Finger nails (50)		Total	
	No.	%	No.	%	No.	%	No	%
S.epidermidis	24	72.73	9	39.13	6	85.71	39	61.91
S.hominis	4	12.12	12	52.17	1	14.29	17	26.98
S.saprophyticus	5	15.15	2	8.70	0	0	7	11.11
Total	33	100	23	100	7	100	63	100

In the reports of national survey, S.epidermidis has been remarkably quoted as primary nosocomial pathogen and has been implicated to be the causative agent of bacteremia by various workers[27]. S.saprophyticus is a well documented pathogen causing primary acute urinary tract infections in young, healthy, sexually active women. Uroepithelial tissue tropism and production of urease contributed to bladder tissue invasion[11].

S.haemolyticus has been documented in many studies as a clinically opportunistic pathogen and is usually the second common CONS recovered from documented infection sites averaging 10%[25].

Slime production: In the present study out of 150 CONS isolated 58(38.67%) strains were slime producing. This is in correlation with Makhija et al.[13], Seetha KS et al.[22], and Mohan U et al.[15]. However, Pal N et al. 19 reported 100% slime production by CONS.

In the present study S.epidermidis was the most common CONS species producing slime 42(55.26%), followed by S.haemolyticus 8(29.63%), S.saprophyticus 5(15.15%). This finding correlated with other workers such as Seetha KS et al[22] and Mohan U et al[15].

The factor determining the pathogenicity of CONS has now been well defined and found to be extra cellular slime[13]. This factor is important in the colonization of foreign body[8]. A significant association between the ability of an isolate to produce slime and its propensity to cause disease has been found in other studies also[19].

The test for slime production may have an important application indicating the pathogenicity of the strains of CONS and should be done routinely in a diagnostic laboratory[22].

Methicillin resistance: In the present study, out of 150 CONS isolated 82(54.67%) were methicillin resistant. This is in correlation with other workers such as Frederic J M et al.[14], Namrata Kumari et al.[16], and Ritusinghal et al.[20]. Methicillin resistant Staphylococci Species present in hospital personnel may act as carriers and can serve as a focus of nosocomial spread of multi-drug resistant staphylococci in tertiary care hospitals and problems to hospital infection control programmes[26].

Antibiotic sensitivity pattern: In the present study, highest numbers of isolates were sensitive to Vancomycin and amikacin. This is in correlation with Frederic JM et al.[14], Seetha KS et al.[22], Namrata Kumari et al.[16], Mohan U et al[15].

Variability in the antibiotic susceptibility pattern of CONS has been observed by various workers which positively reflect the different protocols and panels of antibiotics being used in different hospitals and differences in the geographical locations from where these isolates have

been obtained[15].

Carrier study: In the present study out of 150 samples collected from health care workers, 63 (42%) isolates were CONS. This correlates well with Shobha KL et al[26]. Among hospital staff nasal carrier rate of CONS was 22%, however other studies have reported 45.94% 26, 62%[17]. Among carrer isolates S.epidermidis was leading species followed by S.hominis, this is in correlation with Narayani et al[17].

Conclusion

The clinical significance of CONS is increasing day by day in urinary tract infections, meningitis, endocarditis and other body infections. Very soon CONS may emerge as one of the leading hospital pathogens. S.epidermidis can cause a number of human infections, and should no longer be considered as a harmless commensal. S.saprophyticus is proven pathogen in man.

The antibiotic resistance pattern in CONS is a great threat to the clinicians and the widespread occurrence of methicillin resistance poses a great problem, which needs special attention and intensive study.

Therefore when isolated in pure culture, CONS cannot be ignored as contaminants and the underlying clinical history suggestive of infection due to these organisms must be considered.

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Provisional Natural Tooth Pontic using Fiber Reinforced Ribbon- A case report

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Abstract

The loss of anterior teeth can be psychologically and socially damaging to the patient. Despite a wide range of treatment options available, traumatized teeth may be inevitably lost on certain occasions. Although an anterior tooth has mechanical functionality, it is the compromised facial esthetics associated with tooth loss that is the patient's primary concern. Immediate esthetic replacement of the missing tooth is required in such cases. This replacement can be temporary, semi-temporary or permanent in nature. The abutment teeth can be conserved with minimal or no preparation, thus keeping the technique reversible, and can be completed at chair side thereby avoiding laboratory costs. It can be used as an interim measure or a definitive prosthesis. This paper describes the replacement of a right mandibular lateral incisor using a glass fiber reinforced ribbon with the avulsed natural tooth crown as a pontic.

Key Words

Trauma, Avulsion injury, Fiber splint, Resin bonding, Interim fixed bonded prosthesis, Natural tooth pontic.

Introduction

The sudden loss of an anterior tooth is a catastrophic event for a patient. Traumatic damage to anterior teeth is a common form of injury, particularly in children and adolescents. Patients presenting with traumatized or lost anterior teeth require immediate attention for restoration of esthetics and function. Depending on the many clinical and economic factors, a course of treatment can be decided upon by the patient and dentist.

Although a permanent replacement, such as a metal framework removable partial denture, may be planned after the tissues have healed, the options available for a good esthetic temporary prosthesis are limited. A transitional prosthesis may vary between simple removable tissue supported dentures; temporary full coverage fixed partial dentures and bonded fixed partial dentures. Prefabricated acrylic denture teeth used as a pontic bonded to the adjacent teeth can present challenges in regard to matching color, size and shape, and often require substantial modifications to achieve an acceptable appearance.

Using the natural tooth as a pontic offers the benefits of right size, shape, color and psychological value. When the crown of the tooth is in good condition, it can be temporarily bonded easily to the adjacent teeth with light-cured composite resin[1]. Materials such as a preimpregnated braided glass fiber system (Interlig, Angelus) used with resin bonding techniques is available for quick repairs. This report illustrates use of an avulsed tooth as a pontic bonded to teeth on either side of the edentulous space with a preimpregnated fiber reinforced ribbon by composite resin.

Case Report

A 35 year old male patient reported to the Out Patient Department of Prosthodontics at Sardar Patel Post Graduate Institute of Dental and Medical Sciences, Lucknow with the chief complaint of missing lateral incisor in the lower right front region of mouth. The patient gave a history of tooth avulsion due to bottle opening ten days back. The patient had preserved the avulsed tooth.

Extraoral examination revealed no abnormality. On intra-oral examination the avulsed mandibular right lateral incisor (42) site revealed healing socket. Examination of other teeth revealed generalized gingival recession. Mandibular anterior teeth were crowded. General physical examination revealed no abnormality.

Radiographic examination revealed complete bone loss with respect to the avulsed tooth site.

The patient expressed a strong desire for his avulsed tooth to be used in any possible way.

Treatment Plan

Since the avulsed tooth revealed no deterioration it was planned to immediately restore the patient's esthetic appearance and functionally stabilize the compromised arch.

The patient was motivated for receiving a single visit, glass fiber impregnated splint using the crown portion of the avulsed tooth as a natural tooth pontic.

Technique

1. The avulsed tooth site was evaluated (Fig 1).

Figure 1: Preoperative view: Missing right lateral incisor due to avulsion

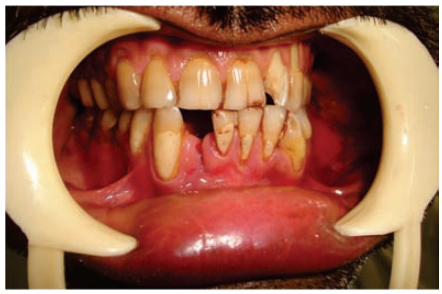
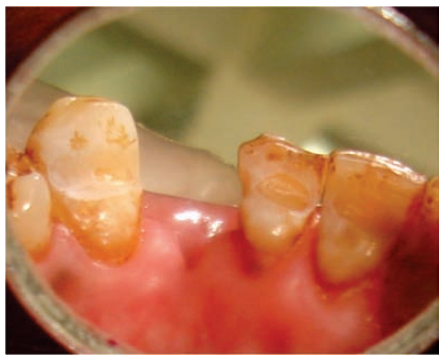


Figure 2: Lingual grooves prepared on abutment teeth

Figure 3: Natural tooth pontic etched with 37% orthophosphoric acid

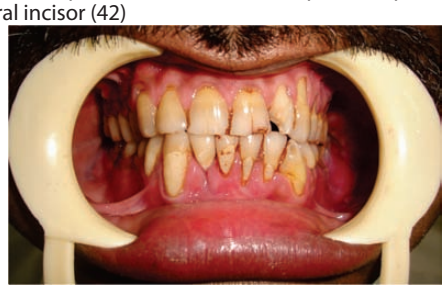


Diagnostic impressions were made and cast poured. The avulsed tooth was measured with a periodontal probe to the length needed. The root was cut from the crown and shaped with a flame-shaped finishing bur.

2. The remaining coronal root canal and pulp chamber were cleaned and sealed with a composite resin.
3. The positional relation and the length of the prepared avulsed tooth was checked using the diagnostic cast. The occlusion was carefully evaluated and adjusted to ensure proper contact relations with opposing teeth.
4. The natural tooth pontic and the selected abutment teeth (31,41,43) were prepared with a horizontal lingual groove to accommodate the glass reinforced ribbon. The groove was approximately 1.5 to 2 mm wide and 0.5mm deep (Fig 2).
5. The pontic was evaluated for fit and proper relationship with the healing extraction site and abutment teeth. Final shaping was done for an ovate pontic design.
6. The length of glass reinforced ribbon (Interlig, Angelus) was determined by placing a piece of dental floss from the distal surface of canine (43) to the distal of the central incisor (31), and a piece of the glass ribbon was cut to this length2 .
7. The pontic and the abutment teeth were etched with 37% orthophosphoric acid (Fig 3).
8. The ribbon was prepared for bonding by first wetting it with a bonding agent (Single Bond; 3M ESPE). A small amount of flowable composite resin (Tetric Ivoceram, Ivoclar Vivadent) was injected into the groove. The ribbon was bonded to the lingual surfaces of the abutment teeth. A layer of composite resin, approximately 0.5 mm thick, was placed on top of the ribbon to secure it in place. The natural tooth pontic was bonded in place with additional flowable composite resin under isolation. The restoration was light-cured for 40 seconds (Fig 4).
9. Occlusal interferences were evaluated. The lingual aspect of the provisional restoration was polished with an abrasive impregnated rubber finishing system.
10. The pontic was kept in contact with the healing gingival tissue to simulate a correct emergence profile and gingival contour. The opposing teeth were kept out of contact with the pontic at rest or in function (Fig 5).

Figure 4: Fiber ribbon bonded to lingual surfaces of pontic and abutment teeth with composite

Figure 5: Post-operative view of natural pontic replacing missing right lateral incisor (42)



Discussion

In the past there have been a number of different techniques described in the restorative dentistry literature for splinting teeth and adding a natural tooth pontic, denture tooth, or composite resin tooth pontic. These pontics were connected to the adjacent teeth with adhesive composite resins, wire, metal mesh, nylon, mesh and cast metal frameworks bonded to the adjacent teeth. The inherent problems with these materials when placing a tooth pontic fixed to the adjacent teeth when replacing a missing tooth were their inability to be chemically incorporated into the dental resin. Another problem

associated with the placement of composite resin splints with submerged wires and mesh grids that in order to protect against breakage more bulk and thickness of composite resin was necessary. This overbulking of the restoration led to an increase in food and plaque retention resulting in making it more difficult to clean around the restoration and maintain good oral health[3].

The challenge to place a thin but strong, bonded composite resin-based single visit bridge was met with the introduction of a high strength, bondable, biocompatible, esthetic, easily manipulated, fiber ribbons that could be embedded into a resin structure.

The advantages of this technique over traditional methods include better bonding, an esthetic appearance, greater translucency, less chair-side time. Also, this technique is not labor intensive. Another added feature was the shape given to the pontic to simulate a correct emergence profile and gingival contour. One problem with glass fiber reinforcement material, is that the glass fibers break and pull out of the composite resin when the composite develops a crack that propagates to the glass fibers. Another system (Connect; Kerr Corp) based on a different type of polyethylene fiber could also be used to achieve similar results. Alternative designs utilize a plasma-treated woven polyethylene fiber (Ribbond, Ribbond Inc, Seattle, Wash)[4]. Other systems using glass or ceramic fibers, such as Vectris (Ivoclar Vivadent, Amherst, NY) and GlasSpan (GlasSpan Inc, Exton, Pa), are possible material system options.

Summary & Conclusions

Resin-bonded fixed partial dentures (FPDs) have been used for dental treatment for many years. Although early resin-bonded FPDs were associated with a high frequency of premature failure, better understanding of preparation design and improved bonding techniques have led to significant improvements in their long-term survival[5]. A case report has been presented, demonstrating the use of fibre splint as a substrate, and modified natural tooth, as pontic, to rehabilitate the traumatized patient with a bonded prosthesis, hence restoring form, function and boosting the patient's self esteem. The primary reason for prescribing a fiber reinforced ribbon-based provisional FPD, was the desire to have a metal free restoration in the mandibular anterior region and to meet the patient's expectations.

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Oral Health Related Quality of Life: An overeview

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Abstract

It is important to understand how people perceive the impact of oral disease on their quality of life. Oral health quality of life (OHQoL) is a relatively new but rapidly growing notion. The concept of OHRQoL is particularly significant to three areas- clinical practice of dentistry, dental research and dental education. There are different approaches to measure OHRQoL; the most popular one uses multiple item questionnaires. OHRQoL should be the basis for any oral health programme development. Moreover, research at the conceptual level is needed in countries where OHRQoL has not been previously assessed, including the Eastern Mediterranean countries.

Key Words

Oral health; quality of life; health related quality of Life, Social wellbeing, outcome measures.

Introduction

The impact of oral diseases on the quality of life is very obvious. The psychological and social impact of such diseases on our daily life is easily comprehensible which makes them of considerable importance. Any disease that could interfere with the activities of daily life may have adverse effect on general quality of life. Therefore, the notion of oral health-related quality of life (OHRQoL) is the product of many observations and research about the impact of oral diseases on different aspects of life M.AL Shamrany, (2006)[1].

History of Oral Health-Related Quality of Life

OHRQoL is relatively new but rapidly growing phenomenon which has emerged over the past 2 decades. Several authors have explored the evolution of OHRQoL and documented the circumstances that have led to its prominence. Slade et al, (2002) and others identified the shift in the perception of health from merely the absence of disease and infirmity to complete physical, mental and social well-being, the definition of the World Health Organization (WHO,1942) as key issue in the conception of HRQoL and subsequently OHRQoL[2]. This shift happened in the second half of the 20th century and it was the result of a silent revolution in the values of highly industrialized societies from materialistic values that concentrate on economic stability and security to values focused on self determination and self actualization Inglehart RF, (1997). The notion of OHRQoL appeared only in the early 1980s in contrast to the general HRQoL notion that started to emerge in the late 1960s. Delay in the development of OHRQoL could be due to poor perception of the impact of oral disease on quality of life. In the 1970s the OHRQoL concept started to evolve as more evidence grew of the impact of oral disease on social roles[3].

Clinical indicators of oral diseases such as dental caries or periodontal diseases were not entirely suitable to capture the new concept of health declared by (WHO, 1984) particularly the aspect of mental and social well-being. This had created demand for new health status measures, in contrast to clinical measures of disease status. As a result researchers started to develop alternative measures that would evaluate the physical, psychological and social impact of oral conditions on an individual. These alternative measures are in the form of standardized questionnaires.

Definition of Oral Health-Related Quality of Life

United States Surgeon general's report on oral health defines OHRQoL as a multidimensional construct that reflects people's comfort when eating, sleeping and engaging in social interaction; their self esteem; and their satisfaction with respect to oral health (Oral health in America, 2000). In 1995, Gift and Atchison, developed a multidimensional concept of OHRQoL based on the structure of the HRQoL model proposed by Patrick and Erickson (1993). OHRQoL incorporates survival; absence of impairment, disease or symptoms; appropriate physical functioning associated with chewing and swallowing and absence of discomfort and pain; emotional functioning associated smiling; social functioning associated with normal roles; perceptions of excellent oral health; satisfaction with oral health; absence of social or cultural disadvantage due to oral status Gift HC,(1995)[4]. Locker developed a model for oral health earlier in 1988 in which he described consequences of disease5.

Oral Health Related Quality of Life Questionnaire				
Measure	**Dimensions measured**	**No of question**	**Example of question**	**Response format**
Various, depending on question format	Chewing, talking, smiling, laughing Pain, appearance	14	Are there any types of food you have difficulties in chewing?	Yes/No
RAND dental health index	Pain, worry, Conversation	3	How much pain have your gums and teeth caused you?	4 categories: not at all, to a great deal
General oral health assessment index	Chewing, eating, social contacts, appearance, pain, worry, self-consciousness	12	How often did you limit the kinds or amounts of food you eat because of problems with your teeth or denture	6 categories: always to never
Dental impact profile	Appearance, eating, speech, confidence, happiness, social life, relationships	25	Do you think your teeth or dentures have good effect (positive), a bad effect (negative), or no effect on feeling comfortable?	3categories: good effect, bad effect, no effect
Oral health impact profile	Function, pain, physical disability, psychological disability, social disability, handicap	49	Have you had difficulties chewing food because of problems with your teeth or denture?	5 categories: very often to never
Subjective oral health status indicator	Chewing, speaking, communication, social relation	42	During last year, how often dental problem caused you to have difficulty in sleeping?	Various, depending on question format
Oral health quality of life inventory	Oral health, nutrition, overall quality of life	56	Two-part question :(A) How important is it for you to speak clearly? (B) How happy are you with your ability to speak clearly?	Part (A): 4 categories, not at all important, to very important. Part (B): 4 categories, unhappy to happy.
Dental impact on daily living	Comfort, appearance, pain, daily activities, eating	36	How satisfied have you been, on the whole, with your teeth in the last 3 months?	Various, depending on question format
Oral health related quality of life	Daily activities, social activities, conversation	3	Have problems with your teeth or gums affected your daily activities such as work or hobbies?	6 categories: all of the time to none of the time
Oral impact on daily performance	Performance in eating, speaking, oral hygiene, sleeping, appearance, emotion	9	(A)In the past 6 months, have dental problems caused you any difficulty in eating and enjoying food? (B)Have you had this difficulty on a regular basis or for a period/spell? (c)During the last 6 months, how often have you had this difficulty?	Various, depending on question format

Importance of Oral Health Related Quality of Life

The concept of OHRQoL is significant to 3 areas of dental health in particular: the clinical practice of dentistry, dental research and dental education (Gift HC, 1997)[4].

OHRQoL has an obvious role in clinical dentistry which translates to clinician's recognition that they do not treat merely teeth and gums, but human beings as a whole. Besides oral –related behavior are motivated by OHRQoL concerns. Notion of OHRQoL is tremendously important at all levels of dental research. Successful research, whether basic scientific research, clinical studies or community research makes a contribution to patient's quality of life Gift HC, (1997). At community research level, the concept of OHRQoL is especially vital to promote oral health care and access to care[6].

Measurement of Oral Health-Related Quality of Life

There are 3 categories of OHRQoL measure, as indicated by Slade et al, (2002). These are (a) social indicators, (b) global self-rating of OHRQoL and (c) multiple items of questionnaires of OHRQoL. Social indicators are used to assess the effect of oral conditions at the community level. Large population surveys are carried out to express burden of oral disease on the whole population by means of social indicators such as work loss, school absence due to oral conditions. Global self-rating of OHRQoL, also known as single-item ratings, refers to asking individuals a general question about their oral health. Response options to this global question can be in a categorical or visual analogue scale (VAS) format.

Multiple questionnaires are the most widely used method to assess OHRQoL (McNeil DW, 1998). Researchers have developed quality of life instruments specific to oral health and the number continues to grow rapidly to comply with demand of more specific measures. In addition these measures can be classified in to generic instruments that measure oral health overall versus specific instruments7. Ten OHRQoL instruments have been thoroughly tested to assess their psychometric properties such as reliability, validity and responsiveness were presented at the first International Conference on Measuring Oral Health Slade GD, (2002). The 10 instruments, dimensions measured, number of questions and response format of each measure are given in Table 2:

Discussion

Measures of oral health-related quality of life OHRQoL are increasingly being used in descriptive population based research as a means of capturing nonclinical aspects of oral health that patient deem most relevant to their overall health and wellbeing Lawrence HP,(2007)[8]. When OHRQoL measures are used alongside traditional clinical methods of measuring oral health status, a more comprehensive assessment of the impact of oral disease on several dimensions of subjective wellbeing becomes possible. These dimensions include physical pain, functional limitation, psychological discomfort, physical disability, psychological disability and handicap, although other overlapping domains of OHRQoL have been described such as oral functions, oral facial pain, psychosocial impact and appearance. It should be noted, however that because the concept of OHRQoL is a complex multidimensional construct conceptualizing it has always been challenge. Typically HRQoL scales are set up on a theoretical basis and are consequently constructed around theoretical domains. At present we are at the beginning of the process of constructing quality of life indices and searching for the best measures for assessing the impact of social determinants on oral health1.

Conclusion

Oral health is an integral part of general health and contributes to health related quality of life. Measures which address oral health-related quality of life OHRQoL are being used with increasing frequency in oral health surveys and clinical trials in dentistry. They document the functional and psychosocial outcomes of oral disorders and are intended to supplement clinical indicators to provide a comprehensive account of the health of individuals and population. The OHRQoL is a broader appreciation of the impact of oral health[1]. From dental public health services perspective there is merit in using OHRQoL instruments in combination with traditional measures, particularly when planning public health services for those most in need of oral health promotion interventions or community based oral health strategies. When health care resources are scarce, findings from such patient-based outcome measures can be used to ensure that funding or services are directed at those conditions most likely to have a negative effect on OHRQoL of a specific population[8].

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Role of Collagen in Vestibuloplasty – A comparative study

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Abstract

The ridge extension procedures are required to improve the denture stability and retention. Vestibuloplasty is a procedure performed to gain more amount of clinical ridge where there is adequate basal bone, by uncovering it surgically and repositioning the overlying mucosa and muscle attachment. In the present study, a comparison of "kazanjian technique with collagen" and "kazanjian technique without collagen" was done to evaluate the efficiency of collagen in maintaining the vestibular depth, in a follow up period of 3 months. 20 patients who were referred to department of oral and maxillofacial surgery for ridge extension were treated with kazanjian technique, in 10 patients raw labial surface of wound was covered with collagen and in the other 10 patients it was left to heal by secondary epithelialisation. Vestibular depth and complications if any were reviewed and recorded on 1st day, 1st week, 1st month and 3 months post operatively. The total increase in vestibular depth after 3 months in technique with collagen is 9.5 - 11 mm where as in technique without using collagen 5.5 - 8 mm. Reviewing the results with regard to maintainance of vestibular depth and complications, we recommend the "kazanjian technique with collagen" over the "kazanjian technique without collagen".

Key Words

Mandible anterior sulcus depth, Vestibuloplasty, Sulcoplasty, Kazanjian technique.

Introduction

Vestibuloplasty is a surgical procedure where by the oral vestibule is deepened changing the soft tissue attachment. This creates a larger bony base by repositioning the muscle attachment and increases the denture bearing area that is capable of supporting and retaining a denture.[1-5] Mucosal grafts and split thickness grafts have conventionally been used in vestibular extension.[6-11] Because these methods involves a secondary donor site,[7-11] various biomaterials have been recently used most of these protect wound and reduce pain. Omura et al reported a newly developed collagen silicon bilayer as mucosal substitute in 1997[12].

Patients and Methods

Twenty patients (12 male and 8 female) were treated from year 2006-2007 within an age group of 48-62 years for denture prosthesis with inadequate mandibular anterior vestibular depth.

Inclusion (table.1) and exclusion (table.2) criteria were considered in the selection of patients.

The collagen used in this study is purified bovine (serosa) reconstituted collagen. Purified collagen refers to collagen which is free from components normally associated with its native state. Reconstituted collagen refers to collagen, which has been reassembled into individual triple helical molecules with or without their telopeptide extensions, brought into solution and then regrouped into the desired form and is then cross linked with tanning agents like gluteraldehyde or chromium sulphate, to improve the tensile strength, make it insoluble, decrease rate of resorption, and lower antigenicity.

Prophylactic antibiotics with analgesics were given to all patients preoperatively and continued thrice daily for the succeeding three days postoperatively.

All patients were operated under local anaesthesia, a transverse mucosal incision was given extending bilaterally just short of mental foramen in the mucosal surface of lower lip at approximately twice the desired additional vestibular depth, vertical release incisions

Table 1: Criteria for inclusion

Shallow labial vestibule
Radiographic evidence of 15mm- 20mm basal bone of anterior region of mandible
No local pathology of bony or soft tissue

Fig. 1: Incision marking

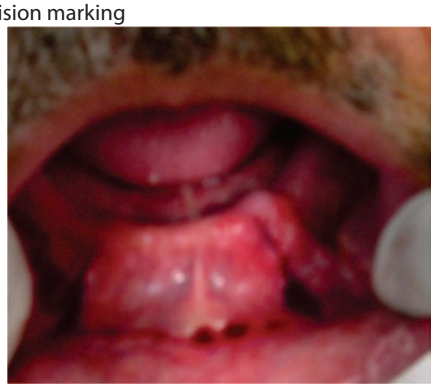
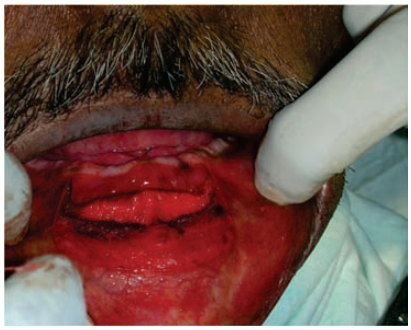


Table 2: Criteria for exclusion

Patients who have undergone previous vestibuloplasty procedure
Medically compromised patients
Patient with inadequate amount of healthy mucosa

Fig. 2: Raising of mucoperiosteal flap



were given extending from the crest of alveolar ridge proximal to mental nerve bilaterally taking care not to damage the mental nerve (fig.1). A full thickness mucosal flap was elevated and extended till the crest of alveolar ridge (fig.2). Supra periosteal dissection was carried out and the muscle attachments were moved inferiorly to achieve the extended sulcus depth. The elevated mucosal flap was sutured to the periosteum with interrupted silk sutures (fig.3).

In 10 patients, the raw surface of lip was covered with collagen and quilt sutures were given with vicryl (fig.4). In another 10 patients, the raw labial surface was left to heal by secondarily epithelisation and granulation tissue formation.

Post operative pain relief, oedema, haemostatic effect, granulation tissue formation, epithelisation, and wound contracture were evaluated after 1st post operative day, 1st week, one month and three months following surgery (fig.5, table 3).

Table 3: Vestibular depth during follow up

	Kazanjian technique without collagen	Kazanjian technique with collagen
Pre operative	2.5 – 4.5 mm	2.5 – 3.5 mm
First post operative day	13 – 15 mm	14 – 15 mm
First week	13 – 15mm	13 – 15 mm
Month 1	11.5 – 13.5 mm	13.5 – 14.5 mm
Month 3	9.5 – 11.5	12 – 14 mm

Fig. 3: Suturing of mucoperiostel flap to the periosteum

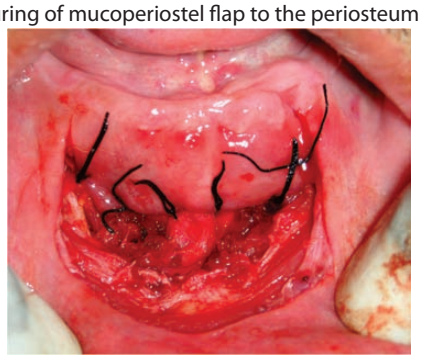
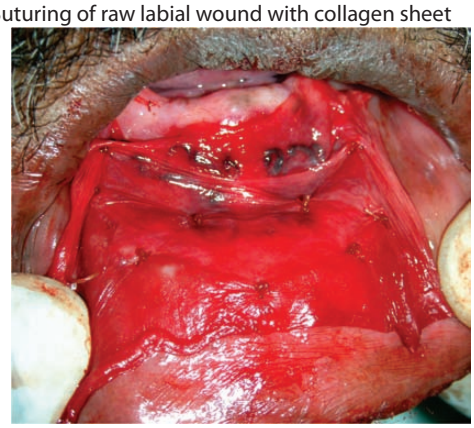


Table 4: Total increase in vestibular depth

Kazanjian technique with collagen	Kazanjian technique without collagen
9.5 – 11 mm	5.5 – 8.5mm

Fig. 4: Suturing of raw labial wound with collagen sheet



Statistical Analysis

The following methods of statistical analysis have been used in this study i.e. student "t' test, Chi-square test of significance and Analysis of Variance. In all above test "p" value of less than 0.05 was accepted as indicating statistical significance.

Results

The study was designed to evaluate the clinical advantage of collagen as biological dressing material in promoting haemostasis, inducing granulation tissue formation, assisting in rapid epithelialisation at raw wound site, contracture and preventing scar formation. The total increase in vestibular depth after 3months in "kazanjian technique with collagen" was 9.5 – 11 mm where as in "kazanjian technique without collagen" was 5.5 – 8 mm. Reviewing of results with regard to maintenance of vestibular depth and complications we recommend the kazanjian technique with collagen over the kazanjian technique without collagen.

Discussion

In edentulous patients, as the alveolar resorption takes place, the attachment of mucosa near the denture bearing area exerts a greater influence on retention and

Fig. 5: Three months post operative

stability of denture, by decreasing the vestibular depth as well as the amount and quality of fixed tissue over the denture bearing area. In most patients, problems with lower denture are more than upper denture since the alveolar ridge resorption is four times greater in mandible than in maxilla.

In our study conducted on 20 patients, none had an ideal denture supporting mandibular ridge and the muscle attachment to the mandibular ridge was high. In our study comparison of vestibuloplasty techniques i.e. "kazanjian technique without the use of collagen" and "kazanjian technique with the use of collagen" was used to evaluate the increase in vestibular depth, (table.4) which showed increase in vestibular depth in "kazanjian technique with collagen", which was statistically significant.

The results of the present study is in accordance with H. David Hall who demonstrated increased vestibular depth with palatal mucosal grafts than with skin grafts,6 though palatal grafts showed good results there was donor site morbidity. There are various surgical technique that are used to treat the problem of reduced vestibular depth i.e. autogenous overlay grafts,[7-11] osteotomy procedures,[15,16] alloplastic grafts,[17] implant procedure and vestibuloplasty extension procedures.

Kazanjian described a secondary epithelisation vestibuloplasty technique for deepening the mandibular labial vestibule in which a labial mucosal flap was pedicled off from alveolar process and was used to cover the newly exposed bone while the lip was permitted to re-epithelialise.

To overcome the disadvantages of original technique like avoiding scar formation and contracture, other techniques were described to cover the raw surface of vestibuloplasty wound like skin grafts,[8-11] mucosal grafts,[6] and recently collagen.[12-13] Mucosal graft is an excellent intra oral graft material, but is available in a limited supply. Skin is the next best, but when grafted in the mouth it becomes macerated and never attains the texture or resiliency of oral mucosa and complicated by growth of adnexal structure like hair and sweat glands. Dermis consists of almost entirely of collagen and as an autogenous graft it can be used successfully. However all these grafts require a second surgical intervention and are associated with donor site morbidity. Our study compared the "kazanjian technique without collagen" and "kazanjian technique with collagen". All the patients showed excellent compatibility to collagen, there was one incidence of infection, and in one case there was excess increase in the vestibular depth due to early breakdown of collagen. Post operative follow up was done for three months. Patients were referred to Department of Prosthodontics for early denture construction around 4 weeks to maintain the newly developed vestibular depth.

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The Prosthodontic Rehabilitation of a Patient with Oligodontia - A case report

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Abstract

Congenital oligodontia or true partial anodontia is a developmental disturbance related to the number of teeth. It is a hereditary phenomenon passed through generations by an autosomal dominant pattern. Patients with such a disorder often face severe problems in esthetics, phonetic and mastication. Here is a case report of partial anodontia with agenesis of 10 teeth, which has been treated with the combination of maxillary fixed partial denture and Mandibular cast partial denture.

Key Words

Oligodontia; Partial anodontia; Hypodontia; Prosthodontic rehabilitation.

Introduction

Oligodontia that involves agenesis one or more teeth is relatively common clinical condition. In approximately 80% of reported cases of oligodontia, only 1 or 2 teeth are missing; in 10%, 4 or more teeth are missing, while in less than 1%, 6 or more teeth are absent[1] in cases of severe partial anodontia, the bilateral absence of the corresponding teeth may be striking. According to Graber, oligodontia is hereditary phenomenon, transmitted in an autosomal dominant pattern with complete inheritance and variable expressivity[2]. Oligodontia may occur in isola¬tion or in association with such syndromes as ectodermal dysplasia, Down's syndrome Ellis van Crevald syndrome and such conditions as cleft lip and palate[1-3].

Patients suffering from congenital oligodontia often face severe problems in esthetics, phonetics and mastication. Prosthodontic treatment of oligodontia plays an important role in the oral rehabilitation. This clinical report describes the Prosthodontic rehabilitation of a congenital oligodontia patient. Maxillary arch was restored with fixed restorations and Mandibular arch was restored with cast partial denture.

Case Report

A 20 year old male patient reported to Department of Prosthodontics, with the chief complaint of impaired esthetics and difficulty in chewing due to lack of numerous missing teeth. He was accompanied by his father who gave a history of few missing teeth since his childhood. A review of patient's medical history revealed that he had no contraindications for the dental treatment, however family history revealed the fact that his father and younger brother had congenitally missing teeth.

Patient was moderately built and poorly nourished, the skin and body hair was normal. Vertical dimension of occlusion was acceptable. Other extraoral examinations were unremarkable. On intraoral examination, the bilateral absence of corresponding teeth was more obvious. In the maxillary arch both lateral incisors and canines were absent. In the mandibular arch all the anteriors were missing. The region of missing teeth revealed knife edged ridges. His oral hygiene was acceptable. Centric relation was coincident with maximum intercuspation. Both mandibular right and left second premolars were below the occlusal plane. The radiological features revealed normal trabecular bone pattern with a finely woven pattern. Crown to root ratio of all the remaining teeth were favorable and were above at least 1:1.5. No other unerupted permanent teeth were seen in the OPG radiograph. As complete physical examination of the patient ruled out any syndromic findings and the congenital absence of teeth was evident, the patient was diagnosed with congenital oligodontia.

The treatment plan was made to replace the missing teeth with two piece fixed partial dentures in the maxillary arch

Figure 1: Pretreatment frontal view.

Figure 2: Pretreatment intraoral view.

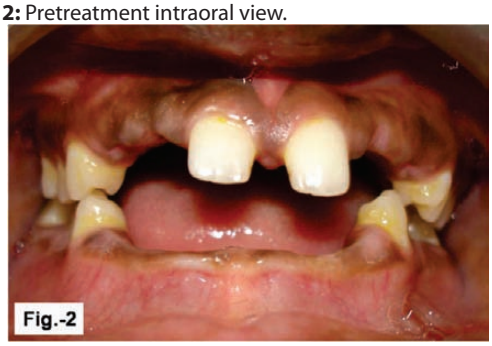
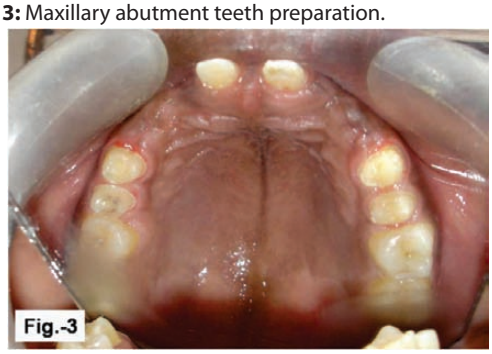


Figure 3: Maxillary abutment teeth preparation.



and a cast partial denture in the mandibular arch. The treatment plan was presented to the patient and his father. The type of restorations, restorative materials, esthetic expectations, complications, limitations, and oral hygiene requirements were discussed. The patient appeared to understand and signed a consent form. Diagnostic casts were made using irreversible hydrocolloid and poured with type IV dental stone. A centric relation record was made. Diagnostic casts were mounted on the articulator using the facebow transfer and centric relation record. Diagnostic survey of mandibular cast was done to determine the necessary mouth preparations and was marked on the cast.

The abutment teeth (11, 14 & 15 and 21, 24 & 25) were prepared for metal-ceramic restorations in the maxilla. Mouth preparations of mandibular teeth were done according to diagnostic survey including preparation of rest seats in relation to mesio-occlusal aspect of 34, 36, 44 & 46 and disto-occlusal aspect of 36 & 46.

Maxillary and mandibular full arch impressions were made using vinyl polysiloxane impression material. Gingival

Figure 4: Maxillary and mandibular impressions.

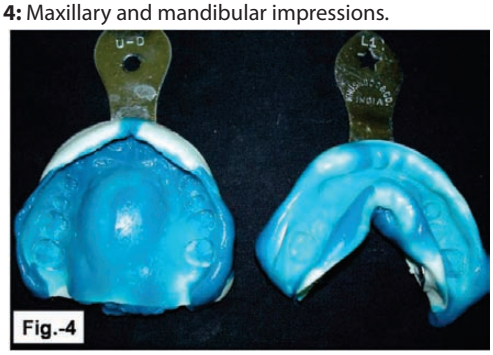


Figure 5: Maxillary metal try in.

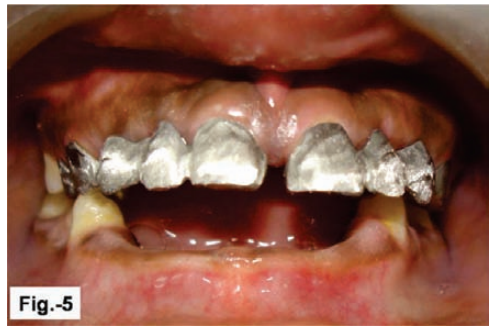
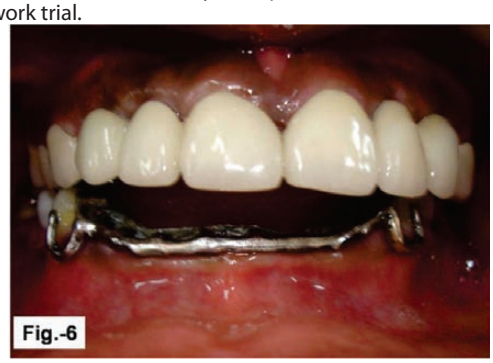


Figure 6: Cemented maxillary fixed partial denture and mandibular framework trial.



retraction of maxillary prepared teeth was obtained using plain braided cord moistened in aluminium-chloride solution. Each impression was poured with type IV dental stone. The dies were sectioned and trimmed. For the maxillary arch wax patterns were fabricated, invested and cast in a high noble metal alloy. The mandibular cast was duplicated with agar-agar and poured with refractory investment material. Wax pattern for partial denture was fabricated on the refractory cast, invested and cast with a cobalt-chromium alloy.

The metal frameworks were tried intra-orally for adequate position and tightness of proximal contacts, acceptable marginal adaptation, stability and internal adaptation. The lower metal framework was tried intraorally to determine the fit and adaptation, including occlusal interferences. After complete evaluation of the maxillary metal trials, porcelain build up was done in the laboratory.

The completed restorations were examined and tried in. fit verification, interproximal contacts and occlusion were accomplished. Then upper fixed partial dentures were

Figure 7: Post-treatment intraoral view.

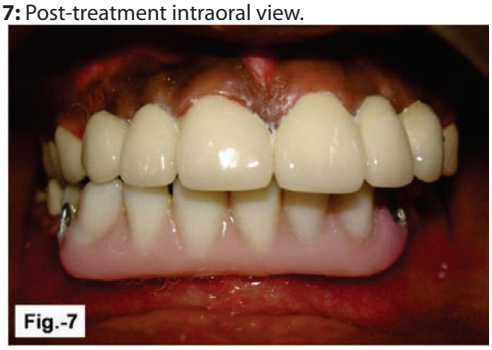


Figure 8: Post-treatment frontal view.

cemented by using Type I GIC. Occlusal rim was fabricated on the lower metal framework, jaw relation and try in was accomplished using necessary guidelines. The completed prosthesis was inserted and post insertion instructions were given. The patient returned at 2 and 4 weeks for an occlusal analysis and for soft tissue evaluation. He was placed on 6 months periodic follow up for prophylaxis. The prognosis was favorable. It was explained to the patient that the long term prognosis of the restorations would depend on the maintenance of oral hygiene.

Discussion

Restoration of the spaces in oligodontia patients require the consideration of many factors including, the number of missing teeth, the distribution of space, the size of the teeth, and the patient's age[4]. The principle and technique of the prosthodontic management are essentially identical to those used in adult therapy[5-7]. Treatment options will depend on the severity of the case. In complete anodontia, the treatment would comprise of complete dentures, either conventional or implant supported ones. Simple adhesive bridges may resolve mild oligodontia cases or it may be appropriate to close the resultant spaces by orthodontic movement of adja¬cent teeth. In more severe cases, combination of fixed partial dentures and removable partial dentures may be used[8-11].

The presented case was a severe form of oligodontia, as there were agenisis of ten teeth. The diagnosis of congenital oligodontia was made from history and clinical examination. By using prosthodontic guidelines, treatment plan was made to restore the maxillary arch with fixed partial dentures and Mandibular arch with cast partial denture. Because of the multiple edentulous areas and anterior curvature form, it was decided to fabricate two piece fixed partial dentures rather than one. Two fixed partial dentures were fabricated from 11 to 15 and 21 to 25. However because of the long span edentulous area, FPD was contraindicated in the Mandibular arch and hence it was restored with cast partial denture with overlay i.r.t 35 and 45. Overlay was planned to provide occlusal stability to 35 and 45 as they were below the occlusal level.

The main objectives in the management of any oligodontia case are to improve esthetics, phonetics and restore mas¬ticatory function. All pretreatment prostho¬dontic goals were achieved without complication.

Conclusion

This clinical report demonstrates that the combination of fixed partial denture and cast partial denture was used in the treatment of congenital oligodontia patients. In this particular patient, the treatment resulted in an improvement of esthetics, phonetics and function that caused a favorable change in the physiology of the patient and instilled confidence in him.

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Sustainable Development: The logical approach, implementation tools, hurdles and the Indian endeavor

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Abstract

In the last half of the twentieth century peace, freedom, development, and environment have emerged as four key aspirations of the world's people. The conflict between the environment and development has been acknowledged and reaffirmed in various conferences and summits. Sustainable development is thus a much desired goal of the world community at present. The concept involves social, economic, environmental and institutional dimensions. The approaches involved are poverty eradication, countering the unsustainable patterns of consumption and production, protection and management of the natural resource base, emphasis on regional cooperation, health and science & technology. Equitable allocation of finance, trade, technology, energy security and human resource between developing and developed world are effective tools for implementation of sustainable development activities. The first and the third world need to work as one so that the human progress made in 20th century does not mar the future and development of our next generation.

Key Words

Sustainable Development, approach, implementation tools, hurdles, Indian endeavor

In the last half of the twentieth century, four key themes emerged from the collective concerns and aspirations of the world's people: peace, freedom, development, and environment. Although reinterpreted over time, these remain prominent issues and aspirations. Various conferences, right from the Stockholm Conference (1972) on the Human Environment to World Summit on Sustainable Development (2002) in Johannesburg, have acknowledged the conflicts between environment and devel-opment and reaffirmed commitment to sustainable development. The World Commission on Environment and Development was initiated by the General Assembly of the United Nations in 1982[1].

Sustainable development is defined as a pattern of social and structured economic transformations which optimizes the economic and societal benefits available in the present, without jeopardizing the likely potential for similar benefits in the future. A primary goal of sustainable development is to achieve a reasonable and equitably distributed level of economic well-being that can be perpetuated continually for many human generations. Sustainable development implies using renewable and non-renewable natural resources in a manner which does not unnecessarily preclude easy access to them by future generations. The primary objective of the Sustainable Development is to reduce the absolute poverty of the world's poor through providing lasting and secure livelihoods that minimize resource depletion, environmental degradation, cultural disruption and social instability[2].

Conceptual Framework of sustainable development can be viewed as a four dimensional idea. The social, economic, environmental dimension addressing key principles of sustainability and institutional dimension addressing key institutional policy and capacity issues[3].

The model: what is to be sustained & what should be developed?

The model of sustainable development promotes the sustenance of the nature (earth, biodiversity, ecosystems), life support systems (ecosystem services, resources, environment) and community (cultures, groups, places) and development of people (child survival, life expectancy, education, equity, equal opportunity), economy (wealth, productive sectors, consumption) and society (institutions, social capital, states, regions)[1].

The potential of following approaches towards achieving a sustainable future has been recognized long back and reiterated time and again:[4]

Poverty eradication by ensuring the security of livelihoods of the world population. The unsustainable patterns of consumption and production linked to market driven consumerism need to be countered through education and public awareness. Protection and management of the natural resource base of economic and social development by recognition of all stakeholders and using the environmental perspective as a guide for evaluating all development projects. Globalization needs to be steered in a way that it serves both the commercial interests as well as the social needs of development. Regional cooperation is therefore necessary to ensure the effective participation of developing and developed nations in all stages of multilateral trade. A greater integration, effective coordination and cooperation between the ministries of health and environment of developing countries is required in view of strong

relationship between health and the state of the environment (thus sustainable development). The role of public health services must give preventive health care equal emphasis as curative health care. Traditional medicine in combination with modern medicine must be promoted while ensuring conservation of the resource base. An understanding must be promoted among key decision makers of the potential of science and education to promote sustainability, reduce poverty, train people for sustainable livelihoods and catalyze necessary public support for sustainable development initiatives. Greater capacity needs to be built in science and technology through improved collaboration among research institutions, the private sector, nongovernmental organizations (NGOs) and government.

The results to be achieved through these approaches have been spelled out as three sets of goals with different time-horizons:[1]

- The short-term goals till 2015 under MDGs
- The two-generation goals till 2050
- The long term goals beyond 2050

Equitable allocation of finance, trade, technology, energy security and human resource between developing and developed world are effective tools for implementation of sustainable development activities but the reality remains far from the ideal scenario.

The rich nations need to fulfill their promise of allotting and timely releasing 0.7% of their gross national income as official international development aid, annually for sustainable development. The aid is often wasted on conditions that the recipient must use overpriced goods and services from donor countries[5]. The new instruments and mechanisms such as the clean development mechanisms (CDM) that are trying to replace overseas development assistance (ODA) need to be examined closely for their implications for the developing countries. Trade regimes are sometimes in conflict with sustainable development priorities. Environmental and social clauses which are implicitly or explicitly part of international agreements must facilitate instead of hampering the trade in developing countries. Mechanisms must be put in place to make available to developing countries the latest technologies at reasonable cost. The existing local technologies in every field must be upgraded and adapted to make them more efficient and useful[4]. Energy security is a growing concern for rich and emerging nations alike. The drive for fossil fuel energy has led to wars, overthrow of democratically elected leaders and establishment of dictatorships. Leading nations admit they are addicted to oil, on the other hand the investments into alternatives energy sources have been lacking. Brain drain is a problem for many poor countries losing skilled workers to richer countries. In healthcare, the effects can often be seen vividly. For example, in many rich countries, up to one third of doctors may be from abroad, many from Sub-Sahara Africa, while many African countries have as little as 500 doctors serving their entire population[5].

Health is thus ingrained within the model, approach and implementation tools of sustainable development.

The Indian effort in sustainable development continues with a variety of development schemes in social, clean technology (clean energy, clean water and sustainable agriculture) and human resources segments[6].

In health sector, India continues its progress with implementation of National rural health mission (NRHM) to strengthen the health care delivery system in rural areas, introduction of National urban heath mission (NUHM) to address unique problems of urban slums and integration of all indigenous health systems under AYUSH (ayurveda, unani, siddha and homeopathy) department of Ministry of Health and Family Welfare to build and effectively use an indigenous health force. All these initiatives are based on principles of sustainable development such as equitable distribution of finance, human resource and utilization and updating of local technologies.

Sustainable energy investment in India went up to US$ 3.7 billion in 2008, up 12 % since 2007. India's sustained work towards reducing Greenhouse Gases (GHG) will ensure that the country's per capita emission of GHG will continue to be low until 2030-31.India has been ranked ninth in the tree planting roll of honor in a campaign to plant a billion trees. Two Indian companies have figured in the list of top five green electronics brands as per the 8th edition of the Guide to Greener Electronics, because of their strong focus on the e-waste management and climate control.

Under national solar mission the government targets to set up 1100 MW grid-connected solar plants for the first phase of the mission till march 2013. The government has approved US$ 974.65 million for this. In addition, the government plans to generate 20,000 MW solar power by 2022.

Furthermore, many Indian corporate houses have ventured into sustainable development activities such as initiatives to improve environment education in schools across India, rainwater harvesting projects, empowering local communities at the grassroots level by creating awareness on the right to information (RTI) act with respect to development projects and unveiling of eco-friendly computers, manufactured with materials completely free of toxic chemicals[6].

The greatest hurdle in progress of sustainable development activities is the divide between developing and the developed nations with the developed world not ready to bind itself to accords such as Kyoto protocol and emission standards. The world climate conference on climate change at Copenhagen witnessed clashes between multiple factions over emission standards, the financing of the transition to energy-efficient technologies in poor countries, and the enforcement mechanism. In the face of appeals by environmental scientists to reduce

rich-country emissions of greenhouse gases by 40 percent by 2020 compared to 1990 levels, the European union has offered only a 20 percent cut and United States a mere 3-4 percent cut[7]. In India, the Bhopal gas tragedy and its consequences both political and social are an evidence of conflict between safe, sustainable development & human health, safety and environment. The tragedy also highlights the shrugging of responsibility both by the developed as well as developing nations in case of obvious manmade disasters. The first and the third world need to work as one so that the human progress made in 20th century does not mar the future and development of our next generation.

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Relationship between Periodontal Infections and Atherosclerosis - A review

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Abstract

Evidence from epidemiologic studies suggests that periodontal infections are independently associated with subclinical and clinical atherosclerotic vascular disease(AVD). Entry of oral bacteria and/or bacterial products into the bloodstream is thought to be one of the key initiators of biological events that link oral infections to AVD. Transient bacteremias are common after dental proce¬dures, regardless of periodontal status, occurring frequently after mastication or after personal oral hygiene. The incidence and intensity of these bacteremias correlate positively with the extent and severity of periodontitis. Analysis of limited data from interventional epidemiologic studies suggests that treatment of periodontal infections results in lower levels of systemic inflammation and favorable effects on subclinical markers of atherosclerosis.

Key Words

Periodontal, atherosclerosis, mechanisms, infection.

Introduction

Evidence from epidemiologic studies suggests that periodontal infections are independently associated with subclinical and clinical atherosclerotic vascular disease(AVD). Although the strength of the reported asso¬ciations is modest, the consistency of the data across diverse populations and a variety of exposure and outcome variables suggests that the findings are not spurious or attributable only to the effects of confounders.

Analysis of limited data from interventional studies suggests that periodontal treatment generally results in favorable effects on subclinical markers of atherosclerosis although such analysis also indicates considerable heterogenecity in responses. In vitro and in vivo studies have established the plausibility of a link between periodontal infections and atherogenesis and have identified biological pathways by which these effects may be mediated.

However, the utilized models are mostly mono-infections of host cells by a limited number of model periodontal pathogens, and therefore may not adequately portray human periodontitis as a polymicrobial, biofilm-mediated disease. Future research must identify in vivo pathways in humans that may:

(i) Lead to periodontitis-induced atherogenesis, or
(ii) Result in treatment-induced reduction of atherosclerosis risk.

Data from these studies will be essential for determining whether periodontal interventions have a role in the primary or secondary prevention of atherosclerosis.

Potential Mechanisms Linking Periodontal Infections & Atherosclerosis

The Role of Bacteremias

Entry of oral bacteria and/or bacterial products into the bloodstream is thought to be one of the key initiators of biological events that link oral infections to AVD[1]. Transient bacteremias are common after dental proce¬dures, regardless of periodontal status, occurring frequently after mastication or after personal oral hygiene[2]. The incidence and intensity of these bacteremias correlate positively with the extent and severity of periodontitis[3] and are in line with histopathologic observations demonstrating disruption of the epithelial integrity of the periodontal pocket.

Oral and periodontal bacteria have been occasionally incriminated as causative for infections at distant organs, including the lung,[4] the central nervous system, or endovascular protheses, suggesting that they are able to establish themselves at extra-oral locations. Many studies have thus evaluated whether bacteria of oral or periodontal origin are detectable, retrievable, and cultivable from atherothrombotic plaques or vascular biopsies. Bacterial DNA from several periodontal pathogens has been detected in human endarterectomy specimens by Polymerised Chain Reaction (PCR),5 by a combina¬tion of anaerobic culture and subsequent PCR identification, by checkerboard DNA-DNA hybridizations, or by fluorescence in situ hybrid¬izations (FISH).

Furthermore, viable A. actinomycetemcomitans and P. gingivalis were recovered and cultured from human atheromatous plaques originating from a patient with periodontal disease[5].

Bacteria/Bacterial Products and Key Atherogenesis-Promoting Processes

Vascular Endothelial Activation

Upon entering the bloodstream, bacteria are rapidly cleared by host immune cells. To survive and elicit effects at distant sites, they have evolved several host-evasion strategies that have been investigated in multiple in vitro studies with P. gingivalis as a model periodontal pathogen. One such strategy is the ability of this microorganism to invade vascular endothelial cells.[6] Within the endothelial cell, the survival of P. gingivalis depends on the concurrent activation of autophagy and suppres¬sion of apoptosis, which provides an intracellular niche where the pathogen can replicate unobstructed by host immune responses. In fact, repression of autophagy by chemical inhibitors, such as wortmannin, results in transition of the bacteria to the phagolysosome and subsequent degradation.

Interactions with Monocytes/Tissue Macrophages

Interactions of periodontal bacteria with other host cells that participate in atherogenesis have included studies involving monocytes which are central to the formation of fatty streaks. Roth et al. (2007) observed an increased adhesion of monocytes to human aortic endothelial cells infected with invasive P. gingivalis when com¬pared with adhesion to non-infected controls, or to cells infected with a fimbriae-deficient P. gingivalis mutant, mediated by elevated expression of adhesion molecules and chemotactic cytokines in the endothelial cells. Complementing these observations, infection of monocytes with invasive strains of P. gingivalis enhanced migration and elicited the expression of the pro-inflammatory cytokines TNF-alpha and IL-6, whereas infection by the fimbriae deficient mutant had virtually no effect. Likewise, monocyte infection with invasive P. gingivalis strains promoted enhanced LDL-uptake and foam cell formation to a greater extent than infection with a non-invasive fimbriae-deficient mutant[7].

Pro-thrombotic and Pro-coagulant Effects

Platelets can be activated either by direct interaction of patho¬gens or their products, or indirectly via the vascular endothelium[8]. P. gingivalis induces platelet aggregation via a TOLL like Receptor (TLR2)-dependent mechanism since its pro-coagulant properties were effectively blocked by pre-treatment with a TLR2-blocking antibody, or by inhibition of the downstream phosphoinositide 3-kinase (PI3-K)/Akt signaling pathway activated by TLR2. Platelet aggregation in plasma was shown to depend on the adhesion molecule Hgp44 and the P. gingivalis protease Lys-gingipain (Kgp), but not on active Arg-gingipain (Rgp).

Oral Bacteria and Atheromatic Plaque Disruption

A role of bacteria and bacterial products is also conceivable in plaque disruption, one of the final and critically important events in atherosclerosis that is caused either by rupture of the fibrous cap of an unstable plaque, leading to exposure of the pro-thrombotic contents of the plaque, or through plaque ero¬sion by apoptosis, triggering local thrombosis.

These events result in the clinical presentation of atherosclerotic vascular disease in the form of a myocardial or cerebrovascular infarction. Degradation of fibrous caps is mediated by matrix metal-loproteinases (MMPs) produced within the plaques by macrophages .9 P. gingivalis and other periodontal bacteria, includ¬ing P. intermedia, have been reported to induce production of several MMPs in different cell types, including macrophages and endothelial cells, while at the same time reducing the expression of the MMP antagonist tissue inhibitor of MMPs (TIMPs).

Activation of Innate Immune Signaling Associated with Atherosclerosis by Periodontal Bacteria

Accumulating evidence suggests that periodontal pathogens and their bacterial products may exert pro-atherogenic effects in vascular endothelial cells via Toll-like receptors (TLRs) and other pattern recognition receptors (PRRs). These primary receptors of the innate immune system recognize highly conserved pathogen-associated molecular patterns (PAMPs). Activation of TLRs and their downstream signaling pathways leads to cellular activation and a specific response to microbial infection. Expression of TLRs is strongly induced in endothelial cells and macrophages in atherosclerotic lesions.

Patients suffering from chronic inflammatory diseases show higher B-cell expression of TLR2 and TLR4, while these receptors are also induced on monocytes in diabetes. Deficiency in MyD88, a central downstream signaling molecule for most TLRs, was shown to result in decreased atherosclerosis in vivo Similarly, deletion of TLR2 and TLR4 in mice had an atheroprotective effect, suggesting that agonists of these receptors play a role in advancing atherosclerosis[10].

However, a recent study utilizing an in vitro model of atherosclerosis found that only blockade of TLR2, but not of TLR4, resulted in significantly attenuated levels of inflammatory mediators and tissue-degrading MMPs.

Autoimmune Responses to Periodontal Bacteria

Molecular mimicry is a term used to describe the possibility that antibody responses targeted against bacterial antigens can essentially function as autoimmune responses due to the high degree of homology between specific bacterial antigenic peptides and mammalian proteins. This has been considered as a biologically plausible mechanism linking infection and atherosclerotic vascular disease[11]. Central to this notion is a family of highly conserved heat-shock proteins (HSPs), which is expressed on certain bacterial membranes, as well as by eukaryotic cells when exposed to stress. Bacterial HSPs are considered major antigenic determinants that elicit

antibodies and specific reactive T-cells that can cross-react with host cells expressing homologous molecules, resulting in auto-aggressive destruction.

Induction of Oxidative Stress by Periodontal Pathogens—Role of ox-LDL

A potential pathway through which periodontitis may contribute to atherogenesis is through direct or indirect effects. Direct effects include the induction of cellular activation and apoptosis by interaction with lectin-like oxidized low-density lipoprotein receptor (LOX-1). Indirect effects are exerted through down-regulation of the expression of endothelial nitric oxide synthase (eNOS), which results in increased production of ROS, ongoing LDL oxidation, and endothelial dysfunction.

Conclusion

Evidence from observational epidemiologic studies that has accumulated over the past few years has extended earlier observations and suggests that periodontal infections are independently associated with cardiovascular clinical outcomes. Although the strength of the reported associations is generally modest, the consistency of the data that have emerged from geographically and ethnically diverse populations across a variety of exposure and outcome variables suggests that the findings cannot be ascribed solely to the effects of confounders.

Analysis of limited data from interventional epidemiologic studies suggests that treatment of periodontal infections results in lower levels of systemic inflammation and favorable effects on subclinical markers of atherosclerosis, although analysis of the data suggests substantial heterogeneity in responses.

However, there are no data available to date suggesting that the prevention of periodontal infections will result in reduced incidence of cardiovascular clinical events. A great many experimental mechanistic in vitro and in vivo studies have established the plausibility of a link between periodontal infections and atherogenesis and have identified biological pathways by which these effects are mediated.

Future research must expand into the identification of in vivo pathways in humans that lead to periodontitis-mediated atherogenesis or result in treatment-induced reduction in atherosclerosis risk. Ultimately, these findings will pave the way for the conduction of appropriately designed clinical trials that will determine if periodontal interventions have a role in the primary or second¬ary prevention of Atherosclerotic Vascular Disease.

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Post-Operative Pulmonary Complications After Elective Abdominal Surgery

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Abstract

The incidence of post operative pulmonary infection vary according to the definition of post operative complications and the surgical site.

Aim

Main aim is to study the incidence and various risk determinants of postoperative pulmonary complications following elective abdominal surgery.

Methodology

A total of 103 patients who had an elective abdominal surgery were assessed for complications.

Results

Among 103 patients, 24.27% developed postoperative pulmonary complications. More commonly the elderly men, obese, smokers, prolonged surgery time and midline vertical incision were other determinants for developing complications.

Conclusion

Adequate preoperative evaluation of pulmonary functions can reduce pulmonary morbidity in a high risk patient undergoing an elective abdominal surgery.

Key Words

Postoperative complications, pulmonary complications.

Introduction

Surgeons world over continue to face the post-operative pulmonary complications, which if severe would be fatal. Despite rapid strides in the field of surgery, anaesthesia and other allied medical fields, the problem of pulmonary complication persists, which adds to morbidity and mortality in the post operative period. The pulmonary complication following abdominal surgery have long been a matter of grave concern to the general surgeons.

The incidence of post operative pulmonary complication following abdominal surgery depends upon the previous health of the patient, pre-operative preparation. Anaesthetic procedure, site of operation and the diligence with which the patient is observed by the surgeons. This incidence is influenced by both pulmonary and non pulmonary factors.

Very often a few complications do pass unnoticed unless a careful and continuous assessment of lung function is done.

The present study is done to know the incidence of post operative pulmonary complications after elective abdominal surgery and to findout the correlation between various risk factors and post operative pulmonary complications.

Background and rationale

In normal persons the volume of air in the lungs depends primarily on body size and build. Furthermore, the different "volumes" and "capacities" change with the positions of the body, most of them decreasing when the person lies down and increasing on standing. This change with position is caused by tow major factors : first, a tendency for the abdominal contents to press upward against the diaphragm in the lying position, and, second, an increase in the pulmonary blood volume in the lying position, which correspondingly decreases the space available for pulmonary air.

Effect of Anesthesia on pulmonary function

General anaesthesia and mechanical ventilation produce marked alteration in pulmonary function, lung volumes and compliance. General anesthesia affects the motion of the chest wall and diaphragm which decrease the lung volumes especially the functional residual capacity, which produces ventilation / perfusion abnormalities with increased intrapulmonary shunting and hypoxemia. Administration of general anesthesia results in a 11% drop in functional residual capacity. Immediately after surgery, a 10-30% decrease in PaO2 occurs which is thought to be owing to ventilation / perfusion mismatch[1].

Expected post operative abnormalities in pulmonary function

After upper and lower abdominal surgery, patients develop restrictive pulmonary dysfunction with a severely reduced vital capacity and functional residual capacity. Because of a reduced inspiratory capacity, these patients are unable to cough effectively and they breathe rapidly with small tidal volumes. These changes are most remarkable in patients after upper abdominal surgery,

less consequential after lower abdominal surgery.

Post operative abnormality in oxygenation that persists beyond 2hrs without hyper carbia are probably secondary to pain, abdominal distension, and immobilization in bed, all of which impair the patient ability to breathe deeply and cough effectively. This leads to decreased functional residual capacity, increased closing capacity, atelectasis and hypoxemia. These abnormalities in lung volume commonly progress over the first 24 hrs post operatively and may not return to normal for 7 to 10 days.

Clinically patients present as atelectasis, pulmonary odema, gastric acid aspiration, pneumonia and pulmonary infection[2].

Aims and Objectives

1) To study the incidence of Post- operative pulmonary complications after elective abdominal surgery.
2) To compare the risk of complications associated with upper and lower abdominal surgery.
3) To evaluate the implications of the nature and duration of abdominal surgery on the development of pulmonary complications.
4) To evaluate the influence of Age, Sex, Obesity and smoking as possible risk determinants for the occurrence of pulmonary complications.
5) To evaluate peak expiratory flow rate (P.E.F.R) as a single test to predict post operative pulmonary complications by Wright's miniature peak flow meter.

Study design and study population

A prospective study of post operative pulmonary complications was carried out in the department of oncosurgery, S.S. Institute of medical sciences and research centre, Davangere during the period June 2008-June 2010.

Patients admitted to the department of oncosurgery, for various elective abdominal surgery were selected for this study.

Study eligibility criteria

Around 103 patients aged between 20-84 years of either sex were selected. All these patients were scheduled for an elective abdominal surgery under general anesthesia. Informed consent taken for the procedure.

Exclusion criteria: Debilitating patients and those with acute cardiorespiratory diseases and those with contraindications for general anesthesia were excluded.

Study procedure (methodology)

A detailed preoperative assessment was done, with a detailed history pertaining to respiratory system, general physical examination, routine investigations like complete hemogram, random blood sugar levels, urine analysis, renal function tests, electro cardiogram, chest x-ray, blood gas analysis was done. Then, peak expiratory flow rate (PEFR) by Wright's miniature peak flow meter was taken.

a) Post-operatively, patients were frequently followed up for 7 days from the day of the surgery and the following parameters were noted.
   i) Temperature
   ii) Productive / dry cough
   iii) Physical examination of the respiratory system
   iv) Chest x-ray on 3rd Post operative day if the above signs were significant.
   v) A B G analysis if there were abnormal chest X-ray.
   vi) Pain score (Mild / Moderate / Severe) daily
   vii) Effective cough (Weak / Good) daily
   viii) Bedside peak expiratory flow rate (P E F R) was determined using Wright's miniature peak flow meter in all the 103 patients for all the 7 days post operatively.
b) Criteria used to determine the incidence of post operative pulmonary complications were ;
   a) Fever >990 F
   b) Productive cough
   c) Clinically abnormal chest findings
g) Criteria used to determine post-operative clinical classification of pulmonary complications by using the following table :

Table 1: Post-operative clinical classification of pulmonary complications

Criteria	Normal post-op course	Micro atelectasis	Macro atelectasis
Fever	$1^0 - 2^0$F	$1^0 - 2^0$ F	3^0 F or >
Productive cough	±	±	±
Physical signs	Normal	Positive	Positive
Chest x-ray	Negative	Negative	±

Results

Table 2: Showing the incidence of post operative pulmonary complications in particular age group

Age Group	Total No.	Incidence of complications	Incidence of complications (%)
< 50 Yrs	66	11	16.66
> 50 Yrs.	37	14	37.83
Total	103	25	

Table No. 10 shows that out of 66 patients who underwent abdominal surgeries belonging to the below 50 years age group had 16.66% (11 patients) of incidence of POST OPERATIVE PULMONARY COMPLICATION and 37 patients of ≥50 years age group had 37.83% (14 patients) of incidence of POST OPERATIVE PULMONARY COMPLICATION

Table 3: Showing the incidence of post operative pulmonary complications in particular sex group

Sex Group	Total	Complications patients	Incidence %
Males	64	17	26.56
Females	39	08	20.51
Total	103	25	

Table No. 11 shows that out of the total 64 male patients, 17 patients (26.56%) of them developed complications. And out of the 39 female patients, 8 patients (20.51%) developed POST OPERATIVE PULMONARY COMPLICATION.

Table 4: Showing the incidence of post operative pulmonary complications in smokers and non smokers

	Total	Total complications	Incidence of complications (%)
Smokers	45	14	31.11
Non Smokers	58	11	18.96

Table No. 12 shows the incidence of complications in smokers and non smokers.

Considering the total study population of 103 patients, 45 patients were smokers, out of which 14 (31.11%) developed complications and 58 patients were non smokers out of which 11 patients (18.96%) developed Post operative pulmonary complications.

Table 5: Showing the incidence of post operative pulmonary complications in obese and non obese patients

Type of Patients	Total	Total Complications	Incidence of complications (%)
Obese	43	13	30.23
Non obese	60	12	20

Table No. 13 shows, out of 103 patients, 43 patients were obese, 13, (30.23%) of them developed complications, and out of the 60 non obese patients, 12 patients (20.00%) developed post operative pulmonary complication.

Table 6: Showing the incidence of complications in relations to the in the of surgery

Type of Surgery	Total Surgeries	Total Complications	Incidence of complications (%)
Upper Abdominal	69	20	28.98
Lower Abdominal	34	05	14.70

Table No. 14 shows, out of 103 patients in the study population, 69 patients underwent upper abdominal surgery. 20 (28.98%) of them developed complications and of the remaining 34 patients who underwent lower abdominal surgery, 5 (14.70%) of them developed post operative pulmonary complication.

Table 7: Showing the incidence of complications in relations to the duration of the surgery performed in the study population

Duration	Total Surgeries	Total Complications	Incidence of Complications (%)
<3 hrs.	79	14	17.72
> 3 hrs.	24	11	45.83

Table No. 15 shows, out of the total 103 abdominal surgeries, 79 surgeries lasted <3 hrs. of duration, out of which 14 (17,72%) surgeries were followed by complications. 24 surgeries had a duration of > 3 hrs, of which 11 (48.83%) were followed by complications.

Table 8: Showing the incidence of complications in relations to the type of incisions used in the surgeries performed

Type of Incision	Total Surgeries	Total No. of Complications	Incidence of Complication (%)
1. Midline/ Vertical	37	15	40.54
2. Paramedian	12	04	33.33
3. Transverse	20	02	10.00
4. Subcostal	06	02	33.33
5. Bilateral Subcostal	02	00	00.00
6. Thoraco Abdominal	19	02	10.52
7. Inguinal	07	00	00.00

Table No. 16 shows that midline / vertical incision had a higher incidence (40 54%) of complications as compared to other incisions.

Table 9: Showing ranges of peak expiratory flow rate (PEFR) number of patients and incidence of complications in each range

PEFR lts/min.	Total No. of patients	Total No. of complications	Incidence of Complications (%)
300 - 400	47	16	34.04
401 - 500	24	06	25.00
501 - 600	18	03	16.66
>600	14	00	00.00

Table No. 17 shows PEFR was taken as a single test to predict Post operative pulmonary complications. 47 patients had PEFR between 300-400 lts/min, of them 16 (34.04%) patients developed complications. 24 patients had PEFR between 401-500 lts/min, of them 06 (25%) patients developed complications. 18 patients had PEFR between 501-600 lts/min, of them 3 (16.66%) patients developed complications. 14 patients had PEFR. more than 600 lts/min., of them none of the patients developed complications.

Independent t-test is used (Table No. 18) to find the mean difference of PEFR between post operative pulmonary complicated and uncomplicated patients. The mean PEFR is statistically significant at all level of mean PEFR readings.

Pre-operative mean PEFR is significant at 5% level only ($P < 0.05$) But post operative mean PEFR for Day 1, Day 2, Day 3, Day 4, Day 5, Day 6, Day 7 is highly significant ($P< 0.001$) between complicated and uncomplicated patients.

Discussion

There is a need to identify patients who are at risk of developing post operative pulmonary complications leading to morbidity and mortality in the postoperative period.

Various authors have employed various definitions of postoperative pulmonary complications.

Table 10 : Showing statistical analysis of mean preoperative and post-operative peak expiratory flow rate (P.E.F.R.) in patients with post-operative pulmonary complications and the others.

Readings		Complicated patients		Uncomplicated patients		t - Value	DF	Significance level
		Mean PEFR	SD	Mean PEFR	SD			
Pre-operative		396	61	451	106	2.445	101	P < 0.05
Post operative	Day 1	86	5	96	8	5.390	101	P < 0.001
	Day 2	100	10	127	19	6 864	101	P < 0.001
	Day 3	103	13	175	33	10.739	101	P < 0.001
	Day 4	100	8	226	49	12.859	101	P < 0.001
	Day 5	120	13	258	51	13.236	101	P < 0 001
	Day 6	132	12	283	48	15.423	101	P < 0.001
	Day 7	178	10	326	53	13.862	101	P < 0.001

However, the incidence rates of the present study are in par with the other similar studies.1,7,14,29 Patient with a malignant disease are at a slightly higher risk of complications probably due to immunocomprimised state. Complications are more common in men, older age group, obese, smokers and prolonged duration of operating time more so with upper abdominal surgeries.

Conclusion

Among 103 patients, 25 (24.27%) patients developed post operative pulmonary complications. Patients $\geq$ 50 yrs had increased incidence of post operative pulmonary complications (37.83%). Incidence were much more in males (26.56%). Out of 45 smokers, 31.11% of patients developed complications as compared to non smokers, 30.23% of obese patients developed pulmonary complications as compared to non obese patients. Upper abdominal surgery had a complication rate of about 28.98% as compared to the lower abdominal surgery. The pulmonary complication rate was more (45.83%) in patients who underwent surgery for more than 3 hrs of duration but the incidence was nil in patients who had operating time less than 1 hr. Midline / vertical incision had a fairly higher incidence (40.54%). It was seen that patients with PEFR between 300-400 lts/min had a higher incidence (34.04%) of complications but no complications with PEFR more than 600 lts/min. 75.72% of patient had normal post operative course whereas 10.68% of patients had microatelectasis, 13.59% of pts had macro atelectasis.

Pre-operative peak expiratory flow rate (PEFR) helps in predicting the probability of development of postoperative pulmonary complications [statistically significant (P < 0.05)].

Adequate preoperative prophylactic measures such as premedication with atropine to prevent broncho secretion, antibiotics, respiratory training, chest physiotherapy are some techniques that may help to maintain lung volumes.

In the postoperative period, radical change in the patient position, aspirations of secretions continuously, early mobilization, narcotics are kept at a minimum dose, manual support of the abdominal wall during cough and adequate pain relief can minimize hypoventilation and help the patient maintain a more normal ventilatory pattern.

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Global Scenario in Counterfeit Medicines: Threat assessment, existing remedies and recommendations

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Abstract

Counterfeit or fake medicines are drugs which are previously expired, fraudulently diluted, adulterated, substituted, completely misrepresented, or sold with a false brand name. They constitute 10% of the global drug market and mostly originate in the developing world, where regulatory and enforcement measures are weakest. Lack of expected clinical benefit, direct harm and emergence of drug resistance can occur due to counterfeit medicines. WHO, along with national and international organizations are taking legislative, regulatory, enforcement, technological and quality assurance initiatives to prevent and detect counterfeit medicines, besides raising awareness about the issue. However, despite making good progress, the threat looms large for the consumer as long as he is not empowered to differentiate between genuine and counterfeit medicines.

Key Words

Counterfeit medicines, fake drugs

Introduction

The problem of counterfeit medicines was first addressed in 1985 at the Conference of Experts on the Rational Use of Drugs in Nairobi. The World Health Organization (WHO), together with other international and nongovernmental organizations, was entrusted with tackling the problem. Accordingly, the World Health Assembly, in its resolutions of May 1988 through 1994, directed the WHO to take the initiative in helping member countries prevent and detect counterfeit medicines[1].

Counterfeit medicines are classified under substandard pharmaceuticals - products whose composition and ingredients do not meet the correct scientific specifications due to negligence, human error, insufficient resources or counterfeiting. They are consequently ineffective and often dangerous to the patient. But, counterfeit medicines are deliberately and fraudulently mislabeled with respect to identity and/or source, with correct or incorrect ingredients, deficient, insufficient or excessive active ingredient, or with fake packaging. They range from random mixtures of harmful toxic substances to inactive, ineffective preparations[2].

The extreme difficulty in tracing the manufacturing and distribution channels of counterfeit medicines hinders attempts to stop their circulation. Public confidence in health-delivery systems may be eroded following use and/or detection of counterfeit medicines. Eliminating them is a considerable public health challenge[3].

Problem Statement: Spread and Depth

Difficulty in defining the extent of counterfeiting: Scale of the problem is obscure because of insufficient detection,[4] non-accessibility of data, non uniformity of data collection and analysis,[5] flexibility of counterfeiters to detection methods and lack of updated information[3].

The market: WHO published estimates that counterfeit drugs constitute 10% of the global drug market, rising to 25% in less developed countries[4]. The world customs organization states that the global market of counterfeit drugs is worth $200 billion annually[6]. In most industrialized countries with effective regulatory systems and market control (eg, most of the European Union and the US), incidence of counterfeit medicines is less than 1% of market value. It is higher where medicines regulatory and enforcement systems are weak, eg African, Asian and Latin American countries[3].

India, China, the United Arab Emirates (UAE) and Switzerland are sources and conduits for counterfeit medicines.

The counterfeit drugs market is growing by 20–25 % per annum in India[4]. However, the Indian Health ministry estimates only 5% of drugs sold in India as counterfeit and 0.3% as spurious[7]. China's pharmaceutical association estimated that 8 % of over-the counter drugs sold in China are counterfeit[8].

Over 50% internet pharmacies that concealed their physical address were found selling counterfeit drugs[3].

Consequences of Consuming Counterfeit Medicines

Counterfeit medication may cause a worsening of the medical condition due to lack of active ingredients, fatalities from toxic ingredients and drug resistance for malaria, AIDS, tuberculosis and bird flu. They reduce revenues and undermine incentives to invest in drug research[4].

Remedial Measures

WHO provides support for strengthening regulatory control of medicines and enforcement by national medicines regulators. To fight counterfeit medicines effectively, a range of stakeholders is needed.

1. IMPACT: In 2006, WHO helped create the International Medical Products Anti-Counterfeiting Taskforce, or IMPACT to involve diverse stakeholder groups in collaborative efforts against counterfeit medicines[3]. Its areas of focus are:

Legislative and Regulatory Infrastructure: The Working Group developed a draft IMPACT working document on national legislation against Counterfeit drugs and initiated a comparative study on existing legislation.

Regulatory Implementation: The Working Group revised WHO Good Distribution Guidelines for promoting quality assurance in supply and distribution chains, developed a unified data collection approach and regulatory guidelines for rapid response enforcement and technology initiatives.

Enforcement: The Working Group developed a guide for identifying, investigating and prosecuting drug counterfeiters with a "Model for a Network of Single Points of Contact (SPOC)" to facilitate international collaboration.

Technology: The Working Group developed a guide on anti-counterfeit technologies, enabled effective authentication technology transfer for enforcement authorities and organized workshops for regulators and technology developers.

Communications: The Working Group developed the IMPACT Communications Strategy to raise awareness of counterfeit medicines. It developed an awareness toolkit. It maintains the IMPACT website and promotes print and electronic materials about counterfeit medicines[9].

Criticism of IMPACT

Small scale pharmaceutical manufacturers in developing countries alleged the influence of multinational pharmaceutical companies in IMPACT. Subtle manipulation of the term 'counterfeit medicines' and interpretation of intellectual property rights (IPR) by these companies have threatened exports of generic medicines from India[10].

Together with other developing countries, India and Brazil urged the WHO to end its IMPACT partnership during the World Health Assembly in Geneva in May, 2010. WHO stressed that anti-counterfeit measures were not directed against legitimate generic medicines and distanced itself from IPR enforcements. However, it accepted that shipments of Indian generics bound for Latin America and Africa were mistakenly seized or halted in transit in the EU[11].

2. International and National Pharmaceutical organizations:

International Pharmaceutical Federation (FIP): FIP Working Group on Counterfeit Medicines promotes purchase of drugs from reputable sources, alertness and reporting of suspicious cases to the manufacturer and regulatory authorities[12].

International Pharmaceutical Manufacturers Association (IFPMA): IFPMA, a global non-profit NGO represented by pharmaceutical companies and industry associations issued the IFPMA Ten Principles on Counterfeit Medicine in June, 2010[13].

Pharmaceutical Security Institute (PSI): PSI, an organization of major pharmaceutical companies, identifies the extent of counterfeit medicines and coordinates international inquiries. It detected 2003 incidents, involving 808 different pharmaceutical products and a 60 % annual increase in arrests of counterfeiters in 2009[14].

PhRMA: It is a US based advocacy organization of domestic and foreign pharmaceutical/biotechnology companies with an anti-counterfeiting working group.

American Pharmacists Association (APhA) and Healthcare distribution Management Association (HDMA) in the US, Royal Pharmaceutical Society of Great Britain, Indian drug manufacturers association (IDMA), Organization of Pharmaceutical producers of India (OPPI) and Indian Pharmaceutical association (IPA) are involved in anti-counterfeiting measures in their respective countries. In February 2010, IDMA sponsored the Indian Pharmacopeial Commission - US Pharmacopeial Convention 9th Annual Scientific Meeting to promote access to good quality medicines and discuss the problem of counterfeit medicines[15].

Criticism of Pharmaceutical Organizations & Industry

Many pharmaceutical companies are reluctant to disclose counterfeit medicines to health staff and the public, lest bad publicity harm the sales of brand name products. This causes failure to warn about the danger to public health from counterfeit medicines[5].

Big pharmaceutical firms are behind Kenya's Anti-Counterfeit Act 2008 which blurs distinction between generic, substandard and counterfeit drugs[16]. WHO agrees that this legislation threatens accessibility of affordable generic medicines in East Africa[17].

3. Multi-stakeholder organizations

The Partnership for Safe Medicines and the Counterfeit Alert Network (CAN) are US based multi-stakeholder organizations involved in anti-counterfeit measures[18].

4. Government Interventions

Governments are conducting surveys to gauge the scale of the problem, increasing allocation to enforcement measures, conducting raids through enforcement

agencies, strengthening regulatory bodies and effecting more stringent punishments to offenders.

The Indian health ministry also proposed a "whistle blower" policy that rewards the public and officers who inform and help seize counterfeit drugs[7].

Criticism of government interventions

Legislative: Taxes, tariffs and price controls of pharmaceuticals by governments have created gaps in supply of quality medicines, to be exploited by counterfeiters.

Heftier punishments can intimidate counterfeiters, but can also get organized criminal cells involved. Moreover, rigorous punishments often make judges reluctant to prosecute, for fear of making incorrect decisions.

Regulatory: Formation of stronger regulatory bodies by governments create extra layers of regulation and opportunities for bribery and corruption.

Drug regulators also delay access to new drugs after passing trials in other countries, creating more gaps in supply to be exploited by counterfeiters.

Enforcement: Impact of increased detection and seizure of counterfeit medicines on the long-term problem is less clear as the lucrative trade in counterfeits continues to flourish[4].

5. Use of Technology

Detection/ Quality evaluation: Weight, density, solubility, viscosity, refractive index and optical rotation, as well as physical description of the tablets can be easily measured by low cost equipment and provide simple tests for detecting counterfeit drugs. The German Pharma Health Fund (GPHF) mini-lab has also developed some simple test methods.

Colorimetry, chromatography, capillary electrophoresis, spectrometry, tensiography and isotopic characterization are other methods in use[19].

Authentication: Earlier, trademarked branding, with idiosyncratic pill shapes and colours were used, followed by tamper-evident packaging systems. Gradually, holographic images on packaging were introduced[4]. Addition of chemical and biological tracers/taggants to the packaging or product improved authentication[19].

Radio frequency identification (RFID) technology is based on an electronic chip which can be embedded in cartons or pellets. It emits radio frequency waves encoding a specific ID, read by a specialized chip reader.

In mass encryption technology, every product has a unique digital identity, encrypted on a barcode on packaging during manufacture. The consumer enters the code into an internet site or SMS to a central registry. Genuine drugs pass authentication and the consumer gets a reply. Counterfeit drugs will either contain no code or have an invalid code, which helps track its source[20]. It empowers the consumer to authenticate a drug in a simple way, using widely available resources, ie, mobile phones.

SMS systems, barcodes and RFID systems also allow retail pharmacists to verify whether the product is authentic and check whether a medicine has been previously dispensed, identify fake packs and expired products.

To prevent counterfeiters inserting fake drugs into legitimate packaging, some of the above methods are combined with security seals[4].

Criticism of technological solutions

Many quality evaluation techniques are costly, like HPLC, Mass spectroscopy etc.

Holograms are generally costly, ineffective over the long term and can be eventually duplicated[4].

With RFID technology, problems are cost, readability, errors and non-availability of RFID readers with consumers[20].

6. Patient safety reporting systems

PSI assists consumers to report suspicious pharmaceuticals to the manufacturer, health care, drug regulatory and law enforcement agencies[14].

WHO prescribed a checklist for visual inspection of medicines to help health professionals detect signs of counterfeiting, such as improper packaging and physical characteristics of medicines. Any suspicion should be conveyed to the local health authority, or WHO Department of Quality Assurance and Safety of Medicines (QSM)[21].

7. Enforcement organizations

Interpol is involved in anti-counterfeiting operations, like Operation Storm II, created under IMPACT which covered Southeast Asian countries and led to the seizure of counterfeit and illegal medicines in 2009[9].

On June 24, 2010, members of the World Customs Organization signed an international agreement to ban the production and marketing of fake drugs[6].

8. Awareness issues

Governments, non-governmental organizations, health organizations, media, pharmaceutical industry, trade organizations, legal, enforcement and consumer protection agencies are raising awareness about counterfeit medicines.

Recommendations

Pharmaceutical Industry

The pharmaceutical industry should have legal responsibility to report suspected counterfeits to drug regulators to protect the patients, even if it harms the brand name.

For enhanced cooperation within the pharmaceutical industry, there can be international agreements between companies to avoid taking advantage of competitors' brands affected by fake drugs[5].

There is a need for cooperation among big pharmaceutical companies and manufacturers of legitimate generic drugs, which can be facilitated by WHO, pharmaceutical organizations and multi-stakeholder groups.

Government interventions

Government controls on prices, taxes and tariffs should not hamper access to quality medicines.

Drug regulators should be accountable for providing safe medicines to the public.

Technological measures

For quality evaluation, tests for bulk properties of medicines, GPHF, TLC and colorimetry are cheap alternatives in drug testing labs of developing countries.

For authentication, mass encrypation systems can be enforced by regulatory authorities till better technologies become available.

Professional and Consumer/ Patient Reporting

Successful reporting systems educate people about counterfeits and reporting methods, provide simple tools (standardized reporting forms), enable ease of access (paper, mail, fax, web, e-mail or phone), use single site for data collection and coordination and integrate diverse stakeholder data needs in assessing the problem[22].

Raising awareness

Pharmacists should be made aware of the dangers, laws, regulations and technology for detection of counterfeit medicines. Professional organizations of medical practitioners should organize programmes to raise awareness and remedial measures among practicing physicians and the public. The Medical Council of India should incorporate counterfeit medicines in its MBBS curriculum and direct medical colleges to raise professional and public awareness by organizing seminars. Training modules in Pharmacovigilance must include counterfeit detection technology. Private pharmaceutical companies should raise public awareness along with health advocacy NGOs. Other business organizations and non-pharmaceutical companies, eg, International anti-counterfeiting coalition (IACC), International trademark association (INTA) etc. should be encouraged to join the campaign.

Public should be warned about the dangers of buying medicines from non-regulated outlets, although they are cheaper and may be available when supplies at regulated health facilities do not meet demand. Such outlets often stock counterfeit medicines[3]. The internet is also a dangerous place to buy medicines when the authenticity of the sources cannot be verified.

However, we should ensure that consumer's confidence in their medicines is not undermined, as it could deter patients from taking genuine medicines[5].

Role of Pharmacists

The ability of Pharmacists and pharmacy technicians to detect minor abnormal physical features of a drug product and its labels, packaging, and/or prescribing information is compromised by the large number of products dispensed on a daily basis and the technical expertise of counterfeiters.

Nevertheless, pharmacists as patient educators, prudent purchasers, and detectors of counterfeit drugs can thwart receipt of counterfeit drugs by patients, but this must be accomplished with minimal negative impact on pharmacy practices[18].

Strengthening health infrastructure

Provision of regulated medicine supplies in rural settings, associated with good healthcare delivery systems enable dispensing of genuine medicines.

Conclusion

Counterfeit medicines undermine the credibility of national health and enforcement authorities and indicate that the pharmaceutical supply system is vulnerable[3]. Deterrent legislation, regulatory oversight and enforcement actions, quality standards, reward schemes, awareness campaigns and technological measures by government, NGOs and international organizations like WHO and PSI are steps in the right direction. Improved data collection, more law enforcement efforts and greater public awareness have all contributed to the identification of a larger number of counterfeit medicines related incidents[14]. However, cooperation among big pharmaceutical companies and manufacturers of generics is the need of the hour.

But, till there is no simple, reliable and cost-effective way for the consumer to authenticate the nature and quality of his medicines, the threat remains serious. Currently, mass encryption technologies can be enforced in developing countries, with funding by international agencies to help drug manufacturers. According to Ranjit Shani, President of the OPPI, "While these technologies won't put counterfeiters out of business, they will certainly slow them down….it will be more difficult for counterfeit drugs to find their way into the market"[23].

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Prevelance of HIV in Patients Attending Integrated Counselling and Testing Centre - RIMS General Hospital, Kadapa Academic Year from April - 2009 to March - 2010

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Abstract

AIDS is a new disease, which came to light only in the year 1981 when it caused out Breaks in the USA. The origin of the virus has been the subject of much controversy, reminiscent of the situation 500 years ago, syphilis was first recognized. It has been suggested that the virus may have originated in Africa, perhaps from a simian. Immunodeficiency and spread to the USA probably through haity. In the permissive American Society of the 1970's the virus spread widely among male homosexuals and drug addicts, finally to come out into the open as outbreaks in 1981. HIV infection was detected rather late in India. The first cases having been found in female sex workers in Madras in 1986.

Key Words

ICTC Centre, No of clients tested for HIV, No of clients receiving HIV tests results, Total No of clients testing Sero – Positive.

Introduction

Morphology

HIV is spherical enveloped virus about 90 – 120 nm in size. The nucleocapsid has an outer icosachedral shell and in inner cone shaped core enclosing the ribonucleoproteins. The genome is diploid composed of two identical single stranded positive sense RNA copies.

In association with viral RNA is the reverse transcriptase enzyme which is a characteristic feature of retroviruses. When the virus infects a cell the viral RNA is transcribed by the enzyme, first into single strandard DNA and then double strandard DNA (Provirus) which is integrated into the host cell chromosome. The provirus can remain latent for long periods, though it influences host cell functions. At times in response to viral promoters the proviron initiates viral replication by directing synthesis of viral RNA and other components. During viral replication when the naked virus buds out through the host cell surface membrane it acquires a lipoprotein envelop, which consists of lipid derived from the host cell membrane and glycoprotein's which are virus coded. The major virus coded envelop proteins are projecting knob like spikes on the surface and the component of the virus, which binds to the CD4 receptors on the susceptible host cells.

Immunology

Viral Genes and Antigens: the genome of HIV contains three structural genes (gag, pol and env) characteristic of all retroviruses as well as other non structural and regulator genes specific for the virus. The product of these genes both structural and non – structural acts as antigens. Sera of infected person contain antibodies to them. Detection of these antigens and antibodies is of great value for the diagnosis and prognosis of HIV infection.

Antigenic Variation and Diversity of HIV: HIV is a highly mutable virus. It exhibits frequent antigenic variation as well as differences in other features such as nucleotide sequences cell tropism growth characteristics and cyto pathology.

Antigenic variation is most frequent in respect of the envelop proteins but is also same less often with other antigens. Based on the antigenic differences two types of HIV has been recognized. The original isolates of HIV and the related strains prevalent all over the world belong to HIV Type – 1. HIV strains react with HIV Type – 1 anti serum very weakly are not at all have been termed HIV Type – 2. The envelop antigens of the two types are different through these core polypeptides show some cross reactivity. HIV – 2 has only 40% genetic identity with HIV-1. It is more closely related to simian immunodeficiency virus than to HIV-1. HIV-1 strains have been classified into 9 sub types based on sequence analysis of these gag and elv genes. These sub types are designated as A – I.

Transmission and Pathogenesis

Transmission

HIV is primarily a sexually transmitted infection in the USA. It has transmitted predominantly among male homo sexuals. The danger of infection is more for the passive partners because mucosal tears are very frequent during anal intercourse and virus leading to lymphocytes in the semen can directly enter through these.

The second mode of transmission is through transmission of blood and Blood products. Before the danger of HIV transmission was recognized many persons had received blood and blood products containing the infectious virus.

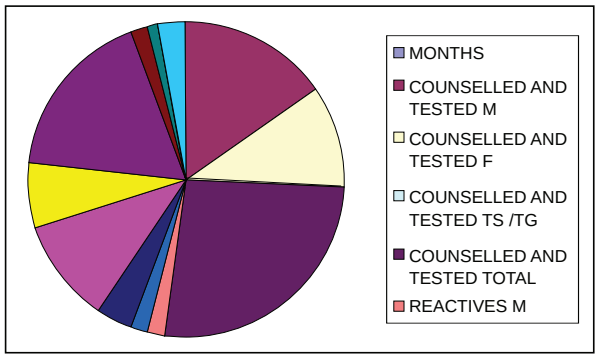
Contaminated Needles can transmit the infection. Needles used to inject drugs can transmit HIV when

Table 1: From April – 2009 To March – 2010

S. No.	Months	Counselled and Tested				Reactives				Voluntary Counselling and Tested				Reactives			
		M	F	TS /TG	TOTAL	M	F	TS /TG	TOTAL	M	F	TS /TG	TOTAL	M	F	TS /TG	TOTAL
1	APRIL – 09	374	246	0	620	50	36	0	86	258	164	0	422	39	27	0	66
2	MAY-09	319	167	0	486	56	30	0	86	240	102	0	342	39	22	0	61
3	JUNE-09	489	314	0	803	68	46	0	114	313	198	0	511	50	33	0	83
4	JULY-09	365	404	337	1113	43	46	36	125	273	245	0	518	37	29	0	66
5	AUGUST-09	498	436	0	934	47	40	0	87	172	64	0	236	19	14	0	33
6	SEPTEMBER-09	420	288	0	709	38	23	1	61	148	93	0	201	16	09	0	25
7	OCTOBER – 09	560	317	0	877	16	44	0	104	166	94	0	260	21	08	0	29
8	NOVEMBER-09	539	302	0	841	64	25	0	89	173	139	0	366	22	09	0	31
9	DECEMBER-09	377	249	0	626	47	19	0	66	91	61	0	152	16	13	0	29
10	JANUARY-10	433	265	0	698	53	24	0	77	76	43	0	119	26	11	0	37
11	FEBRUARY-10	339	217	0	616	43	19	0	62	129	61	0	190	18	11	0	29
12	MARCH-10	513	480	4	997	62	34	2	98	145	118	4	267	18	14	02	34
	TOTAL	5286	3685	314	8971	631	386	39	1056	2184	1382	4	3570	321	200	02	523

M = Male, F = Female, TS= Trans Sex, TG = Trans Gender.

Table 1: Graphically



they are used by more than one person. Needle should never be shared but if they are shared they should be thoroughly between uses.

HIV can be transmitted from mother to fetus/baby while it is still in the uterus during the delivery process and through breast feeding. There is strong evidence that use of anti-viral medications during pregnancy can reduce maternal transmission of HIV.

Pathogenesis

The receptor for the virus is the CD4 antigens and therefore the virus may infect any cell bearing the CD4 antigen on the surface and so are susceptible to infection. Infection is transmitted when the virus enters the blood or tissues of a person and comes into contact with a suitable host cell principally the T4 lymphocyte. Infection is likely to result more often following the introduction of HIV infected cells than of cell free virus. The double strandard DNA transcript of viral DNA is integrated the genome of the suspected cell causing a latent infection. From time to time lytic infection is initiated releasing progeny virions which infect other cells. The long and variable individual HIV can be isolated from the blood lymphocytes cell free plasma, semen, cervical secretion, saliva, tears, urine and breast milk. The primary pathogenic mechanism in HIV infection is the damage caused to T4 Lymphocytes. The T4 cells decreases in No. and the T4: T8 cell ratio is reverse. Viral infection can suppress the function of infected cells without causing structural damage. Infected T4 cells don't appear to release normal amounts of interleukin-2 and Gamma interferon and other lymphokines. This has a mark dampening effect on cell mediated immune response.

Case History

Prevalence of HIV in patients attending Integrated Counseling and Testing Centre in RIMS General Hospital for the academic year of April-2009 to March-2010.

Discussion

Health education, Sex Education and Awareness programs are important to prevent the Retro Viral Positive cased in society.

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Study of CD4 Count in Retro-Viral Positive Eunuchs

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Abstract

In India there is a class of male prostitute's eunuchs, who act as passive agents. They dress like females & wear female ornaments, they are of 2 types.

a. Hijarahs – Are castrated usually before puberty so external genitals resemble female genitals. Due to hormonal imbalance, they develop female characters.
b. Zenanas – Have intact genitals.

Key Words

AIDS, HIJARAHS, CD4 count.

Introduction

Acquired immunodeficiency syndrome (AIDS) is a widespread fatal disease that is caused by human immunodeficiency Viruses 1 and 2(HIV-1and2). The vast majority of cases of AIDS represent infection with HIV – 1. The fundamental lesion in AIDS is infection of CD4 + (helper) T lymphocytes by HIV, leading to the depletion of this cell population and consequent impaired immune function. As a result, rather than dying of HIV infection itself patients with AIDS usually die of opportunistic infections. There is also a high incidence of malignant tumors associated with AIDS, principally, B-cell lymphomas and Kaposi sarcoma.

Epidermalogy

AIDS was first recognized in 1981 with the description of pneumocystis carinil pneumonia in five homosexual men who had been diagnosed over an 8 month period in Los Angeles. However antibodies to HIV have been found in stored blood samples from Zaire dating to 1959, although newer PCR – based analysis have questioned this finding. Homosexual men and intravenous drug abusers who shared needles, transfusion recipients, heterosexual contacts, and infants born to female drug abusers were at risk.

In 1983, the AIDS virus, now termed HIV-1 was identified. AIDS had occurred worldwide in adults and children. In addition, 20 million adults are alive and infected with HIV. Who projects a cumulative total of 40 million HIV infections by the year 2000?

Transmission of Human Immuno Deficiency Virus

It is now clear that with the exception of direct transmission of HIV through blood or blood products, as in intravenous drug abusers and transmission recipients, AIDS is transmitted principally as venereal disease, both homo sexually and heterosexually. Significant amounts of HIV have been isolated not only from blood, but also from semen, vaginal secretions, breast milk and cerebrospinal fluid. Except for cerebrospinal fluid the occurrence of HIV in these fluids reflects the presence of both lymphocytes and true viruses. Among homosexual men the receptive partner in anal intercourse is at particularly high risk of becoming infected with HIV. The virus is transmitted from semen through tears in the rectal mucosa. It is also possible that HIV can infect the epithelial cells of them rectum directly. In heterosexual contact, transmission from male to female is more likely than the reverse, perhaps reflecting the greater concentration of HIV in semen in than in Vaginal fluids.

AIDS is not transmissible by non sexual, causal exposure to infected persons.

Pathogensis

The etiological agent of AIDS is HIV – 1 an enveloped RNA retrovirus that contains a reverse transcriptase (RNA – dependent DNA polymerase)

HIV – 1 is a member of the retrovirus family and specifically the subfamily of lenti viruses.

The HIV -1 genome consists of two identified 9.7- KD single standards of RNA enclosed with in a core of viral proteins. The core is in turn enveloped by a phospholipids bilayer derived from the host cell membrane, in which are found virally encoded glycoprotein's. In addition to the gag, Pol and env genes characteristic of all replication – competent RNA viruses.

HIV -1 contains six other genes coding for proteins that regulate viral replication. The specific target cells for HIV -1 are CD4+ helper T lymphocytes and mononuclear phagocytes, although infection of other cells, such as B-lymphocytes, glial cells and intestinal epithelial cells occurs.

Immunology of Aids

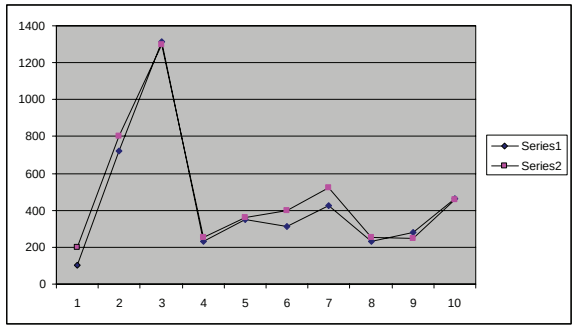
The destruction of CD4+ T cells by HIV -1 constitutes an attack on the Achilles heel of the entire immune system; because this subset of lymphocytes exacts critical regularity and effectors functions that involve both cellular and humeral immunity. Thus in the lyrical AIDS patient all the elements of the immune system are eventually perturbed including T cells, B cells, NK cells and Monocyte / macrophages.

T cells: CD4+ lymphocytes include two functional types: Helper and amplifier (inducer) cells. The first population affected in HIV infection is the amplifier subset. Eventually total CD4 counts fall to less than 500 cells/mL, and the helper-to-suppressor T-cell ratio declares from a normal of 2.0 to as little as 0.50.

Case History

We are collecting 10 blood samples from Retro – Viral positive Hijarahs.

S.No.	Name	Age	Date of HIV Confermation	CD4 Count	After ART CD4 Count
1	Shk.Asha	48	17/09/2009	102	201
2	Shk.Munni	24	24/09/2009	721	800
3	G.Baba Fajuruddin	35	14/11/2009	1316	1300
4	Shk.Ma Basha	35	17/11/2009	233	251
5	M.Subbarayudu	45	13/12/2009	350	362
6	K.Hari	33	26/3/2009	311	400
7	K.Habi Bulla	28	4/5/09	424	521
8	V.C.Tirupathaiah	35	5/6/09	230	252
9	Shk. Mahaboob Basha	38	15/02/2010	281	250
10	Shk.Jayamalini	20	10/3/10	461	460



Series: 1 CD4 Count

Series: 2 After CD4 Count

Discussion

Before and after we are collecting 10 blood samples from Retro – Viral positive Hijarahs. The CD4 count is increased after ART. It indicates increased immunity to the suspected persons during ART.

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Sera Samples Collected from Suspected Dengue Cases of Primary Health Centre, Devalampalli of Kadapa District – Anti Dengue Antibody Tests Conducted in Microbiology Department, RIMS General Hospital – In September 2009

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Abstract

Dengue virus is widely distributed throughout the tropics and subtropics. The name "dengue" is derived from the swatili ki denga pepo, meaning a sudden seizure by a demon. The term break – bone fever was corned during the Philadelphia epidemic in 1780. Dengue fever is clinically similar to the illness caused by Chikun Gunya and O'nyong-nyong viruses. The present case 1st serum sample collected from suspected Dengue cases of PHC Devalampalli of Kadapa district for arranging examination for serological diagnosis and communication.

Key Words

Dengue fever, serological examination, signs & symptoms, Management.

Introduction

Dengue is particularly common in Southeast Asia. Most cases are self – limited and require supportive therapy. A small proportion however can develop hemorrhagic fever as a shock syndrome. Four types of dengue viruses exist – DEN 1 first isolated from Hawaii in 1944, DEN 2 from New Guinea in 1944 and DEN 3 and 4 from Philippines in 1956. Immunity is type specific so that it is possible for a person to have four separate episodes of Dengue Fever. Dengue has been increasing worldwide over the last few decades and today ranks as the most important vector borne disease, with about 2.5 billion people in 200 Countries at risk. Dengue virus is transmitted from person to person by Aedes Aegypti mosquitoes. The extrinsic incubation period is 8 – 10 days. No vertebrate hosts other than humans have been identified.

Case Particulars

1st Sera samples collected from suspected Dengue Cases of PHC Devalampalli of Kadapa District for arranging examination for serological diagnosis and communication of early results.

Laboratory Investigations

Demonstration of circulating IgM antibody provides early diagnosis as it appears with in two to five days of the onset of illness and persists for one to three months. IgM ELISA test offers reliable diagnosis. A Strip Immuno chromatography test for IgM is available for rapid diagnosis. Control of dengue is limited to vector control as no vaccine is currently available.

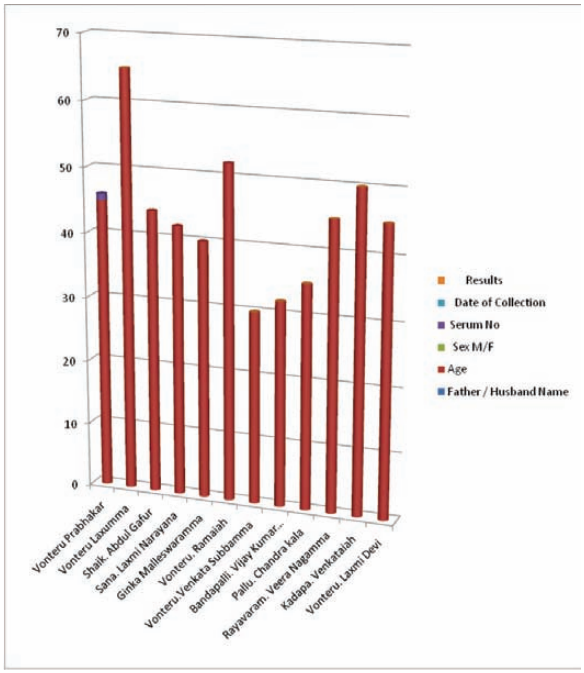
Signs and Symptoms

Dengue presents clinically after an incubation period of 3 – 14 days as fever sudden onset of the headache, retro bulbar pain, conjunctival infection, pain in the back

Table 1: PHC Devalampalli – Parvathareddy Palli (Village), Devalampalli (Mandal) Kadapa Dist.

S. No.	Patient Name	Father / Husband Name	Age	Sex M / F	Serum No	Date of Collection	Results
1.	Vonteru Prabhakar	Self	45	M	1.	27.10.09	Positive
2.	Vonteru Laxumma	Prabhakar	65	F	2.	27.10.09	Negative
3.	Shaik. Abdul Gafur	Self	44	M	3.	27.10.09	Negative
4.	Sana. Laxmi Narayana	Self	42	M	4.	27.10.09	Negative
5.	Ginka Malleswaramma	Reddaiah	40	F	5.	27.10.09	Negative
6.	Vonteru. Ramaiah	Self	52	M	6.	27.10.09	Negative
7.	Vonteru.Venkata Subbamma	Eswaraiah	30	F	7.	27.10.09	Positive
8.	Bandapalli. Vijay Kumar Reddy	Self	32	M	8.	27.10.09	Negative
9.	Pallu. Chandra kala	Vijay Bhaskar Reddy	35	F	9.	27.10.09	Positive
10.	Rayavaram. Veera Nagamma	Subbarayudu	45	F	10.	27.10.09	Positive
11.	Kadapa. Venkataiah	Peddanna	50	M	11.	27.10.09	Positive
12.	Vonteru. Laxmi Devi	Venkata Ramana	45	M	12.	27.10.09	Positive

Table 1: Graph Sheet



and limbs (Break bone fever), Lymphadenopathy and Maculopapular rash. The fever is typically biphasic (Saddle back) and lasts for 5 – 7 days. Dengue may also occur in more serious forms, with hemorrhagic manifestations (Dengue Hemorrhagic fever) or with shock / dengue shock syndrome.

Management

Medical Management

1. Symptomatic treatment
2. If platelet count is < 40,000 replace the platelets..
3. Temperature is present give oral tablets like Tab. Paracetamol / Pain killers like Tab. Diclofenac. Tepid cold sponging.

Discussion

All four types of Dengue virus are present in this country. Occasionally more than one type of the virus has been isolated from the same patient. In present study we are collecting 12 patients' blood samples for serological examinations. Out of 12 samples we get 6 positive cases.

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Prenatal Histogenesis of Human Spleen

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Abstract

Human spleen is an organ of anatomic and functional component of reticuloendothelial system. Spleen is situated in left hypochondrial region. It is soft friable, highly vascular and dark purple in colour. Histogenesis of spleen Studied in 50 fetuses of various gestational ages ranging from 11weeks to 38weeks.

By 11th week only lymphocytic aggregation seen.

By 20th week developing lymphoid follicles observed.

By 32 weeks well developed lymphoid follicles with central arteriole seen.

At 36 weeks crack at periphery of developing lymphoid follicles and arteriole is at periphery.

Key Wors

Lymphoid aggregation, lymphoid follicles, central arteriole, Histogenesis, White pulp.

Introduction

Spleen appears first in 5th week of gestation as condensation of mesenchymal cells in left side of dorsal mesentery. Mesenchymal cells Differentiate into reticulum and primitive free cells resembling lymphocytes. Slightly later lymphocytes will be myeloid in nature. Development of lymphocytes Continues throughout life. Formation of granulocytes, erythrocytes normally Ceases after birth. Enlargement of white pulp forming definite splenic corpuscle. Not found until towards end of fetal development. Adult structure of red pulp not Attained until birth.

Material and Methods

Study was conducted with available still born fetuses collected from maternity Unit. Age of fetuses obtained by crown-rump length. Total number of fetuses Were fifty and fixed in 10% formalin. Fetuses were subjected to

Fig. 1: Macroscopic appearance of fetal spleens.

Fig. 2: Diffuse lymphatic aggregation (H&E, ×100).

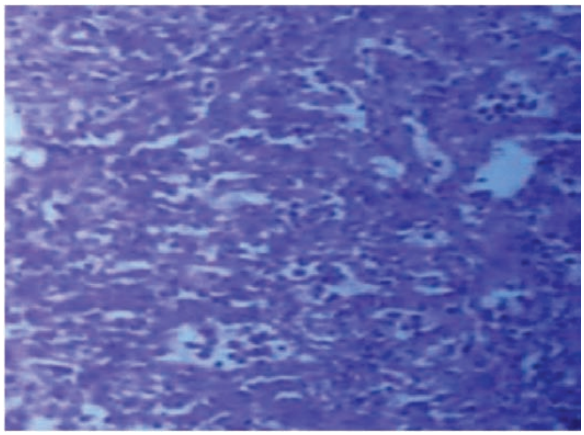
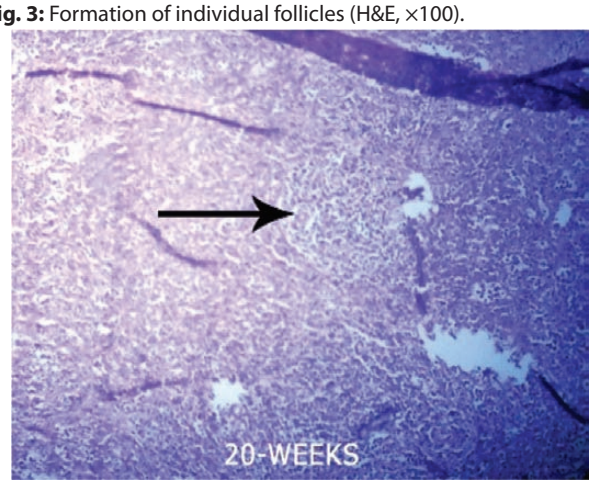


Fig. 3: Formation of individual follicles (H&E, ×100).



protocol of dissection. Fetal spleens extracted and were processed routinely for paraffin Embedding. Five microns thickness sections cut & stained with haematoxylin and eosin. Spleens of different gestational ages studied under light microscope.

Results

Macroscopic features

Fetal spleens look like same that of adult spleen, but vary in size depending on gestational age. The length varies from 1.5cm to 3.8cm. Breadth vary from 0.38 to 1.1cm. Leinorenal and gastrosplenic ligaments well developed. Hilum of spleen Shows splenic artery and vein. Splenic artery is straight in all fetal spleens (fig.1).

Microscopic Features

At 11th week: capsule of spleen formed trabeculae seen. Diffuse lymphocytic aggregation seen. No differentiation of red pulp and white pulp. Venous sinuses seen, but not clear (fig.2).

At 20weeks: capsule well developed. Developing lymphoid follicle seen. Developing splenic cords and sinusoids seen (fig.3).

At 32 weeks: Lymphoid follicle well developed. It can be differentiated from surrounding lymphatic aggregation.

Fig. 4: Follicle measures ½ of the microphotograph (H&E, × 100).

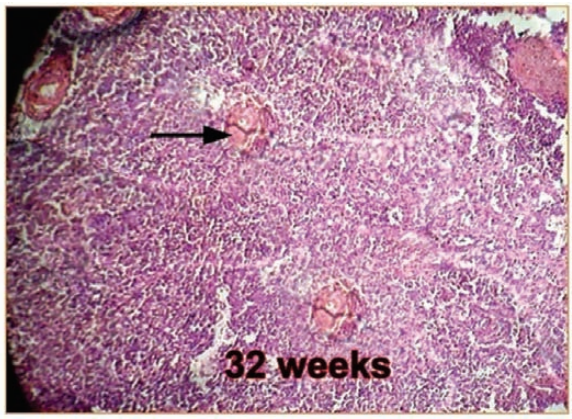
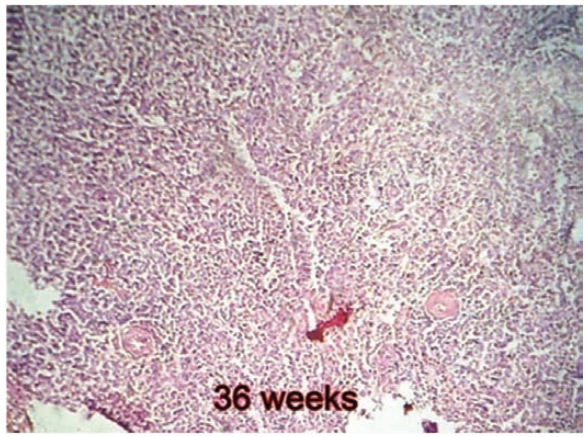


Fig. 5: Follicle measures more than ½ of the microphotograph (H&E, × 100).



Large central arteriole seen. Developing red pulp was seen (fig.4).

At 36 weeks: There was crack at periphery of developing lymphoid follicle. Arteriole shifted to periphery of lymphatic aggregation. Developing splenic sinusoids seen (fig.5).

Discussion

ANAT.Z et.al, studied development of spleen in auto immune radiography stated germinal centers of spleen formed during first few weeks of life shows great variation from one animal to another.

American Journal of Anatomy VOL.8 1984 J.ALLEN.O studied microscopic anatomy & physiology of living transilluminated mammalian spleen.

Marie A.V.Aldes and Diapera. B.S discussed histology of spleen at various gestational ages.

In the present article development of spleen at various gestational ages are studied. Capsule of spleen appeared early and trabeculae can be seen at 11thweek of gestational age. Lymphoid follicles appeared earlier with central large arteriole shifted to periphery because of increase in size of lymphoid follicle. Splenic sinuses and splenic cords appeared earlier and development delayed when compared to white pulp.

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Probiotics- A novel approach to health

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Abstract

Probiotics literally means 'for life'. They are live microorganisms (in most cases, bacteria) that are similar to beneficial microorganisms found in the human gut. They are also called "friendly bacteria" or "good bacteria." Probiotics are available to consumers mainly in the form of dietary supplements and foods. They can be used as complementary and alternative medicine. This review describes current knowledge on probiotics bacteriotheraphy from the general health as well as oral health perspective.

Key Words

Probiotics, friendly bacteria, good bacteria, dietary supplements, bacteriotherapy.

Introduction

"Let food be thy medicine and medicine be thy food', the age-old quote by Hippocrates, is certainly the tenet of today. With the growing interest in self-care and integrative medicine coupled with our health-embracing baby boomer population, recognition of the link between diet and health has never been stronger. As a result, the market for functional foods, or foods that promote health beyond providing basic nutrition, is flourishing. Within the functional foods, is the small but rapidly expanding arena of probiotics[1]. Probiotics were defined by a group of experts convened by the Food and Agriculture Organization of the United Nations (FAO2001) as "live microorganisms administered in adequate amounts which confer a beneficial health effect on the host".

Features

A good probiotic agent needs to be non-pathogenic, nontoxic, resistant to gastric acid, adhere to gut epithelial tissue and produce antibacterial substances.

They need to avoid the effects of peristalsis, which tend to flush out bacteria with food[1].

Composition

Probiotics can be bacteria, moulds or yeast. Among bacteria, lactic acid bacteria are more popular. Lactobacillus acidophilus, L. casei, L. lactis, L. helviticus, L. salivarius, L. plantrum, L. bulgaricus, L. rhamnosus, L. johnsonii, L. reuteri, L. fermentum, L. delbrueckii, Streptococcus thermophilus, Enterococcus faecium, E. faecalis, Bifidobacterium bifidum, B. breve, B.longum and Saccharomyces boulardii are commonly used probiotics.[2]

Delivery of Probiotics

While defined in term as medical probiotics (microbial preparation) and other probiotics (functional food) are provided as products is one of four basic ways[2]:

i) As a culture concentrate added to a beverage or food (such as fruit juice)
ii) Inoculated into prebiotic fibers
iii) Inoculated into a milk – based food (dairy products such as milk, milk drink, yoghurt, yoghurt drink, cheese kefir, bio drink and
iv) As concentrated and dried cell packaged as dietary supplements (non – dairy products such as powder, capsules, gelatin tablets).

Role of Probiotics in General Health

1) Cholesterol: They either inhibit the de novo synthesis or decrease the intestinal absorption of dietary cholesterol. Inhibition of de novo synthesis can be attained by hypocholesterolemic factors like lactose, calcium hydroxyl methyl glutarate, uric acid, orotic acid, whey proteins, etc. They assimilate the cholesterol for their own metabolism or can get bound to the cholesterol molecule, and are capable of degrading cholesterol to its catabolic products.

The cholesterol level can be reduced indirectly by deconjugating the cholesterol to bile acids, thereby reducing the total body pool[3].

2) Anticancer Effects: It has been hypothesized that probiotic cultures might decrease the exposure to chemical carcinogens by detoxifying ingested carcinogens, altering the environment of the intestine and thereby decreasing populations or metabolic activities of bacteria that may generate carcinogenic compounds, producing metabolic products (e.g., butyrate) which improve a cell's ability to die when it should die (a process known as apoptosis or programmed cell death), producing compounds that inhibit the growth of tumor

cells, or stimulating the immune system to better defend against cancer cell proliferation[4].

3) Lactose Intolerance: Yogurt contains less lactose than milk and delays gastric emptying, which partly explains why lactose- intolerant individuals tolerate yogurt. However, yogurt tolerance is mainly due to the supply of lactase activity from the lactic acid bacteria present in the yogurt itself[3].

4) Allergy: It may exert a beneficial effect by altering the composition of the gut microflora, such as decrease in the number of lactobacilli or improving mucosal barrier function. Studies have shown to reduce the incidence of childhood eczema by half compared to placebo, when administered during pregnancy and up to 6 months postnatally. The incidence of asthma or rhinitis was not altered. A follow-up study demonstrated a two-fold increase in transforming growth factor b2, an anti-inflammatory cytokine, in the breast milk of mothers receiving probiotics compared to placebo[5].

5) Probiotics and the Immune Response: Probiotic bacteria can interact with epithelial cells and alter cytokine production through modulation of cellular signal transduction pathways. They can modulate epithelial barrier function, possibly through interactions with Toll Like Receptor(TLR)-2.They also induce a pattern of maturation of Dendritic Cells (DC) characterized by the release of small amounts of Tumor Necrotic Factor(TNF)-alpha and Interlukin(IL)-12, with increased levels of IL-10, and inhibit the generation of proinflammatory T Helper(TH)-1 cells. This increase in IL-10 production may act both by having direct anti-inflammatory effects and by enhancing the generation of T regulatory (Treg) cells.6

6) Necrotizing Enterocolitis (NEC): Probiotic supplementation may reduce the risk of NEC in preterm infants[7].

7) Vaginosis: Lactobacilli predominate in the healthy vagina, and a lack of lactobacilli is a risk factor for vaginosis. The lactobacilli are thought to maintain a favorable vaginal pH in the acidic range and to inhibit pathogens, possibly through the production of hydrogen peroxide and other antimicrobial factors[3].

8) Irritable Bowel Syndrome: Mixtures of concentrated probiotics have been shown to decrease the number of patients relapsing with Pouchitis compared to placebo, over 12- and 18-month periods[8].

9) Hypertension: Consumption of certain lactobacilli, or products made from them, may reduce blood pressure in mildly hypertensive people[3].

10) Diarrhoea: Both therapeutic and preventive effect of probiotics have been demonstrated for prevention of diarrhoea. The precise mechanism is not known, but evidence points to stimulation of the immune system. Clinical trials have shown that the incidence of diarrhoea is lower in response to probiotics versus placebo.On the other hand, there is no consistent evidence for a protective effect of probiotics in traveller's diarrhoea, which can be due to a wide range of viruses and bacteria[9].

11) Nutrient Synthesis and Bioavailability: Fermentation of food with lactic acid bacteria has been shown to increase folic acid content of yogurt, bifidus milk and kefir and to increase niacin and riboflavin levels in yogurt, vitamin B12 in cottage cheese and vitamin B6 in Cheddar Cheese[3].

Role of Probiotics in Oral Health

Since the mouth represents the first part of the gastrointestinal tract, there is every reason to believe that at least some probiotic mechanisms may also play a role in that part of the system. Mechanisms of probiotics are drawn entirely from GIT studies and their applicability to oral health needs further studies.

Some hypothetical mechanisms of probiotics in the oral cavity are mentioned as follows: Probiotics may act by direct interaction or indirect interaction on oral biofilm and microflora and vice versa[10].

Direct interaction may include:

1) Involvement in binding of oral microorganism to proteins (biofilm formation)
2) Action on plaque formation and on its complex ecosystem by compromising and intervening with bacteria to bacterial attachments.
3) Involvement in metabolism of substrate (competing with oral microorganisms of substrate available).
4) Production of chemicals that inhibit oral bacteria (antimicrobial substances)

Indirect interactions may include: Modulating systemic immune function effect on local immunity, effect on non –immunologic defence mechanisms, regulation of mucosal permeability, selection pressure on developing oral micro flora towards colonization by less pathogenic species.

1) The Probiotic Approach to Prevent Dental Caries

A substitu¬tion strategy was developed by Hillman and colleagues(2002) in which they genetically modified a Streptococcus mutans organism so that it no longer produces acid while competing aggressively for the ecologic niche where the wild type S mutans is found. They found that not only does this stop the disease process, it also precludes the re-emergence of the disease-causing organism and eliminates re-infection because the ecologic "inn is full"[11].

A different way of accomplishing the removal of the pathogens is to develop "targeted antimicrobials." The basic idea is to develop an inexpensive targeting molecule that will reliably attach to only the organism of interest, in this case S mutans, S sobrinus, or other chosen pathogen. Once the targeting molecule is perfected, then a "killer" molecule is optimized and chained to the

targeting molecule. The combined unit then selectively eliminates the infection of interest. In the case of the oral cavity and dental caries, this system is attractive from the perspective of eliminating all the pathogens thereby precluding the regrowth of the original infection.

Studies have proved that a short-term daily ingestion of Lactobacillus reuteri derived probiotics delivered via medical device containing probiotic lozenge reduces the levels of salivary mutans[12] and short-term consumption of cheese containing L. rhammosus GG(LGG) and Lactobacillus rhamnosus LC 705 diminishes the caries-associated salivary microbial counts in young adults[13].

2) Probiotics and Periodontal Health

Probiotics lower the saliva pH so that bacteria cannot form dental plaque and calculus that causes the periodontal disease. They produce antioxidants which prevent plaque formation by neutralizing the free electrons that are needed for the mineral formation[14].

Probiotic strains included in periodontal dressings at optimal concentration of 10^8 CFU/ml were shown to diminish the number of most frequently isolated periodontal pathogens, Bacteroides species, Actinomyces sp., S. intermedius and Candida albicans[14].

Teughels et al(2007) reported that the subgingival application of a bacterial mixture including Streptococcus sanguis, S. salivarius, and Streptococcus mitis after scaling and root planing significantly suppressed the re-colonization of Porphyromona gulae (canine P. gingivalis) and P. intermedia in a beagle dog model. This guided pocket recolonization approach may provide a valuable addition or alternative to the armamentarium of treatment options for periodontitis[15]. Passive immunization of humans using Porphyromonas gingivalis monoclonal antibodies temporarily prevents colonization of the same[15].

3) Use of Probiotics in Halitosis

BLIS (Bacteriocin-Like Inhibitory Substances) Streptococcus salivarius K12 obtained in capsule form has a great potential for the control of halitosis. Interestingly, this same strain has been found to inhibit the growth of the Streptococcus species that causes strept throat, so it may have value in more than just bad breath probiotics[16,17].

4) Role of Probiotics in Candidiasis

When a test group of elderly people consumed cheese containing L. rhamnosus strains GG and LC705 and Propionibacterium freudenreichii species shermanii JS for 16 weeks, the number of high oral yeast counts decreased, but no changes were observed in mucosal lesions[18].

Contraindications

Probiotics are contraindicated in those hypersensitive to any component of a probiotic –containing product[22].

Precautions

Pregnant women and nursing mothers should only use probiotic nutritional supplements if recommended by their physicians. The use of probiotics for the treatment of any disorder must be medically supervised.22.

Side Effects of Probiotics

In normal healthy persons, probiotics when taken in recommended doses, does not cause any significant side effects. In rare cases, they may lead to mild digestive problems like flatulence, bloating, diarrhea and abdominal pain. If probiotics are taken in excess amount, there are chances of developing infections that require medical attentions[23].

Immuno-compromised individuals are at a higher risk of developing infection after the use of probiotics. Symptoms such as bloody stools, skin rash and fever are indications of intestinal infection. In addition, probiotics may disturb the normal metabolic processes and autoimmune responses of the body. In case of any symptoms after administering probiotics, one should seek immediate medical attention.

Status of Probiotics in India

In India, probiotics are often used as animal feed supplements for cattle, poultry and piggery. This requirement is also met by importing probiotics from other countries. It is rarely used for human beings. Among all the probiotics Sporolac, Saccharomyces boulardii and yogurt (L. bulgaricus + L. thermophillus) are the most common ones used for human beings. Lactobacilli solution is an example of a probiotic, usually given to paediatric patients in India[1].

The latest and recent addition to the list of probiotics in India is ViBact (which is made up of genetically modified Bacillus mesentricus), which acts as an alternate to B-complex capsules. In India, only sporulating lactobacilli are produced and they are sold with some of the antibiotic preparations[1].

Limitations of Probiotics

- Any a times microorganisms do not reach the G.I. tract in either sufficient numbers or with sufficient activity to be effective.
- Moreover, many bacterial isolates used as probiotic organisms are poor colonizers of the G.I. tract, quickly passing straight through and thereby eliciting only a transitory effect.
- Probiotics have a relatively short shelf-life (often requiring a specialised distribution system) and that they can only be put in certain types of foods.
- Many of bacterial probiotics available in Indian market do not mention about strain specificity, thus limiting their usefulness.

- Uncertainty on the part of the regulatory authorities over whether to classify probiotics as a food or a medicine has caused confusion and seriously delayed research in some countries. Treating them as a foodstuff will generally lead to health claims but treating them as a medicinal product must necessarily involve therapeutic claims, and the regulatory implications are very different[24].
- Many clinicians also worry about the reliability of some of the products currently on the market, doubt whether anybody is responsible for quality control, and remain very unclear as to who needs to take ultimate responsibility for initiating use even though the products used in several of the largest trials have long been on sale to the general public[24].

Conclusion

With the current focus on disease prevention and the quest for optimal health at all ages, the probiotics market potential is enormous. Health professionals are in an ideal position to help and guide their clients toward appropriate prophylactic and therapeutic uses of probiotics that deliver the desired beneficial health effects. There are many probiotic products at the market place and most have supporting evidence behind the advertized health claims[1]. New legislation governing the labelling of probiotics, such as indicating the species, strain and number of bacteria present is likely to come into force in the near future. Probiotics should not be considered a panacea for health, but can be incorporated into a balanced and varied diet to maximize good health.

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A Pilot Study of the Efficacy of Intrathecal Neostigmine for Postoperative Analgesia in Lower Abdominal and Lower Limb Surgery at SIMS, Ghaziabad, Uttar Pradesh

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Abstract

Intrathecal neostigmine had been used in various doses to produce analgesia without neurotoxicity in both animal and human studies. The present study was conducted using 50µg intrathecal neostigmine methylsulphate with 12.5mg bupivacaine (0.5% heavy) for optimum duration of post-operative analgesia with minimal side effects. In this study 100 patients belonging to ASA physical status I and II, age 20-70 years of either sex scheduled for elective lower abdominal and lower limb surgeries under spinal anaesthesia were included. Patients were randomly allocated in two groups: group I (n=50, control) received 2.5ml bupivacaine + 0.5ml of normal saline and group II (n=50, test) received 2.5ml bupivacaine +0.5ml of neostigmine (50µg). Time of onset of sensory and motor block, highest level of block, duration of analgesia and side effects like hypotension, bradycardia, nausea, vomiting, etc were recorded. Onset time of sensory and motor block was much faster In bupivacaine and neostigmine group as compared to bupivacaine group. Patients were pain free for average 6-7 hours with bupivacaine and neostigmine as compared to 3-4 hours with bupivacaine. It was concluded that intrathecal neostigmine in the dose of 50µg provide post-operative analgesia for a period of 6-8 hours with lesser incidence of side effects of nausea and vomiting.

Key Words

Anaesthesia, Spinal Anaesthesia, Drugs, Bupivacaine, Neostigmine.

Introduction

Spinal anaesthesia, is considered to be very safe technique of anaesthesia for lower abdominal and lower limb surgeries. It is being used by anaesthesiologist in different scenarios worldwide. But, management of post-operative pain remains a point of concern with spinal anaesthesia. Various adjuvants like opioids, clonidine, baclofen, ketamine, midazolam had been used intrathecally to prolong the duration of post-operative analgesia. Neostigmine is a anticholinesterase group of drug and had been used in doses of 10 to 200µg by various authors. Post-operative analgesic effect of intrathecal neostigmine was first reported by Hood DD et al in 19951. Higher doses of neostigmine is associated with adverse effects like nausea, vomiting, bradycardia and delayed recovery from motor blockade thus delaying discharge from hospital. Intrathecal neostigmine inhibit metabolism of spinal released acetylcholine and produce analgesia. The present study was conducted using 50µg intrathecal neostigmine methylsulphate with 12.5mg bupivacaine (0.5% heavy) for optimum duration of post-operative analgesia with minimal side effects.

Material and Methods

After approval with institutional review board, 100 patients of ASA physical status 1&2, age 20-70 years of either sex, body weight 50-100Kg, scheduled for lower abdominal & lower limb surgeries were enrolled in the study. Informed consent was taken from each and every patient. Patients were randomly assigned using coded envelop to one of the two study group receiving either 0.5% bupivacaine (2.5ml bupivacaine+.5ml normal saline) group I or 0.5% bupivacaine with 50µg neostigmine (2.5ml bupivacaine+0.5ml neostigmine) group II in a double blind fashion. Patients with history of bleeding disorder, on anticoagulant therapy, weight more than 100Kg, known allergy to study drug, local infection at the site of injection, pre existing neurological deficit, bony deformity and not willing for regional anaesthesia were excluded from the study.

Pre anaesthetic check up of all patients was done one day prior to surgery and patients were kept fasting for 8 hours prior to surgery. All patients were given tablet alprazolam 0.5 mg nights before surgery. Pulse rate, arterial oxygen saturation, Non invasive Blood Pressure, E.C.G and respiratory rate were monitored with B.P.L. excelleo monitor on arrival in O.T. and continued till end of surgery. A good intravenous line established and patients were preloaded with 10ml per Kg of ringer lactate solution. Patient was placed in sitting position and under all aseptic precaution spinal anaesthesia was administer with 25G Quincke's needle in L_2-L_3 or L_3-L_4 interspace and after obtaining free flow of C.S.F., test drug was given according to patient assigned group. Patient was immediately turned supine and oxygen was given by face mask at 4 litre per minute.

Level of sensory block was recorded by using pin prick method and motor block was assessed by modified bromage scale.

0 - no paralysis
1 - inability to raise extended leg against gravity but able to flex knee.
2 - unable to flex knee but able to flex feet.
3 - unable to flex ankle.

Time of onset of block was recorded as time taken from intrathecal drug administration to loss of pin prick at T_{10} and highest level of block was noted.

Duration of surgical analgesia was defined as the period between intrathecal injection and recovery from block, both sensory and motor. In post op period pain score was assessed by VAS every 30 minute till 4 hours and than hourly for up to the period of 12 hours. When pain score was more than 4 analgesia was supplemented by intramuscular diclofenac sodium in dose of 75mg and time of drug given was recorded.

Side effects like hypotension, bradycardia, nausea, vomiting, sweating, sedation, pruritus, increased salivation, urinary incontinence and nystagmus were recorded and treated accordingly. If the systolic B.P. decreased more than 25% from base line value or less than 90mm of Hg the injection mephentermine 6mg intravenously was given. Bradycardia (H.R. less than 55 per minute) was treated with injection atropine sulphate 0.3 to 0.6 mg intravenously. Nausea and vomiting was treated with injection ondansetron 4mg intravenously.

Results

All the groups were statistically comparable regarding demographic profile (Table I). Surgeries done were appendicectomy, herniorrhaphy, hernioplasty, prostectomy, vaginal hysterectomy, and all lower limb orthopaedic procedure. Mean onset time of sensory as well as motor block was faster in group II as compared to group I (table 2). Level of highest block of all 100 patients in both groups is shown in table 3. All patients were able to complete their surgical procedures in both groups. Table 4 shows the mean duration of analgesia (VAS>4). Patients were pain free for 6.6±0.6724 hours in group II as compare to 3.46±0.3852 hours in group I this difference is found to highly significant. Requirement of rescue analgesia was significantly lower in group II as compare to control group I.

Table I: Demographic profile.

Groups	Group I	Group II
Age	40±16	42±16
Sex	22/28	20/30
Weight	77±13	72±11
Height	174±10	177±11

Table 2: Duration of onset of sensory and motor block (Mean ± SD)

Group	Group I	Group II	P value
Sensory block (min.)	5.64±.5834	3.45±.7223	< .001
Motor block (min.)	6.5±.5744	4.05±.7697	< .001

Table 3: Level of highest sensory block in all 100 patients

	Group I	Group II
T_6	7	8
T_8	17	20
T_{10}	26	22
T_{12}	0	0

Table 4: Mean duration of analgesia

	Group I	Group II
When VAS > 4 Mean ± SD	3.46 ± 0.3852 hr	6.66 ±0.6724 hr

In the present study there was fall in systolic and diastolic blood pressure during the study period from their base line values. Some patients required injection mephentermine also, but on comparison of both groups the decrease in systolic and diastolic blood pressure was found to be insignificant. Pulse rate also varied in different point of time but was statistically insignificant on comparison between two groups (Table 5).

In our study side effects including nausea, vomiting and bradycardia were more in group 2 in comparison to group1. Other side effects like sweating, sedation, pruritus, increased salivation, urinary incontinence and nystagmus was not found in any patient of both groups.(Table 6).

Discussion

Acetylcholine acts on spinal muscuranic receptors in animals and humans and produce anti-nociceptive effect. This anti-nociception can be enhanced by intrathecal administration of cholinergic receptor agonist or cholinesterase inhibitors[2]. Neostigmine being a cholinesterase inhibitor inhibits the metabolism of spinally released acetylcholine and thus enhances analgesia[3,4]. Spinal cord toxicity resulting from subarachnoid neostigmine has been ruled out by Hood et al by assessing cardiorespiratory effects and spinal cord blood flows by using intrathecal neostigmine in sheep[5]. Previous studies had used intrathecal neostigmine in doses ranging 10 to 200µg[6,7,8]. In this study we used 50µg intrathecal neostigmine for maximum analgesic efficacy and also minimising the side effects.

Table 5: Showing haemodynamic variables: Pulse rate, Systolic blood pressure and diastolic blood pressure (mean ± S.D.)

		Preop	5 min	10 min	15 min	20 min	30 min	45 min	60 min	90 min
Pulse Rate	Gp I	85.08± 6.754	86.68± 6.978	87.58± 6.349	87.76± 7.0491	88.42± 5.295	87.94± 5.193	87.22± 4.974	86.86± 4.186	86.38± 4.324
	Gp II	84.54± 7.73	85.42± 8.10	85.06± 8.34	86.16± 8.50	87.54± 7.81	86.10± 7.92	86.38± 8.24	85.52± 8.25	85.96± 7.58
Systolic B.P.	Gp I	135.2± 10.21	126.44± 11.35	119.24± 10.87	117.34± 10.31	122.98± 8.52	125.3± 8.78	126.94± 8.73	128.22± 7.87	129.48± 8.42
	Gp II	135.86± 9.78	128.92± 9.86	122.92± 9.44	121.5± 11.37	120.5± 10.80	125.46± 8.82	126.96± 8.06	127.92± 8.15	129.76± 7.09
Diastolic B.P.	Gp I	84.00± 5.74	82.88± 6.36	82.26± 5.89	81.56± 5.34	81.46± 5.29	81.92± 5.13	81.82± 6.13	82.34± 5.16	83.16± 4.73
	Gp II	82.96± 5.73	82.08± 5.64	81.46± 5.68	80.36± 5.48	80.30± 5.68	81.00± 5.62	81.00± 5.45	81.00± 5.45	81.64± 5.21

Table 6: Side effects (%) in both groups

Side effects	Group I		Group II	
	NO.	%	NO.	%
Bradycardia	3	6	5	10
Nausea	4	8	22	44
Vomiting	2	4	11	22

In our study intrathecal neostigmine enhanced the onset of sensory and motor block, Tan et al and Liu et al had also found the enhancement of onset of sensory block by intrathecal neostigmine[9,10]. Saini S et al and Shobhana gupta did not observe any enhancement of onset of sensory block which may be due to non standardization of position of patient during spinal block[11,12]. However, results demonstrated similar level of sensory block achieved in two groups suggesting that the spread of subarachnoid bupivacaine was not affected in the two groups.

Intrathecal neostigmine in a dose of 50µg is required for effective post-operative analgesia. Saini et al observed greatly enhanced analgesia by 150µg intrathecal neostigmine as compared to 50µg intrathecal neostigmine. But higher doses of intrathecal neostigmine were associated with higher incidence of nausea, vomiting, sweating and increased salivation[11]. Hood et al and Tan et al observed a threshold dose for analgesia to be approximately 50µg[1,9]. Chung et al and Lauretti et al also observed statistically significantly lower VAS score in the doses ranging from 25-75µg neostigmine group compared to saline group[13,14]. In our study mean duration of analgesia in intrathecal neostigmine was 6.66 hours as compared to 3.46 hours in control group which is highly significant.

Intrathecal neostigmine produces nausea and vomiting in dose dependent manner, due to cephalad migration of neostigmine to brain stem, accumulation of acetylcholine at chemoreceptor trigger zone induces vomiting. Klent et al reported nausea started with in 30 minutes and lasted for more than one hour in patients despite of premedication with metoclopramide or droperidol[15]. Hood et al reported inability to control nausea and vomiting despite of use of droperidol, metoclopropamide or ondensetron[1]. Saini et al and Shobhana gupta found that patients responded to injection metoclopramide (10mg) or injection ondansetron (4-8mg). In our study 44% of patients had nausea and 22% had vomiting which was effectively controlled by injection ondansetron (4mg) and injection dexamethasone (8mg) simultaneously.

Bradycardia was more frequent in intrathecal neostigmine (10%) as compared to control group(6%) which was effectively treated with injection atropine(0.3-0.6mg).

Intrathecal neostigmine directly stimulates preganglionic sympathetic neurons in spinal cord and can counteract the hypotension induced by intrathecal injection of local anaesthetics. In this study there was no significant difference in incidence of hypotension in both groups.

Intrathecal neostigmine has been shown to have a discernible stimulatory respiratory effect. There was no episode of respiratory depression in any of patient of both groups.Pruritus, increased sweating, urinary incontinence and sedation was not found in any of the patient of this study.

To conclude, intrathecal neostigmine in the dose of 50 µg provide post-operative analgesia for a period of 6-8 hours with lesser incidence of side effects of nausea and vomiting. Efforts must therefore we made to reduce the undesirable adverse side effects like nausea and vomiting by using injection ondansetron and injection dexamethasone as premedication.

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Attitude, Perception and Demand for Research Among Medical Undergraduates in a Teaching Medical Institution in South India

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Abstract

Medical undergraduates in India have no formal pathway to become scientist-researcher. Present study was aimed to reveal attitude, perception and demand for research as well as constraints during conduct of research as perceived by medical undergraduates. A cross-sectional study was conducted among medical undergraduates during March-May 2010. Data were collected by both qualitative (FGD-pile sort exercise) and quantitative methods (self-administered questionnaire) and analysed using Epi_Info, SPSS and Anthropac software. Out of 221 undergraduates, 77.4% felt research is advantageous for their future career. 75.6% viewed teaching of research should be made mandatory in undergraduate curriculum. 71.9% wanted to become doctor in clinical subjects only. 65.2% felt institutional support for undergraduate research was not sufficient in Indian scenario. Gender, duration of professional course and financial status of students did not influence research attitude of undergraduates. Poor awareness and motivation, lack of institutional support, time limitation, poor recognition and less monetary benefit from research practice are major constraints. Positive attitude and demand for research does exist among medical undergraduates, which should be nourished in consultation with medical education regulatory bodies and research funding institutions.

Key Words

Medical undergraduates, pile sort exercise, research

Introduction

Indian education system is based upon British colonial legacy: educational levels, curriculum frameworks, physical structure of colleges and classrooms, and timing of examinations[1]. Although opportunities to participate in research, such as the short-term scholarships supported by Indian Council of Medical Research (ICMR) and Kishore Vaigyanik Protsahan Yojana (KVPY) have boosted the research projects undertaken by medical undergraduates, students in India have otherwise no formal pathway to become physician-scientists or academicians[2]. The Indian published research output has increased by 12.8% in the last decade, far lower in comparison to 86% growth witnessed in neighboring country China[3].

Advances in bio-medical research have highlighted the necessity of attracting greater numbers of physicians to careers that include a research component. Physicians' participation in research is essential to increase the number of clinical and research studies performed[4]. The Medical Council of India also mentions 'developing scientific temper' among medical students; and 'noted a disconnect between the focus in the syllabus by way of teaching/examinations and the actual morbidity pattern observed at the ambulatory level'[5].

Review of literature suggests that Indian medical students have a keen research interest and are ready to be nurtured[6]. However, limitations, concerns and weaknesses in this regard are many which need to be explored. This study thus was planned to reveal attitude, perception and demand for research as well as constraints during conduct of research as perceived by medical undergraduates.

Material and Methods

Study setting: The study was conducted in Pondicherry Institute of Medical Sciences, Puducherry from March to May, 2010. Medical students of second, third and fourth year MBBS who volunteered for participation in the study were included as study subjects. First MBBS students were purposefully excluded as they are usually not exposed to research activities under current medical curriculum. The study was designed to promote research agenda among medical undergraduates and was approved by institutional ethical committee.

Study design: The present cross-sectional study comprised of qualitative method[7] [focus group discussions (FGDs) and pile sort exercise[8]] to obtain information from students regarding their attitude and perception towards research and to guide quantitative data collection. This was followed by administration of self-administered questionnaire for quantitative data collection.

Qualitative data collection: Initially 3 FGDs using semi-structured guidelines to explore attitude and perceptions of medical undergraduates towards research, each with purposefully selected 7-8 students who were interested to participate and ready to talk freely (comprising of both boys and girls) from second, third and final MBBS were conducted and facilitated by a faculty from Community

Medicine. Students were asked to enlist all practical constraints offering resistance to medical undergraduates towards research. Later,[8] practical constraints with relatively high Smith's S value holding undergraduates back from research were pile sorted. The analysis of free list and pile sort data was undertaken using Anthropac 4.98.1/X software[9].

Quantitative data collection: An anonymous self-administered questionnaire developed on the basis of FGDs was used to collect quantitative information which included medical undergraduates' background information, their attitude and perception towards research. To achieve better response, purpose of the study and process of the information collection including the questionnaire were explained prior to each session of information collection during lecture hours. The questionnaires were collected back after 20 minutes of distribution and confidentiality of their responses was assured.

Data analysis: The quantitative data were analysed using Epi_Info software package (Center for Disease Control and Prevention, Atlanta, Georgia, USA) version 6.04 and Statistical Package for the Social Sciences for Windows (SPSS Inc., Chicago, Illinois, USA) version 16.0. To know the likelihood of taking up research as future career, Odds ratios with 95% Confidence Intervals were calculated. To compare data sets, chi-square test was used and $P < 0.05$ was considered statistically significant.

Results

Study population

221 (87.35%) undergraduates responded, out of total 253 who were currently studying in second, third and fourth year MBBS and available during their lecture sessions (total intake of the institute being 100 every year). The mean age of respondents was 20.15±1.09 years and proportion of males and females was nearly equal (47.5% and 52.5% respectively). Among them 90 (40.7%) were from second MBBS, while 72 (32.6%) and 59 (26.7%) respectively were from third and fourth year MBBS. The mean per capita monthly family income of respondents was 38,289 ± 4,732.10 rupees.

Attitude and perception regarding research

While 171 (77.4%) respondents thought research is advantageous for their future career; 159 (71.9%) undergraduates wanted to become doctors in clinical subjects only followed by 24 (10.9%) who wanted to become medical teacher cum researcher in future. However, 33 (14.9%) students were yet to decide their future field of specialization. 187 (84.6%) undergraduates were interested to work in clinical field and almost negligible proportion in para-clinical and none of them were interested to opt for basic sciences in future. 136 (61.5%) undergraduates felt that their parents would agree if they opt for a research oriented career. 92 (41.6%) students stated that they have either conducted or been part of a research project in past (especially projects conducted for ICMR STS or projects conducted during Reorientation of Medical Education, ROME posting).

Undergraduates opined more than one constraint against opting for research oriented career such as lack of recognition (50.2%), lack of institutional support (43%), less monetary benefit (28.1%) and wastage of time (15.4%). While 167 (75.6%) undergraduates expressed that teaching/training of research methods/ research should be made mandatory in medical colleges and undergraduate curriculum; 144 (65.2%) opined that institutional support for undergraduate research is insufficient in India.

Predictors for research attitude

When calculated for predictors of research attitude among medical undergraduates, it was observed that female students were likely to have conducted research in similar frequency in past as male students (OR: 0.95, 95% CI: 0.54-1.68) and were likely to have equal level of aspiration towards research oriented career in future (OR: 1.04, 95% CI: 0.44-2.42). When year of professional course was considered, third and fourth year students were more likely to be part of any research activity in past (OR: 0.60, 95% CI: 0.33-1.09) and more likely to have aspiration for research oriented career in future (OR: 0.62, 95% CI: 0.25-1.52) compared to second year students. However, this was statistically not significant. While students belonging to per capita monthly family income of more than 25000 rupees were likely to have had ever conducted any research in past, they were less aspired for research oriented career in future (OR: 1.46, 95% CI: 0.59-3.68) as compared to students with per capita monthly family income of less than 25000 rupees. However, none of

Table 1: Background information of medical undergraduates (N = 221)

Characteristics	N (%)
Age in years	
18	7 (3.2)
19	61 (27.6)
20	74 (33.5)
21	56 (25.3)
22 and above	23 (10.4)
Sex	105 (47.5)
Male	116 (52.5)
Female	
Year of professional course (MBBS)	90 (40.7)
Second	72 (32.6)
Third	59 (26.7)
Fourth	
Per capita family income/month (N=185)	
Upto 5000	29 (15.7)
5001-15000	39 (21.1)
15001-25000	34 (18.4)
25001-50000	59 (31.8)
50001 and above	24 (13.0)

Table 2: Attitude and perception regarding research (N = 221)

Characteristics	N (%)	Chi square (p value)
Attitude towards research		
Is research advantageous for future career?		< 0.001
Yes	171 (77.4)	
No	14 (6.3)	
Can't say	36 (16.3)	
Future field of specialization		< 0.001
Doctor in clinical subjects only	159 (71.9)	
Medical teacher cum researcher	24 (10.9)	
Pure researcher	5 (2.3)	
Undecided	33 (14.9)	
Future area of interest		< 0.001
Clinical	187 (84.6)	
Para-clinical	6 (2.7)	
Basic science	0 (0.0)	
Undecided	28 (12.7)	
Would parents agree if opted for research?		< 0.001
Yes	136 (61.5)	
No	21 (9.5)	
Don't know	64 (29.0)	
Ever conducted or been part of research		0.014
Yes	92 (41.6)	
No	129 (58.4)	
Perception regarding research		
Constraints in opting for research oriented career*		
Lack of recognition	111 (50.2)	< 0.001
Less monetary benefit	62 (28.1)	
Wastage of time	34 (15.4)	
Lack of institutional support	95 (43.0)	
Others	49 (22.2)	
Should teaching/training of research be made mandatory in medical colleges?		< 0.001
Yes	167 (75.6)	
No	24 (10.9)	
Undecided	30 (13.6)	
Is institutional support for undergraduate research sufficient in India?		< 0.001
Yes	23 (10.4)	
No	144 (65.2)	
Can't say	54 (24.4)	

* Multiple responses

these predictors were significant, indicating a consensus among students regarding research without influence of gender, duration of professional course and financial status.

Pile sort analysis

According to medical undergraduates various constraints which prevent them towards opting for research were (with descending Smith's S value): 1) poor awareness among undergraduates; 2) poor motivation; 3) lack of institutional support, 4) exhaustive and stressful research activity; 5) poor recognition; 6) less monetary benefit; 7) wastage of time, and 8) parent's dislike.

In pile sort exercise, four major groups of constraints towards undergraduate research were formed. The first major group comprised of traditional factors like poor awareness and poor motivation regarding research among medical undergraduates. The second group of constraints was related to failure of current medical curriculum and institutional framework like lack of institutional support, less monetary benefit, poor recognition and wastage of time; as perceived by medical undergraduates. Rest of the two groups was related to parent's unwillingness and exhaustive process of research as felt by students. (Figure 1)

Discussion

Research provides the opportunity to learn through enquiry rather than simple transmission of knowledge. One may argue against research at undergraduate level by pointing at the overburdened medical curriculum. However, those willing to learn, who want to advance in future and looking beyond routine patient care; research certainly widens their career opportunities[10]. Notably, current study showed no significant socio-economic or gender discrimination as far as predictors for whether undergraduates participated in any research in past or their aspiration to be engaged in research in future similar to findings by Harsha et al[11], but against male predominance in research reported by Guelich et al[12].

Attraction towards clinical practice on one hand, together

Table 3: Predictors of research attitude among medical undergraduates

Predictors	Ever conducted/been part of research			Aspiring for research oriented career		
	N (%)	OR (95% CI)	p value	N (%)	OR (95% CI)	p value
Sex						
Male	43 (40.95)	0.95 (0.54-1.68)	0.846	14 (13.33)	1.04 (0.44-2.42)	0.929
Female	49 (42.24)	-		15 (12.93)	-	
Year of professional course						
Second	31 (34.44)	0.60 (0.33-1.09)	0.073	9 (10)	0.62 (0.25-1.52)	0.255
Third and Fourth	61 (46.57)	-		20 (15.27)	-	
Per capita family income/month INR						
Upto 25000	38 (37.26)	0.86 (0.45-1.62)	0.607	17 (16.67)	1.46 (0.59-3.68)	0.376
More than 25000	34 (40.96)	-		10 (12.05)	-	

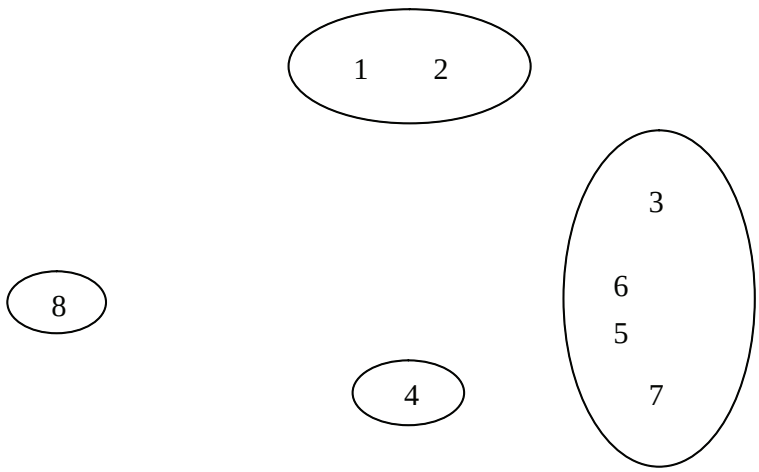
OR = Odds ratio, CI = Confidence interval

with poor awareness and motivation for research, in a set-up where there is poor institutional and monetary support; medical undergraduates are bound to neglect research. However, research is much more important in medical profession which helps in the improvement of the health standards as well as health care delivery to promote health of the people. The scenario is rapidly evolving as we enter the 12th five year plan period with the restructuring of the health care system, implementation of the NRHM, the proposed NUHM and a large number of new medical colleges spread across the country. Meanwhile, health research expenditure is also expected to rise to 2% of the total health expenditure in India by 2010[13].

Factors like lack of incentives and mentoring coupled with privileged selection process in medical education does exist, necessitating that students require strong motivation for being involved in research. However, disparity between state-run and private medical colleges with respect to funding, autonomy, and collaborations in basic research does affect the involvement of medical students[14]. Equally, though students are required to devote additional time towards research apart from their clinical rotations, they do not receive extra credits. To encourage research, students can be given credit for research activity in medical colleges beginning at the institutional level in the form of internal assessment[15] as well as some seed money to pursue such research activity.

Earlier studies showed that training in research methodology received early in medical school helps students to develop a positive attitude towards research 16 and influences scientific output in the form of scientific publications[17]. In present study also medical undergraduates did show a positive attitude towards

Figure 1: Constraints towards research as perceived by medical undergraduates: Non-metric multi-dimensional scaling and hierarchical cluster analysis



1-Poor awareness
2-Poor motivation
3-Lack of institutional support
6-Less monetary benefit
5-Poor recognition
7-Wastage of time
8-Parent's dislike
4-Exhaustive and stressful

research and demanded inclusion of research component in medical syllabus. However, the current medical educational system does not foster a research culture. The glamour of curative care often works as the career guiding principle of medical students[18]. Departments of many affiliated colleges have minor and major research projects sponsored by various agencies like UGC, CSIR, and ICMR etc. But the fact that almost 300 medical colleges in the country are not contributing of their best to health research is highlighted by the fact that in 2007, 96% of the research publications in India emanated from selected 9 medical colleges[18]. With the increasing tendency at the higher education level to lay stress on training the students for research, it is imperative that the teachers at this level take up the challenge of providing quality guidance to the students to learn all the basics of research.

Conclusion

Positive attitude and demand for research does exist among medical undergraduates, which should be nourished in consultation with medical education regulatory bodies and research funding institutions.

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A Prosthetic Appliance for Treatment of Sleep Apnea Syndrome - A case report

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Abstract

Obstructive sleep apnea, a sleep disorder, is becoming more prevalent and requires prompt and effective treatment by the dental and medical specialties. Pharyngeal airway narrowing is a commonly described characteristic in obstructive sleep apnoea syndrome (OSAS) patients. Conservative treatment modalities (ie, intraoral devices that prevent or minimize airway obstruction by the tongue) are recommended for treating mild to moderate forms of OSA. This case report demonstrates the use of a simple intraoral device designed on the Erkodent system, in the management of OSA.

Key Words

OSA, Intraoral device, Erkodent system, Snore Guard.

Introduction

Sleep apneas are classified into three types; obstructive, central, and mixed. Obstructive apneas are the most common type, and result from the collapse or obstruction of the oropharyngeal region of the upper airway. Central apneas are characterized by the simultaneous cessation of both airflow and respiratory effort. During mixed apnea, a central respiratory pause is followed by obstructed ventilatory efforts. Sleep apnea syndrome is a relatively common and potentially life-threatening disorder, estimated to affect more than 3% of men 40 to 60 years of age. The syndrome is closely associated with cerebral infarction, angina pectoris, and hypertension[1].

There are several therapies for the treatment of the syndrome, which include conservative and surgical methods. The conservative methods include weight loss, changes in sleep posture, drug therapy, nasal continous positive airway pressure (CPAP), and a variety of intraoral devices. Of these, the treatment that uses an intraoral device, which positions the mandible anteriorly, is noninvasive and can be easily applied by a dentist. It was reported that the apnea index or number of apneic episodes per hour decreased significantly after insertion of such a prosthetic appliance[2].

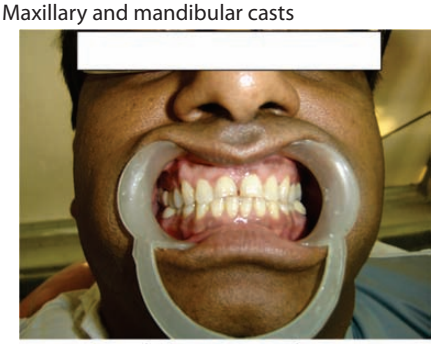
Case Report

A 44 year old male patient reported to the dental clinic with the chief complaint of heavy snoring and disturbed sleep. General physical examination revealed the patient weighing 90kgs with a height of 5 feet 7 inches. There was no significant medical history as revealed by the patient.

Technique

1. Maxillary and mandibular impressions were made and poured in stone (Fig 1). The casts were surveyed to record the height of contour (Fig 2). Face-bow transfer was done and the casts were mounted on a semi-adjustable articulator (Fig 3).
2. The mandibular cast was advanced approximately 5mm on the articulator, but not beyond an end-to-end relationship of the dentition. The vertical dimension of occlusion was increased approximately 6 to 8mm between the anterior teeth3.
3. Modeling wax was adapted to both casts to the height of contour, and a keyway was incorporated in the mandibular occlusal surface to maintain the protrusive position.
   A space of about 3mm was maintained between the wax rims, covering the anterior to serve as an airway.
4. The appliance was then fabricated using the Erkodent system (Fig 4 & 5).

Figure 1: Maxillary and mandibular casts



Preoperative view

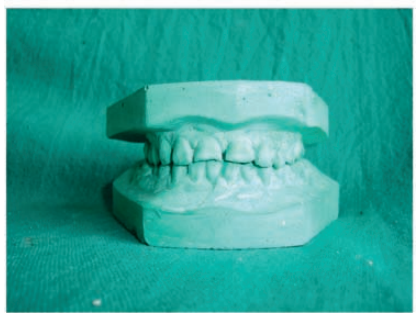


Figure 2: Cast surveyed

Figure 3: Maxillary and mandibular casts articulated

The patient was instructed not to use tooth-paste to clean the appliance (it contains abrasive particles), mouth-wash (can cause discolouring) and water that is hotter than 50 °C(deformation).

The patient was instructed the following after using the appliance:

(i) To wash with water.
(ii) To thoroughly clean the inner and exterior side of the splint with a tooth brush and soap.
(iii) Shake off the water or dry with a towel. Never to blow-dry.
(iv) Allow the splint to completely dry. Keep the appliance in a dry place.
(v) Wash with water again before using it.

On recall, the necessary adjustments were made in the appliance, with the patient reporting satisfaction as regards, decrease in snoring and a sound sleep.

Discussion

Obstructive sleep apnea (OSA) is now recognized as a common clinical disorder with potentially life threatening consequences. OSA is more common in men, and it can be strongly suspected if patient is a middle-aged, overweight, complains of excessive daytime sleepiness, and has a history of heavy snoring that is punctuated by periodic cessation of breathing. While snoring is caused by a narrow airway, sleep apnea is a true breathing obstruction. Other symptoms are early morning headaches which may be due to nocturnal CO2 retention, impaired concentration, depression, anxiety, hypertension, and impotence.

Figure 4: The appliance using Erkodent with connectors on either side.

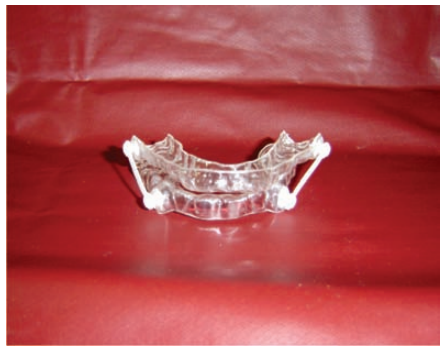
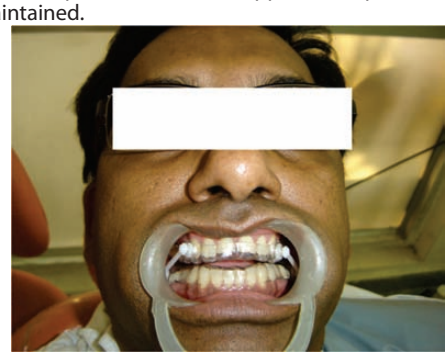


Figure 5: Post operative view- The appliance in place with anterior space maintained.



Obstruction during aponeic periods may occur at single or at multiple sites in the pharyngeal airway. Laryngoscopic studies have revealed that airway obstruction usually occurs at the level of the nasopharynx . Computerized tomography (CT) studies have demonstrated upper airway narrowing at the oropharyngeal and nasopharyngeal levels in awake OSA patients. Cephalometric studies of the upper airway in OSA patients have shown a reduction in the two-dimensional posterior pharyngeal airway space. Fundamental to the pathogenesis of this upper pharyngeal airway narrowing is an interaction between physiological and anatomical changes in this region. Several causes for OSA have been suggested. Obesity is a readily recognized phenomenon in OSA patients. Presence of oedema in the upper respiratory tract has also been suggested in the aetiology of OSAS. Others have suggested anatomical abnormalities of the upper airway, including tonsillar hyperplasia, macroglossia and soft-palate enlargement. Furthermore, the relaxation of upper airway musculature has been studied in relation to OSAS. It was found that when specific oropharyngeal muscles were stimulated during sleep in OSAS patients, airflow could be increased or decreased. Narrowing of the pharyngeal airway as a result of alterations in craniofacial morphology has also been suggested in the aetiology of OSAS4.

If the patient has a retrognathic mandible, the prosthetic device increases the airway by positioning the mandible in

a more anterior position, thereby increasing the intraoral space for the tongue and minimizing the potential for airway obstruction.

Some of the surgical procedures performed are tracheostomy, uvulopalatopharyngoplasty (UPPP), septoplasty and TAP (Thermal Ablation Palatoplasty). Orthognathic surgery procedures, which advance the maxilla or the mandible and the hyoid bone are considered for individuals with skeletal deficiencies.

There is an established role for mandibular advancement devices in the management of both uncomplicated snoring and mild to moderate OSAS5. There are several designs of snore guards to aid in suppressing snoring, from a simple diagnostic bite plate to a fixed or adjustable double jaw device which repositions the lower jaw and/ or tongue forward and downward.

In this case the appliance comprised of two transparent splints, one each for the upper and the lower jaw. The lower jaw is held in a predetermined position by two connectors that are fixed laterally to the splint causing the pharyngeal space to open up.

Snore guards as it is commonly called makes sure, that night is quiet and sleep is refreshing.

Advantages

- The snore guard widens the respiratory tract by anteriorization (moving forward) of the lower jaw. The velocity of the inspired air decreases.
- Noise-generating vibrations of soft tissue (snoring) is decreased or prevented completely by the snore guard.
- Snore guard is a custom-made device for the patient.
- The snore guard is a comfortable device due to its filigree design.
- Movement of the lower jaw still is possible with the snore guard.
- The snore guard does not inhibit breathing through the mouth.
- With the snore guard no further (apparatus-) noise emerges (as with other devices).
- With the snore guard there is no need for surgery.

Summary & Conclusions

OSA is becoming a widespread disorder that requires multidisciplinary intervention by the medical and dental community. Conservative treatment modalities, such as oral prostheses, should be used before irreversible surgical procedures, especially for mild to moderate OSA6. The appliance can be used for the treatment of sleep apnea syndrome, the large majority of cases of which are of the obstructive or mixed type. This article describes a practical, simplified technique for fabricating an OSA prosthesis. The goal of this prosthesis was to posture the mandible and tongue in an anterior position and prevent the tongue from obstructing the airway.

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Body Composition as Related to Age and Gender in Pre-adolescents (9-12 years)

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Abstract

Background

The present study was initiated with the main objective to assess the changes of body composition as related to age, gender and nutritional status during pre-adolescence (9-12 years).

Methods

The study was conducted on 450 pre-adolescents of 9-12 years.

Results

Height, weight, BMI and skin-fold thickness increased with an increase in age indicating growth and developments but no significant difference was seen in height and weight between gender during pre-adolescence. Skin-fold thickness was higher in girls than boys indicating higher fat content in girls. Nutritional status of subjects indicated that the majority of the subjects were nearer to NCHS standards indicating normal linear growth. According to BMI and weight for age classification, majority of the subjects were graded under severe chronic energy deficiency, normal and mild malnutrition group respectively. Age and gender related differences in body composition indicated that body stat 1500 analyser (BSA) fat mass (% and kg) decreased with an increase in age whereas it was decreased when derived from skin-fold thickness (SFT) in both the genders. BSA and SFT fat free mass (% and kg) increased with an increase in age significantly in boys and girls. Mean fat free mass (% and kg) and water (% and kg) were significantly higher in boys than girls. The mean fat (% and kg) was significantly higher in girls than boys. Body composition as related to weight indicated that the lean body mass was significantly higher in the subjects who had maximum weight than the subjects with minimum weight. BSA fat mass and fat free mass were significantly differed from SFT fat mass and SFT fat free mass indicating BSA was not suitable to assess body composition during pre-adolescence (9-12 years).

Conclusions

Significant age related and gender related differences in body composition exist in the pre-adolescent period.

Introduction

Growth produced changes in total body fat (TBF), percent body fat (%BF) and the fat free mass (FFM) during childhood affect adult body composition and fat distribution, all of which in turn, affect risk for cardiovascular and related diseases1. Hence an attempt to study the pattern of age and sex retained differences in total body fat (TBF), percent body fat (%BF) and fat free mass (FFM) during pre-adolescence (9-12 years) years was taken up. Workers who studied2,3 a group of pre-adolescents, found that the weight had increased significantly except for males at 12 years and females at 13 and 14 years. Musaiger et al4 found that there was a significant increase in all the anthropometric measurements. In an another study it was reported that boys presented a positive relation between age of pubertal onset and body mass index ($p<0.01$) which was not observed in girls5. Misra et al6 studied the nutritional profile and its association with anthropometry.

Methodology

The study was conducted on pre-adolescents of 9-12 years defined by date of birth and divided into 3 groups ie. 9-10 years, 10-11 years and 11-12 years. A total of 150 subjects from each group were studied and the subjects were drawn from government and private schools of Hyderabad, India. Consent from the school principals, and the subjects taken and explained of the outcome before the start up of the study. To assess the nutritional status of pre-adolescents anthropometric measurements, sum of four skin-folds was used to assess body composition of subjects following the formula given by Durrnin et al7. Body composition assessment was done using scientifically validated principle of bio-electrical impudence analysis using the body stat 1500 body composition monitoring unit. Fasting plasma glucose levels were estimated using standard method for the subjects who have high BMI.

Data analysis was done using mean and standard deviation, analysis of variance, correlation coefficient, z-test and paired t-test.

Results

The mean anthropometry measurements of boys (table 1) increased with increase in age, but a significant difference ($p<0.05$) was seen in the mean weight and BMI in the age groups of 10-11 years and 11-12 years. The mean triceps, sub-scapular, supra-iliac and sum of four skin-fold were found to be significant ($p<0.01$) in the age group of 9-10 years and 10-11 years and for mean biceps in 10-11 years and 11-12 years boys.

Majority of boys in the three age groups were suffering from severe chronic energy deficiency (Table 2a). About 1.3%, 5.3%, and 4% in the age group of 9-10, 10-11 and 11-12 years respectively were normal. Over weight was observed in 1.3% and 6.7% in boys in age group of 10-11 and 11-12 whereas 13.3%, 4.0%, 13.3 % and 8.0%, 6.6%, 22.6% found to be suffering from mild and moderate chronic energy deficiency.

Figures in parenthesis indicate percentage values

The boys based on weight for age classified into different somatic status are presented in table 2b, and indicated that 1.3% of boys were suffering from severe malnutrition while 56% (9-10yrs), 41.3% (10-11yrs) and 29.3% (11-12yrs) were suffering from mild malnutrition and 6.7% (9-10yrs), 22.7% (10-11yrs) and 17.0% (11-12yrs) were suffering from moderate malnutrition.

Figures in parenthesis indicate percentage values

About 4.4% girls (Table 3a) in the age groups of 10-11 years and 11-12 years were found to be in grade I and grade II chronic energy deficiency respectively. Over weight was observed in 1.3% and 4% of girls in the age groups of 10-11 and 11-12 years.

Figures in parenthesis indicates percentage values

Table 2c depicts that majority of boys were observed with normal linear growth in all the age groups (97.4-100%). Only 2.6% of boys were short in the age groups of 9-10 and 11-12 years.

Figures in parenthesis indicate percentage values

Severe chronic energy deficiency was seen in 69.4%, and over-weight and normal children were 1.8% and 2.7% respectively. The children in grade I chronic energy deficiency (11.5%), grade II chronic energy deficiency (7.5%) and low normal (7.1%) were observed. It is evident that according to weight for age (table 3b) classification 37.6% were suffering from mild malnutrition, 25.8% from moderate malnutrition, 2.3% of girls were suffering from severe malnutrition and 34.3% girls were normal.

Figures in parenthesis indicates percentage values

Table 3c reveals that majority were observed with normal linear growth in all the age groups (81-96%) when

Table 1: Mean anthropometric measurements (mean±SD) of pre-adolescents (9-12 years)

Variables	Age (years)											
	9-10 years			10-11 years			11-12 years			Total		
	Boys	Girls	Z-value	Boys	Girls	Z-value	Boys	Girls	Z-value	Boys	Girls	Z-value
Height (cm)	132.0± 6.0	131.6± 6.2	NS	138.0± 6.1	136.4± 8.5	NS	144.0± 7.7 NS	145.7± 9.0	NS	138.6±6.6	137.9±7.2	NS
Weight (kg)	29.2±7.4	25.0±3.5	2.04*	30.6±7.8	29.0±6.5	NS	34.3±8.8	35.4±7.9	NS	31.4±8.0	29.8±7.1	NS
BMI (kg/m^2)	15.0±1.8	14.0±1.3	2.60*	15.8±2.8	17.1±3.7	NS	16.2±2.9	16.7±3.6	NS	15.7±2.4	16.0±2.8	NS
Biceps (mm)	9.1±3.8	10.0±4.0	NS	10.9±5.6	16.0±8.2	1.91	12.3±6.3	13.4±5.7	NS	10.8±5.4	13.2±5.0	2.40*
Triceps (mm)	4.2±2.3	4.3±2.0	NS	6.4±3.1	6.3±2.4	NS	6.0±2.9	6.2±2.3	NS	5.2±2.7	5.6±3.5	NS
Subscapular (mm)	5.3±2.1	5.9±1.5	NS	7.1±3.2	7.8±3.7	NS	7.8±3.1	9.5±3.8	2.90**	6.7±3.0	7.7±3.5	3.10**
Suprailiac (mm)	11.3±5.8	13.6±4.8	2.50**	17.1±10.1	18.4±9.3	NS	18.2±10.9	22.5±11.0	2.30*	15.5±9.7	18.1±9.5	2.80**
Sum of four skinfold (mm)	30.2±11.4	33.9±12.4	3.70*	40.6±22.0	48.7±37.8	8.10**	44.5±23.9	51.7±40.1	17.20**	38.4±21.3	44.8±29.6	6.40**

NS- non significant
*- significant at 1% level
**- significant at 5% level

Table 2a: Somatic status of boys 9-12 years based on BMI

Classification	Age (years)			
	9-10	10-11	11-12	Total
Overweight (>25 kg)	-	1 (1.3)	5 (6.7)	6(2.6)
Normal (21-25 kg)	1(1.3)	4 (5.3)	3 (4.0)	8(3.5)
Low normal (18.5-25 kg)	3 (4)	10 (13.3)	8 (10.7)	21(9.4)
Grade I				
Mild chronic energy deficiency (16.0-18.5 Kg)	10 (13.3)	3 (4)	10 (13.3)	23(10.3)
Grade II				
Moderate chronic energy deficiency (14.0-16 kg)	6 (8)	5 (6.6)	17 (22.6)	28(12.3)
Grade III				
Severe chronic energy deficiency (<14 kg)	55 (73.4)	52 (69.5)	32 (42.7)	139(61.7)

Table 2b: Somatic status of boys 9-12 years according to weight for age

Classification	Age (years)			
	9-10	10-11	11-12	Total
Normal (>90%)	27 (36)	27 (36)	36 (48.0)	90(40)
Grade I				
Mild malnutrition (75.0-89 %)	42 (56)	31 (41.3)	22 (29.3)	95(42.3)
Grade II				
Moderate malnutrition (60-74%)	5 (6.7)	17 (22.7)	17 (22.7)	37(16.5)
Grade III				
Severe malnutrition (<60 %)	1 (1.3)	-	-	1(0.4)

Table 2c: Somatic status of boys (9-12 years) according to height for age.

Classification	Age (years) (total-225)			
	9-10	10-11	11-12	total
Giant (>105%)	-	-	-	-
Normal (93-105%)	73 (97.4)	75 (100)	73(97.4)	221(98.3)
Short (80-93%)	2(2.6)	-	-	4 (1.7)
Dwarf (<80%)	-	-	-	-

classified according to height for age. 2.6 % in 9-10years, 18.6% in 10-11years and 4% in 11-12 years were short. Only 1.4% of girls were found to be dwarf in the age group of 9-10 years old. A total of 91.2% were normal.

Figures in parenthesis indicate percentage values

It is indicated in table 4 that an average total body fat and percent body fat decreased with increase in age in boys and girls. The average decrease in total body fat for girls was 13.2 kg at 9-10 years and 11.4 kg at 11-12 years. The corresponding decrease in weight in boys was from 10.2 kg at 9-10 years and 9.1 kg at 11-12 years. Similarly the average percent body fat decreased from 52.4 to 36.5 % in girls and 41.9 to 26.4 % in boys. The overall increase in fat free mass from 9-12 years was found both in boys and girls. The average amount of fat free mass increased about 14.4 kg in boys and 7.6 kg in girls.

The relationship between mean glucose levels and high Body mass index of overweight subjects was assessed and presented in table 5.

The mean plasma glucose levels for over weight (BMI>25)

Table 3a: Somatic status of girls 9-12 years based on BMI

Classification	Age (years)			
	9-10	10-11	11-12	Total
Overweight (>25 kg)	-	1 (1.3)	3 (4)	4(1.8)
Normal (21-25 kg)	-	3 (4)	3 (4)	6(2.7)
Low normal (18.5-25 kg)	2 (2.6)	1 (1.3)	13 (17.3)	16(7.1)
Grade I				
Mild chronic energy deficiency (16.0-18.5 Kg)	2 (2.8)	10 (13.4)	14 (18.6)	26(11.5)
Grade II				
Moderate chronic energy deficiency (14.0-16 kg)	3(4)	7 (9.4)	7 (9.4)	17 (7.5)
Grade III				
Severe chronic energy deficiency (<14 kg)	68 (90.6)	53 (70.6)	35 (46.7)	154(69.4)

Table 3b: Somatic status of girls 9-12 years according to weight for age

Classification	Age (years)			
	9-10	10-11	11-12	Total
Normal (>90%)	**14 (18.6)**	**24 (32)**	**39 (52.0)**	**77(34.3)**
Grade I				
Mild malnutrition (75.0-89 %)	**44 (58.6)**	**19 (25.3)**	**22 (29.4)**	**85 (37.6)**
Grade II				
Moderate malnutrition (60-74%)	**17 (22.8)**	**29 (38.7)**	**12 (16)**	**58 (25.8)**
Grade III				
Severe malnutrition (<60 %)	**-**	**3(4)**	**2(2.6)**	**5 (2.3)**

Table 3c: Somatic status of girls (9-12 years) according to height for age.

Classification	Age (years) (total-225)			
	9-10	10-11	11-12	total
Giant (>105%)	-	-	-	-
Normal (93-105%)	72 (96.0)	61 (81.4)	72(96.0)	205(91.2)
Short (80-93%)	2(2.6)	14 (18.6)	3 (4)	19 (8.5)
Dwarf (<80%)	1 (1.4)	-	-	1(0.5)

subjects was found to be within normal range. The mean glucose levels were slightly higher in boys than girls.

Correlation between body composition variables by using a body stat 1500 analyser was presented in table 6. BMI and skin fold thickness strongly correlated with body weight (0.01%) ($r \geq 0.208$) was observed between fat mass (%) and water (% and l) and body weight. There was a positive correlation between weight and fat free mass and negative correlation between fat mass and lean mass.

The mean and standard deviation of the lean body mass of all the subjects into two categories were calculated separately and presented in table 7.

It was found that the mean lean body mass (%) was significantly higher in the subjects who have maximum weight than minimum weight and a significant difference was observed in both boys and girls.

From table 8 it is evident that BSA fat mass (% and kg) decreased with increase in age (41.9 to 26.4, boys and 52.4 to 36.5, girls) where as SFT fat (% and kg) increased with an increase in age from 9-12 years (17.6 to 22.7, boys and 21.5 to 29.4, girls). BSA fat mass (%) was significantly higher ($P<0.01$) than SFT fat (%) except at the age of 11-12 years in boys whereas significant difference ($P<0.05$) was observed between BSA fat (kg) and SFT (kg) except at the age of 9-10 years in girls.

Discussion

The study examined the pattern of age and gender related changes in body fat (% and kg), fat free mass (% and kg), and water (% and l) during pre-adolescence (9-12 years). This study also assessed the physical growth, nutritional status, glucose levels of over-weight subjects and influence of various factors on body composition of pre-adolescents (9-12 years).

All the variables of anthropometry studied, increased with an increase in age significantly ($P<0.05$). The mean height of boys in the present study is 134.0 cm (9-10 years), 138.0 cm (10-11) years and 144.0 cm (11-12) years. These values are found to be similar to the reported values in studies of other workers 8,2,9 where as Venkaiah10 found lower values and Moreno et al11 observed higher values than the present study, respectively which may be due to ethnic differences. The mean weight for age in boys studied was 86-93% of NCHS standards indicating better intake of energy and protein. The mean height of girls was 131.6, 136.0 and 145.7 cm in the age groups of 9-10, 10-11 and 11-12 years old respectively. The height of Indian girls was seen to be lower than the figures in the present study and attributed it to poor nutritional status during last few years9.

The weight of the girls was 29.2, 30.6 and 34.3 kg in the age group of 9-10, 10-11, 11-12 years respectively. These weights were found to be higher than Caucasian, Japanese, British and Indian boys studied by other workers. The weights of boys was 29.2 (9-10 years), 30.6 (10-11 years) and 34.3 kg (11-12 years) respectively. Similar figures were observed in the study of other workers1.8,9,10.

The BMI in boys was 15.0 (9-10 years), 15.8 (10-11 years) and 16.2 (11-12 years). Similar results were obtained by Agarwal et al12. The BMI values for 10 and 12 year old boys were found to be lower than the present values10 and the comparison of the median BMI values with NHANES survey in USA was done and found out that the proportion of Indian adolescent males was below the 5th percentile values ranged from 77.6% at 11 years to 44% at 12 years old10. The major changes may be due to poor nutritional status and other factors like income and educational status.

Table 4: Mean body composition (mean±SD) of pre-adolescents (9-12 years)

Variables	Age (years)											
	9-10 years			10-11 years			11-12 years			Total		
	Boys	Girls	Z-value	Boys	Girls	Z-value	Boys	Girls	Z-value	Boys	Girls	Z-value
Fat (%)	41.9± 9.4	52.4± 13.7	3.6**	37.3± 12.7	43.8± 18.5	2.5*	26.4± 6.8	36.5± 17.9	4.5**	35.2±11.9	44.2±21.0	5.6**
Fat (kg)	10.2±1.5	13.2±4.4	5.4**	10.2±1.7	12.3±4.0	4.2**	9.1±2.0	11.4±3.8	4.4**	9.8±1.8	12.3±4.2	8.0**
Lean (%)	57.5±10.6	44.6±21.4	4.6*	63.0±11.9	52.0± 20.6	3.9**	73.5±6.9	64.1±17.3	4.3**	64.7±11.9	53.6±21.5	6.7**
Lean (kg)	12.4±7.3	14.6±4.3	2.2**	19.4±16.5	18.8±6.8	NS	26.8±7.0	22.2±10.0	3.1**	20.1±7.9	18.0±12.6	2.0*
Water (%)	77.1±10.2	72.7±11.6	2.4*	73.3±12.4	68.2±11.5	2.5**	72.2±8.1	64.5±7.0	6.2**	74.2±10.6	68.4±10.8	5.6**
Water (l)	21.2±4.9	18.6±1.4	4.4**	22.4±2.8	19.8±2.2	6.0**	25.2±6.1	22.6±2.5	3.3**	22.9±5.1	20.3±2.7	6.6**

NS- non significant
*- significant at 1% level
**- significant at 5% level

Table 5: Relationship between high BMI and glucose levels (mg l-1)

Sex	Number	BMI	Present	Normal	Z-value
Boys	6	>25	90.73±13.2	70-110	0.73 NS
Girls	4	>25	87.42±11.4	70-110	2.6*

NS: Non significant; *- significant at 5% level

BMI for girls was 14.0 , 17.1 and 16.7 in the age groups of 9-10 years, 10-11 years and 11-12 years, respectively. Others showed similar results 12,8,13,5. The BMI figures in the study was found to be lower by other workers 14.1,9,16.. Tershakovec et al16 reported that African American individuals had higher insulin levels and insulin resistance which was associated with fat mass, this might have resulted in greater fat mass, body weight, and greater BMI in adolescents.

Subcutaneous fat thickness (SFT) measurements are useful to monitor long term energy balance in pre-adolescents. Triceps, subscapular and other measurements are associated with obesity and blood pressure. Thus the measurements could be useful to follow up body fat when collected reliably. From the present study it is indicated that SFT measurements at four sites were significantly higher in girls than boys correlated by a few other workers19, 12. This difference was because of higher fat accumulation in the subcutaneous tissue during adolescence. Lower skin fold thickness measurements in boys than girls indicate low body fat and high lean mass among boys. The reason for this difference can be attributed to the influence of hormones. Higher skinfold thickness measurements in girls than boys may be due to higher production of androgen. The mean values for triceps, biceps, subscapular and suprailiac measurements in the study were similar to those studied by Agarwal et al 12but lower than the studies by a few other workers which may be due to ethnic group differences14, 8, 18.

Nutritional status of subjects as per BMI was calculated for both boys and girls and indicated that 86% of boys and 90% of girls were suffering from various grades of chronic energy deficiency. The percentage of boys and girls suffering from severe chronic energy deficiency was higher 61.7 and 69.4% respectively. The variations in grades of nutritional status were associated with factors such as occupation, family income, literature level, cultural beliefs, food taboos etc. Apart from this lack of appetite and poor absorption also lead to poor nutritional status. A few subjects were overweight (2.6% boys, 1.8% girls) and normal (3.5% boys and 2.7% girls).

Nutritional status of subjects according to weight for age classification, indicated that 95% boys and 85% girls were suffering from mild malnutrition whereas 90% (boys) and 77% (girls) were suffering from moderate malnutrition respectively which may due to low energy intake. Nutritional status during adolescence mainly depends on weight gain. Girls with chronic under-weight pass into their adulthood with this same stage may suffer high risk during pregnancy. The average weight of Indian girls was 67.7% of NCHS standards19.

Nutritional status of subjects according to height for age indicated that the mean height for 98.3% for boys and 91.2% for girls which indicates normal linear growth. Low height indicates childhood growth retardation mainly due to poor nutrition. However during adolescence, most girls experience what is known as catch up growth and reach almost normal height for that age. Only 4% (boys) and 8.5% (girls) were found to be short in the present study due to poor nutritional status during past years.

The body composition was assessed by using body stat 1500 analyser. The variables assessed that the mean values for body fat (% and kg) was significantly higher

Table 6: Correlation between body composition variables by using body stat 1500 analyser

	Height (cm)	Weight (kg)	BMI (kg m2)	Fat mass (%)	Fat mass (kg)	Lean mass (%)	Lean mass (kg)	Water (%)	Water (l)	Biceps (mm)	Triceps (mm)	Total SFT (mm)
Height (cm)	1.00	-0.02	0.01	-0.07	-0.03	0.07	0.06	-0.01	0.02	-0.01	-0.01	-0.00
Weight (kg)		1.00	0.22**	-0.40**	-0.10	0.40**	0.53**	-0.40**	-0.62**	0.16*	0.35**	0.35
BMI (kg m-2)			1.00	-0.21**	-0.09	0.21**	0.26**	-0.20**	0.15	0.09	0.02	0.18
Fat mass (%)				1.00	0.73**	-0.85**	-0.67**	0.57**	-0.28**	-0.15*	-0.28*	-0.31**
Fat mass (%)					1.00	-0.76**	0.45**	0.31**	-0.07	0.00	-0.13	-0.14
Lean mass (%)						1.00	0.65**	-0.55**	0.29**	0.18*	0.31**	0.35**
Lean mass (kg)							1.00	-0.50**	0.42**	0.21**	0.40	0.42**
Water (%)								1.00	-0.21**	-0.24**	-0.38	-0.44**
Water (l)									1.00	0.04	0.18*	0.17**
Biceps (mm) Triceps (mm)										1.00	0.41**	0.78**
Triceps (mm)											1.00	0.78**
Total sft (mm)												1.00

*: significant at 1% level (r≥0.208), *: significant at 5% level (r≥0.159)

Table 7: Factors affecting body composition.

Gender	Fat free mass (%)		z- value
	Minimum weight	Maximum weight	
Boys (225)	57.5±24.4	73.5±27.2	6.3*
Girls (225)	45.6±23.2	64.5±25.4	5.7*

(P<0.01) in girls than boys in all the age groups. The significant increase in body fat in girls (44.2% and 12.3 kg) than boys (35.2% and 9.8 kg) and the greater degree of fatness compared with boys is due to greater production of estrogen1 in the girls during menarche. The results of fat free mass indicate that boys have higher fat free mass (% and kg) than girls in all the age groups except at the age group of 10-11 years old. The significant difference (P<0.01) in the amount of changes in fat free mass between boys (64.7% and 20.1 kg) and girls (53.6% and 18.0 kg) might be due to the production of testosterone hormone by the males which plays an important role in muscle size and skeletal mass in boys.

Mean fat (% and kg) values of girls were found to be higher than values studied by Tahara et al8 in Japanese girls and reported fat (% and kg) values were 15.7% and 5.9 kg at 11 years age. The large difference may be due to the cultural pressure on Japanese girls to remain thin. The mean fat (% and kg) of girls was greater than Caucasian girls1 which may be due to ethnic group differences. Higher triceps, biceps and skin fold measurements in girls for the present study were observed to be higher than Japanese girls and Caucasian girls8,1.

The mean fat (% and kg) of boys were observed to be higher than Spanish, Caucasian and Japanese boys studied by other workers. The mean fat (%) and fat (kg) in all the age groups were 41.9% and (9-10 years) , 37.3 % (10-11 years) and 26.4 % (11-12 years). The difference might be due to the differences in life style, environmental factors, genetic and physical activity. The similar results were reported by Ellis et al20 who studied that Hispanic males had higher body fat values than the white group and black groups where as black males generally had lower values than white group. The mean fat free mass values of boys in all age groups were 57.5 (9-10 years), 63.0 (10-11 years) and 73.5% (11-12 years) which were reported to be lower than Caucasian, Spanish and Japanese boys was higher than those in the present study.

The mean (% and l) water levels are higher in boys (74.2% and 22.9 l) than girls (68.4% and 20.3 l). Chumela et al21 reported similar results and indicated that males had higher total body water and increased from the adolescent years to mid-adulthood and declined in adult age groups. The mean fat (% and kg) decreased with an increase in age in boys and girls. This is strongly supported by Owa et al22 and Sarria et al2 who reported that fat (% and kg) decreased with an increase in age in boys. The decrease in fat content of girls with an increase in age may be due to low fat intake and socio-economic status. Sandhya23 reported that the intake of fat was found to be less and intake of fruits was more in the girls compared to boys.

Kiess24 and Spiegelman et al25 reported that BMI which is an indicator of body fat, is an influencing factor of blood pressure and glucose levels. However, in the present study the mean blood glucose levels of boys (90.7 mg l-1) and girls 87.4 mg l-1) were found to be within the normal range because none in boys and girls were under the obese category. The results are strongly supported with the study by Tershakovee et al16 who reported that girls had significantly lower glucose levels than boys. Significant correlation was observed between the various anthropometric measurements and body composition variables. There was a positive correlation of BMI with body weight (r=0.20, P<0.01) as BMI increased with increase in weight. Skin fold thickness had a positive correlation with weight (r=0.20, P<0.01) indicating that higher weight subjects had higher skin-fold thickness.

Table 8: Comparision of body composition from body stat 1500 analyser (BSA) and skin fold thickness (SFT)

	Boys (years)			Girls (years)		
	9-10	10-11	11-12	9-10	10-11	11-12
% BSA FM	41.9±9.4	37.3±12.7	26.4±6.8	52.4±23.1	43.8±18.5	36.5±17.9
% SFT FM	17.6±3.9	21.8±4.8	22.7±2.7	21.5±5.6	27.2±7.0	29.4±7.5
z-value	24*	15.5*	3.7**	31.1*	16.6*	7.1*
% BSA FM	10.2±1.5	10.1±1.7	9.1±2.0	13.2±4.4	12.3±4.0	11.4±3.8
% SFT FM	5.1±0.8	6.6±1.0	7.7±1.1	5.3±1.7	7.8±2.5	10.4±3.3
z-value	5.0**	3.5**	1.4**	5.4*	4.5**	1.0**
% BSA FM	57.5±10.6	63.0±11.9	73.5±6.9	45.6±21.4	52.0±20.6	64.5±17.3
% SFT FM	82.4±15.1	78.2±14.7	77.3±7.2	78.5±36.8	72.8±34.2	70.6±33.0
z-value	24.9*	15**	42.0**	32.9*	20.8*	6.1*
% BSA FM	12.4±7.3	19.4±11.9	26.4±15.7	14.6±4.3	18.8±6.8	22.2±10.0
% SFT FM	24.1±14.1	24.0±14.1	26.6±15.6	19.7±5.8	21.2±6.2	25.0±7.3
z-value	11.6*	5.0*	0.2**	5.1**	2.4**	3.2**

*: significant at 1% level, **: significant at 5%level.

A negative correlation was observed between fat mass (%), water (% and l) and body weight (r=0.20, P<0.01) indicating that with increase in body weight, water (% and l) and fat mass decreased. Fat mass (%) was negatively correlated with lean mass (r=0.20, P<0.01) indicating that with increase in fat free mass, the fat mass decreased.

The sex and age related changes in body composition can also be attributed to the changes in weight where weight increases fat free mass in boys and girls during pre-adolescence (9-12 years). Weight is a sensitive indicator of nutritional status and contributes to fat free mass development. The higher weight in males than in females indicated that their body contained less amount of adipose tissue but greatly developed musculature25. Fat free mass change is strongly influenced by change in body weight26. In the present study it was also observed that there was a positive correlation (0.01%) ($r \geq 0.208$) between weight and fat mass (%). The mean fat free mass was less in subjects with low weight when compared with higher weight subjects. Apart from weight, other factors like leptin, hormones, diet, socio-economic status, eating habits, attribute to body composition 1,28.

BSA fat mass (Body stat 1500 analyser) was significantly higher (P<0.05) than fat mass derived from SFT (skin fold thickness) (% and kg) whereas SFT fat free mass (% and kg) was significantly higher (P<0.05) than BSA fat free mass (% and kg). Hence, assessment of body composition by BSA was not in agreement with that of SFT at the age of 9-10 years indicating that the BSA does not read the body composition of young children. But in the age of 11-12 years the agreement between BSA and SFT increased indicating BSA was suitable to assess body composition from 11 years onwards.

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Fibrosarcoma in the Mandible- A rare case report

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Abstract

Fibrosarcoma is a malignant neoplasm of the fibroblastic origin. It can occur in any location being the bone extremities the main affected site. Fibrosarcoma in relation to the orofacial region are rare. Occurrences in the mandible are rare with an incidence ranging from 0 to 6.1% of all primary fibrosarcoma of the bone. Radical surgery seems to be the best treatment option to fibrosarcoma. Radiation therapy has been used as adjuvant treatment in unresectable tumors and chemotherapy is only used for palliative treatment. Here is a case of fibrosarcoma in the right posterior mandible in 62 year old man.

Key Words

Fibrosarcoma, tumor, mesenchymal, orofacial region, mandible.

Introduction

Fibrosarcoma is a tumor of mesenchymal cell origin that is composed of malignant fibroblasts in a collagen background. It can occur as a soft tissue mass or as a primary or secondary bone tumor[1]. Fibrosarcoma represents only about 10% of musculoskeletal sarcomas and less than 5% of all primary tumors of bone[2]. Fibrosarcoma of bone can be diagnosed in patients of any age, but it is diagnosed more commonly in patients in the fourth to seventh decades of life. An infantile form (in children <10 y) of fibrosarcoma also exists, which has got an excellent prognosis compared to fibrosarcoma in adults[3,4]. It is a tumor of mesenchymal origin and the epidemiologic factors are still unknown, but many authors report radiation therapy history as a possible one[5]. In our case the patient had no history of previous radiation.

Case Report

A 62-year-old man was referred by a private dentist to Department of Oral Pathology, with a slow enlarging relatively asymptomatic swelling in the right mandibular posterior region. Patient noticed the swelling four months back.

On extra-oral examination, a swelling was seen in the right lower part of the face (Fig. 1 & 2). Lower lip parasthesia was noticed ipsilaterally.

Fig. 1: Swelling seen on the right lower part of the face

Fig. 2: Extra-oral view: View from submandibular region. Notice the swelling extending beyond base of the mandible

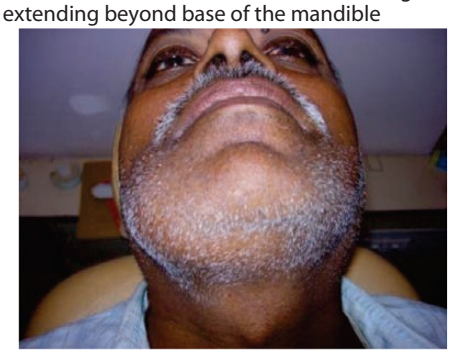
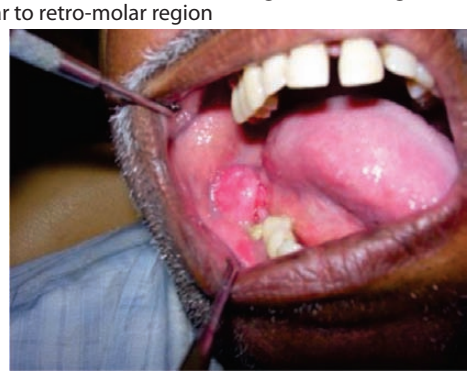


Fig. 3: Intra-oral view: The swelling is extending from distal to premolar to retro-molar region



Intra-oral examination revealed swelling extending from first molar to retromolar region anteroposteriorly, and bicortical expansion was seen (Fig. 3). The swelling measured 3.5cm x 2cm. It was firm to soft in consistency. Colour varied from coral pink to erythematous in some parts of the swelling.

On radiological examination, OPG revealed irregular resorption of the bone in the molar region. Biopsy was advised. Surgical specimen measured about 1.5 cm x 0.75

cm, white to grayish white in colour. The other biopsy specimen was 1cm x 1cm. in size, and grey in colour.

Histopathologic findings: The section was composed of highly cellular and consisted of sarcomatous proliferation of spindle cells. These cells showed plump vesicular nuclei and ill-defined eosinophilic cytoplasm (Fig. 4).

Epithelium and a fibrous capsule

A fibrous capsule was present beneath the overlying epithelium (Fig. 5). The typical herringbone pattern of arrangement of cells (Fig. 6) and increased numbers of mitotic figures are seen (Fig. 7). On high power examination cellular and nuclear pleomorphism was noticed (Fig. 8).

These tumor cells produced moderate amount of collagen. In areas cells with deeper stained nuclei are present in loosely arranged stroma. Hyalinised areas

Fig. 4: Spindle cells with plump vesicular nuclei

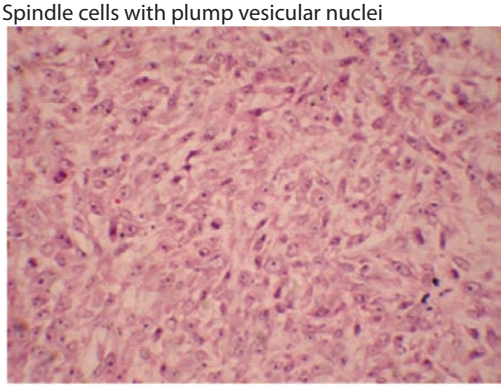


Fig. 5: Tumor mass is seen underlying the oral & ill-defined eosinophilic cytoplasm.

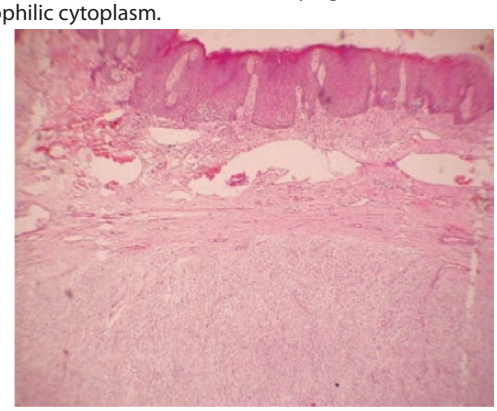


Fig. 6: Herringbone pattern of arrangement

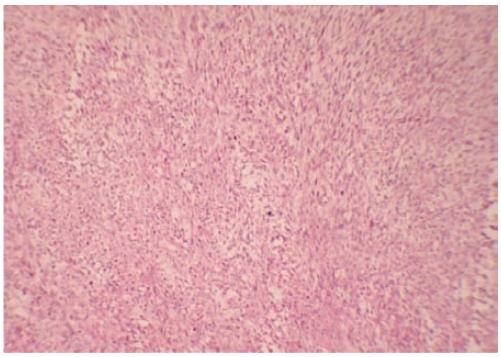


Fig. 7: A histopathologic section showing increased of cells can be noticed number of mitotic figures

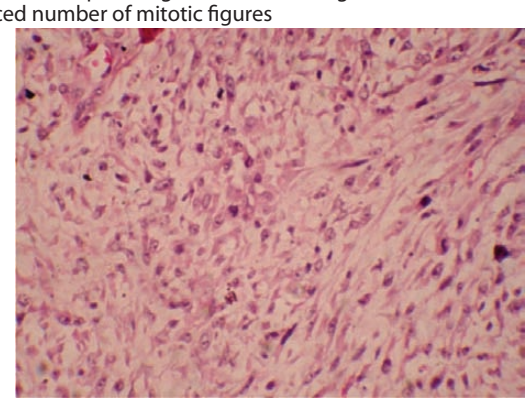
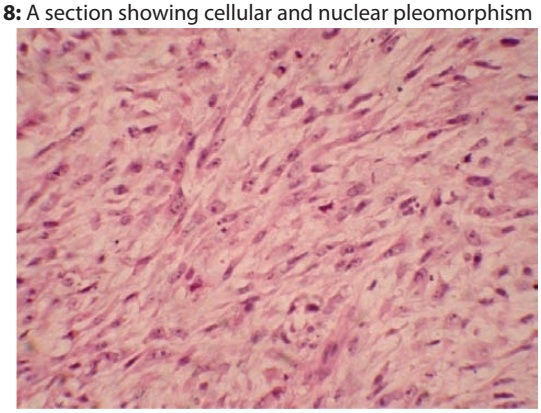


Fig. 8: A section showing cellular and nuclear pleomorphism



are also seen. The histological features correlating with the clinical and radiographic features a diagnosis of fibrosarcoma was made.

Treatment: Wide excision of the tumor was done. Patient was recalled for follow-up.

Discussion

Fibrosarcoma accounts for approximately 15% of all soft tissue sarcomas which represent only 1% of all malignant tumors of the head and neck region. Frankenthaler et al. (1990) found 118 fibrosarcomas of the head and neck region with the neck being the most common site (25%), followed by face (20%), scalp (16%), and maxillary sinus (12%)[6]. Only 12% of the fibrosarcomas were located intraorally, approximately half of them in the lower jaw. The lesions present as slow growing, painless mass which may be present for several years. They are usually well circumscribed.

Histopathological features consist of spindle cells, arranged in the form of intersecting fascicles giving rise to herringbone pattern. The ends of the nuclei taper, the cell outline being inconspicuous. The more the collagen produced by these cells it is considered as well-differentiated tumor. The poorly differentiated tumors produce less matrix, and are highly cellular with dysplastic features marked. Areas of necrosis may be present. The infantile fibrosarcomas tend to be more vascular and hemorrhagic[3,7].

The tumor may present different degrees of differentiation: Grade-I- low grade (well differentiated), Grade-II-intermediate malignancy and Grade-III-high malignancy (anaplastic)[8].

Differential diagnosis based on radiographical features includes Malignant fibrous histiocytoma, Osteosarcoma and non-Hodgkin's lymphoma. Histopathologically it includes synovial sarcoma, malignant peripheral nerve sheath tumor, and malignant fibrous histiocytoma. It also has to be differentiated from fibromatosis lesions[9,10].

Wide local excision remains the treatment of choice [6,11,12,13,14,15]. Radiotherapy is mandatory when adequate safety margins cannot be obtained and a re-operation is not possible[16,17,18,19]. Adjuvant chemotherapy for sarcomas has been applied in tumors of the trunk and extremities, as well as in the head and neck. Although some reports have raised the possibility of some benefit in certain types of sarcomas, the benefit of adjuvant chemotherapy with regard to prolonged survival remains controversial as other studies have not reported prolonged survival [20,21,22,23].

If the tumor is indeed a true fibrosarcoma, chemotherapy may not be required 10; rather combined therapy along with resective surgery becomes the sole treatment modality. The lesions in the mandible require a resection with 1.5 cm to 2.0 cm margins in both bone and soft tissue. In the maxilla, a type of partial maxillectomy is required[24].

In the head and neck region, 20-25% show distant metastasis. Metastatic rate increases with increasing grade of the tumor. The clinical behaviour of the fibrosarcoma is characterized by a high local recurrence rate and a low incidence of locoregional lymph node and/or distant haematogenous metastases. However, haematogenous metastasis may involve the lungs, mediastinum, abdominal cavity and bone[11,25,26]. Local recurrence poses a serious and complex problem with occurrence of infiltration, local destruction, airway compression, oesophageal compression and extension into the mediastinum[11,14,25]. Before therapy, the local extent of the neoplasm and the presence or absence of local and distant metastases must be determined. Contrast-enhanced head and neck C.T. has proved to be a valuable tool for delineating the size of the tumor and the infiltration of neighbouring tissue. Metastatic surveys should include chest radiography, scintigraphic bone scanning and abdominal ultrasound and/or computed tomography.

True Fibrosarcomas of low-grade malignancy; have an 80%, 10 year survival rate. Most high-grade tumors are today diagnosed as malignant fibrous histiocytoma and have only a 30-40% survival rate[27,28].

Fibrosarcomas of Head & Neck appear to have poor prognosis than those of extremity region despite the fact that they are well differentiated. This probably reflects the limited type of resection possible in this region with resultant positive surgical margin. Prognosis is directly related to histological grade, tumor size and adequate surgery treatment with margins free[5]. Follow up is life long, since these may recur anytime over several decades.

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Prevalence of Dental Caries, Oral Hygiene Status and Treatment Needs in Physically Handicapped Children Attending Various Special Schools of Davangere District

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Abstract

Objectives

To assess and compare the prevalence of dental caries, oral hygiene status and treatment needs among different groups of physically handicapped children attending various special schools in Davangere district.

Methodology

A total of 719 physically handicapped children attending various special schools in Davangere district were included in the study. A survey proforma was prepared using WHO oral health assessment form (1997). Dental caries (dentition status and treatment need index, WHO 1997), oral hygiene status (oral hygiene index simplified, Greene and vermilion 1964) and treatment need was recorded. For statistical analysis, chi- square test and ANOVA test were used.

Results

Out of 719 handicapped children, 49.4% (355) had dental caries with mean DMFT being 0.87 (S.D $\pm$1.38) and mean dmft 0.33 (S.D $\pm$ 0.99). The prevalence of dental caries was high among blind group (72%), followed by orthopaedic group (48.6%), compound group (54.5%) and deaf and dumb group (41.2%), the difference was statistically significant (P<0.001). The oral hygiene status was good in 43.2%, fair in 47.9% and poor in 8.9% and the difference among handicap groups was significant (P<0.1). The prevalence of caries with respect to oral hygiene status among the groups was not statistically significant. Overall, 286 (39.8%) children in permanent and 350 (48.7%) children in deciduous dentition required treatment.

Conclusion

The dental profession should be aware of the responsibilities in improving the dental health of handicapped children. There is a strong need for improved education on chemical plaque control and in-service training programmes on oral hygiene to the concerned groups. Both comprehensive and incremental dental care is recommended for these subjects.

Key Words

Dental caries, Oral hygiene status, physically handicapped children, prevalence.

Introduction

Oral health is an integral part of overall health. Oral cavity plays a vital role in the life of human beings through functions like mastication, esthetics, phonetics, communication, emotional expressions. It is highly essential to safeguard oral health of all children from childhood otherwise poor oral health will lead to various dental diseases like dental caries, periodontal diseases which adversely affects the overall health[1].

Handicapped children no way differ from the normal children. The diseases in general and oral diseases in particular in handicapped are no way different from normal children. In almost any community, it is possible to see few individuals suffering from handicaps of varying nature. These handicapped individuals also have the same fundamental rights as any other normal individual[2].

Most handicapped individuals start their life with teeth and gums that are as strong and healthy as those of the normal people. However, their diet, eating pattern, medication, physical limitations, lack of cleaning habits and attitudes of parents and health providers, all contribute to poor oral health of the handicapped[3]. Dental diseases are one of the common problems found in children. Good oral hygiene is important to a normal child for proper mastication, digestion, appearance, speech and health, but it is even more important for handicapped children as some of them use mouth as a functional limb to manipulate a chair and to manipulate bite stick[4]. It is desirable to safe guard oral health of all children from their childhood. Education regarding upkeep of oral health should be given to growing children, both normal and handicapped, in addition to occupation and speech therapy to the latter[3].

In recent years, there have been an increasing number of studies concerning the dental health of normal children. However, very little attention has been paid to the dental health of the handicapped children, who actually require special care and attention. These people cannot maintain proper oral hygiene and dental health as they are physically handicapped[5]. A very few or no studies for

the special group of handicapped in various schools are available in this part of Davangere district. Since these handicaps live in special schools, knowing their problems regarding dental diseases, it will be easy to plan dental care for such groups in school campus. Hence, an attempt is made in this study to assess the prevalence of dental caries and oral hygiene status in physically handicapped children attending various special schools of Davangere district.

Aims and Objectives

1) To assess and compare the prevalence of dental caries, oral hygiene status and treatment needs among different groups of physically handicapped children attending various special schools in Davangere district.

Material and Methods

Before the start of the survey, official permission was obtained from Department of Women and Child Development Office, Davangere and Head of the special schools. Ethical clearance to conduct the study was obtained from Institutional Review Board. The informed consent of the children was taken from the concerned teachers. General information and oral hygiene practices of deaf and dumb children were obtained through a sign language by teachers.

An epidemiological survey was conducted from November to December 2004 to assess the prevalence of dental caries and oral hygiene status among 6-15 years old physically handicapped children attending the special schools for the handicapped in Davangere district. A total number of children who formed the study population were 719 (441 males and 278 females). There are seven special schools for physically handicapped children in Davangere district; all the children attending these special schools were included in the study -

1. Sri Harihara Lingeshwara Physically handicapped school (S.H.L.P.H.S), Harihar.
2. Sri Thipperudraswamy Physically handicapped school (S.T.P.H.S), Jagalur.
3. SriVeerabhadreshwara Physically handicapped school (S.V.P.H.S), Harapanahalli.
4. Sri Maillarlingeshwara Physically handicapped school (S.M.P.H.S), Davangere.
5. Sri Mouneshwari Deaf and Dumb school (S.M.D&D.S), Davangere.
6. Government Blind school for females (G.B.S), Davangere.
7. Pandit Panchakshri Gawaigal special musical school (P.P.G.S.M.S), Bada crosses Davangere.

According to nature of handicap, they were divided into following: Orthopaedic, Blind, Deaf and Dumb, and Compound handicap groups.

A pilot survey was carried out on a group of 70 individuals residing in S.H.L.P.H.S School, Harihara. Pilot study assessment was utilized for proper planning and execution of main study and to finalize the proforma.

Dental caries was recorded using Dentition Status and Treatment Need index as described by WHO (1997)[6]. Oral hygiene status was assessed using Oral Hygiene Index- Simplified given by (Greene and Vermilion 1964)[7]. The children were examined on a chair or stool with examiner standing behind the chair. The examination for dental caries was made using Community Periodontal Index probe and plane mouth mirror and oral hygiene status using explorer and plane mouth mirror. Type III examination was carried out by the investigator himself and recorded by a trained recorder throughout the study.

Statistical Analysis

Chi- square test was used to determine the differences in dental caries and oral hygiene status among physically handicapped groups. ANOVA test was used to determine whether significant differences were present in mean DMFT/ dmft between different handicap groups. The probability value was set at 0.05. (Statistical package SPSS and Minitab software) (Version 13.1, USA).

Results

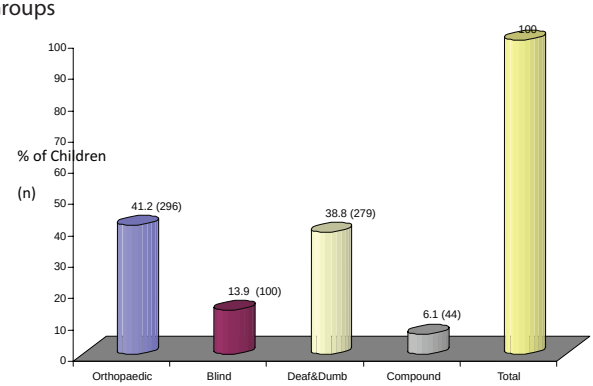
An epidemiological survey was conducted to assess the prevalence of dental caries, oral hygiene status and treatment needs among 6-15 years old physically handicapped children attending various special schools of Davangere district. The study population consisted of 719 school children, out of which 441 (61.3%) were males and 278 (38.7%) were females.

Table 1: Caries Prevalence of the Study Population According to Diet

Type of diet	N	Caries Affected
Vegetarian	311 (43.3%)	133 (42.8%)
Mixed	408 (56.7%)	159 (39.0%)
Total	719	292

Overall, vegetarian v|s mixed, $\chi 2 = 1.50$, P= 0.31, N.S

Graph 1: Distribution of Study Population According to Handicap Groups



The data regarding the duration of handicap, whether present since birth or acquired due to injuries or other conditions was recorded. Out of 719, only 8 children were handicapped due to injuries or other conditions. The distribution of handicap groups is shown in graph 1.

The prevalence of caries among the study population was 49.4%. The prevalence was highest among females (152/278, 54.7%) compared to males (203/441, 46.0%) and the difference was statistically significant ($\chi 2 = 5.10$, $P < .05$). Overall, caries prevalence was highest among blind group (72%) and least among deaf and dumb (41.2%) and the difference among the handicap groups was highly significant. ($\chi 2 = 28.8$, $P<.001$, HS) (Graph 2)

The difference in caries prevalence between vegetarians and those who had mixed diet was not significant. ($\chi 2=1.50$, $p=0.31$, NS) (Table 1) Majority of the children in all the handicap groups cleaned their teeth by themselves and the prevalence of caries was highest among the study subjects who cleaned their teeth with other's help. (Table 2)

Overall, the mean DMFT of the study population was 0.87±1.38 and mean dmft was 0.33 ± 0.99. (Table 3 and table 4) The mean DMFT was highest among blind group and least among deaf and dumb group and the difference in mean DMFT between the various handicap groups was statistically significant. ($P<0.01$) The treatment need for the permanent and deciduous dentition has been shown in table 5 and table 6 respectively.

The oral hygiene status of the study subjects has been shown in graph 3. There was no significant difference in oral hygiene status among the handicap groups with respect to type of diet ($\chi 2 = 4.92$, $P = 0.09$) and mode of cleaning teeth ($\chi 2=1.55$, $P= 0.82$). (20 cases were excluded as the index teeth were not present in younger subjects)

When caries prevalence was assessed with respect to oral hygiene status among handicap groups, 52%, 49.9% and 43.5% were affected by caries among good, fair and poor components respectively and the difference was not significant. ($\chi 2=1.50$, $P=0.47$) (Graph 5)

Discussion

Handicapped are often termed as disadvantaged group, because they are deprived of many social benefits in the society. Hence the studies related to prevalence of dental caries and oral hygiene status in physically handicapped children have drawn the attention of many researchers. Very few studies have been done in India and abroad to find the prevalence of dental caries and oral hygiene status in handicapped children. So, the present study was conducted to assess the prevalence of dental caries, oral hygiene status and treatment need in seven special schools of Davangere district.

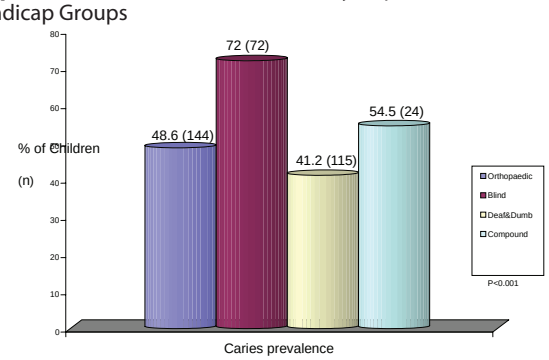
The study population consisted of 719 handicapped children attending seven special schools, out of which, 49.4% had dental caries with mean DMFT 0.87 (SD ±1.38) and mean dmft 0.33 (SD± 0.99). Similar results were observed in studies done by Nagaraja Rao G (1985)8,

Table 3: Distribution of dmft Components Among Handicap Groups

Handicap Groups	Decayed	Missing	Filled	DMFT	Mean DMFT± Sd
Orthopaedic	239	0	01	240	0.81 ± 1.27
Blind	139	06	03	148	1.48 ± 1.61
Deaf & Dumb	177	02	05	184	0.66 ± 1.30
Compound	52	0	01	53	1.20 ± 1.58
Total	607	08	10	625	0.87 ± 1.38

ANOVA F = 10.15, P<.01 Significant

Graph 2: Caries Prevalence of the Study Population According to Handicap Groups



Graph 3: Oral Hygiene Status of Study Population According to Sex

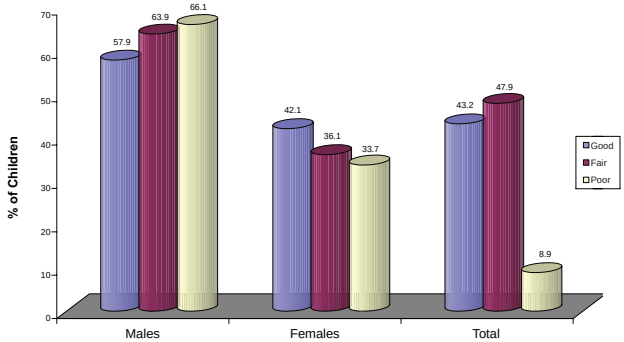


Table 2: Caries Prevalence Among Handicap Groups According to Mode of Cleaning Teeth

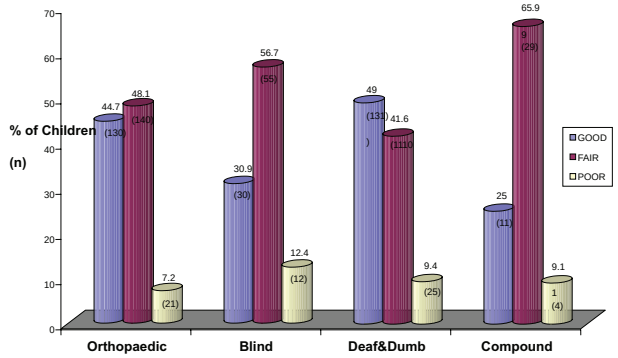
Handicap Groups	Themselves		Other's Help		Under supervision	
	N	Caries Affected	N	Caries Affected	N	Caries Affected
Orthopaedic	281 (95%)	134 (47.7%)	15 (5%)	11 (73.3 %)	0	0
Blind	78 (78%)	58 (74.4%)	01 (1%)	1 (100%)	21 (21%)	13 (61.9%)
Deaf and dumb	279 (100%)	115 (41.2%)	0	0	0	0
Compound	44 (100%)	24 (54.5%)	0	0	0	0
Total	682 (94.9%)	331 (48.5%)	16 (2.2%)	12 (75%)	21 (2.9%)	13 (61.9%)

Table 4: Distribution of dmft Components Among Handicap Groups

Handicap Groups	decayed	Missing	filled	dmft	Mean dmft ± Sd
Orthopaedic	81	0	0	81	0.27 ±0.90
Blind	34	2	0	36	0.36 ± 1.04
Deaf & Dumb	106	0	0	106	0.38 ± 1.06
Compound	14	0	0	14	0.32 ± 1.05
Total	235	2	0	237	0.33 ± 0.99

ANOVA F = 0.60, P = 0.62 (P>.05), Not Significant

Graph 4: Oral Hygiene Status of the Study Population According to Handicap Groups



Oral hygiene status among handicap groups, $\chi 2 = 22.1$, P<.0.1 Significant

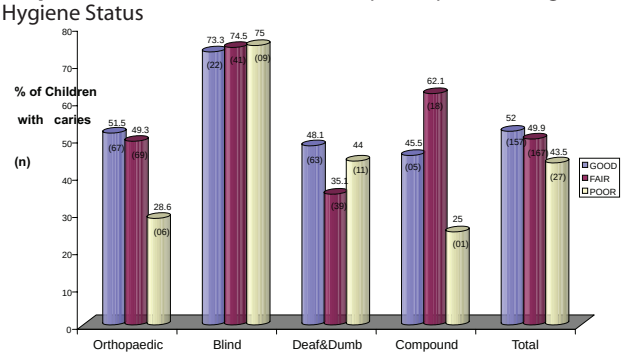
*20 cases were excluded due to index teeth was not present in younger subjects

Rawlani et al (2001)[5], Nunn JH and Murray JJ (1987)[9], and Ohito FA. et al (1993)[10], where the prevalence rate was 47.0%, 50.4%, 50.0% and 44.0% respectively. The higher prevalence of dental caries in handicapped children could be attributed to low power of co-ordination and comprehension leading to negligence of oral hygiene and improper brushing[11].

It was observed that the caries prevalence was lower in male handicapped children (46.0%) than females (54.7%) and the difference was statistically significant (P<0.05). Similar results were obtained by Misra FM. (1979)[12], Basil FM. (1989)[13], Chironga L. (1989)[14], Yee R. (2002)[15]. This may be perhaps due to the fact that girls have the habit of eating snacks between meals because of their longer indoor stay in comparison to boys who mostly spend their time in outdoor activities. It may also be attributed to the fact that girls' permanent teeth erupt at an earlier age than boys' teeth.

Among the different handicap groups, the highest

Graph 5: Caries Prevalence of Handicap Groups According to Oral Hygiene Status



Overall, $\chi 2 = 1.50$, P=0.47, N.S

*20 cases were excluded due to index teeth was not present in younger subjects

prevalence of dental caries was observed in blind group (72 %) with mean DMFT of 1.48 (SD±1.61), and mean dmft 0.36 (SD± 1.04) and least was observed in deaf and dumb group (41.2 %) with mean DMFT of 0.67 (SD±1.30), and mean dmft 0.38 (SD± 1.06) respectively. This difference was found to be highly significant with (P<.001). These results are similar to the studies done by Greeley et al (1976)[16], Shaw L. et al (1986)[17], Gupta DP.et al (1993)[11]. The high caries activity in these children can be attributed to their difficulty in maintaining oral hygiene, poor muscular co-ordination and muscle weakness interfering with routine oral hygiene practices[18].

Regarding the mode of cleaning teeth, higher prevalence was observed among those who cleaned their teeth with others help (75%) and under supervision (61.9%) compared to those who cleaned by themselves (48.5%). This may be due to some of the key factors like ability of the supervision, the position of the child, the selection of tooth brush and technique of brushing and the co-operation of patient[4].

In the present study, the highest percentage of treatment need in permanent dentition was one surface filling and two or more surface fillings. In deciduous dentition, one surface filling, two or more surface fillings and extraction was needed. This is similar to studies done by Mitsea AG. et al (2001)[18], and Gupta DP. (1993)[11]. A number of factors might contribute to so much of treatment need for dental caries among the handicap children. Lack of knowledge

Table 5: Treatment Need for Permanent Teeth in Handicap Groups

Handicap Groups	No. of children required treatment	No. of Teeth requiring Treatment	One surface filling 1	Two or more surface filling 2	Pulp Care and Restoration 5	Extraction 6	Other Care 7
Orthopaedic	123 (41.6%)	239	213 (89.1%)	26 (10.9%)	0	0	0
Blind	62 (62.0%)	145	131 (90.4%)	08 (5.5)	0	0	06 (4.1%)
Deaf and Dumb	79 (28.3%)	179	151 (84.4%)	16 (8.9%)	6 (3.4%)	4 (2.2%)	2 (1.1%)
Compound	22 (50.0%)	52	50 (96.2%)	2 (3.8%)	0	0	0
Total	286 (39.8%)	615	545 (88.6%)	52 (8.4%)	06 (1.0%)	04 (0.7%)	08 (1.3%)

- No treatment (code 0) – 0
- Preventive care (code P) - 0
- Fissure sealant (code F) - 0
- Code 7 - Fixed partial denture

Crown for any reason (code 3) - 0
Veneer/ Laminate (code 4) - 0

Table 6: Treatment Need for Deciduous Teeth in Handicap Groups

Handicap Groups	No. of children required treatment	No. of Teeth requiring Treatment	One surface filling 1	Two or more surface filling 2	Extraction 6	Other Care 7
orthopaedic	142 (48.0%)	81	74 (91.4%)	07 (8.6%)	0	0
Blind	71 (71.0%)	36	32 (89.0%)	1 (2.7%)	1 (2.7%)	2 (5.6%)
Deaf and Dumb	112 (40.3%)	106	75 (70.8%)	0	31 (29.2%)	0
Compound	24 (54.5%)	14	12 (85.8%)	02 (14.2%)	0	0
Total	350 (48.7%)	237	193 (81.5%)	10 (4.2%)	32 (13.5%)	2 (0.8%)

- No treatment (code 0) – 0
- Preventive care (code P) - 0
- Fissure sealant (code F) – 0
- Code 7 - Space maintainer

Crown for any reason (code 3) - 0
Veneer/ Laminate (code 4) - 0
Pulp care and restoration (code 5) – 0

about good oral hygiene practices among the concerned authorities, lack of motivation, low priority given to dental care in the society, lack of facilities for early and regular oral health check up and prompt treatment, poor socioeconomic status of the parents or guardians, and cost of treatment may be the reasons for the accumulated treatment needs. There is sufficient evidence to suggest that the treatment need amongst these children is not being met[18].

Majority of the study population had fair to good oral hygiene status which can be attributed to their institutionalization in special schools and under direct supervision of the teachers of the institutions. Few subjects with poor score (8.9%) may be because of their extent of handicap limiting their activities. Studies done by Shaw L. et al (1986)[17], Gizani S. et al (1997)[19] and Kamatchy KRJ. et al (2003)[2] have shown similar results with a poor oral hygiene status of 7.0%, 10.1% and 13.16% respectively. This may be due to cumulative neglect of oral health and lack of regular dental care.20 It could also partly be explained by limitations in personal abilities or technical difficulties (e.g. inability to reach the tooth brush), but there is quite a strong feeling that nurses and caregivers are more interested in general hygiene than oral hygiene[21]. In the present study, among all the handicap groups, more number of children in the blind group had poor oral hygiene status. The study done by Greeley CB. et al (1976)[16] showed that oral hygiene was worse in blind students and this is because the maintenance of oral hygiene remains the most outstanding challenge in the care of blind patients[22].

Oral hygiene has played a major role as a causative factor in the prevalence of dental caries. Even though oral hygiene status of majority of the study population was between fair and good, 49.4% were affected with caries in the present study. Statistically significant difference was not seen between oral hygiene status and dental caries. The present study showed some unexpected observation in contrast to general belief that "A clean tooth never decays". Some other factors like fluoride, environment, genetics, etc, may be contributing to the caries prevalence rather than oral hygiene and type of diet in the study population. However, lack of statistical significance does not imply that there is no relationship between the two because statistical significance has its own limitations.

In conclusion, the present study found that the differences in caries prevalence and oral hygiene status among different handicap groups were significant. However, majority of the study population had a good to fair oral hygiene with an overall caries prevalence of 49.4% thus indicating the need for further studies to find the possible factors for the occurrence of caries in the study population. It was also found that most of the teeth in both deciduous and permanent dentition required one surface, two or more surface fillings indicating a need for both comprehensive and incremental dental care in the special schools for handicapped children. Adequate follow up of daily oral hygiene practices in self sufficient handicapped children is needed. There is a strong need for improved education on chemical plaque control and in-service training programmes on oral hygiene to the concerned groups.

The results of the present study indicate that caries prevalence and treatment need among the physically handicap children is high thus highlighting the groups that should be targeted by the dental and para-dental professionals and the need to implement preventive measures. The relationship of other cariogenic factors must be determined before appropriate prevention programs are established.

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A Study of Fine Needle Aspiration Cytology and Evaluation of its Role in the Diagnosis of Tubercular Pleural Effusion

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Introduction

Pleural effusion is one of most common problems, with which a patient presents to the pulmonary physician. Most common causes of pleural effusion in India are tuberculosis and, parapneumonic effusion, To find out the cause of pleural effusion, thoracocentesis and biochemical and microbiological analysis of pleural fluid is a common practice. It broadly differentiates exudates from transudates and provides the diagnostic evidence for para-pneumonic effusion. However, this initial analysis has low sensitivity to detect tuberculosis, the most important causes of pleural effusion in India. Pleural fluid cytology can provide a diagnostic evidence for tuberculosis. Establishing Tuberculosis as the cause of pleural effusion can be difficult at times,as the symptmatogy produced is very vague. The diagnosis of Tuberculous Pleuritis is commonly made from observation of granulomas in pleural biopsy specimens or a culture positive for Mycobacterium Tuberculosis from pleural tissue or pleural fluid. However, the diagnosis can be uncertain or missed in "bacteriologically negative" cases.

Tuberculosis is an important cause of morbidity in the Indian population, especially because the diagnosis is often delayed. The cause of delay in diagnosis is due to the non specific nature of its sign and symptoms. Early diagnosis by non invasive method of test like fine needle aspiration cytology [FNAC] is valuable and specially so for debilitated critically ill patients of TPE where the surgical biopsy is contraindicated. [Gupta Et al.AL 2005]

Key Words

Tubercular pleural effusion, Fine needle aspiration cytology, Zeil-Neelsan.

Aim

The present study was undertaken with the following Aim:

1. To see wheather cytomorphological study of pleural fluid in patients of TPE can help in facilitating the diagnosis in cases persistently found negative on bacteriological examination.
2. To provide an early diagnosis of tuberculosis.

Material and Method

Total 50 known cases of TPE in which treatment is not yet started were randomly selected. These cases belonged to different age groups. These are the cases where material obtained was adequate for cytological study. Smears were prepared from the sediments obtained after centrifusing the pleural fluid for 15 minutes at 2000 RPM. At least 5 smears prepared for each case. The smears were stained with:

1. Haematoxylin and Eosin
2. Papanicolau and
3. Ziehl-Neelsen [Z-N]staining

In addition, culture for AFB was also done in all cases. The time delay of culture was tried to over come by to over come by Zeihl- Neelsen staining.

Observation

Table A: Cytologic Pattern in Pleural Fluid

S. No.	Cytologic Findings	No. of Patients
1.	Predominently or only lymphocytes	44[88%]
2.	Mesothelial cells—Occasional -- In groups	03[06%] 01
3.	Histiocytes	18
4.	Mixed inflammatory cells	31

Table B: Z-N Staining for A.F.B.

Name of the Fluid	Positive	Negative
PLEURAL	01	49

Table C: Culture for A.F.B.

Name of the Fluid	Positive	Negative
PLEURAL	02	48

Amongst all these cases, one intresting was encountered during the course of the study as mentioned below:
One muslim female patient, middle aged suffering from PTE. She was also having tuberculosis of the breast.The patient was a post natal case and lacerations were present around the nipple. The scrap smear prepared from the laceration showed tubercle bacilli on Z- N staining.

Discussion

Studies conducted all over the world have high lighted

Table B: Cytological Pattern in Ascitic Fluid

S. No.	Cytological Pattern	No. of Cases
1.	Predominently Lymphocytes	20[80%]
2.	Mixed Inflammatory	18
3.	Mesothelial Cells Occasional	02[08%]
4.	Histiocytes	02

Table C: Cytological Pattern in Cerebrospinal Fluid

Cytological Findings	No. of Cases
Lymphocytes Predominently	14[70%]
Scanty Cellularity	08
Acute Inflammatory Cells Predominently	02

RED BLOOD CELLS THE SYMPTOMS AND SIGNS OF TUBERCULAR PLEURAL EFFUSION [TPE] ARE Early diagnosis of tuberculosis and initiating
optimal treatment would not only enable a cure of
an individual patient but will also curb the
transmission of infection and disease to others in
However, the advantages of simplicity, costeffectiveness
and scope of speedy automation make
serology an attractive adjunct in diagnosis
the communityNON SPECIFIC AND A HIGH INDEX OF SUSPICION IS REQUIRED FOR ITS DIAGNOSIS

the heterogenous nature of the TPE and paucity of lab confirmation of the diseacs. Pleural effusions can occur in any form of pulmonary tuberculosis. It is a well-known fact that neither the clinical features nor any of the imaging modalities are of much help in the diagnosis of a tuberculous pleural effusion. Coexisting parenchymal disease detected radiographically in about one third of the patients with an effusion serves as a marker of active pulmonary tuberculosis. Computed tomography of chest may show lymphadenopathy, pulmonary infiltrates or cavitation not seen on chest radiographs; which although non-specific, may help to distinguish tuberculous pleurisy from other causes like malignancy1. Also there is no single reliable serological test for pulmonary or extra pulmonary tuberculosis. The onus of proving tuberculosis as a cause of pleural effusion rests on microbiological (smear/culture), and histological analysis of aspirated pleural fluid and biopsied pleural tissue. Mycobacteria are seen in pleural fluid only in 10 - 20 % of cases whereas a culture though positive in 25 - 50 % of the cases takes a minimum of 6-8 weeks by conventional methods to be of any clinical utility.

Pleural biopsy is currently the best way to make exact diagnosis but this facility is seldom available in developing countries.

Present study is carried out at SARASWATHI INSTITUTE OF MEDICAL SCIENCES, ANWARPUR HAPUR. Total 50 diagnosed cases of were randomly selected in which treatment was not yet started. Z-N staining and culture was done in each case to reach the definitive diagnosis.

In the present study Table A shows that lymphocytes were present in large number in all the cases. Mesothelial cells were [occasional less than 5cells/100 WBC]. except in one case where they were in groups.

In patients with symptoms of duration less than 2 weeks,there may be predominance of polymorphonuclear leucocytosis. Richard1[1979].

Richard[1979] mentioned that the most useful study of ruling out tuberculosis is analysis of fluid for mesothelial cells.This was confirmed by Light 1979.

The explanation for the disappearance of mesothelial cells is that the serous membrane become covered by a fibrinous layer and subsequently get destroyed by the growth of tubercular granulation tissue. [Spriggs and Boddington 1968]. They stress that if there are scarce or absent mesothelial cells, tuberculosis is a possibility even when lymphocytes do not predominate.

Eosinophils were absent in all the cases. This finding goes in hand with. [Richard,1979] which states that if eosinophils are found in significant number [>10%] one can exclude the diagnosis of T.B. [Richard, 1979]

TABLE B & C shows that only 4% of the case were positive for AFB by Z-N staining & by culture. This low positivity is because mycobacterium bacilli occur in small number [1x10raise to 2 TO 1x10 raise to 4/ml] in closed lesions where the Ph is more acidic due to presence of histiocytes. [Stratton et al,1981]

Summary and Conclusion

CMP pattern in know TPE patients were studied to find out any cellular component peculiar to tuberculosis which will help in the diagnosis and especially in cases persistently negative for tubercle bacilli.

Finding of the present study can be summerised as follows

For TPE, Absence of mesothelial cells and predominance of lymphocytes is a constant finding. IWe did not find Eosinophils even in single case. Hese are the diagnostic CMP in TPE.

Thus in considering the absence of definitive bacterial isolation method for the correct diagnosis of this [PTE] potentially treatable disease, and importance of its early diagnosis as the disease is completely curable in its earlier stages,the present study definitely play an important role in makine the diagnosis of TPE. Such confirmation of the disease may be reassuring to the clinicians and patients particularly when the differential diagnosis includes other possibilities besides tuberculosis. The reports can be given on the same day thus providing early diagnosis.

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Prevalence of Asymptomatic Bacteriuria Among Pregnant Women and its Association with Pregnancy Outcome

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Abstract

Objective

To study the prevalence of asymptomatic bacteriuria(ABU) in pregnant women& its association with pregnancy outcome.

Method

A Descriptive Study (Cross Section) was done in 800 antenatal women up to 28 weeks during the year 2009-2010.Urine culture was done after recording patient obstetrical, personal, past history, clinical examination. Out of which 48 (Group-A) found having ABU ($>1\times10^5$ CFU/ml), while 752(Group-B) were not having any bacteriuria. Both the Groups were further followed monthly up to delivery. At the time of delivery perinatal outcome recorded.

Result

Prevalence of ABU is 6% (48/752). E.coli (75%) was common pathogen followed by Staph.saprophyticus, Klebseilla. It is associated with increased risk of Symptomatic UTI as 12.5% bacteruric & 2.93%non-bacteruric women develop symptomatic UTI($p<0.001$). ABU was found to be associated with Preterm Labour as 20.83% bacteruric & 4.8% non-bacteriuric women have preterm labour($p<0.044$). It is also associated with Low Birth Weight babies as 16.67% in bacteriuric & 6.12%non-bacteriuric women have LBW babies($p<0.049$). Conclusion: ABU is a common infection during pregnancy & it increases the risk of Preterm birth, Low birth weight babies & Symptomatic UTI.

Key Word

Asymptomatic Bacteriuria, CFU-Colony Forming Unit, E.Coli, Urinary Tract Infection, Preterm Labour.

Introduction

Asymptomatic bacteriuria (ASB) is bacteriuria without apparent symptoms of urinary tract infection[1]. It is major risk factor for development of urinary tract infection. Asymptomatic bacteriuria affect all age group but woman particularly pregnant women are more susceptible than men due to pregnancy, short urethra, early contamination of urinary tract with faecal flora and various other reason. Urinary tract undergoes profound physiological and anatomical change during pregnancy facilitating the development of bacteriuria both symptomatic and asymptomatic in women[2].

There are number of conditions associated with an increased prevalence of asymptomatic bateriuria in pregnancy like low socioeconomic status, diabetes mellitus, grand multiparous women[3] etc. Each is associated with two fold increase in the rate of bacteriuria[4].

Asymptomatic bacteriuria in pregnancy is associated with maternal and fetal complication. Maternal complication includes Preclampsia, Anemia, Chorioamnionitis, acute cystitis, acute pyelonephritis. Fetal complication includes Intrauterine growth retardation, Intrauterine death, Low birth weight babies, Prematurity, Premature rupture of membrane etc[5,6].

The present study was thus undertaken to estimate the prevalence of asymptomatic bacteriuria in pregnancy, its causative agent and its consequences in pregnancy.

Material and Methods

800 antenatal women were screened for asymptomatic bacteriuria. Out of which 48 found having asymptomatic bacteriuria($>1 \times 105$ CFU/ml), while 752 were having sterile urine. All women were further followed up to the delivery of their babies.

All data thus calculated was charted, tabulated and analyzed statically. The different parameters were determined as Anaemia, Pregnancy induced Hypertension, Preterm labour and symptomatic UTI. Perinatal outcome of these pregnancies was also studied, in the form of Low birth weight, IUGR, Birth asphyxia, admission to NICU and perinatal death.

Result

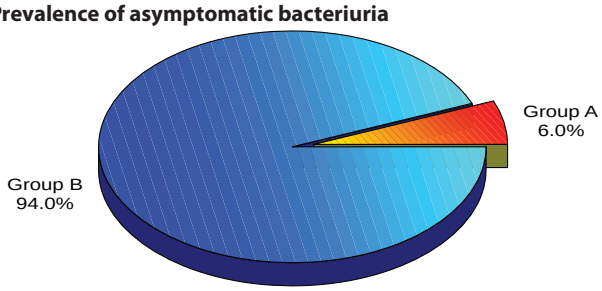
In our study prevalence of asymptomatic bacteriuria was (48/800) 6% in pregnant women. The dominant bacteria were E.Coli 75% (36/48) followed by Staph. Saprophyticus, Klebsiella 25%(12/48). Ciprofloxacin was the most sensitive antibiotic for all the three species

isolated. Tetracycline, Nitrofurantoin and Nalidixic acid were the other antibiotics explored for sensitivity. The sensitivity for different microbes ranged from 50% to 77.8% for these three antibiotics.

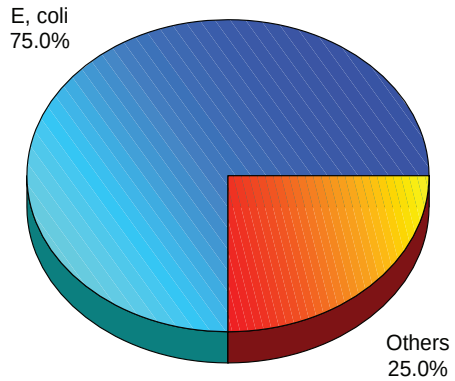
In our study there was no significant association found between ABU with Religion. While rural community show significant compositions (44/48). It is found that 79.2% of bacteriuric women was of upper lower class, and 54.5% of non-bacteriuric women were of this class. Statically it is found significant (p<0.002). So asymptomatic bacteriuria is more common in lower socioeconomic status. Maximum no of patients in both the study group were of age group 21-25 years, Thus asymptomatic bacteriuria was common in age group 21-25 years. Difference was not significant. (P=0.835)

Statistically, the group were matched parity wise. In bacteriuric women 4 patients were nulliparous (8.3%) & rest were multiparous. 100 patients in non-bacteriuric were nulliparous (13.3%) & rest were multiparous.So asymptomatic bacteriuria is more common in Multiparous women. Statistically, there was a significant difference between two groups as regards the parity (p<0.001). Asymptomatic bacteriuria is diagnosed in maximum no. (58.3%) in early weeks (11-20weeks) of gestation as compared to later gestation. Statically it is significant. (p<0.001).

Prevalence of asymptomatic bacteriuria



Bacteria Growth on Urine Culture



Maternal Outcome

In our study anaemia is considered if Hb is<10 gm/dl. 83.3% of bacteriuric women were anemic while 82.4% of non-bacteruric was also anaemic. Statistically it is found insignificant. (p=.875). On analysis hypertension found

Table: Demographic and Physical Characteristics

S. No.	Characteristic	Group–A (n=48)	Group –B (n=752)	P
1.	Religion Hindu Muslim Other	 28 20 0	 400 352 0	 0.489
2.	Residence Rural Urban	 44 4	 694 56	 0.876
3.	Age <20 21-25 26-30 >30	 8 (16.7%) 20 (41.6%) 16 (33.3%) 4 (8.4%)	 140(18.6%) 312(41.5%) 260(34.5%) 40 (5.4%)	 0.835

Table: Maternal outcome

S. No.	Characteristic	Group –A (n=48)		Group –B (n=752)		χ^2	P
Haemoglobin							
1.	<10gm/l	40	83.33%	620	82.45%	0.025	0.875
2.	>10gm/l	8	16.67%	132	17.55%		
Pregnancy Induced Hypertension							
1.	>140/90 mm Hg	6	12.5%	66	8.8%	0.764	0.382
2.	<140/90 mm Hg	42	87.5%	686	91.2%		
Preterm labour							
1.	Preterm	10	20.8%	84	11.2%	4.063	0.044
2.	At term	38	79.2%	668	88.8%		
Symptomatic UTI							
1.	Present	12	25%	22	2.9%	54.028	<0.001
2.	Absent	36	75%	730	97.1%		
Mode of delivery							
1	LSCS	8	12.5%	112	14.1%	0.111	0.739
2	Vaginal	40	87.5%	640	85.9%		

in 12.5% of bacteriuric (6/48) & 8.7% of non-bacteriuric women (66/376). Statistically it found insignificant. Incidence of symptomatic UTI was significantly higher in bacteriuric (25%) as compared to non-bacteriuric women (2.9%) (p<0.001). 20.8% (10/48) of bacteriuria women found develop preterm labour<37 weeks of gestation while 4.8% (36/752) of non-bacteriuric group experience preterm labour pains. These finding are statistically significant (p<0.044).

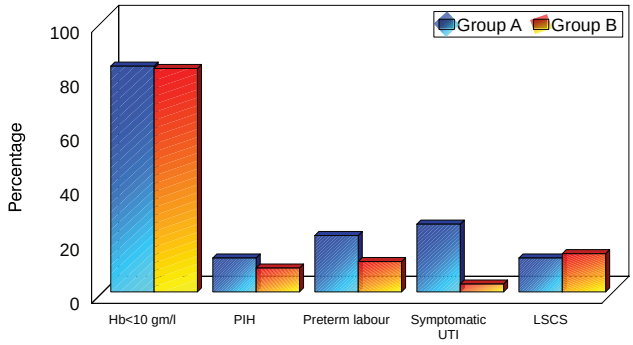
Perinatal Outcome

The incidence of low birth weight was significantly higher in bacteriuric (12/48) 25% as compared to non-bacteriuric (109/752)14.49%. It is found statically significant (p<0.049). No association found between IUGR and asymptomatic bacteriuria. Birth asphyxia, NICU admission, neonatal mortality is not associated with asymptomatic bacteriuria in both groups.

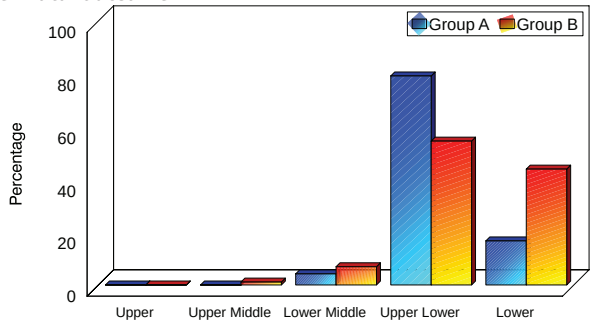
Table: Perinatal outcome

S. No.	Characteristic	Group –A (n=48)		Group –B (n=752)		χ^2	P
Birth Weight							
1.	Birth weight <2.5 kg	12	25%	109	14.49%	3.879	0.049
2.	Birth weight >2.5 kg	36	75%	643	85.51%		
Cause of LBW							
1.	Preterm	10	83.3%	84	77.06%	1.763	0.834
2.	IUGR	2	16.7%	25	22.94%		
1 min. Apgar Score							
1.	<7/10	2	8.3%	60	7.9%	0.917	0.338
2.	>7/10	44	91.7%	692	92.1%		
NICU admission							
1.	Admitted	9	18.8%	77	10.2%	3.406	0.065
2.	Not admitted	39	81.2%	643	89.8%		
Neonatal Mortality							
1.	Alive	48	100%	748	99.4%	0.257	0.612
2.	Stillbirth/IUD	0	0%	4	0.6%		

Maternal outcome



Perinatal outcome



Discussion

In present study, prevalence of asymptomatic bacteriuria was (48/800) 6% in pregnant women, and Escherichia coli(75%) is most dominant causative organism followed by Staphy.saprophyticus and Klebseilla, Ciprofloxacin was the most sensitive antibiotic for all the three species isolated. Tetracycline, Nitrofurantoin and Nalidixic acid were the other antibiotics explored. These finding coincides with Aziz Marjan 7Khattak, Salim Khattak8 etal. prevalence i.e.6.2% in local population of Karachi in 2002 with E.coli (38.89%) in maximum concentration. Naheed fatima & Shabnam ishrat etal9found lower prevalence i.e. 4.8% among local population of Bahawalpur with E.coli (78.6%) in dominant number.

No association was found with Religion and Residence, but significant numbers of patient were in lower socioeconomic status. Other investigator justify us as Peggy J Whalley8 states that variations appear to be related to socioeconomic status & women with ABU studied. The highest prevalence is found in women attending public clinic for indigent women[10,11,12]. Turck Goffe and Patersdorf specifically studied the influence of socioeconomic factor on pregnancy bacteriuria.

No significant correlation found with ABU and Age of patient. But maximum no of multiparous women were present in bacteriuric group. Diverse opinion exists when age, parity was examined. First trimester women were significantly found to be affected by bacteriuria Nerissa Isabel C. Etal. Agrees with us as they said multiparity is associated with bacteriuria in pregnancy, earlier the gestational age the greater the likelihood of bacteriuria. Some investigator claimed that neither age nor parity influences the prevalence of maternal ABU. Henderson, M.[10], Entwisle,G.,and Tayback. M.Hoja[13].

In the present study no significant association of ABU was found with Anaemia and PIH. but Asymptomatic bacteriuria have significant correlation with development of Preterm labour and Symptomatic UTI. Kincaid - Smith and Bullen[12] noted that 37% patient of asymptomatic bacteriuric women develop symptomatic UTI as compared to non-bacteriuric women. Similar findings are showed by Naheed Fatima, Shabnum ishrat etal9 that bacteriuria was found to be causative factor for preterm labour.

The incidence of low birth weight was significantly higher in bacteriuric women. No association found with Birth asphyxia, neonatal admission and neonatal mortality. Urinary tract infection has also been implicated as a risk factor for adverse perinatal outcome of premature birth and/or low birth weight as stated by Kass EH., LeBlanc AL, etal[7].

Conclusion

This concludes that Asymptomatic bacteriuria is a common infection during pregnancy and it greatly increases the risk of Symptomatic UTI, Preterm labour & Low birth weight babies. Association of asymptomatic bacteriuria with anaemia, PIH, IUGR babies was statically insignificant.

Screening with a single urine test could detect most cases of bacteriuria. There is a strong evidence to recommend that screening of bacteriuria should be a routine at antenatal clinics and appropriate treatment should be provided. Screening and treatment of bacteriuria is likely to be cost effective.

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Schwannoma with Unique Pathologic Features- A case report

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Abstract

Schwannoma/Neurilemmoma is a benign mesenchymal tumor, contains no neural elements but arises from the nerve sheath or Schwann's cells. Neurilemmoma is encapsulated and exhibits a characteristic histologic pattern known as Antoni type A and Antoni type B with Verocay bodies. The lesion is partially encapsulated but well demarcated from overlying atrophic/ stretched oral mucosa. We present a case of schwannoma occurring in a 60 year old male edentulous patient with a chief complaint of firm, non tender swelling in anterior mandibular region which gradually increased in size. Interestingly, in many areas, traumatic neuromas like proliferations of cells of neural tissue with elongated, wavy nuclei arranged in swirls as well as haphazard manner were noted.

Key Words

Intraosseous Schwannoma; Neurilemmoma; Antoni A and B; Verocay bodies.

Introduction

Schwannoma is a benign neoplasm of neuroectodermal derivation that originates from the Schwann cells (cells that cover peripheral nerves). This painless, slow-growing, encapsulated tumor lesion may develop at any age and is most frequently located in the soft tissues of the head and neck (25% to 48%) and can range from a few millimeters to several centimeters in size[1,2,3,4].

Intraoral schwannomas are rare, representing less than 1% of the benign primary bone tumors. The most common site of occurrence is the mandible[5,6].

Case Report

A 60-year-old male presented with a slow growth swelling in the mandibular region since 2 months of evolution. Patient was relatively asymptomatic before 2 months. Then he noticed a small painless swelling in anterior mandibular region. Swellings gradually increase in size upto the present size. No history of pain and paresthesia. A clinical examination revealed a single, firm, non-tender swelling 2 x1.5 cms, fixed to overlying edentulous oral mucosa. Patient gives history of denture wearing since last 10 years. The area was swollen, round, singular and hard, with no bleeding was lined with normal mucosa. No radiographic changes were noted.

A diagnosis of fibroma or fibrous epulis was given and excised. The received soft tissue specimen was yellowish white in color measuring about 1.5x 1 cm in diameter and soft in consistency.

Microscopic examination of the mass showed predominantly spindle shaped cells arranged in various patterns. The lesion was partially encapsulated but well demarcated from overlying atrophic as well as hyperplastic oral mucosa (Figure 1). Normal hyperplasic oral epithelium was also evident. In many areas, traumatic neuroma like proliferations of neural tissue with wavy, elongated, nuclei arranged in swirls and haphazardly was noted (Figure 2). Antoni A, Antoni B type areas and

Figure 1: Photomicrograph showing spindle shaped tumor cells arranged in whorls with overlying the keratinised stratified squamous epithelium (H & E stain X 50).

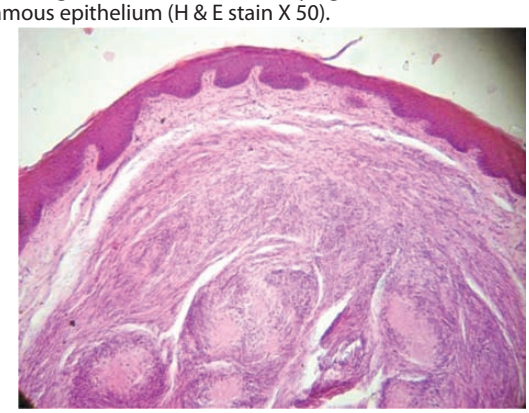


Figure 2: Photomicrograph showing traumatic neuroma like proliferations of neural tissue with wavy, elongated, nuclei arranged in haphazardly and swirls pattern (H & E stain X 100).

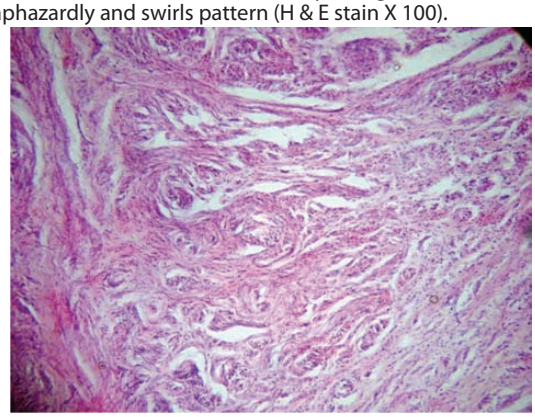
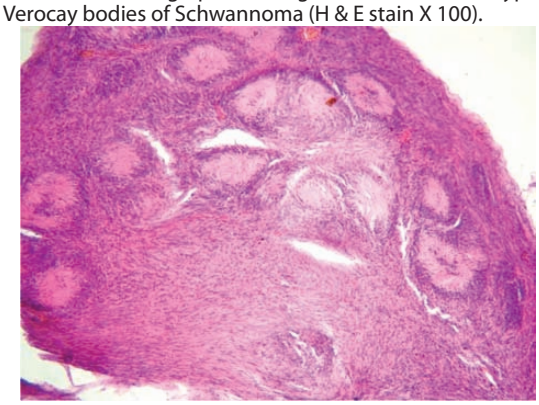


Figure 3: Photomicrograph showing Antoni A, Antoni B type areas and Verocay bodies of Schwannoma (H & E stain X 100).



Verocay bodies of Schwannoma were also seen in the same case (Figure 3).

Based on clinical features and microscopic findings were suggestive of the diagnosis of 'Schwannoma with traumatic neuroma like changes'.

Discussion

Schwannoma rarely occurs in the oral cavity. Most of the cases reported are in the mandible occurring in more posterior location, corresponding to the intraosseous course of the inferior alveolar nerve[7,8]. Intraosseous schwannomas are rare and less than 1%[1,6], but when they occur, the mandible is the most commonly affected site[9,10].

The present case is somewhat unusual because of its association with the peripheral nervous plexus of the anterior region of the mandible its anterior mandibular region.

The mechanism of schwannomas in the case reported here involves a soft tissue or periosteal tumor may cause secondary erosion and penetration into bone[11].

The clinical presentation of this case was a painless swelling tumor in the region of mandibular region in a male of the sixth decade of life.

The microscopic aspect was characteristic and easily distinguishable from other lesions. There are two types of tissue arrangement: Antoni-A and Antoni-B. Between the fibrils there are small eosinophilic masses called Verocay bodies. Antoni- B type is composed of a smaller number of cells and the spindle cells are randomly arranged within a loose myxomatous stroma. In this case, Antoni A tissue was the predominant microscopic pattern. Along with this, traumatic neuroma like proliferations of neural tissue with wavy, elongated, nuclei arranged in swirls and haphazardly was noted. Because, it is a well-encapsulated lesion, the treatment of choice for schwannomas is the conservative surgical enucleation with periodic follow-up.

In brief, this could be the first reported case of schwannoma with traumatic neuroma like changes arising from the mental nerve found in a 60 years old male edentulous patient which was of 2 months duration.

The schwannoma represents a lesion not commonly encountered in routine dental practice. The submucosal forms of this lesion are usually indistinguishable from other benign neoplasms that are also usually seen in the same region. The final diagnosis should be done after histopathological examination and in very few cases after immunohistochemical analysis. The treatment of this lesion is total removal of the lesion.

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Chronic Renal Failure and Hypothyroidism

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Abstract

This study was undertaken to test the thyroid function with chronic renal failure. Forty patients of CRF and forty healthy who served as control were studied for their thyroid function status. The study observed low total T3 and total T4 values in clinically euthyroid CRF patients. However, finding of normal free T4 values (which is metabolically active fraction) and TSH would indicate functional euthyroid status. It can be presumed that free T4 values would fall if these patients develop hypothyroidism, and TSH values would rise simultaneously. Thus free T4 and TSH level combined can be used for diagnosis of hypothyroidism in presence of chronic renal failure. This study found that the plasma concentrations of thyroid hormones in patients with chronic renal failure both free T3 1.38±0.31 pmol/L and total T3 serum concentrations1.06±0.23 nmol/L were reduced as compare to control respectively. Similarly both serum freeT4 06.27±1.09 pmol/L and total T4 56.17±0.8.96 nmol/L were also reduced in chronic renal failure patients .There was slightly increase in serum TSH 6.21±0.73 mlU/L as compared to control 3.43±0.44 mlU/L. Thus it is suggested that thyroid hormones should be evaluated in chronic renal failure patients and thyroid hormone therapy should be given in these patients to maintain thyroid hormone level.

Key Words

Chronic renal failure (CRF), Creatinine clearance, Goiter, Hypothyroidism, Thyroid hormones (TH).

Introduction

The kidney normally plays an important role in the metabolism, degradation and excertion of several thyroid hormones. This contributes to the clearance of iodide; primarily by glomerular filtration. Thus iodide excretion is diminished in advanced renal failure, leading subsequently to an elevated plasma inorganic iodide concentration and an initial increment in thyroidal iodide uptake. The ensuring marked increase in the intrathyroidal iodide pool results in diminished uptake of radiolabeled iodide by the thyroid in chronic renal failure[1,2]. Increase in total body inorganic iodide can potentially block thyroid hormone production. Such a change may explain the slight frequency of hypothyroidism and goiter in patients with chronic renal failure[3,4]. In such patient with renal failure, renal clearance decreases at the same time as renal blood flow progresses, renal tubular and paritubular transport of hormones decreases, causing disparity in serum hormones concentrations[5,6]. Different studies have shown thyroid dysfunction in patients with CRF which include low circulating concentrations of thyroid hormones, altered peripheral thyroid hormones metabolism and altered binding to transporting proteins, as well as a reduction in thyroid hormone content and increase of iodine reserves in thyroid gland[7]. Epidemiologic data suggests that euthyroid sick syndrome (ESS) is the most common condition, followed by subclinical hypothyroidism[8]. ESS affect subject without thyroid disease and with a biochemical finding, that is commonoly characterized by decrease in triiodothyronine(T3) and occasionally free thyroxine (FT4), as well as an increase in reverse T3 levels, whereas thyroid stimulating hormone (TSH) remain normal. Subclinical hypothyroidism is characterized by increase in the level of TSH; however total T3 and free remains within normal range[9,10]. Given the similarity of signs and symptoms, sometimes it is difficult to identify subject with CRF who also present hypothyroidism,[11,12] therefore, different studies have been carried out to estabilish the incidence of these condition. Most of these studies involve adult populations and indicate prevalence that ranges between 5and 30%[13,14]. Few studies involving children with CRF have been published and incidence of thyroid dysfunction that ranges between 10 and 55%[15,16] has been found. With regard to the type of condition, in case of both children and adults ESS was most common followed by primary hypothyroidism, secondary hypothyroidism[17] and goiter[18] as described in adults. Free T4 values remain within the normal range[19]. The aim of this study was to establish the incidence and type of thyroid dysfunction with chronic renal failure.

Material and Method

Forty patients of chronic renal failure (CRF) attending the Department of Medicine and Central Lab Biochemistry, SIMS Ghaziabad from Dec. 2009 to August 2010 were studied after taking all clinical and biochemical investigation, history (renal function test including serum creatinine, blood, urea, total protein, creatinine clearance. The severity of chronic renal failure was

based on creatinine clearance values in patients with diabetes mellitus, nephritic syndrome and those might affect on renal function were excluded from study. Forty healthy individuals preferably relatives of patients were selected to serve as normal control. After an overnight fast of 14-16 hours, 5ml blood samples of patient and control were collected in vacuum tubes and allowed to clot at room temperature for 60-120 minutes followed by centrifugation at 3000 g for 10 minutes at 40 degree C. Serum was stored at -20 degree C for estimation of thyroid hormones T3 and T4 by EIA method[21], kits were supplied by Span Diagnostics, Surat, India.

The following investigations were carried out in all patients and controls.

1. Serum Total Triiodothyronine (TT3)
2. Serum Total Thyroxine (TT4)
3. Serum Thyroid Stimulating Hormone (TSH)
4. Serum free T4 and free T3.

Observation

The study was conducted on 40 patients (26 male and 14 female) of different age group and 40 healthy age and sex matched individual served as control.

Table no-1 shows the distriburion of patients according to age group. The result shows maximum patients (14) 35% were in the age of 51-60 years followed by (12) 30% were in age group of 60 and above years, 08 patients were in age group of 41-50 years, 04 patients were in age group of 31-40 years, while the least (02)5% were in age group of 20-30 years.

Table 1: Distribution of patients according to age

Age group (years)	No of patients	Percentage
20-30	02	5.0%
31-40	04	10.0%
41-50	08	20.0%
51-60	14	35.0%
60 and above	12	30.0%
Total	40	100%

Table no-2 shows level of serum total T3, total T4, free T3 and free T4 in renal failure patients were significantly decreased 1.06±0.23 nmol/l, 56.71±08.96 nmol/l, 1.38±0.31pmol/L and 06.27±1.09pmol/L and serum TSH was slightly increased 06.21±0.43ml/U/L as compared to control p<0.001.

Table 2: Thyroid hormones concentration in patients of chronic renal failure and control

Serum concentration	CRF (no=40) mean±S.D.	Control(no=40) mean±S.D.	P value
Total T3nmol/L	1.06±0.23	1.64±0.27	<0.001
Total T4nmol/L	56.17±08.96	87.01±11.16	<0.001
TSHmIU/L	06.21±0.73	3.43±0.44	<0.001
Free T3(pmol/L)	1.38±0.31	4.73±0.59	<0.001
Free T4(pmol/L)	06.27±1.09	17.03±1.86	<0.001

Discussion

The interactions between kidney and thyroid functions are known for years[22,23]. Thyroid hormones (TH) are necessary for growth and development of the kidney and for the maintenance of water and electrolyte homeostasis. On the other hand, Kidney is involved in the metabolism and elimination of TH. From a clinical practice viewpoint, it should be mentioned that both hypothyroidism and hyperthyroidism are accompanied by remarkable alterations in the metabolism of water and electrolyte, as well as in cardiovascular function. All these effects generate change in the water and electrolyte kidney management[24,25]. Moreover, the decline of kidney function is accompanied by change in the synthesis, secrection, metabolism and elimination of TH. Thyroid dysfunction acquires special characteristics in those patients with advanced kidney disease[26,27]. On the other hand, the different treatments used in the management of patient with kidney and thyroid diseases may be accompanied by changes or adverse events that affect thyroid and kidney function respectively[28,29].

The most common kidney derangements associated to hypothyroidism are elevation of serum creatinine levels, reduction in GFR and renal plasma flow (RPF)[30], disruption of the capacity to excrete free water and hyponatremia[31]. These alteration may be absent in patients with central hypothyroidism due to the fact this kind of thyroid hypofunction is often accompanied by other pituitary hormone deficiencies that might affect directly or indirectly the kidney function[32].

Primary hypothyroidism is associated with a reversible elevation of serum creatinine in both adults[33,34,35] and children[36,37]. This increase is observed in more than half (55%) of adults with hypothyroidism[38]. Moreover some authors have reported an elevation of serum creatinine associated with subclinical hypothyroidism[39].

Primary hypothyroidism is associated with a reduction of GFR and RPF that are normalized following levothyroxine administration[14,15,29,32,33,37,39]. Similarly, normalization of circulating TH concentrations with replacement therapy in hypothyroid with chronic kidney disease (CKD) can significantly improve GFR[40]. However, it has recently been reported that kidney function recovers slowly in hypothyroid children, and sometimes partially, after the introduction of replacement with levothyroxine[41]. The long- term clinical implications of these findings are unknown.

Hypothyroidism –associated kidney dysfunction seems to be more related with the decline in thyroid hormone levels rather than with thyroid autoimmunity[42]. Among the mechanisms involved in hypothyroidism-associated kidney derangements are direct effects of TH on the cardiovascular system (increased peripheral resistance and reduction of myocardial contractility and stroke volume) and metabolism (hypothyroidism and indirect

effects through paracrine or endocrine mediators such as insulin –like growth factor type I (IGF-I) and vascular endothelial growth factor)[12,39,42].

Several factors, including malnutrition and intercurrent processes, may be involved in the reduction of serum T3 in uremia patients. Fasting and disease alter iodothyronine deiodination, thus reducing peripheral production of T3. The presence of chronic protein malnutrition is associated with a reduction of binding protein synthesis and could reduce plasma total T3 concentration TNI and interleukin–I inhibit the expression of type 15-deiodinase, the enzyme responsible for T4 to T3 conversion in peripheral tissues. This would explain how chronic inflammation and vascular damage associated to CKD interferes with the normal process of T3 synthesis from T4[43,44,45,46]. The case of the renal failure in hypothyroidism is due to two mechanisms, decreased renal plasma flow due to a hypodynamic state in hypothyroidism and in severe cases renal failure can be secondary to rhabdomyolysis, knowledge of the association between thyroid dysfunction and renal impairment is important for the clinician. We suggest that thyroid function testing should form part of the first line blood investigations for patients with chronic renal failure.

Conclusion

This study was undertaken to test the thyroid function with chronic renal failure. Forty patients of CRF and forty healthy who served as control were studied for their thyroid function status. The study observed low total T3 and total T4 values in clinically euthyroid CRF patients. However, finding of normal free T4 values (which is metabolically active fraction) and TSH would indicate functional euthyroid status. It can be presumed that free T4 values would fall if these patients develop hypothyroidism, and TSH values would rise simultaneously. Thus free T4 and TSH level combined can be used for diagnosis of hypothyroidism in presence of chronic renal failure. This study found that the plasma concentrations of thyroid hormones in patients with chronic renal failure both free T3 1.38±0.31 pmol/L and total T3 serum concentrations1.06±0.23 nmol/L were reduced as compare to control respectively. Similarly both serum freeT4 06.27±1.09 pmol/L and total T4 56.17±0.8.96 nmol/L were also reduced in chronic renal failure patients. There was slightly increase in serum TSH 6.21±0.73 mlU/L as compared to control 3.43±0.44 mlU/L. Thus it is suggested that thyroid hormones should be evaluated in chronic renal failure patients and thyroid hormone therapy should be given in these patients to maintain thyroid hormone level.

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Socio-Environmental Determinants of Health: An overview of Vantamuri village

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Abstract

The present survey was conducted to assess Socio-Environmental determinants of Health. A cross sectional study was conducted in Vantamuri Village of North Karnataka and the information was collected regarding water supply, sanitary facilities, disposal of solid and liquid waste and health care facilities, by house to house survey. Statistical analysis was done by calculating proportions and percentages. There were around 500 families living in the village and out of them 59% were below poverty line. Fifty one percent of villagers used well water and majority of them were not sanitary wells. Only one bore well was there for public use. Only 13% of families had a facility of sanitary latrines and rest practiced open air defecation. The main source of energy for cooking was wood (85%). New approaches aiming to change these practices into culturally acceptable ones, to improve healthy living conditions and to promote innovative technology for human excreta disposal, solid waste disposal are required in rural places.

Background

World Health Organization has defined the health which gives positive side of the existence. The community health is nothing but a group of people in community must have harmony with their environment. This can be achieved through improving the host resistance of population to environmental hazards, safety of the environment and improving our health care systems. Developing countries and poor countries are facing the problems like poverty, inequity and epidemiological transition[1].

Safe water is one of the most important felt needs in public health in developing countries in the twenty first century. In India, approximately 72.7 per cent of the rural population does not use any method of water disinfection and 74 per cent have no sanitary toilets[1]. It is estimated by World Health Organization (WHO) and United Nations International Children's Emergency Fund (UNICEF) that 1.1 billion people lack access to improved water supply and improved sanitation yet to reach 2.6 billion in developing world including 500 million in India. The country also loses over an estimated 200 million workdays annually due to these diseases. The year 2005 marked the beginning of the "International Decade for Action: Water for Life" and the renewed effort to achieve the Millennium Development Goal (MDG) to reduce by half the proportion of the world's population without sustainable access to safe drinking water and sanitation by 2015[2]. On the Total Sanitation Program the construction of nearly one crore toilets was planned and hoped that every rural school, Anganwadi centre will have proper toilets by March 2008[3].

According to WHO's report 2.6 million deaths occur every year in India by diseases due to poor environmental and sanitary conditions[4]. Diarrheal diseases are one of the major causes of childhood mortality and morbidity in the developing countries and 88% of diarrheal diseases are attributed to use of unsafe water, poor sanitary facilities and poor hygiene[5]. More than 4 million children die each year of infectious diarrheal diseases worldwide. The most frequent causes identified are contaminated water and unhygienic conditions. Most common pathogens identified are V. Cholera (56%) among bacterial, Giardiasis (6.3%) in parasitic and Rotavirus (7.7%) in viral infections6. Access to adequate safe potable water not only reduces incidence of diarrheal diseases but also improves child and maternal health indirectly by enabling women to spend more time on child care activities[1].

Indoor air pollution is another environmental hazard faced by the rural population especially by the women and children. A majority of the world's population still relies principally on wood, animal dung and crop residues for fuels. Wood stoves create pollutants both indoors and outdoors. Exposure to irritant gases like suspended particles of respirable size, gases including polycyclic aromatic hydrocarbons produced during cooking on Chula is considered as a primary cause of acute respiratory infections[7]. Low income households (families) in urban and rural areas are forced to use the wood for fuel in traditional stoves, which is not only a low quality fuel but is also a high cost cooking energy option[8]. India consists of 35% of the global population without access to electricity and only 44% of families in rural area are with electricity facilities[9].

A socio-demographic survey will provide comparable high quality of data base on a range of health indicators. We need to measure the problem, evaluate existing programme and develop new cost effective strategy or technologies and raise the awareness towards the socio-environmental determinants of health and disease[10]. Most of the families living in Vantamuri village suffer

from diseases based on sanitation and water scarcity especially during summer and monsoon flood period. Therefore, this study provides baseline information on environmental sanitation and information of Eco-Scan system application which offer appropriate and sustainable solutions for different circumstances and demands in the village.

Methodology

The extensive survey was carried out in Vantamuri village which is 22 kilometers away from Belgaum city. The information on socio- environmental facilities was collected during May 2008. The protocol of this study was developed based on the required relevant information. The scope of this project covers the existing sanitation system that is practiced in rural area of Karnataka, India and particularly in Vantamuri village.

There were around 500 households (families) in the Vantamuri village. All houses were selected for the survey. Minimum two follow up visits were made, if the family members were not available during the survey. Due to unavailability of 47 families, the survey of 453 households was carried out. The structured questionnaire covered socio demographic data, details of water supply, sanitary facilities and basic health services provided to the people. The situation of the water supply and sanitation in the village was found out by direct interview method and house to house visit. The information was also collected regarding immunization, family planning practices and health care facilities. The analysis was done by using proportions and percentages.

Results

The population of the Vantamuri village (2001 census) was 4622, out of which 2951 (63.85%) were adults and 1671(36.2%) were children. Out of total 500 families, 30% belong to poor status and 59% were below poverty line.

For most of the villagers, well water was the main source of water and majority were not sanitary wells. Only one bore well was there for public use. The water supply to the village is pumped from separate bore wells to overhead water tanks and outflow is connected to the households through pipe lines(Table 1). Only 13% of the households had sanitary latrines and majority (87%) practiced open air defecation (Graph-1). The main source of energy for cooking was wood and most of houses had electric connections (Table 2). Very few households practiced sanitary methods for solid and liquid waste disposal (Table 3). It was observed that in most of households waste was disposed indiscriminately. Only one third of people disposed solid waste satisfactorily.

Various health care facilities were available at Vantamuri. Majority of them 318 (70.2%) used public health care settings such as Primary Health Center which is situated in the village itself; 91(20.1%) used private and 37 (8.2%) used both the facilities. The basic services like immunization and family planning services provided to the community were well utilized in the village. The survey showed that 245/278 (88.13%) of the children (below five years) had been immunized completely, 4(1.5%) were not immunized and remaining were incompletely immunized. Sixty percent (269) couples had adopted permanent method of family planning, 40 (8%) couples used temporary methods and 144 (32%) couples were not using any measures of family planning.

Discussion & Conclusion

It has been estimated that morbidity due to diarrhea can be reduced by an average of 6-20 per cent with improvements in water supply and by 32 per cent with improvements in sanitation[2]. Unsafe water, poor sanitation and indoor smoke are identified as top most risk factors for many health hazards in developing countries. Environmental factors are estimated as being responsible for nearly 20% of disease burden in India1. Many studies have concluded that the healthful environmental factors are important to improve the overall health of the community.

In a village survey conducted at Palwa village of Ujjain District, 84% of population did not have access to water within the household premises and 55% had access to water source at a distance of more than 50 meters and in more than half (58%) of the households, females were responsible to collect water[11]. Compared to this study the accessibility of water is better in our study village, but hygiene practices were not studied in our village.

The studies have shown that contamination of Coliform organisms present in water samples collected at various locations were suggestive of contamination both at the source (overhead tanks) and also in the distribution taps and water stored at homes[12].

Table 1: Distribution of Houses according to sources of water supply.

Sl.No	Source of water	Number	Percentage
1	Tap Water & Bore well	127	28%
2	Well Water	230	50.8%
3	Both	96	21.2%

Table 2: Sources of Energy for Cooking and Lighting at households.

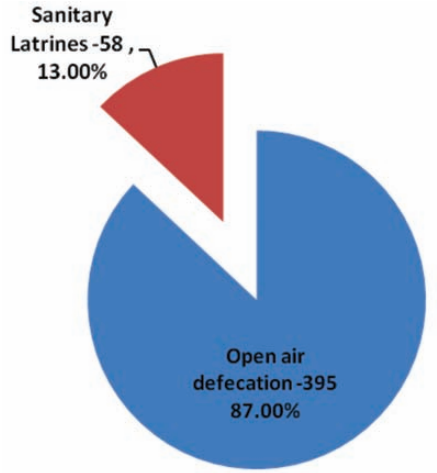
Sl.No	Source of energy	Number	Percentage
1	Cooking		
	Wood	385	85%
	LPG	52	11.5%
	Both	16	3.5%
2	Lighting		
	Electricity	360	79.4%
	Others(No electricity)	93	20.5%

Table 3: Methods of Solid waste and Liquid waste Disposal at households.

Sl. No	Methods of Solid Waste Disposal	Number	%	Methods of liquid Waste Disposal	Number	%
1	Manure pit	144	31.8*	In front of house	250	55.2
2	Throw out side	224	49.4	Soakage pit	40	8.8*
3	Burn	54	11.9*	Kitchen Garden	43	9.5*
4	Back yard	31	6.8	Back yard	120	26.5

*Sanitary methods of disposal

Graph 1: Sanitary Practices in Vantamuri Village



In the present survey 49% households use water supplied from over head tank through tap. Further studies are required to analyze the water quality as it was beyond our protocol. In this survey, 85% households were using wood as fuel for cooking. Low income households are disadvantaged, as they use a traditional low efficiency wood stove which is not only a low quality fuel but is also a high cost cooking energy option. A recent survey in a group of villages in south India revealed that the energy consumed for cooking in these villages amounts to 8.0 GJ/capita/year. By contrast the average amount of energy consumed for cooking in the U.S. using gas stove is 1.5 - 2.0 GJ/person/year. The much higher level of cooking energy consumption in villages in developing countries is chiefly a result of lower fuel economy[8].

A survey of cooking conditions and practices should precede or accompany tests of fuel economy which may be possible to raise the overall fuel economy in an area by discouraging certain practices and encouraging others. According to the 2001 Census, 6.02 crore households use electricity as the primary source of lighting out of a total of 13.8 crore households in the country. In contrast, in this village 79% of households had electricity connection. In the villages availability of electricity is only during the working hours and day time9. Viable and reliable electricity services result in increased productivity in agriculture and labor, improvement in the delivery of health and education and access to communications (radio, telephone, television, mobile telephone). National statistics states of problems regarding generation, transmission and distribution of electricity. Shortages in energy demand and peak power demand have been around 8% and 12% on average between 2000 and 2003, which is going to increase as the population grows and increased industrialization / urbanization. There are many causes of poverty in rural regions of our country. Most of the rural population of India depends on agriculture. Poverty and health are the two sides of the same coin. It has been noticed that more than 22% of the entire rural population and 15% of the urban population of India lives in difficult physical and financial predicament.

Ecologically sustainable sanitation or Eco-Scan is a new approach to sanitation which respects ecological integrity, conserves and protects freshwater, promotes healthy living. New approaches aiming to change these present practices into culturally acceptable practices, to improve healthy living conditions and to promote innovative technology for human excreta disposal. This can generate income or an indirect benefit especially in developing countries like India. Thus Eco-Scan systems offer appropriate and sustainable solutions for different circumstances and demands[6]. Improved literacy, awareness and health education program have a major impact towards the betterment of present scenario. Further research is required in environmental aspects of health determinants.

Acknowledgement

We acknowledge the great cooperation and assistance of NSS team, members and volunteers (2008-09) of J.N.Medical College, Belgaum who actively participated in this survey.

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Differentiation of Bone and Soft Tissue using Methylene Blue-Acid Fuchsin: A new stain combination

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Abstract

Introduction

Hematoxylin-Eosin(H-E) provides optimal staining for histology, but in formalin-fixed, decalcified, paraffin-embedded bone tissue, both bone and soft tissue appear the same shade of pink. In addition to the improved staining properties, the methylene blue-acid fuchsin stain is also superior to H-E in terms of its stability, cost and ease of use.

Aim & Objectives

To determine the efficacy of methylene blue-acid fuchsin stain combination to differentiate mineralized structures from surrounding soft tissues in various oral lesions.

Material & Methods

Two sections each of peripheral cemento-ossifying fibroma, central cemento-ossifying fibroma, fibroma with calcification, fibrous dysplasia, adenomatoid odontogenic tumour and pleomorphic adenoma were taken. One section was stained with hematoxylin-eosin and the other with methylene blue-acid fuchsin.

Results & Conclusion

In contrast to standard hematoxylin-eosin stain, which stains both bone and soft tissues pink, the methylene blue-acid fuchsin stain combination demonstrates remarkable contrast with bone appearing bright pink and the soft tissue blue-purple.

Key Words

Methylene blue, acid fuchsin, bone, soft tissue

Introduction

In the commonly encountered pathologies of the oral cavity, calcified structures often pose problems, may it be in processing or staining. While gross calcific deposits are easily seen in routine hematoxylin-eosin (H&E) stained sections, early minimal deposits are often missed out and differentiation between organic matrix of calcified tissue and soft tissue becomes difficult. From a research standpoint, histomorphometry is an important technique for measuring bone loss[1-3]. However, this requires consistent, efficient, accurate differentiation of bone and soft tissues in order to calculate such parameters as bone area, bone volume and surface lengths. Though immunodiagnostics could be the solution, its high cost, time consuming and cumbersome procedure, special armamentarium makes it a far reach in regular laboratories. Though H-E remains the gold standard, histochemistry can be explored overcoming the constraints of immunohistochemistry. H-E provides optimal staining, but in formalin-fixed, decalcified, paraffin-embedded tissue, both hone and soft tissue appear almost the same shade of pink. Also, consistency can be an issue with H-E since laboratories often use different recipes and protocols for H-E staining. The aim of this study was to find the efficacy of an alternate stain or staining combination that could be used to distin¬guish between bone and soft tissues in paraffin sec¬tions that have been fixed in 10% neutral buffered formalin.

Material & Methods

Five cases each of cemento-ossifying fibroma, fibroma with calcification, fibrous dysplasia, adenomatoid odontogenic tumour (AOT) and pleomorphic adenomas were taken from the archives of the department. Two sections of 4 µ were sectioned from each tissue block. One was stained with routine H-E and the other with methylene blue-acid fuchsin.

Procedure for methylene blue-acid fuchsin staining: 4 Slides were deparaffinized and rehydrated as for H-E.

Figure 1a: Cemento-ossifying fibroma. (H&E 10x)

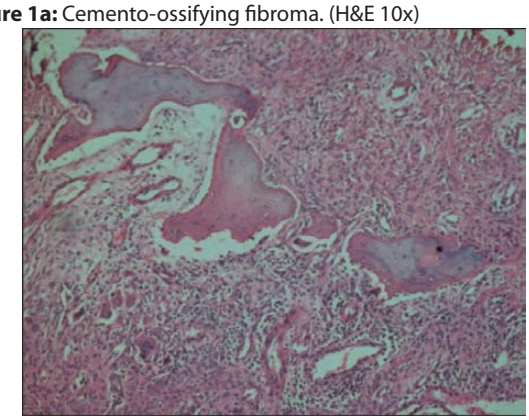


Figure 1b: Cemento-ossifying fibroma. (Methylene blue-Acid fuchsin 10x)

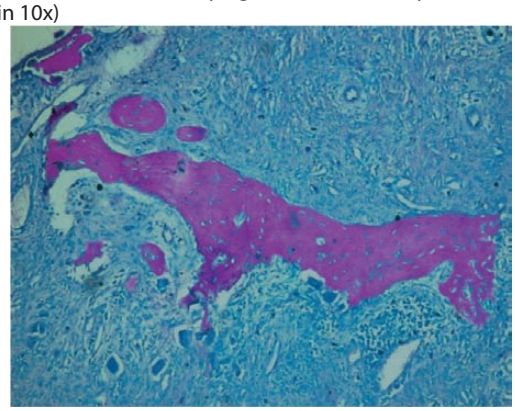


Figure 2a: Fibroma with calcification. (H&E 10x)

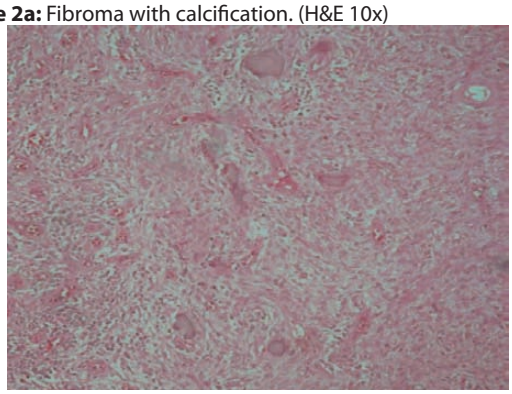


Figure 2b: Fibroma with calcification. (Methylene blue-Acid fuchsin 10x)

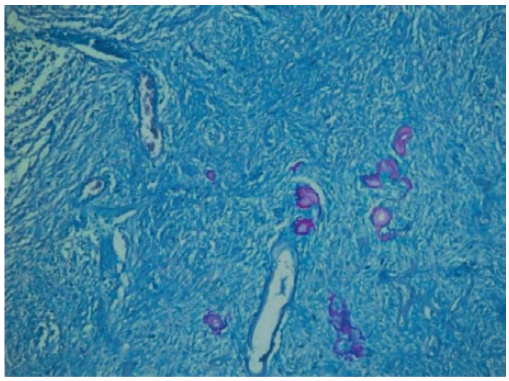
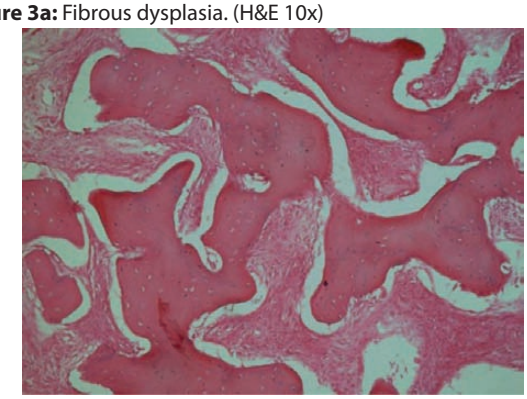


Figure 3a: Fibrous dysplasia. (H&E 10x)



staining. Slides were then immersed in aqueous 0.2% methylene blue for 30 seconds. Following methylene blue staining, the slides were rinsed briefly in distilled

Figure 3b: Fibrous dysplasia. (Methylene blue-Acid fuchsin 10x)

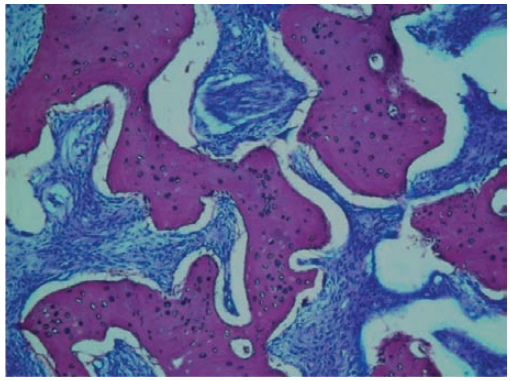


Figure 4a: AOT. (H&E 10x)

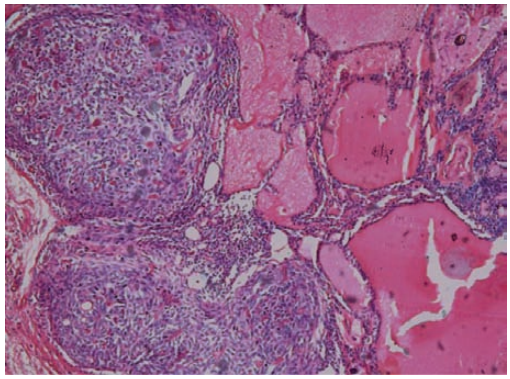


Figure 4b: AOT. (Methylene blue-Acid fuchsin 10x)

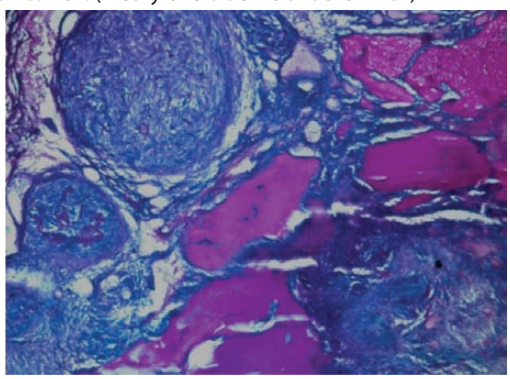
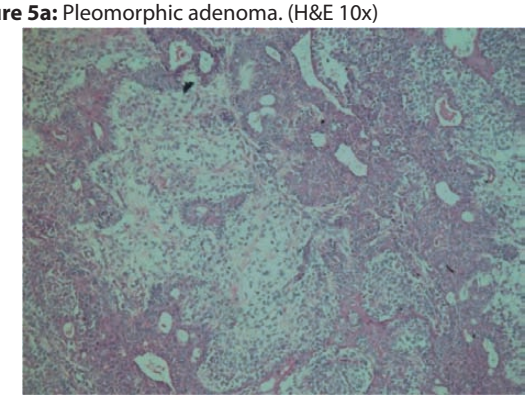
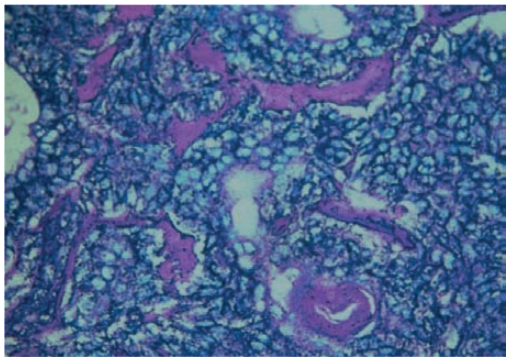


Figure 5a: Pleomorphic adenoma. (H&E 10x)



water and stained in aqueous 0.2% acid fuchsin solu¬tion for 5 minutes. Slides were then rinsed in dis¬tilled water, dehydrated, cleared and mounted.

Figure 5b: Pleomorphic adenoma. (Methylene blue-Acid fuchsin 10x)



Results

In contrast to standard hematoxylin-eosin stain, which stains both bone and soft tissues pink, the methylene blue-acid fuchsin stain demonstrates remarkable contrast between bone and other tissues. Methylene blue-acid fuchsin stained bone bright pink and the surrounding soft tissues blue-purple (Figure 1-5).

Discussion

A major concern with histomorphometry is the ability of the observer to distinguish between the bone surface and surrounding soft tissues. As there are few stains that can adequately make this distinction, this new stain combination has great merit for the quantitative study of bone tissue. Also, distinction of osteoid & soft tissue is important for appropriate diagnosis & treatment. In addition to the improved staining properties, the methylene blue-acid fuchsin stain is also superior to H-E in terms of its stability, cost and ease of use. The methylene blue and acid fuchsin solutions are extremely stable and demonstrate consistent staining even after 6 months of storage[4]. The solutions are simpler to make and require fewer ingredients, keeping costs down and reducing preparation time.

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Expression of Perlecan (Heparan Sulphate Proteoglycan) in Oral Squamous Cell Carcinoma

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Abstract

Background

Perlecan is a basement membrane heparan sulfate proteoglycan. It plays a vital role in cell- cell adhesion, cell-matrix adhesion and is associated with several growth factors. Recently its role has been found in many pathological and physiological conditions. Aim of this study was to understand the immunolocalisation of perlecan in normal mucosa and oral squamous cell carcinoma and also to derive a correlation between perlecan expression and various grades of carcinoma.

Method

A total of thirty tissue blocks comprising of ten normal mucosa and twenty oral squamous cell carcinoma were included in the study. They were examined for the presence of perlecan protein core by immunohistochemistry using monoclonal antibody (Anti-Basement Membrane-type heparan sulfate proteoglycan core protein. Specificity: Mouse monoclonal anti human Perlecan Clone No: 85-9). Interpretation of staining was done and the observations statisticaly analysed by Fisher exact tests to evaluate the expression of perlecan within and around the tumor islands.

Results

In normal epithelium perlecan expression was limited to basal layer. In oral squamous cell carcinoma, perlecan was present in surface epithelium, stroma as well as tumor islands. Perlecan expression within tumor islands became scarce with the higher grades of carcinoma.

Conclusions

It was deduced from the results that with the increase in degree of carcinoma; more heparanase enzyme acts on perlecan and from the breakdown of perlecan; fibroblast growth factor, transforming growth factor-β and other growth factors are released. All these factors are known to promote tumor growth.

Key Words

Perlecan, immunohistochemistry, heparan sulphate proteoglycan, oral cancer, growth factors, squamous cell carcinoma.

Acknowledgements

We are thankful to Professor T. Saku of Niigata University Graduate School of Medical & Dental Sciences, JAPAN for providing us with perlecan monoclonal primary antibody.

Introduction

Perlecan is a basement membrane type heparan sulfate proteoglycan (HSPG). Perlecan name derives from its electron microscopic structure i.e. beads or pearls on a string. It is a large proteoglycan (400 to 500 kDa) present in virtually all vascularised tissue with a distribution that is primarily confined to basement membranes including those of oral mucosa. Perlecan is synthesized by basal cells and fibroblasts adjacent to the basal lamina[1]. Perlecan is also synthesized by vascular endothelial and smooth muscle cells present in the extracellular matrix. It has been demonstrated in recent years that perlecan is distributed not only in the basement membranes but also in the stromal space of various pathophysiological conditions. The complex pleiotropy of perlecan suggests that this gene product is involved in several developmental processes, at both early and late stages of embryogenesis, as well as in pervasive human diseases such as cancer and diabetes[2]. Perlecan has been shown to be present in tissues, such as enamel organs of the tooth germs and ameloblastomas in which intercellular spaces are prominent.3 Perlecan was found to be present in the stellate reticulum of enamel organs of developing tooth germs. This study suggested that perlecan plays a role in tooth morphogenesis[4,5]. Perlecan expression in keratocystic odontogenic tumor was studied and found that perlecan protein was localized on the cell border from parabasal layer to subkeratinised layers of lining epithelium[6].

The dysplastic cells need more amount of perlecan for its proliferation[1]. Immunolocalisation of perlecan using a monoclonal antibody against its core protein helps in understanding the carcinomatous changes in the tissue. Based on the pattern of expression of perlecan, changes in the dysplastic tissue and squamous cell carcinoma can be analyzed.

Material & Methods

Formalin fixed paraffin embedded tissues were retrieved from the archives of the department. Ten histopathologically normal buccal mucosa, as control, were included in Group-1. Group-2 comprised of twenty histopathologically diagnosed oral squamous cell carcinoma (OSCC) divided into eight cases of well differentiated squamous cell carcinoma (WDSCC), seven cases of moderately differentiated squamous cell carcinoma (MDSCC) and five cases of poorly differentiated squamous cell carcinoma (PDSCC). A tissue section of ameloblastoma was used as control for primary perlecan antibody[5]. µ thickness from each of formalin fixed paraffin embedded tissues of Group 1 & 2 were sectioned and immunostained with monoclonal perlecan antibody.

Antibodies

Primary antibody: Anti-Basement Membrane – type heparan sulfate proteoglycan (HSPG) perlecan core protein [Specificity: Mouse monoclonal anti human perlecan clone No: 85-9]. Secondary antibody containing Super Sensitive Polymer 3, 3'-diaminobenzidine (DAB) detection kit (Biogenex) was used.

Immunohistochemistry (IHC)

Paraffin sections were subjected to immunohistochemical staining for perlecan core protein. For antigen retrieval, deparaffinized sections were kept in staining trough filled with citric acid (pH 6.0) and were boiled in pressure cooker for five minutes. The sections were rinsed in 0.01 M phosphate-buffered saline (PBS; pH 7.4).After that sections were introduced to peroxide block for ten minutes followed by power block for ten minutes at room temperature in a humidifying chamber. Sections were not washed with PBS after exposing them with power block. Then sections were incubated with primary antibodies for 1 hour at 1: 100 dilutions. After rinsing with two changes of PBS sections were subjected to super enhancer. Then they were incubated for thirty minutes with secondary antibodies which conjugated with peroxidase labeled dextran polymers. After rinsing with PBS, sections were treated with DAB for twenty minutes. Finally sections were counterstained with hematoxylin. For control study on antibodies the primary antibodies were replaced with pre-immune rabbit immunoglobulin-G (IgG) or mouse IgG subclasses (Biogenex). Positive control of ameloblastoma for primary perlecan antibody showed strong immunopositivity (Fig:1) in ameloblastic follicle whereas negative control with pre immune IgG rabbit antibodies did not show any staining. Immunoreaction of group 1 & 2 were compared with ameloblastoma staining. Immunostained slides were interpreted and the observations were subjected for statistical analysis.

Results

In normal oral mucosa perlecan was expressed faintly in the basal layer (Fig:2). Within the basal layer perlecan was immunolocalized to the cell border. It appeared as though basal cells beget perlecan in normal epithelium. In oral squamous cell carcinoma perlecan immunopositivity was found in connective tissue stroma of almost all the cases which was a significant find (Table 1, Fig:3). In a few cases immunopositivity was seen in and around the tumor islands (Fig:4). In WDSCC more number of tumor islands showed positivity compared to MDSCC & PDSCC (Fig:5). In the tumor islands immunolocalization of perlecan was at the cell border and in few areas there was a coalescent

Fig. 1: Positive control, Perlecan expression in ameloblastic follicle; IHC 40X

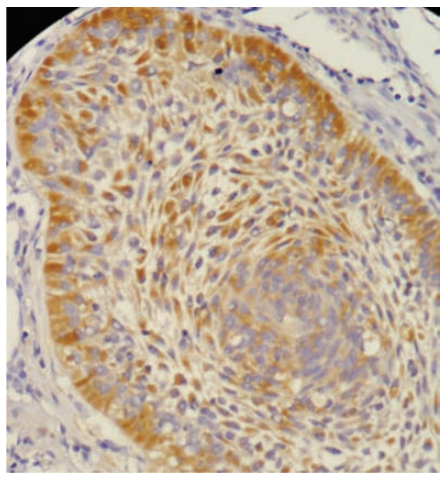


Table 1: Perlecan Expression in various Degrees of Squamous Cell Carcinoma

Group 2 Carcinoma(20)	Staining within Stroma	Staining within tumor island	Staining Intensity
WDSCC* (8)	8(100%)	4(50%)	++
MDSCC° (7)	6(85%)	3(42%)	+
PDSCC† (5)	4(80%)	1(20%)	+
Fisher Exact Test	(WDSCC) Vs (MDSCC+PDSCC)	(PDSCC) Vs (WDSCC+MDSCC)	
Probability (p) value	p = 0.495	p = 0.603	

* Well differentiated squamous cell carcinoma
°Moderately differentiated squamous cell carcinoma
† Poorly differentiated squamous cell carcinoma

Fig. 2: Expression of Perlecan at cell borders in basal cell layer of normal epithelium; IHC 40X

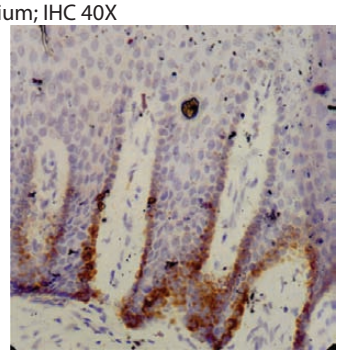
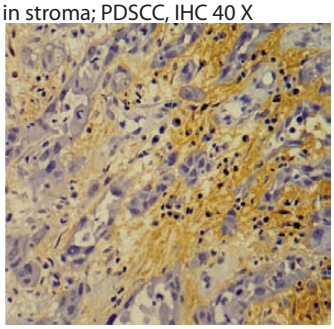


Fig. 3: Perlecan in stroma; PDSCC, IHC 40 X



staining at cell border and cytoplasm. With the increase in level of carcinoma perlecan immunostaining showed descendency within tumor islands. No specific pattern was observed for immunostaining of perlecan in the stroma.

Discussion

Perlecan has got five domains and various molecules are attached to them thus increasing the diversity of its applications in developmental, physiological and pathological conditions. The ameloblastoma cells synthesize perlecan and deposit it in their intercellular space. The intercellular perlecan might act as a carrier for transport of nutrients to tumor cells within ameloblastomatous foci[3]. Various other studies conducted on odontogenic tumors have demonstrated that enamel proteins such as amelogenin and enamelin are co-localized with other extra cellular matrix (ECM) molecules especially those, that are basement membrane associated such as HSPG, type- IV collagen, laminin and fibronectin[7]. In a study on the volume of intercellular space during hamster cheek pouch carcinogenesis at the ultrastructural level, the results showed increase in separation of epithelial cells during carcinogenesis although it is not yet known if this separation results from the loss of cohesion between specialized structures i.e. desmosomes or non specialized membrane areas.8 Reviewing above studies, it can be hypothesized that perlecan in dysplastic epithelium helps in tumor progression by acting as a carrier for transport of nutrients in the intercellular spaces along with other ECM molecules. Several lines of evidence by IHC have shown that basal cells express specific cell membrane molecules

Fig. 4: Perlecan in tumor islands & stroma; MDSCC, IHC 40 X

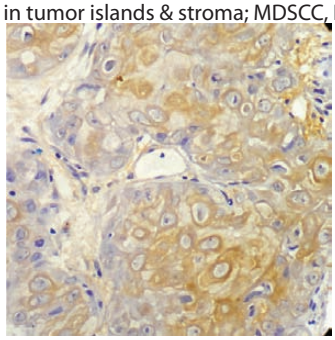
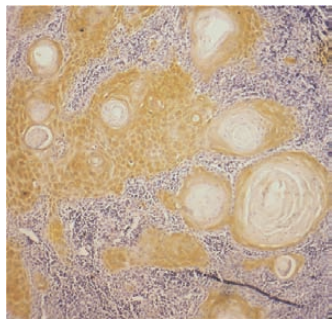


Fig. 5: Perlecan expression in cytoplasm and cell border; WDSCC, IHC 10 X



such as integrins, type II interleukin 1 receptor, epidermal growth factor, fibroblast growth factor (FGF) and lectin. These trapped growth factors and molecules may function in a way which will lead to the proliferation of dysplastic cells[9]. The expression levels of FGF2 were in correlation with severity of epithelial dysplasias which were found in the vicinity of head & neck squamous cell carcinoma.10 Lectin, a sugar moiety associated with cell adhesion has been demonstrated in oral epithelial dysplasias and squamous lining of jaw cysts[11]. Taking these studies and the present study into account it can be predicted that because of the presence of perlecan in the intercellular space; FGF, tumor growth factor (TGF-β), lectins, integrins and interleukins can help in progress of tumor. It is known that HSPG is produced mainly by fibroblasts and partly by endothelial cells and smooth muscle cells. So being an ECM molecule, its presence in stroma is inevitable. Perlecan plays a vital role in angiogenesis, tumor progression and metastasis. Perlecan is a reservoir for FGF1, FGF2 and TGF-β; and all these factors help in tumor growth. FGFs are potent growth promoting and angiogenic proteins that are abundant at the site of active tissue remodeling and tumor invasion. Thus perlecan should be considered a novel biological ligand for FGF-7, an interaction that could influence cancer growth and tissue remodeling[12,13]. In an immunocytochemical study on gastric carcinoma cases it was found that basic fibroblast growth factor (bFGF) was mainly located in the endothelial cells and fibroblasts. Areas of deposition of bFGF partly corresponded to the areas of increased immunoreactivity for perlecan. However in the present study perlecan was irregularly distributed in the stroma in almost all the cases of OSCC[14]. Many studies have suggested that perlecan is a potent angiogenic modulator. An in vivo study in a

rabbit ear model established that perlecan is a potent inducer of bFGF mediated neovascularisation. It induces the formation of large blood vessels interconnected by multiple anastomoses and branched to form an extensive network of fine capillaries. In another study using electron microscopy it was found that perlecan was distributed around blood vessels. It was of both host cell and tumor cell origin. Tumor-derived perlecan was distributed throughout the tumor matrix suggesting that tumor perlecan rather than host perlecan controls tumor growth and angiogenesis. Where as in the present study, under light microscopy it was not possible to distinguish whether perlecan in the stroma was of host cell origin or tumor cell[15,16]. In situ hybridization studies done on salivary adenoid cystic carcinomas(ACCs) indicate that perlecan is biosynthesized by carcinoma cells in the proliferation phase and lead to the formation of initial pseudocystic structures in the stroma[17]. In the current study it was analyzed that expression of perlecan was more in WDSCC cases which is an early stage compared to PDSCC which is an advanced stage which is in accordance with the studies conducted on ACCs. Expression of endoglycosidic heparanase and sydecan-1 in esophageal carcinomas inferred that there was loss of syndecan-1 in advanced head & neck carcinomas. Syndecan is also a cell surface bound HSPG and endoglycosidic heparanase cleaves HSPGs. There is increased expression of heparanase in invasive esophageal carcinomas[18]. Considering above studies it is suggested that with the increase in grade of carcinoma, HSPGs get cleaved by heparanase. Similarly in the present study perlecan expression within tumor island was scarce with the higher grades of carcinoma and its pattern became haywire. It can be hypothesized that with the increase in degree of carcinoma; more heparanase enzyme acts on perlecan and from the breakdown of perlecan; FGF, TGF-β and other growth factors are released. All these factors promote the tumor growth.

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