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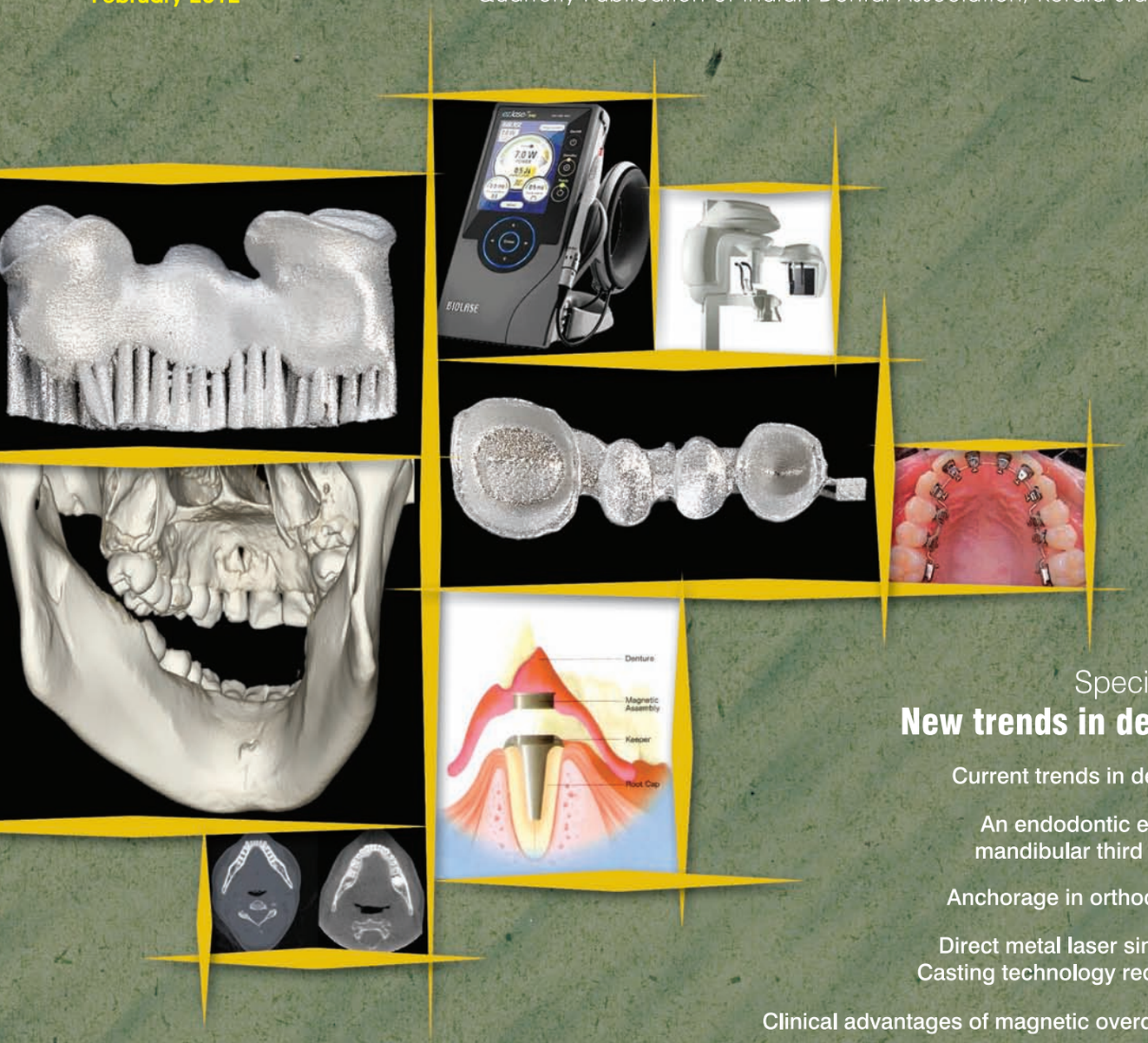

Special Issue

New trends in dentistry

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NEW TRENDS IN DENTISTRY

The future of dentistry is now. Waiting another 10 years to adopt or integrate these new areas of dentistry will leave you decades behind. Decide which areas will best augment your practice, make informed decisions regarding your choice of product/technology, obtain education and training, and have fun! Digital dentistry is more than just hype. When properly implemented and fully educated, return on investment can be excellent, increased joy in practicing dentistry can be experienced, and better care for your patients can be delivered. Implementation of computers into each operatory and throughout the practice is the first and most frequent adoption of digital dentistry.

Digital dentistry may be defined in a broad scope as any dental technology or device that incorporates digital or computer-controlled components in contrast to that of mechanical or electrical alone. This broad definition can range from the most commonly thought area of digital dentistry—CAD/CAM (computer aided design/computer aided manufacturing)—to those that may not even be recognized, such as computer-controlled delivery of nitrous oxide. Each area of digital dentistry has advantages in comparison to the conventional device or technique. Yet, some of the advantages may be diminished by the increased cost or technique sensitivity. CAD/CAM for dental manufacturing and the dental laboratory profession is already in the early majority and will soon approach the late majority. The laboratory profession has discovered what the clinicians have been slower to recognize — CAD/CAM works. It is faster, more economical, predictable, consistent, and relatively accurate. Return on investment can be incredible if a team approach is adhered to. Cone beam CT is an exciting technology that has seen rapid growth due to decreased costs, many options to choose from, increased number of general dentists placing implants, decreased radiation compared to conventional CT scans, and rapid adoption by universities and specialists. As an example, although diode lasers have been available for more than a decade, early majority adoption did not occur until the recent decrease in prices of lasers and increased offerings and competition. This has resulted in an alternative to the lower cost electrosurgery devices.

Dentists who have not yet adopted this prerequisite for digital dentistry should do so now! Daily advances and improved software adapted from other industries allow this technology to be affordable, attain the fastest adoption rate, and offer a high return on investment. Current and highly effective systems include Eaglesoft (Patterson), Dentrix (Schein), Practice Works (Carestream Dental), and Web-based software such as Curve Dental. Digital patient education is growing rapidly. The future in this area will reveal technologies and methods of communication already available in other industries, such as voice-activated and/or touch-screen computer and software instruction, live video and rapid recall of photos and educational components, 3-D video presentation with and without monitors or tablets, and off-site live consultation and education.

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Kerala Dental Journal

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Contents

President's Message

Dr. Raveendranath M.

Dear colleagues,

It is very encouraging to note that a special issue of KDJ is being released soon. Special issue of KDJ is a silver line in the evolution of KDJ and it is heartening to all who loves IDA. KDJ has been serving IDA Kerala State and Dental fraternity in a meticulous manner over these years and everyone who cares IDA is glad to witness its growth. Growth of KDJ is exemplary and inspiring especially in the context when other journals in other forums are struggling to survive. Special issue of KDJ reflects the trust of members, the dependence of members, the authority and authenticity of KDJ. Here I feel time has come for KDJ to pivot, co-ordinate or spear head other scientific activities including research for IDA Kerala State, which would broaden the scientific base of IDA and there by acceptance of IDA.

The present team of office bearers completed first trimester in office and when look back it was very satisfying. As wished we could initiate few long term programmes and instill confidence in our members to take up future challenges of our association and profession. More inspiring is the response of the members in all concluded activities like Aquire 2012, Installation of WDC, State executive meeting, Dentists Day, state level workshop on a Practice management and Dental tourism. All programmes were well attended, appreciated and have superior rating.

Project reports on DPRPD (Dental purchase and dispute redress division) and Dental Health survey are ready and is available on website for debate. Likewise discussions are initiated on branding of IDA, standardization of clinic and IDA level certification of Clinic. Everything is set to launch IDA-RCC workshop on Oral Cancer and there by develop resource people to the magnitude of 600 experts for IDA on Oral Cancer.

Our immediate challenge is raising the fraternity contribution to 10 lakhs and hopefully new IDA HOPE team could achieve this soon.

I expect more inputs from members with good ideas, proposals and participation in all IDA activities at branch level and State level that would energize us to do more.

Thanking You,

Dr. M. Raveendranath
President -IDA Kerala State

Dr. K. Nandakumar

Patients' expectations of a dentist

Our society has become affluent and it can afford any form of advanced treatment. And at the same time, patients have a wide variety of choices in selecting the dentist and services. The number of dentists, have increased in our state and how are the patients selecting a dentist? Selection of a dentist is based on the following factors:

1. Continues his or her education: a dentist who pursues continuing education opportunities to keep abreast of new research and changing technology.
2. Creates a welcoming atmosphere: a dentist who has an office with a welcoming atmosphere where patients never feel rushed or uncomfortable. The entire staff is friendly and helpful.
3. Educates patients: a dentist who seeks to educate his or her patients about proper dental care as well as on the treatments suggested. They encourage their patients to develop good preventive care habits.
4. Has extensive scientific knowledge: a dentist who has a wealth of knowledge about teeth and oral hygiene. They are able to quickly identify problems as well as the most effective treatment.
5. Employs a gentle touch: a dentist who understands that a patient's mouth is sensitive and performs all treatments with a gentle touch. A great dentist makes an effort to minimize pain and discomfort.
6. Believes in patient involvement: a dentist who involves a patient in decision making for treatment. They allow patients access to their records and explain all the options for treatment. A dentist who understands that a patient needs to feel in control of his or her treatment.
7. Has good manual dexterity: A dentist needs to have excellent manual dexterity and who should be able to perform intricate procedures with ease for extended periods of time.
8. Understands new technology: A dentist who stays up-to-date on the latest innovations in dental technology and incorporates new techniques and equipment into his or her practice.
9. Is passionate about oral hygiene: A great dentist has a deep passion for oral care. They seek to educate the public about developing good brushing habits and are committed to helping every patient have a healthy mouth.
10. Puts people at ease: A dentist who can make even the most terrified patient feel at ease. They have a calming nature and help patients relax during treatment.

Dr. K. Nandakumar
Editor, KDJ

Current trends in dentistry

* Sunil P.M., ** T. Isaac Joseph, *** Jaisanghar N., **** Veeravermal

Abstract

Modern dentistry has grown phenomenal heights.It is imperative for dentists to update the current trends in dental procedures to keep in pace with recent advancements. A paradigm change in dentistry is seen in areas like diagnosis, treatment modalities and dental therapeutics. New trends include early caries detection with advanced instruments, cad/cam in prosthesis, chair side oral cancer screening, newer computer imaging techniques, dental laser, association of periodontal diseases with cardiac diseases and sedation dentistry.

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Introduction

The practice of dentistry has been revolutionized. New instruments and techniques help dentists diagnose and treat their patients faster, less painfully, and with more accuracy. Most of these changes have occurred in the areas of technology, services, and patient care. The field of dentistry is undergoing a rapid change currently in the areas like diagnosis, imaging, therapeutics and treatment modalities, due to change in disease pattern, population, and people's need to dentistry. It is untenable for the dentists to update the current dental procedures to maintain international standard. Dental surgeons need to update his/her knowledge by attending seminars, workshop, hands on training and refreshment courses. In India, medical tourism is gaining a momentum, it is high time even dental tourism should be promoted for which dentists need to update and sharpen his/her clinical skills.

The impact of current trends is seen in the areas like

Diagnosis

Treatment modalities

Dental therapeutics

Diagnosis

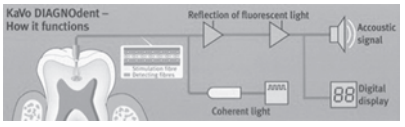
1. Early caries detection:

Two new machines help dentists diagnose tooth decay in the early stages, before significant cavities form.

DIFOTI (Digital Imaging Fibre-Optic Trans-Illumination) is

an extremely intense light that is shined on and through the tooth to show decay between teeth and in hard-to-see areas. It is completely painless and does not use radiation. DIFOTI® uses safe visible light and takes advantage of recent advances in computer technology to bring dentistry into the twenty-first century

DIAGNOdent is a small laser-like wand that looks for cavities based on the softness of a tooth. It is more accurate than the traditional metal explorer used by dentists and dental hygienists. These two new diagnostic aids help dentists find decay sooner and more precisely.



Altered tooth substances and bacteria fluoresce when they are exposed to a specific wavelength of light. The DIAGNOdent operates at a wavelength of 655 nm. At this specific wavelength, carious tooth structure will exhibit fluorescence, proportionate to the degree of caries, resulting in elevated scale readings on the display of the DIAGNOdent.[1]

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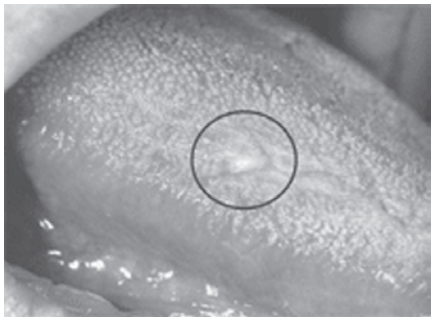
2. Early detection of cancer:

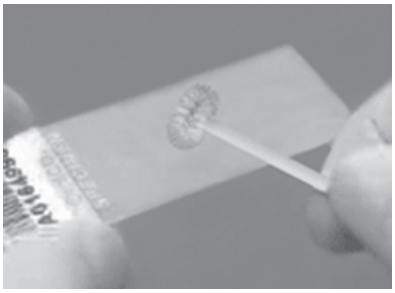
Oral Brush biopsy

Oral CDx is a simple chair side technique to evaluate the common, small oral spots that used to be considered "non-suspicious". When an examining dentist is of any suspicion of the lesion being an early malignant lesion, simple Oral CDx technique can be used to find any abnormality in these small spots. Oral CDx usually gives an indication of the dysplastic changes in the suspected lesion. Dysplasia means that unhealthy cells are restricted to the epithelium, i.e. the area above the basement membrane. The basement membrane is highly impervious to penetration and it typically takes several years for an oral dysplasia to become an oral cancer. By this method the early suspected lesions can be diagnosed as a dysplastic or non dysplastic one even year before its malignant transformation.[2]



Harmless appearing red or white lesions – tested with Oral CDx

Transepithelial tissue sample is collected with Oral CDx brush and is turned till pin point bleeding is observed



The sample is transferred onto a bar coded slide and is immediately fixed for preservation

Imaging

Cone Beam Computed Tomography

Indications of CBCT in the Maxillofacial Region

- Evaluation of the jaw bones to assess the feasibility of placing dental implants at specific sites in the jaws and the status of previously placed implants. This ensures that every possible precaution has been made to reduce the risk of involvement of the nerves in the lower jaw, and the sinuses and nose in the upper jaw.
- Evaluation of the tempro-mandibular joint (TMJ)
- Evaluation of facial structures prior to orthodontic treatment
- Assessing the airway space (sleep apnoea)
- To permit 3D reconstructions of the bones or the fabrication of a Bio model of the face and jaws
- Assessing the mandibular nerve prior to the removal of impacted teeth.[3]

Advantages of CBCT compared to conventional imaging

Cone beam images provide an undistorted or accurate dimensional view of the jaws in contrast to the Panoramic images, where they are both magnified and distorted. In addition, while CT images can provide cross-sectional (bucco-lingual), axial, coronal, sagittal, and panoramic views, a panoramic film provides an image of only one dimension, namely a mesio-distal or antero-posterior perspective.

When compared to the CT equipment used in the medical field the,

- Cost of equipment is approximately 3-5 times less than traditional Medical CT. In addition to which the equipment is substantially lighter, smaller, have better spatial resolution (i.e. smaller pixels)
- In the majority of cone beam CTs the patient is seated, as compared with lying down in a medical CT unit. This, together with the open design of the cone beam CTs virtually eliminates claustrophobia and greatly enhances patient comfort and acceptance. The upright position is also thought by many to provide a more realistic picture of condylar positions during a TMJ examination
- Radiation dose is considerably less than with a medical CT.[4]

Limitation of CBCT compared to regular MDCT

Lower contrast resolution which means less discrimination between different tissue types (i.e. bone, teeth and soft tissue)



MDCT Axial Image CBCT Axial Image

Treatment modalities:

1. Lumineers:

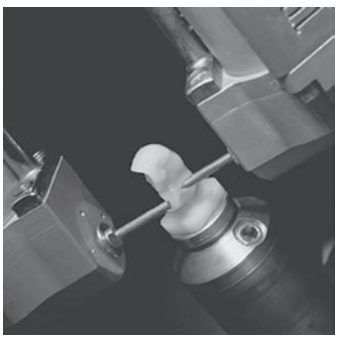
Lumineers are a special type of ultra-thin veneers by Cerinate. Like traditional veneers, Lumineers can be used to reshape smile with very minimal reduction of teeth. They can also be used to treat diastema and discolored teeth. The main difference is that Lumineers are made from special patented cerinate porcelain that is very strong but much thinner than traditional laboratory-fabricated veneers. Their thickness is comparable to contact lenses, and so they are often called contact lenses of teeth. Lumineers needs very little preparation of teeth comparing traditional veneers, where a significant amount of tooth is removed. The fact Lumineers requires very minimal tooth removal; the procedure is often reversible as natural tooth structure is left intact. Lumineers are so versatile that they can be placed over existing crown and bridge work, without the need to replace them. They are the perfect solution for stained, chipped, discolored or slightly misaligned teeth.[5]

2.CAD-CAM in dentistry:

CAD/CAM is an acronym that means computer-aided design/computer-aided manufacturing. CAD/CAM technology has been used in the manufacturing industry for many years. Today, CAD/CAM technology is used in dentistry to help dentists and dental lab technicians fabricate precise shapes and sizes for dental restorations, including inlays, onlays, crowns, and bridges. Dentists use CAD/CAM technology to provide with durable, well-fitted single and multiple tooth restorations in a more efficient manner than traditional lab-fabricated restorations. Another advantage of CAD/CAM technology is that it can allow a typical two-visit tooth restoration to be accomplished in one visit, provided that the dentist has the technology in the office (chair side CAD/CAM).

Impression of teeth is recorded by data capture or scanning to obtain the oral information. This method uses 3D optical systems for capturing single components. Anatomical dental duplicate capture (plaster cast), is made using a laser scan method. Dentists and dental lab technicians use CAD/CAM technology to design the anatomical features, size and shape of a tooth restoration on a computer. The CAD/CAM computer screen displays a 3-D custom image of teeth and gums, allowing dentist to use a cursor to draw the precise design of the tooth restoration. The CAD/CAM machine fabricates the restoration through a milling chamber that crafts the tooth-like ceramic material into a precise replica of the drawing.

One of the advantages of CAD/CAM technology is that, dentist does not need to create a moulded impression of teeth. Secondly, there may be no need for a temporary restoration or a return visit to the office for a permanent restoration.[6]

CEREC 3D System 3D Milling chamber

3. Lasers in dentistry

The word LASER is an acronym for Light Amplification by Stimulated Emission of Radiation.

There are several photo biological effects possible when using a dental laser.

• The principle laser-tissue interaction is photo thermal, which means the energy is transformed into heat. Surgical incisions and excisions with accompanying precision and haemostasis are one of the many results of a photo thermal event when the operating parameters are correct.

• There are photochemical effects that the laser can

stimulate chemical reactions, such as the curing of composite resin; and break chemical bonds, such as using Photosensitive compounds that, when exposed to laser energy, can produce an singlet oxygen radical for disinfection of periodontal pockets and endodontic canals.

• Certain biological pigments, when absorbing laser light can fluorescence, which can be used for caries detection within teeth.

• A laser can be used in a non-surgical mode for bio stimulation of more rapid wound healing, pain relief, increased collagen growth and a general anti-inflammatory effect.

• The pulse of laser energy on hard dentinal tissues can produce a shock wave, which could then explode or pulverize the tissue, creating an abraded crater. This is an example of the photo acoustic effect of laser light.

All dental surgical lasers currently available are designed for soft tissue procedures; and only the two Erbium wavelengths are safe and effective for teeth and bone. The therapeutic or low level lasers show beneficial results for healing, although the majority of the reports are anecdotal. The initial clinical results of photo disinfection also show promising applications for disease control. Lasers are more commonly used in dentistry now a days mainly for the periodontal problems, gingivectomy and excision of soft tissue lesions.[7]

4. Relationship between periodontal and cardiac

Diseases

Periodontitis seems to influence the occurrence and the severity of coronary artery disease and increases the risk of heart attack or stroke, and the study proposes two hypotheses for this occurrence. One hypothesis is that periodontal pathogens could enter the bloodstream, invade the blood vessel walls and ultimately cause atherosclerosis.[8] (Atherosclerosis is a multistage process set in motion when cells lining the arteries are damaged as a result of high blood pressure, smoking, toxic substances, and other agents.)

Another hypothesis is based on several studies that have shown that periodontal infections can be correlated with increased plasma levels of inflammation such as fibrinogen (this creates blood clots), C-reactive protein, or several cytokines (hormone proteins).

Therapeutics:

Introduction of newer drugs whose major use is in the field of dentistry include,

Drug for smoking cessation

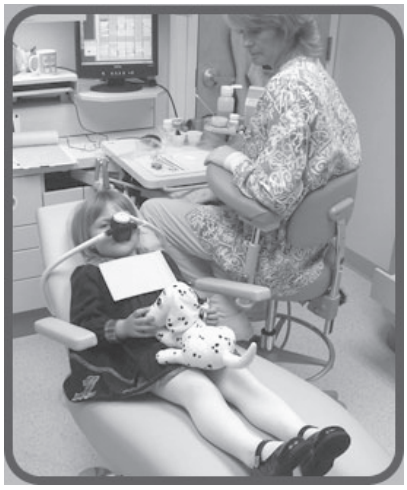
Varenicline: It is a partial agonist selective for $\alpha 4\beta 2$ nicotinic acetylcholine receptor subtypes. Varenicline binds with high affinity and selectivity at $\alpha 4\beta 2$ neuronal nicotinic acetylcholine receptors. The efficacy in smoking cessation is believed to be the result of varenicline's activity at a sub-type of the nicotinic receptor where its binding produces agonist activity, while simultaneously preventing nicotine binding to $\alpha 4\beta 2$ receptors.[9]

Drug for reversal of local anaesthetic effect:

Phentolamine mesylate: Local anaesthetic solutions frequently contain vasoconstrictors to increase the depth and/or duration of anaesthesia. Generally, the duration of soft tissue anaesthesia exceeds that of pulpal anaesthesia. Negative consequences of soft-tissue anaesthesia include accidental lip and tongue biting as well as difficulty in eating, drinking, speaking, and smiling – is a particular concern in children. The duration of local anaesthetic effect can be reduced effectively and thereby reversed using phentolamine mesylate which eliminates the occurrence of the above mentioned complications.[10]

Sedation dentistry

§ Sedation dentistry is a term that refers to the use of anesthesia during treatment to put patients into a relaxed state, almost like sleep. Sedation dentistry is



often used during procedures that require an extensive amount of time in the treatment chair, and sedation is ideal for patients who exhibit dental phobia or have difficulty controlling their movements (this includes children). While sedation dentistry implies that patients are unconscious, this is usually not the case. Some forms of sedation dentistry simply alleviate anxiety or put patients in a sleep-like state, so that little is felt or remembered from the dentistry procedure.

§ The perfect candidates for sedation dentistry include patients with a fear of needles or other dental anxiety.as well as individuals who require complex treatment and would like their procedure performed during a single, pain-free visit.

Sedation dentistry is normally carried out with help of a qualified anesthetist who selects the drugs which include nitrous oxide, opioids, benzodiazepines, chloral hydrate, and barbiturates for conscious sedation.[11]

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An endodontic enigma: mandibular third molars

* Liza George, ** Sujathan

Abstract

Third molars are highly variable in their internal anatomy and often present complex root canal system. However because of prosthodontic, orthodontic or functional considerations, it is sometimes essential to preserve the tooth by endodontic treatment. Proper preoperative radiographic evaluation using IOPA X-ray at different angulation will reveal the root canal anatomy. This is the case report of a mandibular third molar with a middle mesial canal.

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Introduction

The main objective of root canal treatment is the removal of organic debris from the infected root canal and obtaining a hermetic seal in the root canal space. The success of endodontic treatment involves correct method of cleaning and shaping of the root canal. Most teeth can be successfully treated endodontically regardless of anatomic irregularities, but root surface volume in contact with bone is what determines the long term prognosis.[1]

Mandibular third molar being the last tooth in the molar series has been associated with greater variation in root pattern and canal system.[2,3] 17% of mandibular molars had one root [40% of which contained two canals], 77% had two roots, 5% had three roots and 1% had four roots.[4] Teeth with two roots exhibited highly variable canal morphology, containing from one to six canals, including 2.2% that were C shaped.

Multiple case reports have been described with the mesial root of mandibular first molar. Almost 1 – 15 % of mandibular molars has been reported with a middle mesial canal.[5] In many of the canals they join in the apical third, thus it has been argued that it was not an extra canal but rather than sequelae of instrumenting the isthmus between the MB and ML canals[6].This is the case report of a mandibular third molar with three mesial canals in two roots and one distal canal in one root.

Case report

A thirty five years old lady came to the dental office with the chief complaint of pain in the right lower posterior teeth when food gets lodged in the tooth. On examination the mandibular third molar showed a deep carious cavity on the occlusal surface involving the mesial side. The tooth was not tender on percussion and was responsive to vitality tests [cold,hot,electric]. The preoperative radiograph of the right molar revealed a deep carious lesion involving the pulp. The clinical diagnosis of irreversible pulpitis was made. Considering the functional position of the tooth, endodontic treatment was planned.

After local anesthesia, rubber dam isolation, and disinfection of the field with 30% Hydrogen peroxide and 5% tincture of iodine, all carious tissue was removed and adequate endodontic access was made. The access opening was made triangular initially, and on inspection of the pulpal floor, three canal orifices were visible on the mesial side [mesio buccal MB, middle mesial MM, mesio lingual ML] and one on the distal side. Initially all the three canals were separate and accessible using K file No 10 and the distal canal was located using K file No 15.The working length was established using intra oral periapical radiograph(fig-1).

Considering the curvature of

* Professor, ** Professor & H.O.D, Department of Conservative Dentistry and Endodontics, Annoor Dental College, Muvatupuzha, Ernakulam, Kerala.

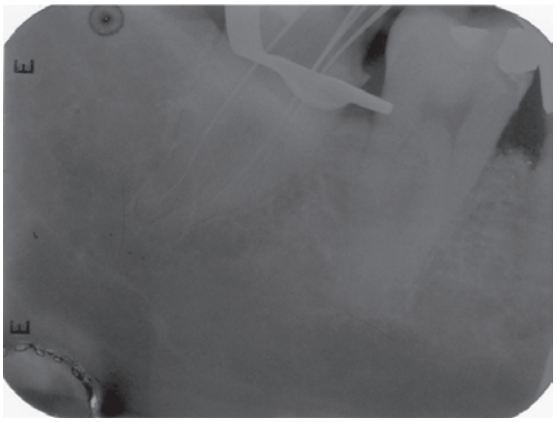

Fig. 1

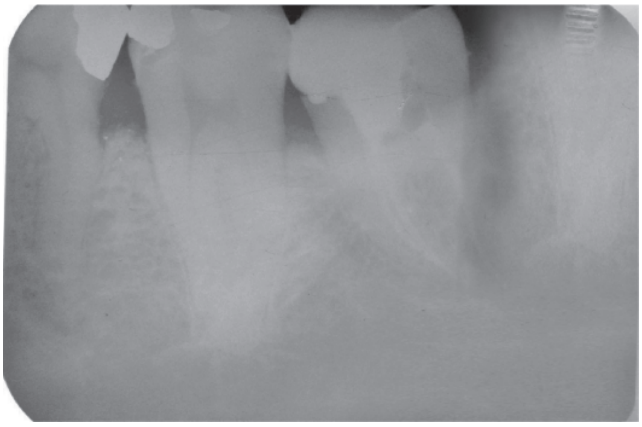

Fig. 2

the tooth the canals were instrumented with NiTi K files upto No 15 file followed by Hero shaper files [Micro Mega]. Copious irrigation was made with sodium hypochlorite and 17%Ethylene diamine tetra acetic acaid. The canals were finally washed with sterile saline, dried with paper points and filled with Gutta percha [025, ISO colour coded 4%Dentsply Maillefer] in the same visit (fig-2).

The canal orifices were sealed and intermediate restorative material was used to seal the pulp chamber during the inter appointment time. The patient experienced no post operative sequelae, and an appropriate coronal restoration was performed in the subsequent appointment. The patient will be followed clinically after 6 months and then yearly to monitor the peri radicular response.

Discussion

Prior to endodontic treatment, the endodontist must assess the root canal morphology. Cleaning and shaping of all the canals must be performed to receive a hermetic filling of entire root canal space. Literature gives multiple reports dealing with the anatomic variations of mandibular molars, and hence the floor of the pulp chamber should be observed thoroughly to locate accessory canal orifices for long term success of endodontic treatment. Root canal treatment has been completed in a single visit because there is evidence in literature that single visit root canal treatment might be as effective as multiple visit root canal treatment.[7,8]

This case report points out to a mandibular third molar with a middle mesial canal. Initially all the three mesial canals were separate. However after the shaping and cleaning of the canals, it was found that MB and MM canals terminated in a single apical foramen. Studies have shown the presence of isthmus in the mesiobuccal root of maxillary first molars most often 3-5 mm from the root apex. Isthmus should be cleaned as they function as bacterial reservoirs. Presence of an isthmus should be suspected whenever multiple canals are seen.

Radiograph however showed the presence of two mesial roots and one distal root. The use of cone – beam computerized tomography [CBCT] will further indicate the presence exact number of roots.

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Anchorage in orthodontics

* Shukoor K.M.

Introduction

Anchorage is the word used in orthodontics to mean resistance to displacement. Every orthodontic appliance consists of two elements: an active element and a resistance element. The active parts of the orthodontic appliance are concerned with tooth movement: the resistance elements provide the resistance (anchorage) that makes tooth movement possible.

Inevitably, reaction forces can move other teeth as well if the appliance contacts them. Whenever a force is exerted to move a tooth an equal amount of force is exerted on the opposite direction upon the area which serves as resistance unit. During orthodontic treatment it is simply not possible to consider only the teeth whose movement is desired. Reciprocal effects throughout the dental arches must be carefully analyzed, evaluated and controlled

Classification Based on the utilization of extraction space by the anchor teeth:

a) Maximum or critical or Group A anchorage

b) Moderate or Group B anchorage

c) Minimum or Group C anchorage

The sources of anchorage during orthodontic treatment is mainly obtained from:

1. Intra oral sources
2. Extra oral sources

Intra oral sources: includes:

1. Teeth
2. Alveolar bone
3. Basal jaw bones
4. Musculature

Extra oral sources: If sufficient amount of anchorage cannot be obtained from intra oral sources, certain extra oral areas can be utilized as sources of anchorage to achieve orthodontic and orthopaedic changes during treatment

Teeth: When some teeth are moved to a desired position the remaining teeth can be used as anchorage or resistance unit because tooth itself can resist movement.

Alveolar bone: Till a certain amount of force is applied to a tooth, the alveolar bone itself can resist tooth movement. Beyond that limit tooth movement will take place by alveolar remodeling.

Basal bone: Some areas of the basal bone are available as sources of anchorage. These areas include the hard palate lingual surface of the mandible in the region of the root, which can be used as inter maxillary and intra maxillary anchorage.

Musculature: The normal tonus of the facial and masticatory muscles plays an important role in the normal development of dental arches. Abnormal muscle forces can cause flaring and spacing of teeth in hypotonic cases and forces in a lingual direction in hypertonic cases. This hypertonic muscle force can be used to increase the dental anchorage as in the case of lip plumper.

Extra oral sources: If sufficient amount of anchorage cannot be obtained from intra oral sources, certain extra oral areas can be utilized as sources of anchorage to achieve orthodontic and orthopaedic changes during treatment.

They are used in

i. Space maintenance: The mesial movement of the molar is prevented by the use of head gear face bow assembly.

ii. Extra oral anchorage can be used to produce mesiodistal, vertical and angular changes in tooth position.

iii. For distalization of molar. Extra oral anchorage may be required to distalize the molars for correction of molar relationship or to gain spaces for other dental corrections.

iv. To produce orthopedic changes.

The extra oral sources are:

i) Occipital region
ii) Cervical region
iii) Parietal region
iv) Frontal region
v) Chin region.

Occipital region: Anchorage from this region produce superiorly directed force on the maxilla and maxillary teeth.

Cervical region: Here the anchorage is obtained from nape of the neck. This can cause extrusion of maxillary molars leading to increase in lower facial height. This can also be used to move the maxillary dentition and restrict the forward growth of the maxilla (Fig. 1).

Parietal region: This region can be used as an extra oral anchorage in case of using high or

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Fig. 1


Fig. 2


Fig. 3

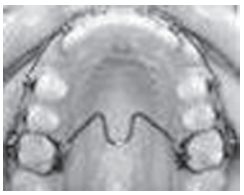
Fig. 4


Fig. 5

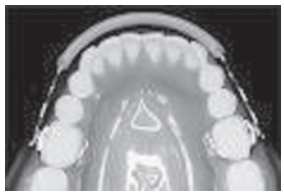
Fig. 6

vertical pull head gear or in case of combination headgear (Fig.2.)

Frontal region: Anchorage from this region is obtained while using reverse pull head gear (Fig.3).

Chin region: Chin can be used as an extra oral anchorage during orthopedic treatment (Fig.3).

Factors influencing anchorage

Root form: The anchorage potential of a tooth depends upon its root form. Cross section of the root can be:

- Round
- Triangular
- Flat

Round root: Round root can be seen in bicuspids and palatal roots of maxillary molar can resist horizontally directed force in any direction.

Triangular root: Triangular roots of maxillary canine, maxillary central and lateral incisors offer the maximum resistance to displacement.

Flat root: Seen in mandibular incisors, mandibular molars and buccal roots of maxillary molars can resist movements in the mesiodistal direction, but have little resistance to movement on the thin edges found on their buccal and lingual sides.

Sizes and number of roots: Multi-rooted teeth with large roots have a greater ability to withstand stress than single rooted teeth because these teeth has got greater root surface area and more number of periodontal ligament.

Root length: In physiologic conditions, the root length indicates the depth to which the tooth is embedded in bone. The longer the root, the deeper it is embedded in bone and greater is its resistance to displacement.

Inclination of tooth: The axial inclination of a tooth is important in assessing its value as a source of anchorage. A greater the resistance to displacement is offered when the force exerted to more teeth is opposite to that of their axial inclination.

Mutual support: When the anchor tooth is supported by contact with another tooth on either side, the overall resistance to tooth movement is increased. Teeth mutually supporting each other can best contribute to the overall resistance value when they are in line because the forces can pass in a relatively straight line through the contact points and receive maximal support from each other.

Ankylosed teeth: These teeth are fused to alveolar bone and there is no periodontal ligament in between. Orthodontic tooth movement of such teeth is not possible and therefore they can serve as excellent anchors whenever possible.

Alveolar bone: The alveolar bone and certain areas of hard basal bone are available as sources of anchorage.

Cortical bone anchorage: The concept of cortical bone anchorage implies that, to anchor a tooth, its roots are placed in proximity to dense cortical bone under a heavy force that will further squceze out the already limited blood supply and thus anchor the tooth by restricting the physiological activity in an area of dense laminated bone. Because of its density and its limited blood supply, the cortical bone resists change and tooth movement is limited. On the other hand when we desire to move a tooth we should seek out that route through the less dense trabecular bone where under a light force a generous blood supply can be maintained that will produce the physiological osteoclastic reaction of bone resorption that is needed for the efficient movement of the teeth.

Musculature: The normal tonus of the facial and masticatory muscles plays an important role in the normal development of dental arches. Abnormal hypotonic musculature causes flaring and spacing of teeth, when hypertonic muscles exert restrictive forces in a lingual direction. Dental anchorage may be increased by making use of hypertonic labial musculature as in the case of a lip plumper.

Anchorage failure is pevented in begg light wire technique by:

A) Use of thin round steel (wilcock's special plus) arch wire, rubber elastics and root moving auxillaries, all of which exert tooth moving forces of such low values that the anchor molars are moved far less by these forces than the teeth mesial to them. The light elastics procluce 2 to 2 ½ ounce force.

B) Another means of preserving anchorage is to place anchorage bends in the upper and lower arch wires, mesial to the anchor molars buccal tubes on the day of commencing active treatment. The arch wire force exerted through these anchorage bends is so v light, that it barely tips anchor molars distally, but it is sufficiently powerful to prevent them from being moved mesially during treatment.

C) Another means of preventing anchorage failure is not to move any teeth bodily other than the anchor molar during the first two stages. Arch wire and rubber elastics force are allowed to tip the crowns freely in any direction. As this takes place, very little force is required to move the crowns lingually and distally.

Anchorage in pre-adjusted appliance

1. Extra oral anchorage
2. Intra oral anchorage

Extra oral anchorage:

Head gears

- Cervical
- Occipital
- Parietal

Intra oral:

- Trans palatal arches (Fig.4)
- Nance and Lingual holding arches(Fig.5)
- Lip bumper(Fig.6)
- Banding of second molars
- Separate canine retraction
- Design of springs and loops.etc

Anchorage control in MBT system: This successful system of treatment mechanics using the pre-adjusted bracket system in its standard form, M. Laughlin and Bennett and then worked with Trivesi to redesign the entire bracket system to compliment their proven treatment philosophy and to overcome the perceived inadequacies of the of the original SWA.

MBT is a version of the pre-adjusted bracket system specifically for use with light continuous force, lace backs and bend backs and it was designed to work ideally with sliding mechanics.

The MBT brackets haves reduced tip compared with the earlier generations of the pre-adjusted appliance. This combined with light arch wire results in reduced anchorage need in the opening stages of treatment.

Skeletal anchorage in orthodontics: Tooth borne anchorage is one of the greatest limitations of modern orthodontic treatment because teeth move in response to forces. While extra oral anchorage can be used to supplement tooth brone anchorage and to deliver forces in direction not possible with intra oral forces. Extra oral anchorage has severe limitations because it requires excellent patient co-operation.

An important application of the basic principles of bone physiology is the use of rigid endosseous implants for orthodontic and orthopedic anchorage. Both animal studies and clinical trials of custom orthodontic devices have established that rigidity integrated implants do not move in response to conventional orthodontic and orthopedic forces.

Implants as anchorage units: Now micro implants are being used for archorage purpose. Orthodontic movements that are considered difficult to accomplish with traditional methods can be achieved with minimal patient cooperation by using miniscrew implants. Mini-screw implants, often referred to as temporary anchorage devices (TADs), have become an accepted component of orthodontic treatment. Orthodontic Mini screws are ideal TADs as they do not go osseointegration and very easy to use. It can be used as anchorage unit for dental as well as skeletal corrections.

Conclusion

A sound knowledge of anchorage is very important during orthodontic treatment. Most of the time we may have to prevent anchor loss, but sometimes we have to burn anchorage as in minimum anchorage cases. If we do not know how much anchorage should be taxed during orthodontic treatment, the prognosis of treatment will not be satisfactory.

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Direct metal laser sintering: Casting technology redefined

* George P.John

Abstract

Background. Over the past two decades, researchers have been making progressive attempts to introduce automation into the conventional manufacturing processes in dentistry, which are predominantly manual in nature. Direct metal laser sintering is a rapid prototyping technique which has revolutionized casting technology, with an intention to produce materials of higher- and uniform-quality and to sustain this through the standardization of manufacturing processes and the reduction of production costs.

Clinical significance. The digitalization of manufacturing processes in dentistry is progressing at a rapid pace. A not-too-distant future of automatically fabricated restorations that have pronounced benefits is a foreseeable reality. Advantages specific to these restorations include;

« Enhanced design quality
« Shorter dental laboratory production time
« Improved clinical success
« Comparative cost benefit

Conclusion. Emerging technologies like direct metal laser sintering may broaden dramatically our current perceptions, which in turn will have a profound influence on the future of manufacturing processes in dentistry.

Keywords. CAD/CAM, Direct metal laser sintering

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Introduction

The lost wax technique as suggested by Taggart in 1907[1] is the prevailing method of fabrication, employed for the casting of fixed prosthetic dental restorations, such as inlays, onlays, crowns, and fixed partial dentures, in commercial dental laboratories. The fabrication of restorations using this traditional technique involves various procedures in the dental laboratory from the careful pouring of the stone die or cast from the impression, to the preparation of the cast, and then the fabrication of the wax pattern, followed by the investing, and the casting procedures.[2] A more superior, single-stage dental laboratory process would be helpful to replace the currently employed multi-stage technique for preparing cast restorations.

Today, dental technology employed in conventional casting procedures, is witnessing a revolutionary process of transformation. This radical shift is due to the rise and increasing use of digital dental technology on an unprecedented scale through the automation of manufacturing processes.[2] The automation achieved through the CAD/CAM (computer-aided design / computer-aided manufacturing) technology has ushered in a renewed expectation towards furthering the objectives of

♦ **Quality** – through higher– and more uniform– quality of material utilized in the fabrication process;

♦ **Standardization** – of the fabrication processes;

♦ **Economy** – through reduction in the total cost of production;

♦ **Success** – through increased clinical longevity of restorations.

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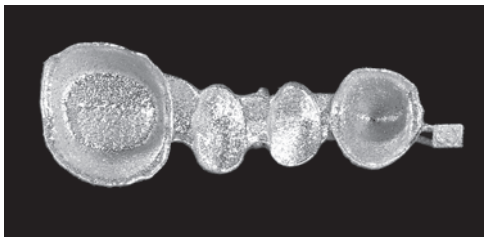
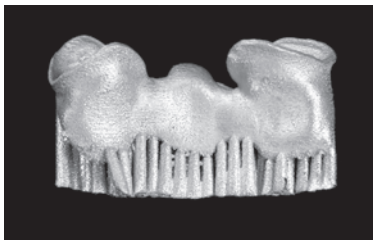

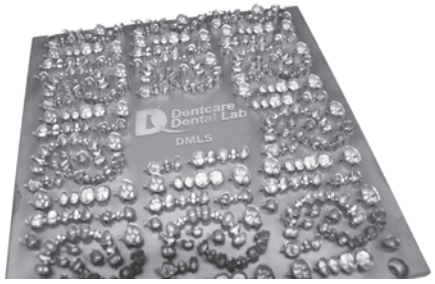

Direct metal laser sintering (**DMLS**) is an additive metal fabrication technology[2] developed by Electro Optical Systems (EOS) out of Munich, Germany. It is also referred to by the terms selective laser sintering (SLS) or selective laser melting (SLM) and is a promising new technology which may replace casting of base metal alloys.[3]

This technology envisages the use of a high-power laser which can rapidly fuse small particles on the surface of a powder bed of the base metal alloy into a mass representing the desired three-dimensional object. This is achieved from a computer-aided design (CAD) file or another file created from scanned data of cross-sections generated from a three dimensional digital description of the part. After each cross-section is scanned, the thickness of the powder bed of the base metal alloy is lowered by one layer, and a new layer of base metal alloy is applied on top. This process is repeated until the part is completed. The physical process involved with the laser sintering can be full melting, partial melting, or liquid-phase sintering, and up to essentially 100% density can be achieved.[4] The Direct metal laser sintering process has made it possible to produce approximately 450 high–quality units of crowns and bridges in a span of 24 hours, which corresponds to an unbelievable production speed of approximately three minutes per unit on an average.

EOS, founded in 1989, has revolutionized e-manufacturing through the EOSINT M 270 system[5] – the only system of its kind that produces cost–effective, high–quality dental prostheses using Direct Metal Laser Sintering (DMLS). This single-stage process of computer-aided manufacturing of dental prostheses utilizes three-dimensional data slices from a 3D-CAD model to produce the desired geometry of almost any complexity. A technician works with this 3D model to properly orient the geometry for part building and adds to the support structure as appropriate. Once a "build file" has been completed, it is "sliced" into the layer thickness the machine will build in and downloaded to the EOSINT M 270 machine, thereby putting in place the process for the "build" to begin.

This build is achieved by selectively fusing a special cobalt chromium molybdenum–based super alloy powder at a temperature of 1400°C, using a 200 Watt Ytterbium (Yb) – fiber optic laser inside a build chamber. The build chamber area has a material dispensing platform and a build platform along with a recoater blade used to move new powder over the build platform. The technology fuses metal powder into a solid part by melting it locally using the focused laser beam and builds up the parts additively layer by layer. This fully automated system is capable of producing economically, high- quality units of crowns with final strength that can be used immediately, in a matter of hours and by achieving a typical precision of ± 20 micrometers and without any tooling. DMLS is a net-shape process, producing parts with high accuracy and detail resolution, good surface quality and

excellent mechanical properties. This could result in the widespread clinical use of Co-Cr restorations due to their accurate fit and precision, although their current use is limited.[6]

Boons of DMLS

DMLS has many benefits over the conventional manufacturing techniques employed for casting metals.

« **Speed** – is certainly the stand-out feature and parts can be built within a matter of hours.

« **Convenience** – DMLS does not require special tooling like castings, making it convenient for short production runs.

« **Design Superiority –** DMLS permits fabrication of restorations with uncompromised marginal accuracy and fit, apart from achieving consistently high material purity.

« **Design Sensitive –** Since the components are built layer by layer, it is possible to design internal features and passages that cannot be cast or otherwise machined.

« **Economy –** Complex geometries and assemblies with multiple components can be simplified to fewer parts with a more cost effective assembly.

These benefits are in addition to the advantages mentioned earlier with respect to CAD/CAM restorations.

Conclusion

Over the last decade, Rapid Prototyping (RP) techniques have gained wide acceptance. Among the different RP techniques, Direct metal laser sintering has the distinct advantage of being able to process a wide range of materials and holds significant promise as a viable alternative to the conventional casting processes currently employed in dental laboratory practice.

Rapid Tooling and Manufacturing technologies have shown steady growth. It can be expected that in the next decade, they will achieve the same level of acceptance as Rapid Prototyping, by the continuous improvement in material properties.

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Apex locators

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Abstract

The accuracy of working length determination in root canal treatment plays a crucial role in the treatment and prevention of periapical disease. Since the introduction of apex locators new and more accurate devices have been developed. Electronic apex locators are highly sensitive devices that can be used to accurately determine the location of the apical constriction within a narrow interval in both vital and necrotic permanent teeth. Electronic apex locators reduce the number of radiographs required and may detect root canal perforations and fractures. Third and fourth generation apex locators can operate in the presence of intact or necrotic tissue, blood, inflammatory exudates, and various irrigants.

Although the use of EALs can reduce radiographic exposure for the patient, it is important to note that EALs are not an absolute substitute for radiographs and should be used as an adjunct. Further research is required to determine the sensitivity of these devices in various clinical situations, such as teeth with root resorption, wet or irrigated canals and complex pulpal morphology.

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Introduction

Ideas have arisen, challenges emerged, materials developed, techniques devised, mistakes repeated, and personalities have been dominant. Yet within this framework confines of this "small tissue often considered insignificant tissue", history has repeated itself, leading us to choose a variety of pathways- "less travelled by".

Dr. James L Gutmann (Pathways of Pulp 8th edition)

The success rate of conventional root canal treatment is predictably high, as long as the basic principles of endodontic treatment are followed. Complete removal of viable or necrotic pulp remnants, microorganisms from root canal is essential for endodontic success. Hence accurate determination of root length is an essential step in the root canal treatment, as chemo-mechanical preparation cannot be accomplished without determination of working length. The cemento-dentinal junction (CDJ), where the pulp tissue changes into the apical tissue, is the most ideal physiologic apical limit of the working length. It also is referred to as the minor diameter or the apical constricture. Working length as in endodontic glossary can be defined as "as the distance from a coronal reference point to the point at which canal preparation and obturation should terminate".

Importance of Working Length:

✓ Confine the instrumentation to the canal system.

✓ Create/maintain apical stop at the minor constriction.

✓ Prevent under-instrumentation.

✓ Prevent over-instrumentation.

• Traditional method for determination of working length is radiograph but it's difficult to achieve accuracy of canal length because the apical constriction (AC) cannot be identified, and variables in technique, angulations and exposure distort this image and lead to error. Hence electronic method for estimation of working length was introduced. Electronic apex locators (EAL) is an instrument, which used with appropriate radiographs, allows for much greater accuracy of working length control. (McDonald 1992, Pratten

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Fig. 1 D.C Ohm meter

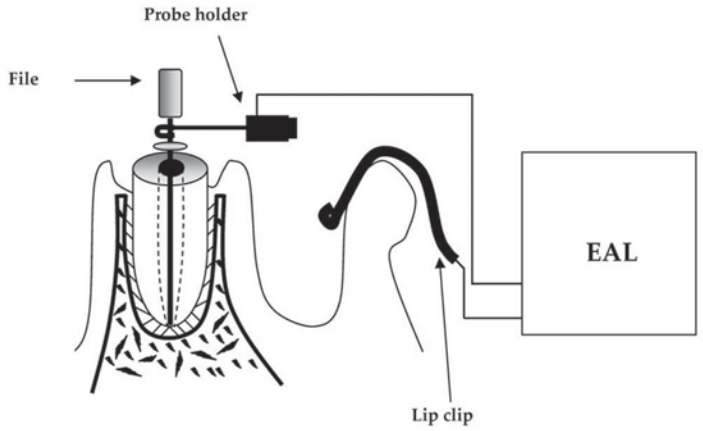

Fig. 2 Typical circuit for electronic determination of working length

& McDonald 1996, Segura- Egea et al 2002).

Historical review of eals:

In 1918, Cluster[1] first put forth the idea that the root canal length could be determined by using the electrical conductance. Later in 1942, Suzuki reported a device that measured the electrical resistance between the periodontal ligament and the oral mucosa in dogs which was found to be 6.5 K*w*.[2] Additionally, he showed that if an endodontic instrument that is connected to an ohmmeter is introduced into the canal and advanced until the ohmmeter shows the value of 40 ÒA, the tip of the instrument has reached the periodontal ligament at the AF (Fig 1). The device by Sunada in his research became the basis for most EALs.

How does eals work????

One side of the apex locator's circuitry subsequently is connected to the oral mucosa through a lip clip and the other side to a file. When the file is placed into the root canal and advanced apically until it is tip touches periodontal tissue at the apex, the electrical circuit is completed (Fig 2). The electrical resistance of the EAL and the resistance between the file and oral mucosa are now equal, which results in the device indicating that the apex has been reached. It uses the human body to complete the circuit.

Generations of apex locators:

First generation eals: (Resistance induced):

It measures to the opposition of the flow of the direct current or resistance. When the tip of the file reached the apex in the canal, the resistance value is 6.5 kilo ohm (current 40 microA). The devices which came under this includes Root canal meter developed in 1969, Endodontic meter, Endodontic meter S II, Dentometer, Endoradar. The disadvantage was pain felt due to high current and unreliable results compared to radiographs (Tidmarsh et al in 1985).

Second generation eals: (Impedence apex locators):

It measures opposition to the flow of the alternating current or impedence.[3] In 1972, Inoue developed Sono-Explorer (Hayashi Dental Supply, Tokyo, Japan)[4], one of the earliest in this generation.

Other devices includes of Root Canal Meter (Onuki Medical Co., Tokyo, Japan), Endodontic Meter S II (Onuki Medical Co., Tokyo, Japan), Sono-Explorer Mark II (Hayashi Dental Supply, Tokyo, Japan), Sono-Explorer Mark II Junior (Hayashi Dental Supply, Tokyo, Japan) in United States it is known as Sono-Explorer Mark III. In 1990, Fouad et al. found that the Sono-Explorer Mark III to be accurate to 0.5 mm from the apical foramen (AF) 75% of the time.[5] In 1990,Fouad et al. found that the Endocator (Yamaura Seisakusyo, Tokyo, Japan) to be accurate to 0.5 mm from the AF 75% of the time.[19] In 1994, Pallarés & Faus found that 89.6% and 88.7% of the Endocator readings for dry and non-dry canals, respectively, occurred within 0.5 mm intervals closest to the AC.[6] In 1990, Fouad et al. found that the Apex Finder (Analytic/Endo, Orange, California, USA) to be accurate to 0.5 mm from the AF 67% of the time.[5] In 1993, Himel & Cain found that the Foramatron IV(Parkell Dental, Formingdale, NewYork, USA) to be accurate to 0.5 mm from the radiograph apex 65% of the time and within 1.0 mm 83% of the time.[7] In 1994, Czerw et al. found the Digipex II (Mada Equipment Co., Carlstadt New Jersey, USA)to be as reliable as the Root ZX in an *in vitro* study.[8] Exact-A-Pex (Ellman International, Hewlett, New York, USA). In 1990, Fouad et al. found that the Exact-A-Pex to

Fig. 3-a; i root apex locator, b; E magic finder, c; Naviroot, d; apex nrg-xfr locator

be to 0.5 mm from the radiograph apex 55% of the time.[5] In 1985, Tidmarsh et al. found that the Dentometer (Dahlin Electromedicine, Copenhagen, Denmark), and Endo Radar (Elettronica Liarre, Imola, Italy) to be unreliable when compared with radiograph,[9] with many of the readings being significantly longer or shorter than accepted working length. The major disadvantage was the presence of tissue and electroconductive irritants in the canal changes the electrical characteristics and leads to inaccurate, usually shorter measurements.[10]

Third generation eals:

Similar to second generation but uses multiple frequencies. They have more powerful microprocessors and are able to process mathematical quotients and algorithm quotients to give accurate readings. It includes of:

i. Endex/apit:operates when canal is filled with saline or sodium hypochlorite. Main disadvantage is that each canal need to be calibrated.[11,12]
ii. Root ZX: uses dual frequency and comparative impedence principles. It measures at two frequencies 8 and 0.4Hz inside the canal. It detects changes in capacitance at the AC.[13] In literature a number of studies have been done regarding root zx EALs.[14-20]
iii. Apex finder: it is self-calibrated and can measure with electrolytes present in the canal. It has five signal frequencies to read four amplitude ratios.[21,22]
iv. Neozona ultima ZX: (Satelec Inc., Mount Laurel, NJ, USA) It is the successor to the Sono Explorer line of apex locators and uses a number of frequencies to sample the canal using the best two for its reading.[23]
v. Other third generation apex locators in use world-wide includes of Justwo or Justy II (Yoshida Co., Tokyo, Japan), the Mark V Plus (Moyco/Union Broach, Bethpage, NY, USA) and the Endy 5000 (Loser, Leverkusen, Germany). Their market share is very low compared with the Root ZX and there is limited research on their features and accuracy.[24]

Fourth generation eals:

i. Bingo/Raypex 4: it uses 2 frequencies of 8KHZ and 400 Hz. The manufacturers claim that the combination of using only one frequency at a time and basing measurements on the root mean square values of the signals increases the measurement accuracy and the reliability of the device.[25]
ii. Elements diagnostic unit and apex locator: It uses a composite waveform of two signals, 0.5 and 4 kHz. It takes the resistance and capacitance measurements and compares them with a database to determine the distance to the apex of the root canal.[26]
iii. Raypex_ 5, (VDW, Munich, Germany). Wrbas et al. compared the accuracy of two EALs: Root ZX and Raypex_ 5, under clinical conditions, in detecting the minor diameter in the same tooth. They reported that the minor diameter was located within the limits of 0.5 mm in 75% of the cases with the Root ZX and 80% of the cases with Raypex_ 5.[27]

Fifth generation eals (recently introduced apex locators):

It was developed to improve the characteristics of fourth generation apex locators.

1. Root EALs: it uses dual frequency. On reaching the apex along with graph it produces beep sound. It has compact, ergonomic design.(Fig.3a)

2. Emagic finder apex locator (S Denti Co Ltd.): it uses dual frequency and can be used in any canal conditions.[28] (fig3b)

3. Other devices in this group includes of NaviRoot Plus Apex Locator (fig 3c), Apex NRG XFR (fig 3d)

Sixth generation adaptive apex locators:

This appliance combines the established accuracy of the first method with the second method's convenience and detailed information concerning the state of the cut canal. The method and the device should ensure high accuracy of determining the spot

of the cementum dentine line regardless of the moisture in the canal, the presence of non-extirpated pulp, exudates, irrigants, and dried canal.[29]

Conclusion:

Introduction of electronic apex locators into endodontics have made it easier for the clinicians in determining the actual working length. It is particularly useful when the apical portion of the canal system is obscured by certain anatomic structures, such as impacted teeth, tori, the zygomatic arch, excessive bone density, overlapping roots, or shallow palatal vaults. Studies have shown that its effect is comparable to radiograph[30] and it also reduces radiographic exposure. But no individual technique is truly satisfactory in determining the endodontic working length.

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28. The accuracy of electronic length measurement in small and large canals using four apex locator. -Sung Sang Seop thesis for department of dentistry master's degree- The accuracy of EASs was revealed in the order of e-Magic Finder, Root ZX, Bingo 1020 and Smarpex. The accuracy for small root canal: e-Magic Finder > Root ZX > Bingo > Smarpex. The accuracy for expanded root canal: e-Magic Finder > Bingo > Root ZX > Smarpex.

    Conclusions: The e-Magic finder is the most accurate of these 4 apex locators.
29. Slavcho Dimitrov*, Dimitur Roshkev** *Department of Conservative Dentistry, Faculty of Dental Medicine, Medical Academy, Sofia, Bulgaria ** OPTIKA LASER /OPTICS LASER/, Sofia, BulgariaJournal of IMAB - Annual Proceeding (Scientific Papers) 2009, book 2.
30. Shohreh Ravanshad, DDS, MSD, Alireza Adl, DDS, MSD, and Javad Anvar, DDS, MSD. JOE

Denture cleansers

* Rene Kuriakose, ** Surekha R. Godbole, *** R. U. Thombare

Abstract

Denture base materials can be colonized and deeply infected by microorganisms. Effective prevention and control of healthcare associated infections has to be embedded into everyday practice and applied consistently by everyone. Inadequate home care can seriously compromise the clinical results for the success of denture. Adequate patient education to maintain hygiene of denture is necessary if prosthodontics is to be practiced as a preventive discipline, ensuring the greatest possible preservation of remaining oral structures. The presence of denture stomatitis among denture patients has been reported and acrylic resin dentures are an important predisposing factor as this prosthesis may act as reservoir of infection and surface irregularities present would increase the likelihood of microorganisms remaining on the surface even after the prosthesis has been cleaned. This article focuses on the awareness of removeable denture hygiene which includes mechanical and chemical plaque control to prevent denture stomatitis.

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Edentulousness, leading to loss of oral function has for many centuries been regarded as a variable but inevitable consequence of ageing. Over the past decades this has been minimized by the considerable advances in preventive dentistry and oral health care. Prosthodontic techniques have been developed to replace lost teeth and oral tissues and one of the major concerns in geriatric dentistry is the functional performance of complete denture as a replacement for natural teeth.[1] Yet the mainstay for the management of a complete or partially edentulous state, till date remains to be an acrylic denture. Acrylic resin bases attract stains and odour producing organic and inorganic deposits causing "denture breath" and accumulation of plaque and oral microbial flora that include bacteria, viruses and fungi like candida *albicans* which ultimately results in inflammatory changes to oral mucosa. The presence of denture stomatitis among denture patients has been reported and acrylic resin dentures are an important predisposing factor as this prosthesis may act as reservoir of infection and surface irregularities present in denture would increase the likelihood of microorganisms remaining on the surface even after the prosthesis has been cleaned. Dentures containing food debris, tartar and stain cause tissue response and allow multiplication of microbial flora and these microorganisms may also serve as reservoirs for disseminated systemic infections with gastrointestinal and pleuropulmonary involvement indicating chemical plaque control as the method of choice for geriatric patients especially those lacking manual dextirity, and done by soaking in denture cleansers to prevent denture stomatitis.[2]

Therefore as the saying goes "*prevention is better than cure*", indicating oral hygiene propaganda which emphasizes the need to remove and clean removable prosthesis after each meal. Effective prevention and control of healthcare associated infections has to be embedded into everyday practice and applied consistently by everyone. Inadequate home care can seriously compromise the clinical results for the success of denture. Adequate patient education to maintain hygiene of

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denture is necessary if prosthodontics is to be practiced as a preventive discipline, ensuring the greatest possible preservation of remaining oral structures.[3]

The purpose of this article is to review current materials and methods for cleaning dentures and to discuss different means of keeping dentures plaque free. Denture cleansing can be categorized into two types :

1. Mechanical denture cleansers
2. Chemical denture cleansers

1. Mechanical denture cleansers includes :

a) Brushes : Most common method of routine denture cleansing for removing artificial discolorations and plaque from denture surfaces is by brushing with mild abrasives. Wear on the dentures increases with increasing diameter of bristles and decreases with increase in length of the bristles.

b) Denture pastes and powders: Abrasive action increases the wear of the dentures. It contains insoluble calcium carbonate which is highly abrasive as compared to soluble sodium bicarbonate. Paste containing Zirconium is considered as superior for cleaning and polishing and decreasing acrylic resin abrasiveness.

c) Ultrasonic agents: Cleansing action directly related to solution used. When used along with disinfectant increases the effectiveness of disinfectant and does not deteriorate the polished denture surface.

2. Chemical denture cleansers :

Denture hygiene is compromised both due to limitations of the denture material as well as lack of manual dexterity of denture wearers indicating chemical plaque control as the method of choice for geriatric patients, done by soaking in denture cleansers to prevent denture stomatitis. Various denture cleansing solutions are available depending on their chemical composition such as alkaline peroxides, alkaline hypochlorites, acids, disinfectants and enzymes.

a) Alkaline Peroxides: Most commonly used cleanser which when dissolved in water forms solutions of hydrogen peroxides. This type of cleansers usually combines alkaline detergents to reduce the surface tension and oxygen release agents such as sodium perborate which release oxygen from the solution. The oxygen bubbles exert a mechanical cleansing effect.

b) Alkaline hypochlorites: Removes stain dissolve mucin and other organic substances, inhibits calculus formation on dentures by dissolving the plaque organic matrix and are bactericidal as well as fungicidal. Most significant disadvantage is that tarnishing and corroding of metallic dentures and bleach acrylic resins.

c) Dilute acids: Dilute solutions of hydrochloric or phosphoric acids are effective on calculus and stain on dentures. Responsible for the tarnishing and corroding of metallic dentures and bleach acrylic resins. Harmful to skin and eyes therefore care should be taken during handling.

d) Disinfectants: 0.05% salicylate and chlorhexidine immersion for few minutes can cause reduction in denture plaque, these are mainly used to prevent cross contamination from operatory to laboratory and unsuitable for daily use as denture cleanser because of many disadvantages caused such as bad odor and taste, bleaching and crazing effects on acrylics, also can cause harmful biologic side effects.[4]

e) Enzymes: A mixture of enzymes such as proteinase, dextranase, mutanase, trypsin, papain, lipase, amylase etc caused a significant reduction in plaque formation. These enzymes act by the breakdown of macromolecules of glycoprotiens, mucoprotiens and the mucopolysaccharides found in denture plaque into less adhesive small units. They are bactericidal as well as fungicidal by attacking and breaking down the cell walls of the microorganisms.[5]

Proper hygienic care of removeable dentures is an important means of maintaining a healthy oral mucosa in denture wearers. Dentists as well as patients should realize that microbial plaque on dentures may be harmful to both the oral mucosa and the patient's general health. It is the obligation of the dentist to educate, motivate and instruct the patient about means and methods of plaque control and it is the patient's responsibility to maintain oral hygiene through a daily home care routine. Thus proper knowledge of the material and the cleanser to be used is essential for the dentist and the patient should be educated about the judicious use of it to prevent its deterioration.

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Esthetic orthodontics

* Anil Kumar P., ** Shino P. Mathew, ** Amal S. Nair

Introduction

Aesthetics has always been a catchword among patients. In the present age, there is an increasing stress on the importance of looking good, and therefore there is an increasing number of patients, approaching the orthodontist seeking orthodontic treatment.

However, taking into consideration the changing social scenario, the patient's demand for aesthetics arises not only at the end of treatment, but during the course of treatment as well. Herein lies the relevance and importance of aesthetic orthodontics.

Esthetic Orthodontic Appliances

1. Labial Orthodontics
   - Esthetic brackets
   - Tooth coloured archwires
   - Fiber reinforced composite (FRC)
2. Lingual orthodontics
3. Invisalign
4. Clear Aligner Therapy (CAT)
5. Esthetic retainers

I. Labial orthodontics

Tooth Coloured Brackets

Various types of esthetic tooth colored brackets have been introduced by manufacturers into the market.

- Ceramic Brackets
- Ceramic brackets with metal slots
- Polycarbonate/ Composite Brackets
- Fiber glass composite polymer bracket
- Hybrid Brackets

A) Ceramic Brackets

- The introduction of ceramic brackets to orthodontics is only a part of the rapidly expanding ceramic technology in many industries. Ceramics are renowned for their hardness, resistance to high temperatures and chemical degradation. The atomic structure that imparts these advantages also accounts for their brittleness which is the most glaring fault of ceramics.

- **Composition**

Ceramic brackets are composed of aluminum oxide.Polycrystalline alumina & monocrystalline alumina are the two most common varieties.

Advantages

- Superior aesthetics
- It significantly resists discoloration unlike polycarbonate brackets
- Can be used in patients undergoing MRI scans.
- Used in patients with nickel allergy.
- Durable with good dimensional stability
- Allowed incorporation of the SWA feature.

Disadvantages

- Enamel abrasion of opposing teeth such as in deep bite cases.
- Brittleness of bracket leading to fracture.
- Brittle fracture of the bracket on debonding, makes debonding technique sensitive.
- Due to the inherent nature of the material, accurate bracket positioning is a demanding exercise.
- Higher frictional resistance to sliding
- High cost.

B) Ceramic bracket with metal slot

Ceramic brackets with metal slots were introduced into the market to combine the aesthetic advantage of ceramic bracket alongwith the reduced frictional advantage of a metal to metal interface.

C) Polycarbonate / Composite Bracket

Polycarbonate brackets and polysulfone brackets were introduced as esthetic orthodontic components

Advantage

- Aesthetically acceptable when compared to steel brackets.

Disadvantage

- Staining and discolouration
- Poor dimensional stability, higher wear and tear
- Reduced abrasion resistance
- Difficult sliding mechanics owing to friction between bracket slot & wire.
- Necessity of a compatible bonding resin.

D) Fiber-glass composite polymer bracket

These are brackets that offer all the mechanical advantages of metal brackets and the aesthetics of ceramics without any of its disadvantages.

The fiber glass brackets can be confidently used without fear of enamel wear when in occlusion. The mechanical lockbase of the bracket provides for easy and safe bonding without the need for additional conditioner.

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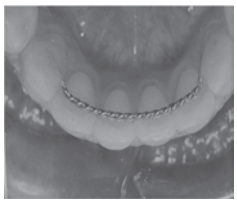
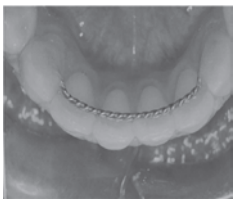
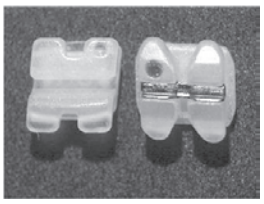

Bonded


Bonded retainer


ceramic + metal slot


ceramic brackets

- **Tooth Coloured Archwires**

- Epoxy coated tooth coloured archwire
- Optiflex archwire
- Honey dew coloured TMA wire

A) **Epoxy Coated Tooth coloured archwire**

- These are NiTi or Stainless steel core archwires which have a coating of epoxy resin on its surface. The coating improves the surface characteristics of these wires without affecting its mechanical properties. It offers low values for friction when coupled with other ceramic or composite brackets.

It possesses superior wear resistance and colour stability, and has a colour that is more natural looking than white coatings.

These aesthetic archwires are available in all common round, square and rectangular sizes.Also available with a reverse curve of Spee.

B) **Optiflex Arch Wire**

Optiflex archwires is a recent entrant that is designed to combine unique mechanical properties with a highly esthetic appearance.

It has a unique 3 layered structure.

i) **A silicon dioxide core** –Provides the force for moving the teeth.

ii) A **silicon resin middle layer** – Protects the core from moisture and adds strength to the core.

iii) **Nylon outer layer**- Prevents damage to the wire, increases strength, and provides stain resistance.

The wire can be either round or rectangular and is manufactured in various sizes.Its mechanical properties include a wide range of action and the ability to apply light, continuous forces.

Sharp bends must be avoided as they could fracture the core. Optiflex archwires is a highly resilient archwire that is especially effective in the alignment of crowded teeth.

C) **Honeydew coloured TMA wires**

Honeydew coloured TMA wires are esthetic wires that are prepared by passing electric current through titanium alloys immersed as anode. Coloured TMA wires are now considered as a good alternative to Stainless steel wires in sliding mechanics during space closure since it has good formability, resiliency and low frictional resistance. The frictional values for coloured TMA wires were comparable to that of SS wires.

II. LINGUAL APPLIANCE

The lingual appliance which was introduced by Dr.Craven Curz is gaining popularity. The present appliance is an edgewise appliance offered either in 0.0018 or 0.022 slot size.The appliance has a horizontal slot and a biteplane built into the upper and lower anterior brackets. There are multiple molar attachments available including a tube, a twin bracket and a hinge cap.

Lingual orthodontics offers the clinician and patient a viable alternative to conventional treatment. The appliance has been shown to deliver comparable results when compared to conventional appliances. In fact, the lab procedures used allow precise prescription of tooth movement. The bite plane reduces the difficulty involved in treating deep bite cases.

Advantages :

1. The brackets are bonded to the lingual surface, which proves as a main esthetic advantage over labial technique.

2. The labial enamel surface is saved from chemical insults of etching and bonding procedures. These procedures can result in permanent unsightly decalcification

3. Oral hygiene is better performed with the tongue playing a major self – cleansing act.

4. Clinical judgment of treatment program can be enhanced as the labial surface of the teeth is free to accurately follow the tooth movement accomplished.

5. Short time response of the lips and cheeks to treatment can also be accurately judged.

6. There is an inherent bite opening effect in the technique which is the first movement accomplished.

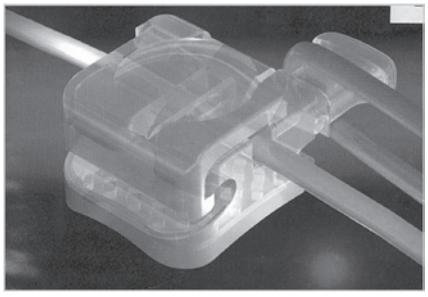
7. There is an inherent arch expansion (maxillary) due to the reduced interbracket span.

8. While achieving distalization of molars, a bodily movement is obtained rather than the tipping seen in labial appliance.

9. Anterior segment retraction is performed with ease because the tongue is in a more posterior position and does not exert pressure on the anterior teeth.


Ceramic SL


Ceramic SL2

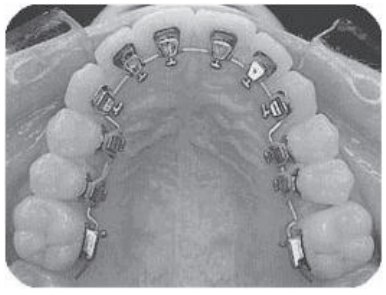

Clarity 3m unitek - metal slot


Composite bracket


Essix retainer


Fiber glass

Invisalign


lingual

10. The use of indirect bonding technique paves way for accurate bracket placement.

Disadvantages :

1. Tissue irritation and speech difficulties.
2. Difficulty in obtaining arch coordination.
3. Undesirable extrusion of posterior teeth
4. Gingival Irritation
5. Appliance placement and bonding
6. Difficulty in wire placement.
7. Expensive

III. INVISALIGN

The Invisalign system, a technologically advanced aesthetic orthodontic treatment sytem was the brainchild of Zia Chisti & Kelsey Wirth, management graduates in Stanford University's MBA programme.

They started Align technologies in April 1997. The introduction of the Invisalign system took the orthodontic field by storm owing to public awareness and demand.

The Invisalign system is a clear, removable, esthetic tooth moving appliance.

Advantages

- High level of esthetics. Patient can undergo treatment without others knowing about it.
- Ease of maintaining oral hygiene as brushing and flossing can be done in the normal manner. (Not possible with brackets)
- The appliance can also double up as a bleaching tray at any stage of treatment.
- Levels of patient comfort are high.
- No diet restrictions like in conventional orthodontic appliances.
- Lower chairside time, lesser no. of dental appointments.

Disadvantages

- Only relatively small magnitude of changes is possible.
- If the appliance is discontinued for a relatively long period, the treatment procedure would have to be restarted from the beginning.
- Difficulty in speech for some patients in the initial stages.
- Rarely, allergies may arise in patients with polyurethane allergy.
- May result in some degree of bite opening.
- Expensive.

CLEAR ALIGNER THERAPY (CAT)

The CAT is yet another type of clear, removable tooth moving appliance similar in principle to Invisalign. However, the manufacturing process is not entirely automated. It requires an actual plaster model setup unlike the Invisalign which uses virtual models for planning.

Advantages

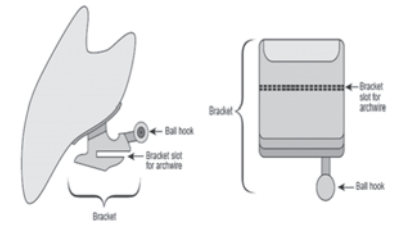
-Economical when compared to Invisalign

-Treatment plan can be changed in between.

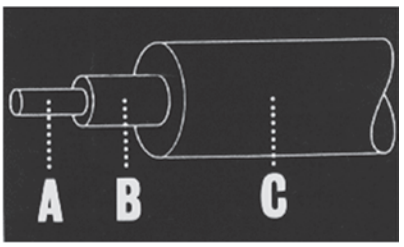
- Even if patient discontinues use of aligners for a period, treatment need not be restarted from the first stage.

Disadvantages

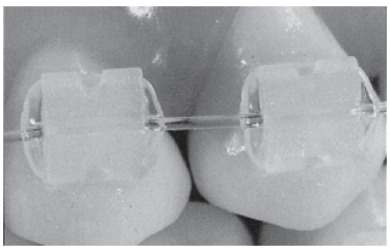
- Requires fabrication of plaster models.
- Needs higher no. of patient visits.



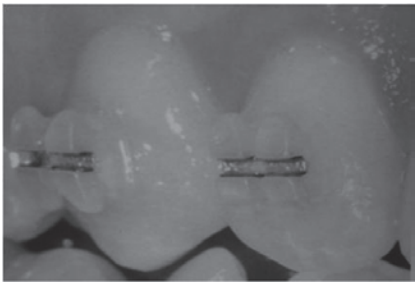
Lingual brackets



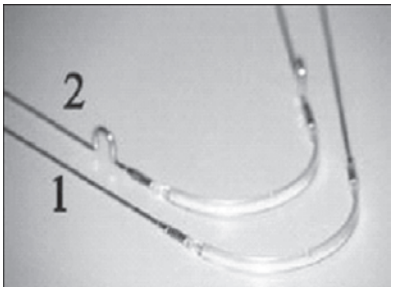
Optiflex



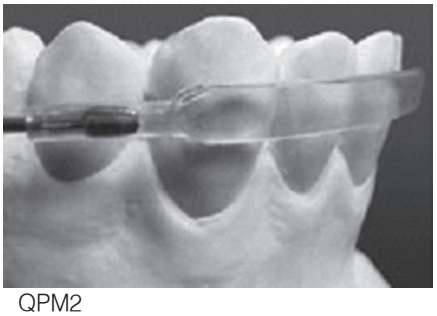
Optiflex2



Polycarbonate



QPM



QPM2

- Higher amount of chairside time.

AESTHETIC RETAINERS

Retainers are passive orthodontic appliances that help in maintaining and stabilizing the position of teeth long enough to permit reorganization of the supporting structures after the active phase of orthodontic treatment.

They include appliances like :

- Essix Retainer
- Organic Polymer Aesthetic retainer
- Lingual retainer

A) Essix Retainer

-These are clear, thin canine to canine appliances that snap into place, and retained without clasps.They are fabricated using .030 inch Essix plastic sheet which is reduced to.015 inch during thermoforming.

Essix retainers can be used for retreating minor relapse of anterior teeth or for detailing a finished case when alignment discrepancies become apparent after debonding.

B) Organic Polymer Retainer It is fabricated from 1.6 mm diameter round polyethylene terephthalate. This material can be bent with with a plier but will return to its original shape if not heat treated for a few seconds at a temperature less than 230 degree Celsius.

However, connecting the posterior metal arms to the plastic is a difficult procedure. Also, the retainers would fail if the plastic portion was disconnected.

C) Lingual Retainer

- Lingual retainers are commonly used.

- 1st Generation – Plain, round .032 - .036 inch blue Elgiloy wire is used with loop at each end bonded to the canines.

- 2nd Generation- Three stranded .032 inch wire without terminal loops which is bonded to canines.

- 3rd Generation – Plain, round .030-.032 inch diameter stainless steel wire with sand blasted ends.

Conclusion

At the very crux of creating a happy patient, lies the clinician's ability to recognize the positive elements of beauty in each patient and to create a strategy to enhance the attributes that fall outside the parameters of the prevailing orthodontic concept.

In providing treatment, the clinician needs to balance what he knows is functionally best for the patient and attain desirable aesthetic goals at the same time. In doing so, it enables the orthodontist to truly live up to the epithet of the "Smile Architect".

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Interception of a developing skeletal Class III malocclusion with functional appliance

* Chintu S., ** Sobha Kuriakose, *** Teena Faizal

Abstract

Skeletal class III type malocclusions are quite common among children. Many of them show a genetic predisposition and are due to an inherent growth abnormality. However many Class III malocclusions may result from premature occlusal contacts causing forward functional shifting of the mandible. These postural or pseudo Class III relations are to be corrected as early as possible. This article discusses a simple technique for correcting a pseudo Class III relationship during the mixed dentition stage with a removable lower inclined plane appliance.

Introduction

Malocclusions are uncommon in the primary dentition. There is usually sufficient space available for the twenty primary teeth in the dental arches, during this stage. Abnormalities like crowding and proclination of teeth starts to appear in most children during the early stages of mixed dentition mainly due to a large Incisor liability. Crossbites of a single tooth or multiple teeth can occur in the anterior region due to upper incisors erupting in a slightly lingual position. This is due to a lingual eruption path of maxillary incisors which may be due to genetic reasons, lingual displacement of the permanent tooth germ due to trauma, presence of over retained primary incisors or due to the lack of space.[1] Total anterior cross bites can occur during primary dentition phase itself due to non dental reasons. Such total anterior crossbites often result from excessive growth of the mandible in relation to the maxilla or a retarded growth of the maxilla, and can result in the development of a true skeletal Class III malocclusion.[2] Habitual forward positioning of the mandible due to occlusal prematurities can result in malocclusions which resemble true skeletal Class III malocclusions called pseudo Class III malocclusions. In such cases the permanent molar relationship is class III with the lower incisors overlapping the upper anteriors in crossbite in habitual occlusion. But it is possible for the child to retrude the mandible into centric relation and bite with incisors in an edge to edge relationship in such cases. Maxillary growth is restricted by the overlapping lower incisors and hence early correction of such crossbites is essential.[3] The habitual forward positioning of the mandible can stimulate condylar growth and a true Class III skeletal malocclusion may result.

Children with a pseudo class III malocclusion have a concave profile, an anteriorly divergent face and a prominent lower lip overlapping the upper. [fig.1] Parents are quite worried about the displeasing appearance of the child in pseudo Class III cases. Early treatment reduces the psychological burden of facial and dental disfigurement on both the child and parents[4]. Pseudo Class III relationship is usually caused by upper permanent incisors erupting

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Fig. 1 Pre treatment photo graph

Fig. 2 Habitual occlusion with anterior cross bite

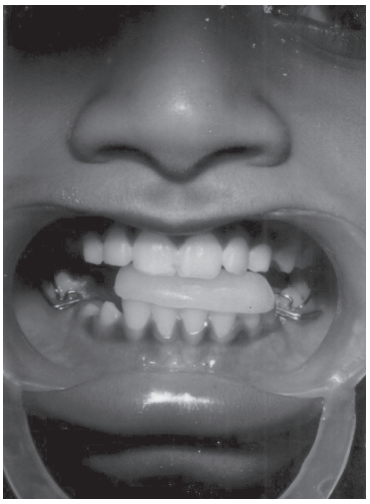

Fig. 3 Patient wearing removable lower inclined plane

in a slightly retroclined fashion, that leads to the lower incisors touching them early or prematurely during mouth closure which in turn deflects the mandible into a forward position.[5] This suggests that the upper incisors need to be tipped outwards into a proper overjet position. Early correction of the anterior crossbite in pseudo Class III during mixed dentition stage can be achieved by using simple orthodontic appliances like removable appliances with auxillary springs behind upper incisors, fixed or removable inclined bite planes on lower anteriors, removable appliances with anterior expansion screws etc.[1]

Case Report

A male patient aged 8 ½ years reported to the department of Paedodontics along with his parents complaining about a protrusive lower jaw. Extra oral examination of the child revealed a concave profile and a skeletal Class III pattern of the face. The upper lip was overlapped by a prominent lowerlip (Fig. 1). Maxillary base seemed to be normally placed in relation to the anterior cranial base. Intra oral examination revealed the upper permanent incisors to be slightly retroclined and the lower incisors to be slightly proclined, leading to a premature contact between the upper and lower incisors which forced the mandible forward into a protrudedposition(fig2). All the maxilliary teeth from primary rightcanine(53) to the primary left canine(63) were in crossbite with the lower anterior teeth. Deciduous lower molars were reportedly lost prematurely due to caries and the loss of deciduous molars leading to loss of proper occlusion in the posterior segments, seemed to be aiding in a forward posturing of the mandible.

Though the permanent first molars were in Class III relationship, when the patient was asked to swallow and bite with the mandible as posteriorly placed as possible, the permanent molars showed a tendency to go into a Class I relationship. Anteriorly the incisors could be brought nearly into an edge-edge relationship.

It was thereby confirmed that the mandibular protrusion was as a result of a functional abnormal mandibular forward shift (pseudo Class III or postural Class III) and that it was not a true Class III skeletal relationship. However, normal growth of maxilla seemed to be restricted by the vertically overlapping lower anterior teeth which made interception of the anterior crossbite essential(fig2).

Cephalometric analysis showed that Point A was normally related to Nasion(SNA-82®) and that Point B was positioned slightly ahead(SNB-84®) showing that the pseudo Class III relationship had chances of becoming a true Class III skeletal relationship if left untreated (ANB = -2®).

It was decided to correct the functional shift of mandible and the total anterior crossbite using a removable lower inclined bite plane appliance.

Design and Method of using removable lower inclined plane [fig3].

Upper and lower arch impressions were taken along with an occlusal bite registration with the patient biting in habitual occlusion. Casts were mounted in an articulator and the removable inclined plane was constructed in the following manner. Undercuts present in relation to the lower anterior teeth from 42 to 73

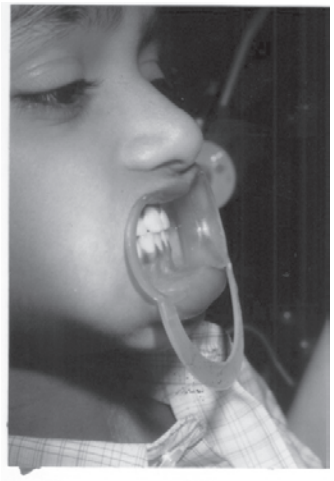

Fig. 4 Corrected cross bite

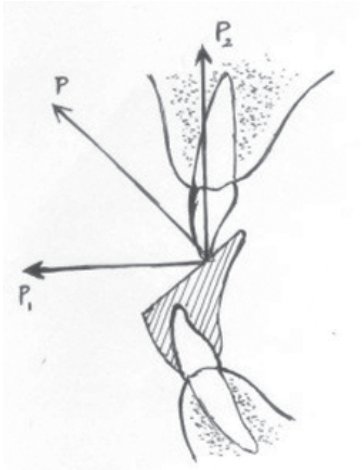

Fig. 5 Working scheme of lower inclined plane

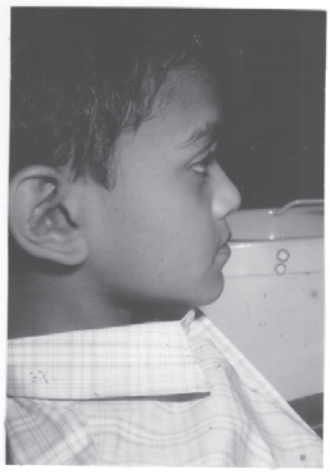

Fig. 6 Post treatment Photograph

were blocked out with modeling wax. An inclined plane with clear acrylic was made with a 45® angulation downwards and in such a way that the upper incisors were just touching the upper margin of the inclined plane. The inclined plane was connected lingually to a lingual acrylic plate with Adam's clasps on 36 and 46 made out of 0.036" stainless steel wire.

Initially the patient was asked to wear the appliance 2 – 3 hours only for a few days for getting adjusted with the appliance. Gradually the parents were asked to make sure that the child wore the appliance throughout the day except while eating solid food. The total anterior crossbite got corrected within a time span of four weeks[fig 4] and the appliance was discontinued thereafter. The patient also learned to bite with the mandible in a normal retruded position with the molars occluding in a near Class 1 relationship.

The appliance not only tipped the upper incisors into a normal overbite but also exerted a backward force onto the mandible each time the patient swallowed acting in ways similar to functional appliances like a Class III reverse twin block appliance.

Discussion

Most of the skeletal Class III malocclusions show a genetic predisposition. However occlusal prematurities like lower incisors touching the upper incisors quite early during mandibular closure can deflect the mandible forwards. In such cases the permanent first molars occlude in a Class III pattern and the face gets a typical skeletal Class III appearance. If left corrected the patient habitually places the mandible ahead of the maxilla during closure with lower incisors overlapping the upper incisors and this in turn can develop into a true skeletal Class III relationship. Early interception of a pseudo Class III relationship of maxilla and mandible is recommended in order to prevent it from developing into a full blown Class III relationship.[4]

Delaying the treatment until all the permanent teeth erupts can also cause loss of space for the upper permanent canine to erupt into the oral cavity at around 12 years. The upper incisors are vertically overlapped by the lower incisors which exert a backward pressure on the upper incisors and push them backwards into the space meant for permanent canines.[6] Early correction of anterior cross bite in a pseudo Class III malocclusion can guide the upper permanent incisors into a proper overjet relationship with lower incisors and will remove restrictions on forward maxillary growth. Besides this will allow proper eruption of canines and premolars. Proclining the upper incisors from their cross bite position can provide more space for canines.[7]

The incidence of pseudo Class III is greater than the incidence of true skeletal Class III in many population making it a major orthodontic problem in children.[8] Developing skeletal Class III malocclusions are usually intercepted using functional appliances like a Frankel 3 appliance, a reverse Twin Block or orthopedic appliances like chin caps or Face masks.[9] Pseudo Class III cases can be managed using removable orthodontic plates with springs, anterior expansion plates or fixed or removable lower inclined planes during the mixed dentition period.

A removable lower inclined plane was used to

correct the anterior cross bite which was causing a pseudo class III malocclusion in the above mentioned case. Since the acrylic inclined plane was removable, the child was comfortable with the appliance as it could be removed while eating. The Child was asked to take soft diet through out the treatment period (3 – 4 weeks) and was asked to chew with the posterior teeth only, with the mandible placed in a retruded position. The child was motivated initially by showing him in a mirror, the improvement in his appearance when the mandible is placed in a retruded position. He was also told that his upper teeth will slide over the inclined plane and come into their normal position which made him very curious.

Heavy intermittent force gets applied to the upper anteriors each time the child closes his mouth and bites on to the inclined plane. The pressure of the bite (P) divides into the two force vectors P1 and P2 (fig5). The pressure P1 proclines the upper incisors when a patient wears the inclined plane on lower incisors.[10] Since every action has an equal and opposite reaction, there was a backward thrust onto the lower incisors as well as the mandible as a whole, pushing the mandible backwards into a centric relation. Once the cross bite gets corrected, no additional retention is required, since the upper incisors prevent the forward thrusting of the mandible and the patient bites with the first permanent molars in a normal Class I relationship. A significant improvement in the appearance of the child was evident in the above case with the profile changing from concave to straight[fig6]. A chin cap maybe added to the treatment plan in cases where there is a high increase in pretreatment SNB values.

Conclusion

Pseudo Class III malocclusion with anterior cross bite and forward posturing of the mandible restricts maxillary growth and hence should be treated during the mixed dentition stage itself, in order to permit natural growth. The removable lower Catalans appliance is a very simple functional appliance that can not only correct severe anterior cross bites but also exert a backward pressure onto the mandible pushing it back into a normal centric relation. Since the appliance can be removed while eating, patient cooperation is more while using a removable lower inclined plane than with a fixed lower inclined plane. Combining a chincap along with this appliance can suppress any abnormal growth tendency of the mandible or redirects its growth.

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Clinical advantages of magnetic overdenture

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Abstract

Implant retained overdenture is considered as a gold standard in oral rehabilitation of edentulous maxilla & mandible. Its relative simplicity, minimal invasiveness, predictability, efficiency & affordability make it an attractive treatment option. Commonly used methods for anchoring overdentures, utilize bars, studs & magnets. This article reviews the treatment options available to restore edentulous maxilla & also reports on a chair side technique of using Magfit which is a magnetic overdenture used to retain a maxillary complete denture.

Key words: Magnetic overdenture, MagFit (Fig. 1)

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Introduction

Magnets were first used for overdenture retention in 1977. Back in 1977 it was considered as a novelty but today it is an accepted alternative to conventional attachments.

Most of them use a "closed field" magnet configuration, which provides optimum retention &thus the possibility of magnetic field effects on tissues is eliminated.

Initially there were problems due to corrosion &this problem has been resolved by use of improved designs. Clinical experience shows that overdentures preserve alveolar bone & that magnetic retention can be effectively used on tooth roots which would have a poor prognosis with conventional attachments. Magnets can also be used to retain over dentures against implants as inexpensive alternative to conventional implant dentures.

Maintaining these teeth or roots enables a delay in alveolar bone resorption and preserves periodontal proprioception and masticating efficiency, improving the quality of life and oral health.

A range of attachment systems are used to retain overdentures. The most common devices are the Bar-clip, O-ring, the ERA system and magnets. The bar-clip, ERA system and the O-ring offer greater retaining power for over dentures than magnets;[1] however, magnets transmit lower force levels to the teeth than other types of attachments.[2]

Use of magnets in dentistry was first described by Freeman in 1941, who used them to stabilize the prosthesis in a jaw with advanced alveolar bone resorption. For sometime the magnet of choice for retaining dental and maxillofacial prostheses was Samarium-cobalt (Sm-Co); however, this magnet was considered fragile and was later substituted.[3] The most commonly used magnet in prosthetic dentistry today is Neodymium-iron-boron.[4] It combines high magnetic saturation with good resistance to demagnetization and produces higher magnetism than any other known magnetic material. Since one of its limitations is low resistance to corrosion by oral fluids, it must be coated by another material, generally titanium.[5]

A new alloy of iron and platinum has recently been investigated for use in prosthetic dentistry, owing to its strong force of attraction and high magnetic saturation. Since this alloy contains a high percentage of platinum, it is expected to offer excellent resistance to corrosion and may be used as a substitute for Nd-Ir-B.[6]

Case report

A 57 year old male patient reported to Dept of Prosthodontia at Azeezia College of Dental Sciences & Research with partially edentulous maxillary arch and fixed prosthesis on mandibular arch. Most of the remaining teeth in

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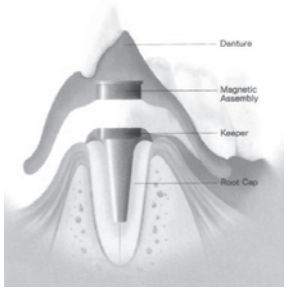

Fig. 1

Fig. 2

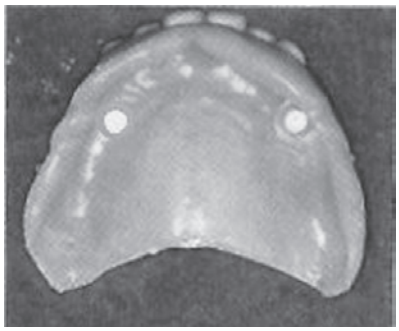

Fig. 3

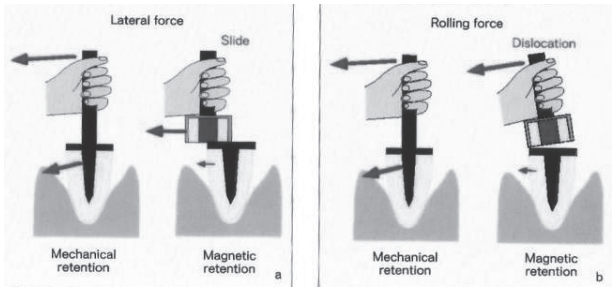

Fig. 4

maxilla were attrited and some were periodontally weak. The opposing fixed prosthesis was almost in class 3 relation with flared maxillary anteriors.

Extraction of all maxillary teeth will lead to bone resorption and a denture fabricated with labially flared anterior teeth to attain anterior contact will lack esthetics and stability. Clinical and radiographic evaluation showed that only maxillary canines were suitable to be used as an abutment for over denture. To attain retention even after a slight displacement, a magnetic over denture was chosen than a conventional over denture.

Treatment procedure

All teeth other than canines were extracted. Intentional RCT of canines were done. Canines were prepared similar to a conventional over denture to receive the keeper. In order to minimize the lateral force, the dome shaped occlusal surface of root cap was placed at the level of gingiva. Impression was recorded, (Dentsply putty + ultra light body) and a cast was poured and sent to the lab. Magnetic keepers (MagFit EX) were custom fabricated and later placed in the mouth to check for fit. Magnetic keepers were then luted over the teeth (Fig. 2). Final Impression of the maxillary arch was recorded, jaw relation recorded and try in was done. Denture was processed and verified for fit. In subsequent recall visit after 1 week the patient was satisfied with his dentures, he had no discomfort. Now the denture is ready to receive the magnetic disc (MagFit DX). The magnetic discs were placed over the keepers inside the oral cavity. After blocking the undercuts, self-curing acrylic resin was applied in the space for the magnet in the denture base and then the denture is seated over the keeper under occlusion. After curing, denture is removed. The discs were picked by the self cure acrylic resin under the denture (Fig. 3). Excess material was trimmed. Polishing of denture was done, and was reseated to check pressure spots using a disclosing paste. Final adjustments were done and support, stability and retention was verified. Patient was recalled after one week to check for any discrepancy and subsequent adjustments were made. Patient was recalled after 6 months to check the success of the prosthesis

Discussion

The rationale for using magnetic overdenture in this case is that tipping force from opposing natural tooth is likely to dislodge a conventional overdenture. This can be overcome by using a magnetic over denture. Laboratory studies have shown that magnets have better retentive properties and are less susceptible to fatigue than stud attachments.[7, 8] The use of magnets in removable dentures; promotes adequate retention, stability and eliminates the need of prosthetic structures that may compromise aesthetics. It also improves the distribution of forces to the supporting or stress bearing areas, mainly by dissipating lateral forces.[9]

Doukas et al measured the deterioration of retentive force among five kinds of attachments of different implant distances (19, 23, 29mm). They reported that all the attachments, except for the magnetic attachment, showed deterioration of retentive force.[10]

The advantage of using magnetic over denture was:

1) The retention is increased. The relationship between

the magnet and the keeper are maintained even with slight physical separation so that permanent attractive forces are always resent (Fig. 4).

2) It can alleviate pressure on the root and protects the abutment tooth from excess stress.
3) It can diminish lateral and rotative strength when under force. Thereby increasing the longevity of the roots.
4) Better aesthetics because clasps on metals are absent.
5) The keeper has a smaller radicular extension facilitating its use without compromising the tooth structure of abutment teeth. It can be used in posterior teeth.
6) Inspite of multiple abutment teeth, parallelism between the teeth is not required
7) Easy to seat and maintain by patients
8) Self seating property makes it suitable for those with minimal manual dexterity
9) No special equipments required for fabrication

It offers simplicity, low cost, self adjustment, inherent stress breaking, automatic repositioning after denture displacement, comparative freedom of lateral denture movement, reduces trauma eliminates need for adjustment in service.

Disadvantages

1) Contraindicated in patients using pacemakers.
2) Possibility of interference during MRI scanning
3) Cannot be used in patients allergic to metals.
4) Cost effectiveness.

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CT aided management of type III dens in dente

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Abstract

Dens in dente, also known as dens invaginatus, dilated composite odontoma or deep foramen caecum, is a developmental malformation which usually affects maxillary incisor teeth, particularly lateral incisors. It may, however occur, in teeth anywhere within the jaws but other locations are comparatively rare. It can occur within both the crown and the root, although crown invaginations are more common. The use of computed tomography (CT) serves as a boon in endodontic diagnosis of complex anatomic variations. The present case demonstrates the CT evaluation and endodontic management of a Type III dens in dente (Oehler's TypeIII).

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Introduction

"Dens in Dente" is a developmental variation which is thought to arise as a result of an invagination in the surface of the tooth crown before calcification has occurred.[1] The affected teeth radiographically, show an infolding of the enamel and dentine which may extend deep into the pulp cavity and sometimes even reach the root apex. Tooth crown and root may exhibit variations in size and form.

This anomaly was first reported by Ploquet in 1794. A dentist named 'Socrates' in 1856 first described Dens in dente in human teeth. In dental literature numerous authors have reported on this anomaly beginning from Baume (1874) and Busch (1897).[2] This developmental malformation is known by numerous names including Dens Invaginatus, Dilated Composite Odontome, Invaginated Odontome, Dilated Gestant Odontome, Tooth Inclusion and Dentoid In Dente. The reported incidence for dens invaginatus ranges from 0.04-10%.[3] Teeth commonly involved are maxillary lateral incisors and usually bilateral occurrence is observed (43%).[4]

Root canal treatment of teeth with complex root canal anatomy such as Dens in Dente can be problematic because infected pulpal tissues may remain in inaccessible areas of the canal system. The cleaning and debridement of such root canal systems are therefore challenging. Conventional diagnostic aids like radiographs play an important role in assessment of complex root canal morphologies. These modalities, however, do not provide detailed information of the complexity as a result of their inherent limitations. This calls for the use of more advanced imaging modalities such as computed tomography, which can help the clinician in making a more accurate diagnosis. The following case report presents a management of Type III dens in dente with periapical lesion, diagnosed with CT.

Case report

A healthy 18 year old female patient reported to our dental clinic with complaint of pain and swelling in relation to her upper left lateral incisor (Fig. 1). Patient gave a history of repeated palatal swelling and pain in relation to the same tooth from the past 2 years.

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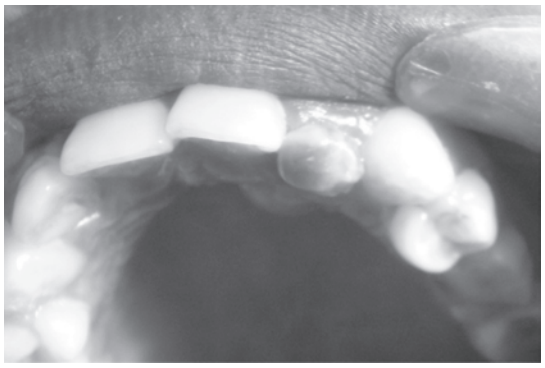

Fig.1 Discoloration and malformation.

Fig.2 Presence of an invagination along the entire length of the root.

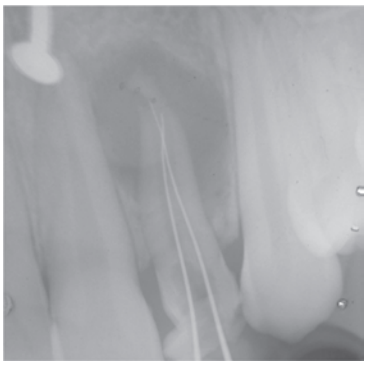

Fig.3 Working length radiograph confirmed the presence of two separate root canals.

Fig.4 Post obturation radiograph showed a dentine bridge along the entire length of the root canal.

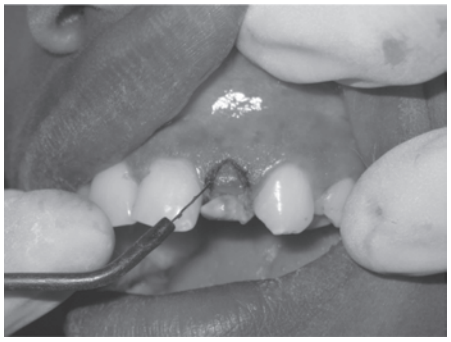

Fig. 5 Crown lengthening done using electrocautery.

Fig. 6 Crown lengthening showing presence of invaginations.

On clinical examination, the upper left lateral incisor was found discoloured with folding of the tooth crown palatally. Radiographic examination revealed the presence of an invagination along the entire length of the root. (Fig. 2)

Based on the finding, presence of type III Dens in dente was confirmed and a definite treatment plan was formulated, which included, non surgical endodontic therapy, crown lengthening, raising a palatal flap- to seal the groove, reinforcement of crown, permanent restoration and surgical apical curettage if necessary.

Treatment started with conventional endodontic procedure. Working length radiograph confirmed the presence of two separate root canals (Fig. 3). Instrumentation was done using K-files, and calcium hydroxide was placed an inter-appointment dressing for three weeks. Obturation was done using cold lateral condensation of Gutta-percha. Post obturation radiograph showed a dentine bridge along the entire length of the root canal (Fig. 4). Post endodontic rehabilitation was started with crown lengthening, which was done using electrocautery (Fig. 5). Crown lengthening revealed the presence of invagination as a developmental groove on the labial aspect (Fig. 6).

A palatal flap was raised to expose the root surface. Palatal surface of the root also had similar type of invagination. Infolding of the tooth crown was evident from the palatal aspect. Palatal and labial grooves were sealed with Light cure GIC and sutures were placed (Fig. 7). A provisional crown was placed in order to maintain the gingival contour.

Next, a Computed Tomography (CT) of the maxilla was taken and a three dimensional reconstruction of the involved tooth was done (Fig.8). The 3D reconstruction showed the developmental groove along the entire length of the root, both labially and palatally (Fig. 9).

Bony lesion was evident on the CT, which eroded palatal and labial cortical plate (Fig. 10). In the next appointment, the temporary restoration was placed inside the access cavity and some amount of obturation material was removed and the tooth was reinforced by flowing composite into the access cavity. Crown

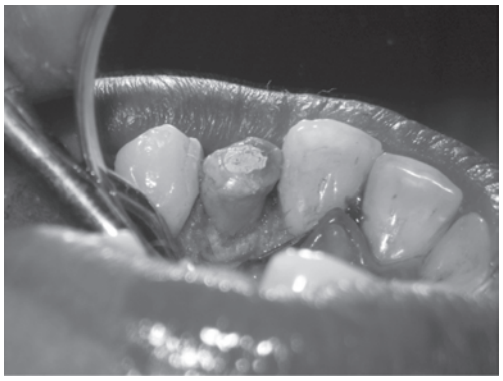

Fig. 7 After raising the flap palatal and labial groove sealed with light cure glass ionomer cement.

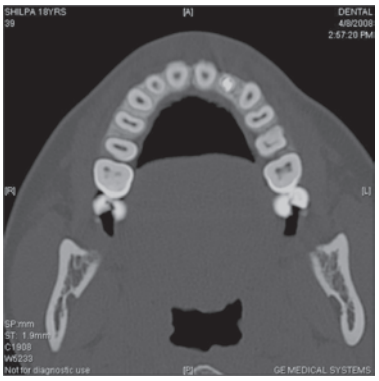

Fig. 8 Computed tomographic (CT) view of the maxilla.

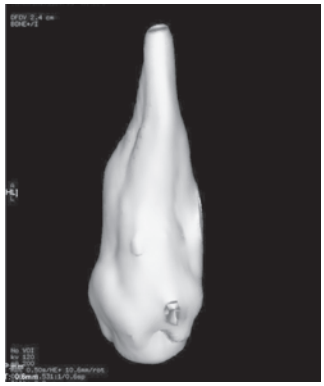

Fig. 9 Three dimensional reconstruction of the involved tooth showing developmental groove along the entire length of the root, both labially and palatally.

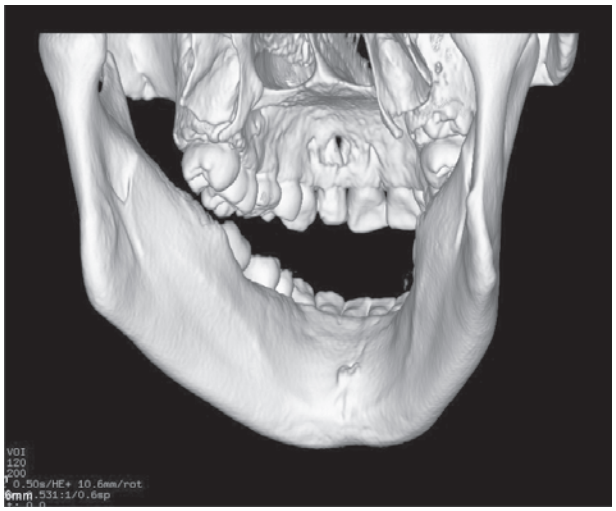

Fig.10 Bony lesion was evident on the CT, which eroded palatal and labial cortical plate.

Fig.11 Permanent ceramic crown placement.

preparation was done and a new provisional crown was fabricated. In the next appointment, a permanent crown was cemented (Fig. 11). 6 months follow up revealed a satisfactory clinical and radiographic outcome.

Discussion

Over the decades several theories have been proposed to explain the aetiology of this condition [2]. They include:

- Growth pressure of the dental arch. (Euler-1939/ Atikinson-1943)
- Focal failure of growth of internal enamel epithelium (IEE) (Kronfeld 1934)
- Rapid and aggressive proliferation of a part of IEE invading the dental papilla.(Rushton-1937)
- Distortion of the enamel organ during tooth development. (Oehler 1957)
- The 'twin-theorie' -Fusion of two tooth germs. (Bruszt 1950)
- Infection - Fischer (1936).
- Trauma - Gastafson & Sundberg. (1950)
- Genetic factors - Ireland et.al- (1987), Hosey& Bedi –(1996)

Oehler's classified Dens in dente into three types [2]

- Type-I- Enamel-lined minor forms occur within the confines of the crown not extending beyond the amelocemental junction.
- Type II -an enamel lined form which invades the root but remains confined as a blind sac.
- Type III- A form which penetrates through the root perforating at the apical area showing a second foramen in the apical or the periodontal area.

Invagination allows for the entry of irritants into an area which is separated from the pulp by only a thin layer of enamel and dentine which may be hypomineralized and presents a predisposition for caries.[5] This result in pulp necrosis within a few years of eruption, abscess formation, cysts, displacement of teeth, and may even lead to internal resorption.[3]

In case of Dens in Dente, the patient is usually unaware of the condition. A diagnosis is made only when the symptoms start or by routine radiographic examination. In the present case also, the condition was left unnoticed until the patient presented with symptoms. Usually the invagination acts as a niche for bacterial growth and jeopardizes the status of the pulp. If detected in the initial stages, the vitality of the pulp can be maintained by prophylactic restorations.[6] Once the pulp and the periradicular tissue are infected, the clinician should think of conventional endodontic therapy, apexification, or endodontic surgery if the conventional treatment fails.[7]

The present case was also approached in a conservative manner. A conventional root canal therapy was performed. Usually a number of difficulties are encountered during endodontic therapy of teeth with dens in dente. First is the difficulty of gaining access without compromising the weak tooth structure and avoiding perforations. These can be overcome by the use of radiographs in different angulations and by the use of magnification. Unpredictable internal anatomy of the pulp space in dens in dente makes the complete disinfection difficult. Use of calcium hydroxide as an inter-appointment dressing and the use of ultrasonic assisted irrigation helps to provide a sterile environment for successful endodontic therapy.[8] In the present case, we used calcium hydroxide dressing to disinfect the canal.

Use of three dimensional micro CT and operating microscope is useful for studying the complex internal anatomy of invaginatus.[9] However, patient compliance is a major factor for these advanced diagnostic procedures. In this case only after the endodontic therapy and establishment of esthetics was the patient willing for CT scan. Use of thermoplastisized gutta-perha technique is useful to gain a complete obturation. However, lack of apical control is a serious disadvantage. Extrusion of filling material beyond the apex is often observed in invaginated teeth because of their irregular morphology.[10] Apexification can be attempted as an intermediate treatment of choice or an artificial barrier with calcium hydroxide may be placed before obturation with gutta-percha. In severe cases or when the conservative therapy fails, endodontic surgery or intentional replantation can be performed.

Conclusion

Historically endodontic treatment of teeth with severe Dens Invaginatus was deemed impractical. Treatment options were limited to extraction. The dramatic improvements in endodontic armamentarium and diagnostic aids like CT have made possible the conservative treatment of such anomalies. The clinician should be aware of this anomaly because of the risk of apical inflammatory disease. Prophylactic restoration of the palatal pits of these teeth is important to avoid possible biologic injury and related inflammation.

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Unusual double real image of a giant sialolith in panoramic radiograph

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Abstract

Giant sialoliths are rare entities which can be diagnosed by routine radiographic techniques including panoramic radiography. The three dimensional central zone of focal trough in panoramic machine will generate double real image of objects in the film. Sialoliths of submandibular gland or duct may come into this zone to generate unique images. A thorough knowledge of principles of image formation is necessary to differentiate and assess the actual position and morphology of structures situated in this zone. We report a case of giant sialolith generated a combined double real image in panoramic radiograph and discussed underlying principles of panoramic image formation.

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Introduction

Sialolithiasis is the most common disease of salivary glands. It is a calcareous concretion, usually affecting the submandibular gland and its duct. Sialoliths commonly measure between 5 to 10 mm in size, and all stones over 10 mm can be reported as sialoliths of unusual size.[1] Giant sialoliths measuring more than 35 mm are rare, with only around 16 cases published in the literature. Ninety four percent of the giant sialoliths reported were in the submandibular gland. Panoramic radiograph can be used as a screening investigation to assess pathology involving major salivary glands.

Panoramic radiography has overcome many limitations of conventional radiography making it possible to depict in a single image, a complete representation of the teeth, jaws, temporomandibular joints, and maxillary sinuses with acceptable definition. Hence the panoramic radiograph forms the basis of a logically conceived and relatively low-radiation strategy for diagnostic examinations.[2]

Thorough knowledge of principles of tomography and image layer formation is necessary to localise and assess the appearance of image before treatment planning. Here we are reporting a case of submandibular giant sialolith presenting with unusual distorted appearance caused by overlapping of double real images in panoramic radiograph which highlights the principles of image formation in panoramic radiology.

Case report

A 60-year-old male reported with complaint of severe pain and swelling on floor of mouth of 4 days duration (Fig.1). There were episodes of intermittent pain in the same region for the past one week especially with food intake. There was no associated history of trauma, tooth ache, burning sensation in the oral cavity. No history of systemic diseases in the past.

On extra oral examination, the patient showed diffuse swelling over the left submandibular region with normal overlying skin without any sinus, fistula, ulcer or elevation of temperature. The swelling was warm and tender on palpation with soft to firm consistency. Posterior submandibular region showed a discrete firm mass which was mildly tender suggestive of inflamed superficial part of submandibular salivary gland. No submandibular Lymphadenopathy was noted.

Intraoral examination revealed inflamed floor of the mouth which elevated left side of tongue. The left submandibular salivary gland was firm, tender on palpation with pus discharge from Wharton's duct

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Fig.1 Shows extra oral photograph of the patient

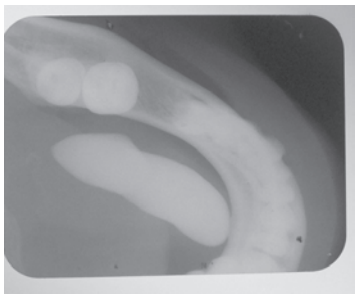

Fig.2 Shows intra oral photograph showing inflammatory swelling involving floor of mouth.

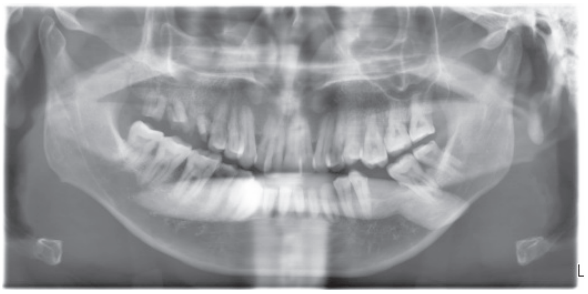

Fig.3 Cropped image of cross sectional mandibular occlusal radiograph showing uniformly radiopaque mass of 45mm×15mm suggestive of giant calculus.

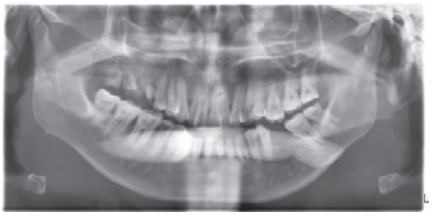

Fig.4 Panoramic radiograph showing a fusiform radiopaque image of 132.0mm×17.2mm size overlapping mandible extending to second molar region bilaterally.

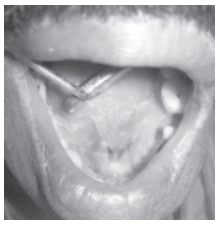

Fig.5 Intraoral photograph shows perforated left Wharton's duct after spontaneous expulsion of calculus.

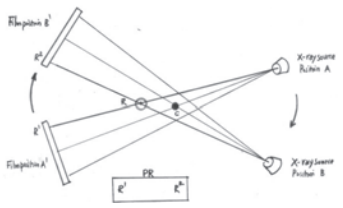

Fig.6 Diagram showing principles of double real image formation in panoramic radiography. X-ray source positions A and B produces corresponding film positions of A' and B'. C is the centre of rotation. R is the position of object by which double real images will form in film. R^1 and R^2 represents double real images. PR is panoramic radiograph shows position of symmetrical double real images.

Fig.7 shows diagram of mandible with imaginary diamond shaped zone where double real image forms (represented with vertical lines) where anterior two third of calculus was positioned

orifice on pressure. A hard mass palpable through the Wharton's duct orifice suggestive of calculus in the duct (Fig. 2). A provisional diagnosis of left submandibular sialodochitis and sialadenitis due to sialolith was made and patient was sent for radiographic examination.

Radiographic examination with a cross sectional mandibular occlusal radiograph showed a uniformly radiopaque mass, of fusiform appearance. It measuring approximately 45 mm in length, and 15 mm width in the floor of mouth medial to body of mandible extending posteriorly from 37 region anteriorly up to the lingual cortical plate of left mandibular arch in relation to 41region suggestive of a giant sialolith (Fig.3).

Panoramic radiograph revealed an elongated fairly fusiform shaped radiopaque image with a size of 132.0mm×17.2mm overlapping body of the mandible, alveolus, teeth and interocclusal air shadow extending to second molar region bilaterally. The image appears to be the union of two images of sizes 90.0mm×17.2 and 50.3mm×17.1mm overlapped in the region of 43 resulted in an enhanced radiopacity (Fig. 4).

The image was identified as a combination of two double real images, one on the left side from 43 to 37 and other from 47 to 43. Patient was advised antibiotics and analgesics to reduce the acute symptoms to aid surgical removal. But the patient reported next day with a history of exacerbation of pain and cough with spontaneous expulsion of the calculus on the previous night. Examination showed a perforated left Wharton's duct. (Fig.5)

Discussion

It is estimated that sialolithiasis affects 12 in 1000 of the adult population.[3] Males are affected twice as much as females.[4] Forty per cent of parotid and 20% of submandibular stones are not radiopaque and sialography may be required to locate them. Salivary calculi are usually unilateral. Clinically they are round or ovoid, rough or smooth and of a yellowish colour.

Submandibular stones composed of 82% inorganic and 18% organic material. They consist of mainly calcium phosphate with smaller amounts of carbonates in the form of hydroxyapatite, with smaller amounts of magnesium, potassium and ammonia. This mix is distributed evenly throughout. The organic material is composed of various carbohydrates and amino acids. Bacterial elements have not been identified at the core of a sialolith.[5]

Sialolithiasis of the submandibular gland can be completely asymptomatic. Common symptoms vary from a painless swelling, moderate discomfort to severe pain with large glandular swelling accompanied by trismus and usually associated with eating. Sialo-liths are commonly 1-10 mm in size, but giant sialoliths (greater than 3.5 cm) have been reported occasionally.[6,7] Although giant sialoliths have been reported in the salivary glands, they have rarely been reported in the salivary ducts. Surgical removal is the treatment of choice for giant sialolith. In this case sialolith was located in left side Whartons duct.

One of the primary radiographic investigation for sialolithiasis of major salivary gland includes panoramic radiography. It is a curvilinear variant of conventional tomography and is also based on the principle of the reciprocal movement of an x-ray source and an image receptor around a central point or plane called image layer in which the object of interest is located. Objects in front of or behind this image layer are not clearly captured because of their movement relative to the center of rotation of the receptor and x-ray source and will result in ghost images, blurring or distortion.[8]

Real image and ghost image in panoramic radiolography

Two types of images can be seen in panoramic radiograph. Real and ghost images. Real can be subdivided into single and double real images. A real single image is formed when the anatomic structure is located between the rotation centre of the beam and the film. A ghost image is formed when the object is located between the x-ray source and the centre of rotation. Analysing the characteristics, image of sialolith in this radiograph is resulted from double real image formation due to unique position of sialolith.

Concept of double real image

Double real image occur only with midline objects falling in a diamond shaped zone in the midline of oral and maxillofacial region where the objects are intercepted twice by x-ray beam when patient imaged from right and left side. Anatomic structures creating this kind of images include hard and soft palate, body of hyoid, epiglottis, and cervical spine (Fig. 6).[9]

In this case since sialolith is positioned just medial to the focal trough of left body of mandible and more towards the source, it was subjected to radiation from the beginning of rotation cycle of panoramic machine. The result is a real image extending from body of mandible in relation to 38 region to 43 region. The image is magnified more in horizontal direction as the rays have to travel longer through the sialolith because of its medial position.

As the anterior two third of the sialolith is in the imaginary diamond shaped zone where double real image forms, (Fig. 7) it is again subjected to imaging when tube head reaches left side to generate a partial real image extending from 43 to 47. The real image on right side appears magnified than its left counterpart in vertical dimension as it is more towards the tubehead than its former imaging position. The non uniform elongation of sialolith may be explained by the oblique position caused by anterior two third of the sialolith being outside the focal trough of left quadrant. Union of the two halves of double real images in a same horizontal and vertical plane resulted in the current unique appearance of the image.

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Reattachment of crown root fracture with esthetic fiber post

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Abstract

Coronal fractures of anterior teeth are the most frequent form of acute dental injury. Today, restoration of such traumatised incisors by reattachment of the original tooth fragment appears to be most conservative treatment approach. This case report describes the functional and aesthetic recovery of a maxillary lateral incisor. The treatment used fiber post reinforcement and reattachment of the fractured coronal segment.

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Introduction

Dental trauma is a very frequent accident among children and adolescents in the 11 to 18-year-old age range, usually associated with sports activities, falls and bicycle accidents. The main problems caused by tooth fracture secondary to traumatic injures include functional, aesthetic and phonetic impairments.[1,2,3] In the permanent dentition, the most common type of dental injury is the uncomplicated crown fracture, which accounts for over half of tooth traumas.[4] Uncomplicated crown fractures can typically be treated according to the extent of hard tissue loss with enamel recontouring, composite bonding, or porcelain veneers.[4] Complicated crown and crown-root fractures, on the other hand, represent a dilemma for the restorative dentist. While uncomplicated crown fractures can be managed with conservative restorative options, and severe complicated crown-root fractures typically are unrestorable, complicated crown and crown-root fractures where both the crown and the root are available and relatively intact may sometimes be managed with a tooth fragment reattachment technique using intra-canal anchorage. While this treatment option may not provide as much predictability as the extraction of the tooth and the placement of a single-tooth implant, the reattachment of large coronal segments may still be advantageous in many situations.[5,6]

The objective of this case report is to present a conservative approach for the treatment of an extensive crown-root fracture of maxillary lateral incisor. Advantages, disadvantages, and prognosis of this treatment modality are discussed.

Clinical case report

24 year old healthy female patient reported in the department of conservative dentistry and endodontics with a history of trauma and inter maxillary fixation two months back followed by pain and tenderness of left lateral incisor.

On clinical examination, it has been noted complicated crown root fracture of maxillary left lateral incisor, presenting tenderness of adjacent periodontal tissue. The fracture line shown as a crack line located just above the gingival margin. There was no visible crack line on the palatal surface. (fig 1-3)

At this initial visit, the fragment was removed. It has shown that the fracture line extended palataly to cement enamel junction. No bone fracture was observed. The adjacent teeth were responded within the normal limits of the pulp tester. (Fig. 4, 5)

Based on the clinical and radiographic findings a diagnosis of complicated crown root fracture was achieved and the treatment plan was proposed.

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Fig. 1, fig. 2 Diagnostic IOPAR

Fig. 3 Preoperative view

Fig. 4 After removing the coronal fragment (labial view)

Treatment plan

The goal of the treatment was to achieve patient comfort and reasonable esthetics while maintaining health and provided limited function.

The emergency dental care aimed to alleviate the pain and discomfort. The coronal fragment was gently removed under local anaesthesia. The soft tissue laceration treated conservatively with local antiseptic solution.

The coronal pulp was curetted and the fragment was maintained in saline storage. The tooth was treated endodontically and obturated with guttapercha. Obturation of apical 6 mm done by sectional filling. There was adequate adoption of the incisal fragment in the buccal aspect but the palatal fragment was not possible due to invasion of the biological width. Crown lengthening procedure done on the palatal surface of the tooth. After seven days post space prepared for prefabricated post. The post space prepared for the placement of fibre post (TFW-11, ø 1.1 mm, TENAX®, Fiber White Post, Coltène Whaledent). The diameter of the post at the coronal level is 1.1 mm and cylindro-conical in design. Hence its coronal two third increases retention and apical one third provides optimal adaptation to shape of root canal, which avoids aggressive removal of the dentin from the root canal. The post was pretested and it was snugly fitting in the root canal as well as in the coronal fragment. The coronal fragment attached to the tooth by resin cement. The palatal access was sealed with composite resin and tooth composite interface repaired with composite resin and adjusted for occlusal interferences.

Discussion

The choice of clinicians as regards the restorative treatment of the fractured teeth directly affects the treatment prognosis and requires careful consideration of several factors such as extension and pattern of the fracture, the endodontic involvement and possibility of using fractured segment in the reattachment process.[7]

In this case tooth #22 restored with its own fragment, thus allowing for maintenance of proper ties that one inherent to the tooth such enamel surface smoothness and inimitable combination of colours.[8,9,10]

Advantages

- Regaining colour and size of the original tooth
- Being worn away in a similar proportion to adjacent tooth without trauma
- Giving an emotionally and socially positive response due to the protection of natural tooth structure,
- Rapid and conservative nature of the treatment,
- Economical aspect of a one-visit treatment

Reis et al[11] suggest that clinicians choose a reinforcement technique such as enamel bevelling, external chamfer or internal grooves to improve the fracture strength of the reattached fragments simple reattachment without additional preparation may not restore even half of the fracture strength of the intact teeth.

A fiber post system is a logical option because it can be bonded to the root canal walls and to the coronal fragment and it presents adequate physical and mechanical properties. The post and core material should be esthetically compatible with crown and surrounding tissue. Resin luting agent shows good adhesion for carbon fiber post and glass fiber post. It has also been postulated that stress distribution characteristics of bonding material could reinforce the tooth. However a flexible post can cause failure of the bonding interface between core and dentine due to the fatigue of adhesive interface. To maximize the longevity of the restoration we proceeded to remove the most of the dentin from the coronal fragment before reattaching it. Dentin removal from the coronal fragment before has been shown to increase the bond

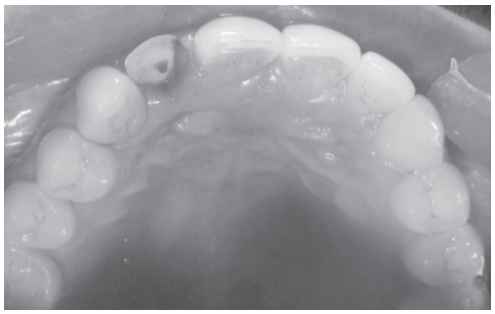

Fig. 5 Palatal view

Fig. 6 Fractured coronal segment

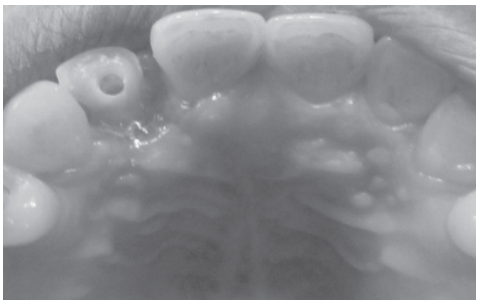

Fig. 7 Post space preparation of the root canal

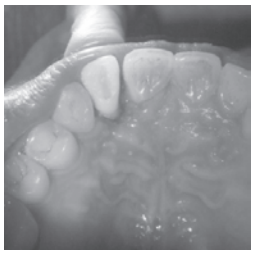

Fig. 8 Immediate after reattachment (palatal view)

Fig. 9 2 months follow up labial view

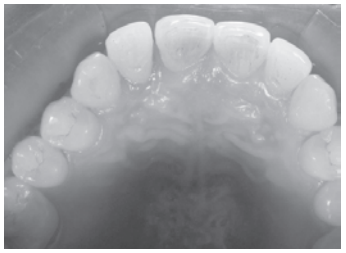

Fig. 10 Palatal view

Fig. 11 Post operative IOPAR

strength and prevents the external darkening of the devitalized dentin fragment.[12]

Conclusion

Traumatic injuries more common in children, adolescents and young adults. A conservative restorative option is described as treatment for a crown root fracture. The fragment reattachment was made possible with the use of intracanal fiber post system. Prognosis is uncertain as a result of lack of longitudinal studies comparing the same pattern fracture as well as the same restorative technique. The main objective of the presented technique is to provide a highly conservative approach that combines the aesthetic and function, postponing the use of more aggressive prosthetic solution.

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Vitapex - alternative for zinc oxide eugenol?

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Abstract

The main aim of obturation of the root canals of the primary teeth is to prevent recontamination of the canals from either apical or coronal leakage and to isolate and neutralise any remaining pulp tissue or bacteria.Commercially various obturating materials are available and is used routinely in pediatric dental practice for many years.eg: ZnOE, iodoform paste,KRI Paste(ZnOE+Iodoform)etc.This article reviews the comparison of two obturating materials that is traditionally used, ZnOE and vitapex to help the general practitioners and dental specialists to decide on these two materials for obturation.

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Introduction

The ideal requirement of the obturating material to be used in deciduous teeth is that it should resorb at similar rate as the primary roots so that it does not interfere with eruption of permanent teeth.[1] It should have stable disinfectant power. It should be harmless to the periapical tissues and to the permanent tooth germs, should be easily be inserted into the root canal and easily removed if necessary, should adhere to the walls of the canals and should not shrink. It should not be soluble in water, should be radio opaque and not discolour the tooth.[1] Most of the materials used in pediatric dentistry fulfils these criteria to a certain extend but vitapex has certain advantages over other material.

Discussion

ZnOE

ZnOE has limited antimicrobial action. ZnOE paste are not antibacterial unless formacresol is incorporated. ZnOE shows highest apical leakage. Lack of catalyst allows adequate working time for ZnOE but application of ZnOE into the root canals is difficult. The main disadvantage of ZnOE is overfilling. ZnOE when extruded beyond the apex it sets into a hard cement that resists resorbtion[2]. It can remain in the alveolar bone from months to even years and it can cause a mild foreign body reaction also.[3] It can disturb the succedaneous permanent teeth and deflection of the teeth may occur as resorbtion reaches the pulpal floor due to the presence and obstruction from the bulk of ZnOE. It is applied with the help of endodontic hand instruments manually.

Vitapex

It is premixed Ca $(OH)_2$ and Iodoform paste in silicon oil base. It is available as premixed, prepacked polypropylene syringes and disposable tips. It is used as temporary or permanent root canal filling material after pulpectomy. It is ideal for infected root canals[4]. When injected, it directly flows in to tight curved accessory canals[5]. It contains iodoform 40.4 %, $Ca(OH)_2$ 30.3%, silicone 22.4%. It has good antibacterial and bacteriostatic properties. It can easily be inserted and removed from the canals.[6] Vitapex resorbed extraradicularly and intraradicularly without apparent illeffect clinically and radiographically[7]. Vitapex when extruded into furcal or apical area can either diffuse away or be resorbed in a short period of one or two weeks.[8]

It is harmless to permanent tooth germ, is radio opaque and

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VITAPEX with disposable tips

do not set to a hard mass. Studies has shown that it resolved furcation pathology at faster rate than ZnOE at 6 months but at 12 months both material shows similar results. Vitapex shows minimal apical leakage. It can be used more safely whenever there is doubt about the patient returning for followup.[9]

Conclusion

ZnOE has been used world wide for obturation of deciduous teeth. Both clinically and radiographically both shows favourable results. But considering ease of application and rate of resorbtion and other properties vitapex is recommended as prior choice than ZnOE for obturation. It proved to be nearly ideal obturation material for deciduos teeth.

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The resilon – epiphany system for root canal obturation

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Abstract

Gutta Percha has been the material of choice in root canal obturation for many years. However, it does not bond to dentin and is prone to leakage. The Resilon – Epiphany System uses Resilon soft resin as a root canal filling material. This system is supposed to resist microleakage much better than gutta percha. Although more research is needed to better understand this material, the material looks very promising. This article briefs some of the properties and the applications of this new obturating material.

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Introduction

A proper obturation of the prepared root canal space is one of the keys to success of root canal therapy. The creation of a seal that will prevent penetration of irritants from the oral cavity into the radicular tissue via unfilled root canal space is the primary purpose for using obturation materials. If the root canal system is not properly obturated, the success of a clean, well prepared root canal system will be compromised. The commonly accepted technique for obturation in endodontics is using lateral condensation of gutta percha cones with a root canal sealer[1]. Gutta percha appears to be the least toxic and tissue irritating root canal filling material available. However, gutta percha does not adhere to the dentinal walls and consequently, a sealing agent is required. When sealer was not used with thermomechanical condensation techniques, gutta percha leakage increased 5 to 20 fold.[10] Still the fact remains that gutta-percha and endodontic sealer do not provide a fluid-tight seal. Such a disadvantage of gutta-percha has led to a call for a new and improved product, the Resilon – Epiphany system.[2]

1. Monoblock concept

The new obturation system Resilon was introduced containing Resilon along with resin – based sealer. Resilon performs in a similar way to gutta percha, has the same handling properties and can be heat softened or dissolved with solvents such as chloroform during retreatment procedures. A realseal/ epiphany sealer is a dual – cure resin composite sealer which is used in conjunction with Resilon points. The Resilon system is expected to form a monoblock within the canal space, whereby the core (Resilon) is bonded to the sealer (Epiphany) and the resulting complex is bonded to the root dentine by the resin-based primer. Such a monoblock has been suggested to reduce bacteria ingress pathways and strengthen the root to some extent.[3]

2. Composition

It consists of a core material, sealer and primer.

Resilon core material

Organic part: Thermoplastic synthetic polymer – polycaprolactone

Inorganic part: bioactive glass, bismuth oxychloride, barium sulphate.

Epiphany root canal sealer

Organic Part: Bis GMA, ethoxylated Bis GMA, UDMA, hydrophilic difunctional methacrylates.

Inorganic part: calcium hydroxide, barium sulphate, barium glass, bismuth oxychloride, silica.

Resilon primer

Sulfonic acid terminated functional monomer, HEMA, water, polymerization initiator.[4]

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3. Leakage

Gutta percha has been the standard obturating material used in root canal treatment, but it does not reinforce endodontically treated roots owing to its inability to achieve an impervious seal along the dentinal walls of the root.[5]

Although the Resilon/Epiphany system exhibits monoblock effect, still leakage was observed, which may be attributed to inadverdent stripping of the sealer off the canal wall during placement of cones, disruption of the maturing resin – root dentin bond during cold lateral condensation or the C-factor. However the mean leakage with Resilon/Epiphany system was lower than that for gutta-percha with AH plus sealer.[6]

4. Fracture resistance

Teeth obturated with Resilon were more resistant to fracture than those obturated with gutta – percha. Many advantages of Resilon have been reported, which include reduction in post endodontic leakage and periapical inflammation and improvement in root strength. These advantages have been attributed to the monoblock concept, whereby the Resilon core is bonded to the sealer and the resulting complex is bonded to root dentin by a resin based primer.[7]

5. Thermoplasticity

Resilon is available in International Organization for Standardization (ISO) cone form and in pellet form and can used with cold and warm compaction techniques. When a resin composite sealer is used with a Resilon core material, a bond is formed with the dentin wall making the filling resistant to bacterial penetration and increased resistance to tooth fracture. Resilon can be softened with heat and used in the thermoplastic gutta-percha delivery systems. It is seen that Resilon filling material flows better into lateral canals when a single back fill technique is used.[8]

6. Intracanal medication

The apical seal of the root canal system filled with Resilon is not adversely affected when calcium hydroxide is used as an intracanal medication. Calcium hydroxide is one of the most widely used intracanal medicaments in endodontics today and remains the best medicament available to reduce residual microbial flora.[9]

7. Irrigants

Sodium hypochlorite or hydrogen peroxide tend to weaken the Resilon seal when used as the final irrigant. Hence EDTA or chlorhexidine is recommended as the final irrigant. Epiphany resin root canal sealers were significantly more resistant to fluid movement than gutta percha and AH plus sealer. Thus Resilon with Epiphany sealer provides a better seal than gutta-percha and AH plus sealer.[10]

8. Spreader penetration

It has been shown that the apical seal is best when the spreader can be placed close to the working length when employing the lateral compaction method for root canal obturation. An additional spreader penetration was possible in the case of Resilon when compared with an equally tapered gutta-percha using the same controlled pressure.[11]

9. Coronal seal

Epiphany is a dual – curable resin based sealer that sets under both curing light and chemical reaction. The coronal 2mm of the sealer requires about 40 seconds light curing and the entire filling cures chemically in approximately 15 to 30 minutes. When compared with the LED and Plasma Arc curing units, the Quartz Tungsten Halogen light curing unit provided an improved coronal seal.[12]

10. Obturation method

The single – cone method, cold lateral condensation and thermoplastic techniques are the various methods to place this material in the canal. It can be done using the same instruments and devices that are used for gutta-percha condensation.[4]

11. Retreatment

The indications for retreatment of root filled teeth are when there is persistence of disease as a result of microleakage, incomplete cleaning and shaping, complex anatomy or technical short comings. Despite the materials acclaimed superior properties, a number of reasons will necessitate retreatment of Resilon – filled teeth. The obturated material can be removed from canal by application of heat as well as solvent along with endodontic files. Rotary instruments can also be used. It took less time to remove Resilon compared to gutta percha when rotary instrumentation was used. Resilon exhibits higher flowability than gutta percha when subjected to heat because it has a lower melting point and a higher molecular weight than gutta – percha. Thus quicker removal of gutta percha can be achieved using heat generated from the System B or rotary files at high rpm. Thus the same techniques which are used for removal of gutta percha such as use of rotary instruments, heat application and solvents can be applied to Resilon filled teeth as well. But it is seen that these techniques were quicker in removing

Resilon compared to Gutta-percha and it resulted in cleaner walls in the apical area.[13]

12. Root-end filling material

Resilon has certain advantages over other root-end filling materials in surgical endodontics because of its ability in providing an immediate light cured seal. It is as effective as MTA and superior to super – EBA as a root -end filling material in resisting bacterial leakage. When used in an environment with good hemostatis, Resilon has shown to be a potent root-end filling material.[14]

13. Biocompatability

The cytotoxicity of Resilon is lower than gutta percha while Epiphany is more cytotoxic than Grossman's sealer, Thermoseal and Sealopex.[15]

Conclusion

The search for new materials with improved properties is an on-going process. Resilon seems to be superior to Gutta-percha as a root canal filling material. However more profound analysis and longer follow-up period on larger group of patients is necessary to evaluate this new root canal filling material. Nevertheless, it may be assumed that this material may successfully replace gutta-percha in the nearest future.

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Prosthetic rehablitation of a xerostomia patient with a mandibular split salivary reservoir denture

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Abstract

Xerostomia is the subjective sensation of oral dryness, usually, but not invariably, associated with hyposalivation. The major dental problems reported by xerostomic patients include a high caries rate, repeated failure of dental restorations, and early tooth loss that necessitate various degrees of prosthodontic treatment. This article outlines the prosthodontic management of this special group of patients.

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Introduction

Xerostomia is a common patient complaint that could be due to systemic conditions like rheumatic fever, Sjogrens syndrome, salivary gland diseases, diabetes mellitus, Parkinsons disease, dysfunction of immune system like AIDS/HIV, due to head and neck radiation and medication related side effects. Patients suffering from xerostomia may complain not only of dry mouth, but also of difficulty in normal oral and oropharyngeal functions including eating, speaking and swallowing. Increased susceptibility to infection is also seen. Extreme discomfort is a commoncomplaint, especiallythe retention and stability of the denture. Depending upon the cause variety of treatment options are available. In case of medication induced xerostomia, tapering the dosage or changing the medication can improve the condition. In such cases measurement of a patients non stimulated salivary flow rates before and after altering the medication is useful in gauging the success of treatment. Gustatory stimulation of salivary glands by mastication of sugar free chewing gums or lozenges may be helpful. In severe xerostomia cases saliva substitutes, salivary stimulants or soft denture liners can be used to minimize patient discomfort. Often a combination of treatment may be required.

Salivary substitutes containing thickening agents for longer relief, increased moistening and lubrication have been developed and are available in different forms (solution, gels and sprays). Its contents mainly include carboxy methyl cellulose, electrolytes and flavoring agents (eg. wet mouth ICPA health products, AquseelCipla ltd). These salivary substitutes can be delivered in case of completely edentulous patient with the help of salivary reservoir dentures.

This article presents a case report in which such an edentulous patient with xerostomia has been managed by salivary reservoir denture.

Case report

A 65 year old male patient had reported to the Department of Prosthodontics at Sree Mookambika Institute of Dental Science complaining of severe discomfort in wearing his lower denture along with dryness of mouth. History of the patient revealed that the patient had undergone radiationtherapy for salivary gland tumor before 3 months. Intra oral examination revealed maxillary and mandibular edentulous ridges, areas of irritation associated with the lower denture, dry tongue and minimal frothy saliva in the floor of the mouth.

The treatment plan was to fabricate a new lower complete denture with salivary reservoir.

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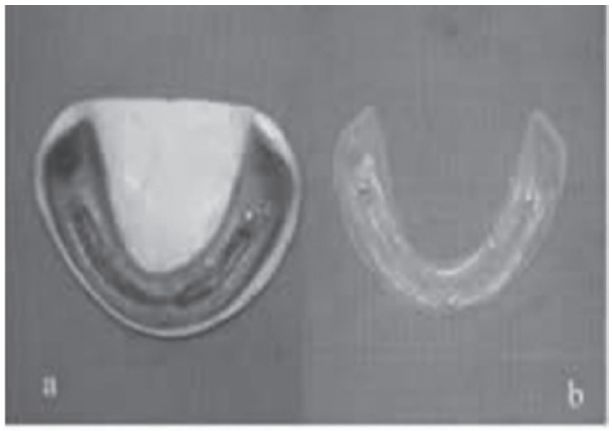

Fig. 1 Placement of metal rod with grooves

Fig. 2 Wax trial

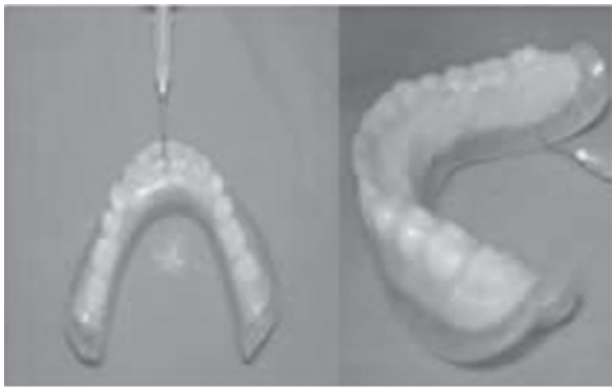

Fig. 3 Lower denture with a clear acrylic base and a removable pink acrylic upper section

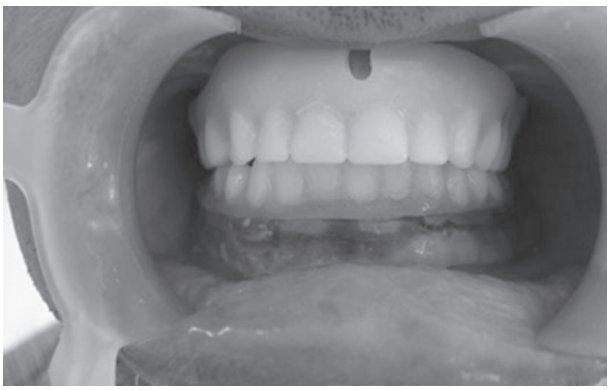

Fig. 4 Dentures in the patient's mouth

This procedure is outlined below.

Procedure

Clinical Procedure

1. Primary impression was made with putty rubber base impression material and secondary impression made with light body poly siloxane(Elite HD+ 45021, Badia, Polesine (Rovigo)-Italy).

2. Wax up for permanent denture base was done on the final cast by using shellac denture base and modeling wax (modeling wax no 2 Hindustan wax factory Hyderabad). Step was created at the periphery and wax was removed from the centre. Six metal rods, 3mm in length, 2mm in diameter having groove at one end were made in nickel chromium metal alloy. It was placed at a distance in such a way that all should remain parallel to each other. The end with grooves was inserted into the wax so that it would get locked in the denture base after processing, then flasking and dewaxing was carried out and polymerized with clear heat cure acrylic. (Fig. 1)

3. Wax rims were made over denture base and jaw relation wasrecorded.

4. Teeth arrangement was done and trial verified in patients mouth (Fig. 2).

5. Flasking followed by dewaxing of the lower trial denture was done to obtain a base portion containing permanent denture base and a counter portion containing teeth. Petrolium gel was applied on the lower permanent denture base along with the metal rods. Clay (Play Dough Reynolds Company) was placed in the prepared trough. Aluminum foil was adapted on the periphery of the denture for easy separation of twohalves, the molds were packed with heat cure acrylic resin and processed.

6. The upper denture was fabricated in the conventional manner

7. After deflasking the upper segment of the mandibular denture was attached to the lower segment for finishing and polishing. All finishing and polishing were done with the segments together to ensure a flush smooth finish.

8. Hollow spaces was created in centre of two halves of the split lower denture.

9. Reservoir was made as large as possible while maintaining sufficient denture wall thickness.

10. Finally a full lower denture with a clear acrylic base and a removable pink acrylic upper section were obtained.

11. Thin straight fissure no 8 bur was used to drill a small hole for salivary drainage from the inferior aspect of the lingual flange of the denture into the reservoir. (Fig. 3)

12. Detailed instructions were given to the patient about how to separate and clean two halves of the denture as well as refilling the reservoir with artificial denture using a syringe (24 guage 2ml disposablesyringe).

13. After a few visits the patient was able to wear the denture comfortably throughout the day and only needed to refill the reservoirs twice per day. (Fig. 4)

Discussion

The advantage of this split denture technique or previous reservoir dentures lies in the ready access to the reservoirs. It allows easy cleaning and adjustment of the reservoir as needed. The use of clear acrylic resin for the base section enables one to clearly visualize the level of artificial saliva. This method utilizes routine materials used for denture construction. Both the pieces were retained because of parallelism of the nickel-chromium rods. From a clinicians perspective the clinical stages during construction are routine and requires less chair side time. However laboratory stages are time consuming and precision is essential to ensure accurate and smoothly fitting segments. Cutting reservoirs in the denture weakens its structure. Sufficient vertical dimension and thickness are suitable of this technique.

Conclusion

This article provides a novel approach in the management of a xerostomia patient by fabricating an artificial salivary reservoir denture made from routine denture base material. The technique of fabrication is simple, denture is easy to clean and it provides good lubrication to the oral tissues.

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Comparative evaluation of vitamin 'C' levels in serum of patients with periodontitis, with and without diabetes mellitus-A clinico-biochemical study

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Abstract

Background: Vitamin C, also referred to as ascorbic acid or ascorbate, belongs to the water-soluble class of vitamins. Vitamin C (L-ascorbate) is an essential nutrient and is highly effective antioxidant acting to lessen oxidative stress. It has been suggested that ascorbic acid may play a role in periodontal disease. Low levels of vitamin C influences the metabolism of collagen within periodontium thereby affecting its ability to repair and regenerate.

Aims and objectives: The objective of the present study was to estimate the serum level of vitamin C in periodontitis with and without diabetes mellitus.

Materials and Methods: A systematic random sample of 40 subjects with at least twenty teeth present, were selected for the study and were divided into two groups. Vitamin C level and random blood sugar were measured and all subjects underwent periodontal examination. Periodontitis was defined as clinical attachment loss more than 4mm.

Results and Conclusions: The result of this study showed that serum vitamin C level was decreased in diabetic subjects as compared to non-diabetic subjects with periodontal complications. Although this relationship needs further investigation, periodontists should counsel the individuals with periodontitis and diabetes mellitus regarding the advantages of consumption of vitamin C, to diminish morbidity for these individuals.

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Introduction

Periodontitis is a term used to describe an inflammatory process, initiated by the plaque biofilm that leads to loss of periodontal attachment to the root surface and adjacent alveolar bone and which ultimately results in tooth loss. The primary etiological agent is specific, predominantly gram negative anaerobic or facultative bacteria within the sub gingival biofilm. These bacteria have the ability to activate host defence mechanisms, which breakdown epithelia and other structures of gingiva and periodontium, while at the same time inactivating repair systems.

Although now it has been unanimously accepted that periodontal disease is the resultant of an interaction between microbial plaque and the resultant inflammatory and immunological changes within the periodontal tissues, it is also recognized that the nature and severity of this interaction in turn may be modified by many systemic factors, including hormonal changes, nutritional deficiencies, blood dyscrasias, drug ingestion, aging or a compromised immune system.

The vitality of the periodontal tissues, in both health and disease, depends strongly upon an adequate source of essential nutrients being available to the host. The epithelium of the dento-gingival junction and the connective tissue are among the most dynamic tissues in the body. The maintenance of

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Table 1: *Serum vitamin C level (mean + SD) across the groups*

Parameters	**Group A** (Non diabetic with Periodontitis)	**Group B** (Diabeticwith Periodontitis)	**Reference (mg/dl)**	**Value p-value**
Vitamin C (mg/dl)	1.00 + 0.31	0.26 + 0.07	0.4+ 1.5	<0.0001**

** Highly Significant

these tissues and, therefore, the integrity of periodontium is dependent upon adequate supply of proteins, carbohydrates, fats, vitamins and mineral salts. A chronic deficiency in the availability of one or more of these nutrients may be expected to produce pathological alterations in the periodontal tissues.

Periodontal diseases are the result of bacterial infections to the gingival tissues. Therapy to decrease the levels of oral microorganisms can reduce gingivitis and stabilize periodontitis. Although dietary components play a major role in the pathogenensis of dental caries, diet plays primarily a modifying role in the progression of periodontal disease. A periodontal lesion is essentially a wound, and sufficient host resources must be available for optimal healing to take place.

The exact mechanism by which nutritional deficiencies modify periodontal destruction has not yet been precisely defined. The effect of nutrition on the immune system and its role in periodontal disease has been recently reviewed. Neiva et al. in 2003 reviewed the literature on the use of specific nutrients to prevent and/or treat periodontal diseases and concluded that although treatment of periodontal disease with nutritional supplementation has minimal side effects, the data on its efficacy are limited.

Diabetes mellitus is a group of complex multisystem metabolic disorders characterized by a relative or absolute insufficiency of insulin secretion and or concomitant resistance to the metabolic action of insulin on target tissues.

Hyperglycemia is a hallmark of diabetes mellitus as are its chronic metabolic complications. Periodontitis has been recognized as the sixth major complication of diabetes.

Investigations into vitamin C (ascorbate/ascorbic acid)-periodontal relationship go as far back as the 18th century when a British naval physician revealed that scurvy, which was accompanied by putrid gums could be successfully treated with oranges and lemons.

Malnutrition has been suggested also as a cause of diabetes mellitus. Numerous studies have found alterations in micronutrient status of patients with diabetes mellitus, and in some studies deficiency of certain vitamins has been correlated with presence of diabetic complications.

The exact pathogenic role of alteration in vitamin c levels in diabetes mellitus has been disputed. Hence this study was designed to estimate and compare the levels of vitamin C, in the serum of non diabetic patients with periodontitis and diabetic patients with periodontitis.

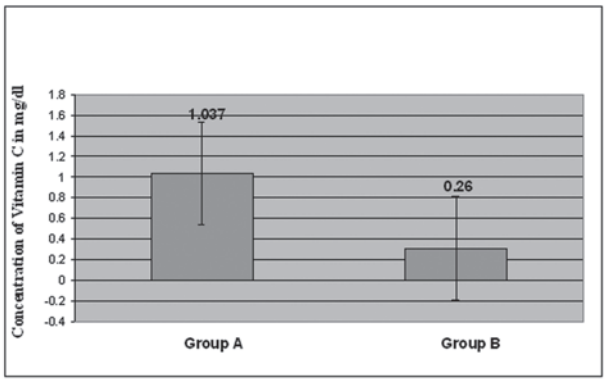
Materials and methods

Source of Data

Twenty subjects who were diabetic with periodontitis; twenty subjects who were non diabetic with periodontitis were selected from a total of 228 patients. Selection criteria included were as follows:

1. Subjects with a minimum complement of 20 teeth.
2. Patients with chronic periodontitis with more than 4mm of clinical attachment loss and more than 30% of alveolar bone loss, involving at least 6 teeth in each arch.
3. Bleeding on probing in at least 30% of teeth.
4. Healthy controls without any systemic disease and with periodontitis
5. Subjects with random blood sugar ? 200 mg/dl with symptoms such as polyuria, polydipsia, polyphagia and fasting blood sugar ? 126 mg/dl.
6. Patients who had not undergone any periodontal surgery for at least six months prior to sampling.

Fig. 1 Comparision of Serum Level of Vitamin C (mean ± SD) across the Groups.



Subjects with the history of any antibiotic therapy within six months prior to study, history of smoking, tobacco consumption, subjects with vitamin supplements and who regularly used mouth washes, pregnant women, lactating women, women in their menstrual phase and currently on antibiotics, steroids or hormonal therapy were not included for the study.

Methodology

A total of 228 patients reporting to the department of Periodontics between age 30 and 70 yrs were screened for presence of periodontitis and diabetes mellitus. Each patient was asked to sit comfortably on a dental chair. A detail medical and dental history was recorded. A periodontal examination was performed on two randomly selected quadrants (one maxillary and one mandibular). Clinical attachment loss and periodontal probing depth were also recorded.

Venous blood sample was collected from the subjects and was sent to central research laboratory to assess random blood sugar level and vitamin C levels. Venous blood samples were collected and centrifuged at 3000 rpm for 15 minutes and the supernatant serum was collected to measure the vitamin C levels. The vitamin C levels of clinical samples were measured using spectrophotometric quantitation (dinitrophenly hydrazine method) at 520nm. All the patients were informed regarding the nature of the study and the informed consent was recorded.

Among 228 patients, twenty subjects who are non diabetic with periodontitis were selected and assigned to Group A. Twenty subjects who are diabetic with periodontitis were assigned to Group B.

Vitamin C levels, periodontal status, random blood sugar levels were recorded and tabulated.

Statistical analysis

Data was statistically analysed by Student "t' test to compare Vitamin C level between the groups. Statistical Software SPSS17 was used to analyse the data.

Results

Mean serum level of vitamin C in Group A (non diabetic with periodontitis) was found to be 1.00+0.31 mg/dl and 0.26+0.07 mg/dl for Group B (diabetic with periodontitis). The difference of serum level of vitamin C was found to be statistically highly significant ($p<0.001$) across the groups (Table 1, Fig. 1).

Discussion

The present study was conducted in the Department of Periodontics, A. B. Shetty Memorial Institute of Dental Sciences, Mangalore to evaluate and compare the levels of vitamin C in non diabetic patients with periodontitis and diabetic patients with periodontitis.

On a global basis, malnutrition is the most wide spread cause for immunosuppression in humans. Several lines of evidence strongly suggest that chronically malnourished individuals constitute a special risk group for severe and at times unique periodontal pathologies. The commonest types of periodontal lesions are inflammatory lesions elicited by specific pathogens in dental plaque. When exposed to infections or inflammatory agents, the host responds not only by mounting appropriate specific and nonspecific immune responses but also by initiating a well characterized series of metabolic adjustments. Inflammatory stimuli from dental plaque promote release of reactive free radicals and also elicit metabolic changes that are modulated by potent soluble mediators known as cytokines

Deficiency of vitamin C increases susceptibility to infection, impair the function of neutrophils and macrophages, reduces antibody -mediated, cell-mediated, phagocytic and delayed type of hypersensitivity reactions and depletion of antioxidants.

The pathogenesis of periodontal disease is complex because it reflects a combination of the initiation and maintenance of the chronic inflammatory process by a diverse microbial flora and its numerous bacterial products. The subsequent host response to this infection mediates a complex cascade of tissue destructive pathways.

Additional factors contributing to this multifaceted local disease process in the oral cavity include a number of systemic diseases, especially diabetes that can

exaggerate the host response to the local microbial factors, resulting in unusually destructive periodontal breakdown.[5]

An abundance of information accumulated from studies on the complications of diabetes and periodontal disease has revealed that a hyperactive innate immune response may be the antecedent of both diseases, which probably have a synergistic effect when they coexist in the host.

Experimental evidence in diabetes mellitus patients has suggested that micronutrient deficiency leads to glucose intolerance. Serum vitamin C levels were lower in diabetics than non-diabetics. Similar findings were seen in our study.

In the present study, an attempt was made to compare the levels of vitamin C in diabetic and non diabetic individuals with periodontitis and the results show that serum vitamin C levels were higher in diabetic patients with periodontitis when compared to non diabetic patients with periodontitis.

Deficiencies in vitamin C lead to glucose intolerance in diabetes mellitus patients. These alterations may contribute to some of the complications of diabetes and hence there is a need for judicious replacement of vitamin C in diabetic patients with demonstrated deficiencies.

Future research should focus on an evaluation of different vitamins and nutrients that may help to prevent the onset and progression of periodontal diseases in medically compromised individuals.

Conclusions

Periodontists must be aware of the increasing numbers of malnourished individuals and diabetes mellitus patients and of the significance of diabetes mellitus as a multiple-risk-factor syndrome for overall and oral health. It is reasonable to consume a nutritionally adequate diet to help maintain host resistance and to maintain the integrity of the periodontal tissues. A good diet contributes to both good general health and oral health. There is insufficient evidence to justify treatment with vitamins and mineral supplementation in the adequately nourished individual. However it may be reasonable to suggest supplementation of vitamin C for patients whose nutrition might be inadequate and especially for patients with diabetes mellitus to prevent some of the complications of diabetes mellitus and to maintain healthy periodontium.

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Interceptive orthodontics

* Saibel Farishta

Interceptive orthodontics refers to treatment which is designed to minimize the extent of a developing malocclusion and to limit the adverse effects of local causes. Interceptive orthodontics may be divided into 3 main areas –

Crowding, extractions and space management - Including early loss of deciduous teeth, balancing and compensating extractions, loss of permanent incisors first molars and space maintainance.

Displacement and cross-bites - Including anterior and posterior/ lateral cross bites

Local Factors - Including management of supernumeraries, unerupted teeth, infraoccluded deciduous molars and habits [digit sucking].

The use of functional appliances may also be considered a form of interceptive orthodontics.

Crowding, extractions and space management

Early loss of deciduous teeth –

The effects of early loss of deciduous teeth depend on –

1. Site of tooth loss 2. Degree of crowding 3. Age of the patient 4. Occlusion

The two effects most commonly seen are the shift of the centreline towards the site of a unilateral extraction, usually a deciduous canine or deciduous 1st molar and mesial migration of the posterior teeth after the loss of deciduous second molar, leading to space loss and potential crowding in the permanent dentition.

Where a deciduous teeth cannot be saved and extraction is required, balancing [contralateral tooth] and compensating [equivalent tooth in the opposing arch] extractions are often described to limit these adverse effects. Balancing extractions are usually done when deciduous canines and first molars are removed, this helps preserve the centreline relationship. While in compensating extractions, deciduous second molars are usually extracted to maintain the buccal segment occlusion.

Extraction of deciduous canines - The timely removal of deciduous teeth may simplify orthodontic treatment at a later stage. Extraction of deciduous canines is most often recommended and is seen as the first stage in the process of 'serial extraction' [fig 1].

Loss of deciduous canines will allow a degree of spontaneous alignment of incisors. This may be helpful to correct a labially placed lower incisors, where there is a risk of gingival recession due to a thin mucoperiosteal covering and palatally erupting upper lateral incisors. The crowded incisors align at the expense of increasing the crowding in the buccal segment and later premolar extractions are often required.

The position of palatally placed permanent canines may be improved by the extraction of the deciduous canine. If the upper canine is not palpable high in the buccal sulcus by 8-9 yrs of age, radiographs are necessary to locate its exact position [fig 2].

Loss of Permanent Teeth - Upper incisors and first molars are not only the teeth most frequently lost but also have the greatest effect on the dentition.

Upper Incisors- Upper incisors are at risk from trauma, particularly in a Class II div 1 malocclusion. There is approximately a one in three chance that a child with an untreated Class II malocclusion will experience significant trauma to the upper incisors. Where it is not possible to save the traumatized tooth, consideration must be given to the long term treatment plan. In general, it is better to maintain the incisor space for later restoration and to treat the rest of the malocclusion on its own merit.

The most unfavourable result arises when the incisors are allowed to drift, leading to significant space loss, tipping and centreline shifts. Removable space maintainers will prevent this tooth movement and provide an acceptable appearance for the patient until definite treatment can be undertaken. It is important to place wire stops between the prosthetic tooth and adjacent teeth to prevent wear of the acrylic tooth and further space loss.

The alternative treatment plan is to close the space, bringing the lateral incisor into the central incisor position and restoring it to the same size as the central. However, there is often a significant size discrepancy between the two teeth and restored lateral incisor rarely produces a good esthetic result.

First Molars - Extraction of the first molars is largely dependent on the stage of development of the second molar. If the second molar root is less than one-third formed when the first molar is extracted, it is probable that it will erupt favourably. Problems arise

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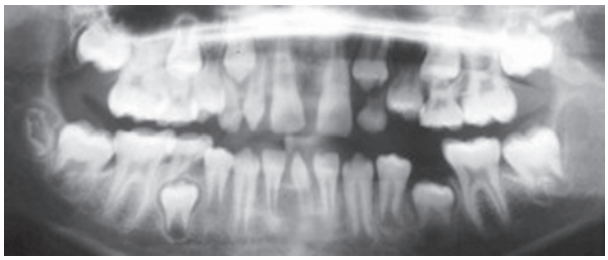


Fig. 1

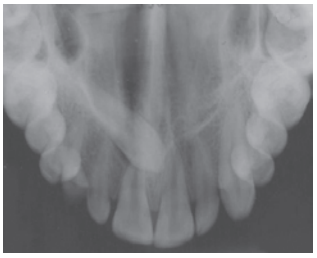
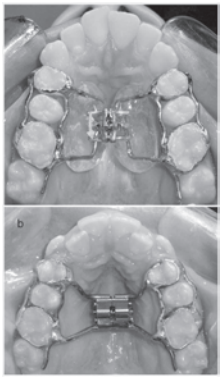


Fig. 2

Pic. 1 Anterior Crossbite

Pic. 2 tongue thrust habit



Pic 3. RME appliance

Pic. 4 Removable Expansion Appliance with Screw

when the first molar has to be extracted significantly earlier or later than this time and appliance treatment is then indicated.

Early first molar extraction may produce spacing in the buccal segment and tipping and rotation of premolars and second molars. Where possible, the first molar should be restored and maintained until the optimum time for extraction.

Extractions after the second molar root is more than one third formed, leads to a more mesioangular path of eruption than normally seen and a severely tipped second molar when erupted. This effect is lessened in the upper arch as the unerupted second molar generally has a distal inclination which uprights during its mesial path of eruption.

Balancing and compensating extractions may be considered but the decision relies on many factors, in particular the malocclusion and crowding. For this reason, an orthodontic assessment is desirable where there are one or more first permanent molars of poor prognosis.

Crossbites and Displacements

Anterior Crossbites - Anterior crossbites may involve between one and four upper incisors in crossbite with the lower incisors. They are frequently associated with an anterior displacement and should be treated at an early stage. Failure to treat at an appropriate stage may lead to periodontal problems, including mobility and gingival recession and in addition, the crossbite is more likely to persist into the permanent dentition [pic 1].

Anterior crossbite correction can usually be undertaken using a simple upper removable appliance with a spring or springs to procline the upper incisors. If a positive overbite is established, minimal retention is required otherwise a period with nocturnal wear of appliance is important. Success is more likely when the patient can achieve an edge to edge incisor relationship before treatment and when the incisors are at a normal inclination. Where there is underlying maxillary hyperplasia, more complex treatment with a splint and protraction headgear may be required to attempt an orthopaedic change.

Posterior Crossbites – Posterior buccal crossbites may be unilateral or bilateral. Unilateral crossbites are often associated with transverse displacements as the maxillary and mandibular arches are of the same dimension and in order to achieve maximum intercuspation, a displacement occurs. Treatment may be undertaken in the early mixed dentition using a removable appliance with an expansion screw or a coffin spring.

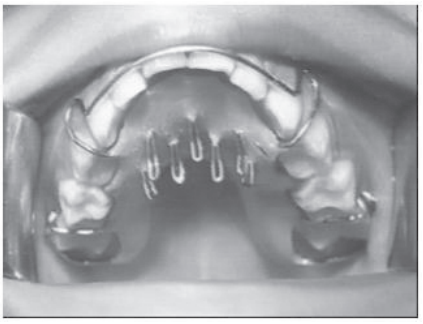
If a unilateral crossbite occurs with no displacement, this is usually due to skeletal asymmetry and correction should only be attempted if the discrepancy is mild. If there is a marked asymmetry, excessive tooth movement will be needed and stability is questionable.

Local Factors

Supernumarary Teeth: A supernumerary tooth is one that is additional to the normal complement of teeth. The prevalence of supernumerary teeth ranges

Pic 5. coffin spring

Pic 6. quad helix



Pic. 7 Removable Habit Breaking Appliance with crib

from 0.8 to 2.1% in deciduous and permanent dentition. They are found more frequently in the anterior region of the maxilla, although they may occur in any part of the jaw. They are commonly classified according to their morphology as supplemental, where the supernumerary resembles the tooth of the normal series, or rudimentary, where it may be described as conical, tuberculate or odontome.

The effect of the supernumerary varies according to its type and position. Treatment is aimed at either the extraction of the supernumerary before problems arise or minimizing the effect if adjacent teeth have already been affected.

- Supplemental supernumeraries resemble the tooth in that series and commonly cause localized crowding. Extraction of the most displaced or poorly formed tooth is indicated.
- Conical supernumeraries [mesiodens] are generally found in the midline. They frequently cause displacement of the central incisors or a large central diastema. They are more rarely associated with failure of eruption of incisors. Extraction of the supernumerary is necessary in these cases but care is necessary to prevent damage to the developing incisor roots. Occasionally they will be seen as an incidental finding on routine radiographic examination.
- Tuberculate supernumeraries are usually described as barrel-shaped. They are classically associated with failure of incisors eruption and extraction of the supernumerary is again indicated.
- Odontomes may be complex or compound and are rarely seen. They may cause failure of eruption or displacement in which case removal is required.

Infraoccluded deciduous molars – Ankylosis of the deciduous molars may be seen as an apparent 'submergence' while the surrounding teeth and alveolus continue to increase in height. Disruption of the normal resorptive process of exfoliation is thought to be the main cause, although primary failure of eruption may occur in rare cases. Tipping of the adjacent permanent teeth and prevention of eruption of the permanent successor are the main adverse effects. Extraction of the infraoccluded tooth is often indicated.

Unerupted Tooth – Maxillary incisors and canines are the teeth which most often require treatment to facilitate their eruption and the problem is frequently identified when one tooth remains unerupted after the emergence of the contralateral tooth. Removal of any local factors, such as retained deciduous teeth or supernumeraries, is the first line of treatment. Removable or fixed appliance therapy is often required to create sufficient space in the arch and provide traction to the unerupted tooth.

Habits – Thumb, finger or dummy-sucking habits are common in young children but normally cease spontaneously by 5 yrs of age [pic 2]. If the habit persists, the severity of the malocclusion depends on how vigorous the habit is, its duration and the age of the patient. The malocclusion most frequently seen in association with digit sucking is a Class II div 1 incisor relationship with an increased overjet and a reduced, incomplete overbite. In addition, the maxillary arch may be narrowed leading to a unilateral crossbite with a displacement. Various orthodontic appliances are available for arch expansion pic 3, pic 4, pic 5, pic6]. Cessation of the habit will allow improvement of the malocclusion provided the patient has sufficient growth and development remaining. Fitting a 'habit breaker' may help the child to stop the habit and allow some spontaneous improvement [pic 7]. These are removable or fixed appliances which act as a reminder to children that they should not be sucking their thumb.

Conclusion

A number of everyday orthodontic treatment modalities, carried out by an orthodontist can be classified as interceptive orthodontics. General practitioners play an important role with regards to early diagnosis, screening patients and correct referrals to the specialist as well as carrying out some simple interceptive procedures. Many patients who undergo interception will still require definitive treatment at a later stage but with the anticipation that the problem will be less severe.

Periodontal considerations in orthodontic treatment

* Rajashekar, **Amal S. Nair, ** Shino P. Mathew

Introduction

The goal of orthodontic treatment is not only to improve facial esthetics and function but also to address to the health of supporting structures and how teeth are placed in them. No matter how talented the orthodontist is, a magnificent orthodontic correction can be destroyed by failure to recognize periodontal susceptibility. Both the short and long term successful outcomes of orthodontic treatment are influenced by the patient's periodontal status before, during and after active orthodontic therapy, which also includes post treatment maintenance by the patient. Periodontal pathogenesis is a multifactorial etiologic process and the orthodontist must recognize the clinical forms of inflammatory periodontal diseases. Co-operation between different specialties in dentistry is extremely important in establishing diagnosis as well as in treatment planning. One such interaction exists between orthodontics and periodontics. The interrelationship between orthodontics and periodontics often resembles symbiosis. In many cases, periodontal health is improved by orthodontic tooth movement, whereas orthodontic tooth movement is often facilitated by periodontal therapy.

Basic tooth movements and periodontal changes:

Orthodontic treatment is based on the premise that when force is applied to a tooth it is transmitted to the adjacent investing tissues, certain structural alterations take place within these tissues which allow for, and contribute to tooth movement.

Intrusion

Intrusion alters the cemento-enamel junction and angular crest relationships, and creates only epithelial root attachment: therefore a periodontally susceptible patient is at greater risk of future periodontal breakdown. Tooth movement, when properly executed, improves periodontal condition and is beneficial to periodontal health. Orthodontic forces, when kept within biological limits, do not induce tissue alterations leading to loss of connective tissue attachment and periodontal pocket formation. The gingiva moves in the same direction as that of tooth intrusion but it moves only by about 60%. Gingival sulcus gets deepened by about 40% of tooth intrusion.

Indications:

1. It is indicated for teeth with horizontal bone loss.

2. For increasing the clinical crown length of single teeth.

Since orthodontic movement of teeth into inflamed infrabony pockets may create an additional periodontal destruction, and because infrabony pockets are frequently found at teeth that have been tipped or elongated as a result of periodontal disease, it is essential that periodontal treatment with elimination of the plaque induced lesion be performed before the initiation of orthodontic treatment. Maintenance of excellent oral hygiene during the course of treatment is equally important.

Extrusion

Extrusion or eruption of a tooth or several teeth, along with reduction of the clinical crown height is reported to reduce infrabony defects and decrease pocket depth. Extrusion of an individual tooth is used specifically for correction of isolated periodontal osseous lesions. Studies have shown that extrusion in the absence of gingival inflammation reduces bleeding on probing, decreases pocket depth and even causes formation of new bone at the alveolar crest as the tooth erupts, with no occlusal factor present.

The improved periodontal condition resulting from extrusion may have been due to both physiologic and microbiologic changes in the local environment. The subgingival microbial plaque may have been converted to a supragingival plaque by the extrusive tooth movement, thereby

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lessening its pathogenicity and effect on gingival tissues.

Forced eruption:

1. It helps to save an isolated tooth in which caries, trauma, or iatrogenesis have destroyed the clinical crown by bringing the fractured, diseased or prepared margins of the neck of the tooth more coronally to reestablish biological width.

2. Although forced eruption is associated with an increase in the width of attached gingiva, mucogingival junction remains unaltered.

3. Fibrotomy, which is done before active eruption, is essential for success of the procedure.

4. For shallowing out of isolated intraosseous defects.

5. Increase clinical crown length of single teeth.

Rotation

Relapse tendencies exist in a fairly high percentage of treated malocclusion and it is greatest for rotation corrections. The fibrous elements of the periodontal ligament adapt to tooth movement in possibly 3 mechanisms:

1. Progressive osteogenic and cementogenic activity plays an active role in the shortening of the extended fibers during tooth movement.

2. The stretching of the wavy collagen fibers and reorientation of their directional morphology permits a certain amount of tooth movement.

3. The existence of a type of intermediate plexus might allow an elongation of fiber bundles by slippage of the fibers over one another and a subsequent reorientation of the fibers in a new position.

Space closure:

After orthodontic closure of an extraction site with a fixed appliance, the gingival tissue as a rule becomes hyperplastic when the space diminishes. The teeth that are moved together thereby push the gingiva in front of them, and a fold or invagination of epithelium and connective tissue is formed. Edwards has recommended surgical removal of the excess gingival tissue that appears in papillary form buccally and lingually between the teeth that have moved together.

Traumatic occlusion and orthodontic treatment:

Studies indicate that traumatic occlusion forces

1. do not produce gingival inflammation or loss of attachment in pts with healthy periodontium

2. do not aggravate and cause spread of gingivitis

3. May aggravate an active periodontitis lesion i.e. may be a co-destructive factor

4. May lead to less gain of attachment after periodontal treatment.

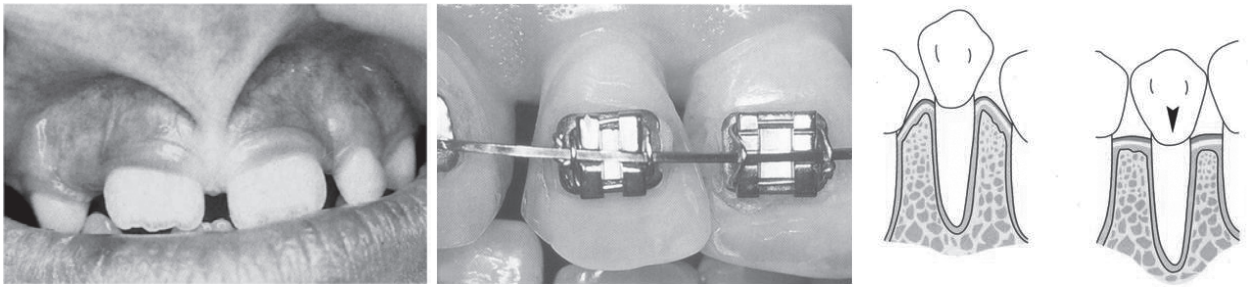
The importance of reducing jiggling of teeth after orthodontic treatment of patients with moderate or advanced periodontitis may be significant

1. Studies demonstrate that bone dehiscences caused by jiggling forces will regenerate after elimination of trauma.

2. Occlusal adjustments may be a factor in the healing of periodontal defects, especially bone defects.

Abnormal frenum and muscle pull has been considered detrimental to periodontal health by pulling away the gingival margin from the tooth contributing to accumulation of plaque and calculus, and leading to inflammation and pocket formation. Adequate depth of the vestibule has been similarly held significant. Several surgical procedures to deepen the vestibule as well as to reduce the height of frenal attachments have been developed as preventive therapeutic measures.

Occasionally in the developing dentition, abnormal frenal or muscle attachments may extend onto the crest of the alveolar ridge. The erupting tooth may pass through the alveolar gingiva and be deficient in keratinized tissue. Surgical recession will ensure normal eruption of the tooth with adequate attached gingiva.



Orthodontic force and labial recession:

Teeth having adequate attached gingiva occasionally develop localized recession during treatment. It has generally been assumed that such destruction has been associated with excessive force that has not permitted repair and remodeling of alveolar bone.

Gingivoplasty:

Gingivoplasty is the reshaping of gingiva to create physiologic gingival contours, for the sole purpose of recontouring the gingiva in the absence of pockets. Gingival and periodontal diseases often produce deformities in the gingiva that interferes with normal food excursion, collect plaque and food debris and aggravate the disease process.

Fibrotomy:

Methods to reduce of relapse of orthodontically treated teeth, especially rotated teeth include

1. Complete correction or over correction of rotated teeth.
2. Stable long term retention with bonded lingual retainers.
3. Use of fibrotomy.

Frenotomy:

Hyperplastic types of frenum with fan shaped attachment may obstruct diastema closure and hence surgical intervention is desirable. In the past frenectomy was undertaken. The complication with frenectomy is that the complete removal of the frenum may result in gingival recession between the central incisors. Hence frenotomy with only partial removal of the frenum with the purpose of relocating the attachment in a more apical direction is currently undertaken. Tissue healing is uneventful although some scarring may occur.

Distraction osteogenesis of the periodontal ligament

DO is the process of growing new bone by mechanical stretching of pre existing bone tissue. A new concept of distracting the PDL is proposed to elicit canine retraction in 3 weeks. This is called dental distraction. The PDL acts as a suture between the bone and the tooth.

Changes in the periodontal ligament on the mesial side of the canine can be classified into

1. stretching and widening of the PDL
2. active growth of new bone spicules in the distracted PDL during the second week
3. Recovery of the distracted PDL during the fourth week.
4. remodeling of striated bone from the fourth week to the third month after distraction
5. maturation of the striated bone

Adult orthodontics:

The changes that are seen in the PDL as a result of ageing are

1. IN GINGIVA
   1. Diminished keratinisation
   2. Reduced stippling
   3. Increased width of attached gingiva
   4. Decreased connective tissue cellularity
   5. Increased intercellular substance
   6. Reduced oxygen consumption
   7. Thinning of oral epithelium
   8. Atrophy of connective tissue with loss of elasticity
2. IN PERIODONTAL LIGAMENT
   1. Increased elastic fibers
   2. Decreased vascularity
   3. Decreased mitotic activity
   4. An increase in the width of the ligament
3. IN ALVEOLAR BONE AND CEMENTUM
   1. Osteoporosis
   2. Decreased vascularity

3. Decrease in healing capacity

4. Continuous increase in the amount of cementum

Adult patients present a challenge to orthodontists because they have high esthetic demands and they often have dental conditions that may complicate treatment, such as tooth wear, poorly contoured restorations and periodontal diseases. Advanced periodontal disease may cause pathologic tooth migration involving a single tooth or a group of teeth. The sequelae may be tipping and extrusion of one or several incisors, and development of a single diastema or multiple spacing of the front teeth. In such cases orthodontic treatment may be required for cosmetic reasons to attain an aligned front tooth segment.

Changes in pdl during orthodontic treatment:

Potential benefits of orthodontic treatment:

1. Improved width of attached gingiva especially when moving a labially positioned tooth lingually.

2. Induction of bone formation

3. Can re-establish biologic width in teeth with subgingival restoration margins by forced eruption.

4. Closure of spaces of extracted teeth may help prevent periodontal disease complications

Harmful effects:

Gingival and periodontal changes related to orthodontic treatment are, in general, transient with no permanent damage. However, lengthy orthodontic treatment, accompanied with sustained poor oral hygiene leads to gingival and periodontal damage. The deleterious effects include gingivitis, gingival hyperplasia, marginal periodontitis, gingival recession at extraction sites, loss of attachment, interdental clefts, especially at vestibular aspects of extracted mandibular premolars, reduced width of keratinized gingiva, marginal bone loss and apical root resorption.

Changes in pdl following orthodontics:

Periodontal tissues adapt to teeth that are moved orthodontically along the dental arch. Furthermore, experimental studies have shown that orthodontic tooth movements along the arch will not result in loss of periodontal support provided the gingival tissue is kept free of inflammation.

Dentitions with reduced periodontal support show a marked tendency to return to their pretreatment position following active appliance therapy. Thus, semi-permanent or permanent retention may be required. Thin, flexible spiral wire bonded to the lingual surface of each tooth in a segment may represent a simple and effective way of retaining realigned front teeth.

Long-term effects of orthodontic treatment on periodontal health:

While no differences were observed in the prevalence of moderate to severe periodontal disease, the orthodontic group manifested a greater prevalence of mild to moderate periodontal disease than the control group in the maxillary posterior and mandibular anterior regions of the mouth.

A greater prevalence of mild to moderate periodontal disease was found in the posterior regions of the mouth in those orthodontic patients whose treatment included extractions than in those treated without extractions.

Mucogingival problems were found with similar frequency in the orthodontically treated and control subjects and no differences in this regard were observed between orthodontic patients whose treatment involved extractions and those treated without extractions.

Preventive program for orthodontic patients:

Before orthodontic treatment:

1. control active periodontal disease and caries

2. Risks of treatment have to be explained to the patient. Awareness of the existing problem and the possible complications that may arise during treatment must be explained.

During orthodontic treatment:

1. Emphasis on oral hygiene.

2. brushing instructions.

3. check plaque removal effectiveness

4. periodic periodontal evaluation and check up

After orthodontic treatment

1. Patient must be motivated to maintain good oral hygiene.

2. Maintenance of routine dental check ups.

Peri-Implantitis: A risk factor in implant failure

* Elizabeth Koshi, ** Koshi Philip, *** Mintu M. Kumar

Abstract

Peri-implantitis is an implant-related condition which is increasingly being noticed in the clinical setting, contributing to a significant proportion of implant failures. As modern dentistry moves forward in leaps and bounds, the focus so far has been on the design of implants, both on a macro- and microscopic scale to improve and ensure success. Implant failure due to peri-implantitis however, is a multifactorial disease process most likely attributed to the interaction of certain host factors, like microbiology, genetic susceptibility and host modifying factors. The mechanism of interaction between these factors is still unknown, yet animal and human studies implicate each factor as playing a crucial role. Various treatment modalities have been attempted including combination approach of surgical debridement, antimicrobial therapy and systemic antibiotics which has shown moderate success.

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Introduction

Oral implants have enjoyed high clinical success rates over the last decade, with numerous designs of implants all claiming to have superior quality over another. It should be recognized however, that clinical complications or failures do occur and as such, a challenge is posed to the clinician in terms of initial diagnosis of peri-implant diseases and subsequent management

Peri-implantitis is defined as an inflammatory process affecting the tissues around an osseointegrated implant in function, leading to the formation of a peri-implant pocket and loss of supporting bone. The incidence of peri-implantitis range from 2-10%.[1]

The inflammation of the soft tissues is associated with bleeding after gentle probing with a blunt instrument. There may be suppuration from the pocket. Swelling and redness of the marginal tissues is not always very prominent, and there is usually no pain associated with peri-implantitis. Peri-implantitis should be distinguished from peri-implant mucositis in that the former is defined as an inflammatory lesion that affects the supporting bone, while the latter is a reversible inflammation localized to the soft tissues only.[2]

Implant complications and failures

Implant failures can be broadly divided into two categories:

a) Early failures b) Late failures.

Early failures may be related to an inability to establish a close bone-to-implant interface and may occur before or after loading. It is suggested that a number of factors are relevant to early failures, such as premature loading, biocompatibility, surgical trauma or an impaired host healing response. Late failures refer to a disruption of an already osseointegrated relationship between the mineralized bone and implant. Causative factors of late failures include, over-loading and chronic bacterial infection (peri-implantitis).[3]

Bacterial infections play an important role in the failure of dental implants. There is adequate evidence supporting the view that microorganisms play a major role in causing peri-implantitis.[3,4]

Experiments in humans has shown that deposition of plaque on implants can induce peri-implant mucositis. It has been demonstrated that antimicrobial therapy improves the clinical status of peri-implantitis patients.[5,6]

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An early study which compared the microbiota surrounding successful and failing titanium implants found that failing sites had a significantly higher proportion of micro-organisms. Gram negative anaerobic rods, spirochaetes and fusiform bacteria were found in higher proportions at peri-implantitis sites as compared with healthy sites, which were predominantly composed of coccoid forms. Periodontal pathogens such as *Porphyromonas gingivalis,Actinomyces actinomycetemcomitans* and *Prevotella intermedia* have been shown to colonize the peri-implant sulcus from 1 to 3 months after exposure to the oral environment.[7]

A long term prospective study investigated the incidence of implant failure due to infection in patients with a history of chronic periodontitis. The study population included 53 participants who received dental implants and were monitored over a 10 year period. Subjects were divided into two groups according to the reason for previous tooth loss (i.e. Group A= chronic periodontitis, Group B = other). Findings indicated that a significantly greater incidence of peri-implantitis occurred in Group A (28.6%) when compared with the group B (5.8%).[8] Ciancio et al found that implant success was very high in periodontally compromised patients with a good standard of oral hygiene. It seems that oral hygiene is an important factor in the overall success of implants in any patient, yet more so for those with a history of chronic periodontitis.[9]

Contributing factors

Impaired healing. The magnitude of the surgical trauma due to lack of irrigation and overheating, and some local and systemic factors play a major role in implant failures related to impaired healing.

Overload. It includes those situations in which the functional load applied to the implant exceeds the capacity of the bone to withstand it.

Other attributes to implant failure are poor surgical technique, poor bone quality and poor prosthesis design.[4,10]

Clinical Diagnosis

The well advanced peri-implantitis lesion may be clearly identified by evidence of radiographic bone loss, mobility and clinical signs of infection. It is the early lesion that poses the greatest challenge to the clinician and is undoubtedly of greatest value in order to avoid further bone resorption and subsequent loss of the implant.[11]

Typical signs and symptoms of peri-implantitis include

1. Evidence of vertical destruction of the crestal bone, often "saucer shaped".
2. Formation of a peri-implant pocket (> 4mm),
3. Bleeding or suppuration after gently probing,

Tissue redness and swelling.[12]

Clinical signs of peri-implantitis may not always be evident. Standardized radiographs are suggested one year after fixture placement and every alternate year thereafter. However, if clinical parameters indicate signs of peri-implant infection additional radiographs may be taken to determine the extent of marginal bone loss.[13,14]

Probing the peri-implant sulcus with a blunt, straight periodontal probe such as the automated probe or the TPS probe, allows the assessment of peri-implant probing depth, bleeding after probing, exudation and suppuration from peri-implant space.[15]

Implant mobility is an indication for lack of osseointegration. Even in well advanced peri-implantitis, implants may still appear immobile due to some remaining direct bone-to-implant contact. Thus, mobility serves to diagnose only the final stage of osseodisintegration.[15]

Bacterial culture, DNA probes, polymerase chain reaction, monoclonal antiboby and enzyme assays to monitor the subgingival microflora have been proposed to determine an elevated risk for periodontal disease or peri-implantitis.[15]

Smoking is an established risk factor for chronic periodontitis and undoubtedly contribute to an increased risk of implant Ioss. However, study results show a trend toward an additive affect whereby smokers with a history of chronic periodontitis displayed a poorer implant survival rate of 80% versus 100% in non smokers.[16]

Treatment of Peri-implant infections

Management of peri-implantitis generally works on the assumption that there is a primary microbial etiology. Furthermore, it is assumed that micro-organisms and their byproducts lead to infection of the surrounding tissues and subsequent destruction of the alveolar bone surrounding an implant. Mombelli A and Lang suggested five considerations in the therapy of peri-implantitis:

1. The removal of the bacterial biofilm in the peri-implant pocket.
2. Decontamination and conditioning of the surface

of the implant.

3. Correction via reduction or elimination of sites that cannot be adequately maintained by oral hygiene measures.

4. Establishment of an effective plaque control regime.

5. Re-osseointegration[17,18]

There is a consensus that proper oral hygiene should be established, and that occlusal forces be evaluated and corrected by occlusal adjustment when deemed traumatic.

Supra-and submucosal mechanical debridement and topical antimicrobial treatment should be part of the initial therapy.

Various topical antimicrobial treatments are recommended like use of chlorhexidine mouth rinses, professional irrigation with chlorhexidine, hydrogen peroxide, stannous fluoride or tetracycline solutions, application of tetracycline fibers.

In cases with horizontal bone loss or with wide/ shallow intraosseous defects showing inadequate resolution after initial therapy, open debridement combined with osseous re- contouring is suggested. Regenerative surgery is proposed for intrabony two- and three-wall defects, dehiscence defects, intrabony defects > 4mm deep[19].

Lang et al. (1997) suggested the use of barrier membrane. Kwan & Zablotsky (1991) and Jovanovic (1993) proposed grafting or barrier membrane, or a combination of both procedures, without providing any specific recommendations as to the selection of graft material and barrier membrane.[20,21]

Conclusion

Peri-implantitis is one of the most significant risk factors associated with late implant failures. Micro-organisims play a major role in this disease, particularly gram negative anaerobic bacteria. Limited scientific evidence is available to endorse or recommend a specific modality of treatment and it seems that like periodontal disease, one regime may be successful in one patient and not another. Randomized controlled studies to evaluate the non surgical and surgical treatment of peri-implantitis is needed. Until further research is available, the clinician should make a clinical judgment based on the individual case using a rational and evidence-based approach.

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Comparative evaluation of oil pulling therapy and chlorhexidine mouth rinse in maintenance of patients undergoing orthodontic treatment

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Abstract

Back ground: Oil pulling is a traditional Indian folk remedy with oral and systemic benefits which has gained much interest recently. The present study compared the efficacy of oil pulling therapy with sesame oil and Chlorhexidine gluconate in the maintenance of patients undergoing fixed orthodontic therapy. **Material and methods:** 30 patients undergoing fixed orthodontic treatment in the department of Orthodontics, P.S.M. Dental College was evaluated for plaque and gingivitis. After FMP, they were instructed to use 0.2% chlorhexidine mouth rinse or use oil pulling therapy. After one month PI and GI scores were assessed. **Results:** Oil pulling therapy and chlorhexidine therapy had statistically significant reduction of PI and GI scores compared to Full mouth prophylaxis alone. **Conclusion:** Oil pulling therapy is as effective as chlorhexidine mouth rinse in the maintenance of oral hygiene in patients undergoing fixed orthodontic therapy.

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Introduction

The accumulation and maturation of bacterial biofilm at the gingival margin is widely recognized as the primary etiologic factor in the development of chronic gingivitis. Current treatment for gingivitis is directed at the disruption of biofilm by professional and home care mechanical methods.[1] Efficient plaque control techniques are time consuming and require motivation and skill to be performed well. Certain group of individuals including patients on orthodontic appliance requires chemical adjuvant for oral hygiene maintenance. Chlorhexidine is the proven gold standard chemical plaque control agent.[2] Chlorhexidine is a broad spectrum antiseptic with pronounced antimicrobial effects and side effects like staining, taste disturbance mucosal erosion, swelling of parotid gland, enhanced supra gingival calculus formation. This has stimulated the search for an alternative antiplaque agent.

Oil pulling therapy is a traditional Indian folk remedy which is claimed to cure numerous systemic diseases. It is mentioned in Ayurveda text *Charaka samhitha*[3] where it is called *kavala gandusha/ kavala graham*. It can be done using oils like sunflower/sesame oils.

Aims and objectives

To compare the efficacy of oil pulling therapy and Chlorhexidine gluconate in the oral hygiene maintenance of patients undergoing fixed orthodontic therapy

Material and methods

30 patients undergoing fixed orthodontic treatment for more than three months in the Dept. of Orthodontics, P.S.M Dental College volunteered for the study. Screening and selection of the volunteers were carried out by a single examiner. Signed consent was obtained from the participants. The participants were randomly divided into 3 groups. Group 1-oil pulling therapy with full mouth oral prophylaxis, group 2-0.2% chlorhexidine mouth rinse with full oral prophylaxis, group3-full mouth oral prophylaxis alone. The oil and chlorhexidine were randomly distributed without the knowledge of the examiner.

Inclusion criteria

1. Subjects with plaque induced gingivitis undergoing fixed orthodontic treatment for more than 3 months
2. 18-25 years of age

Exclusion criteria

1. Any medical condition that interfere with periodontal health
2. History of consumption of antibiotics within last 1 month.
3. Intolerance or allergy to mouth rinse

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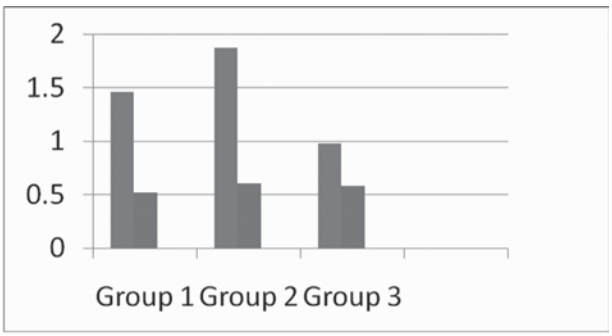

Fig 1 Plaque index

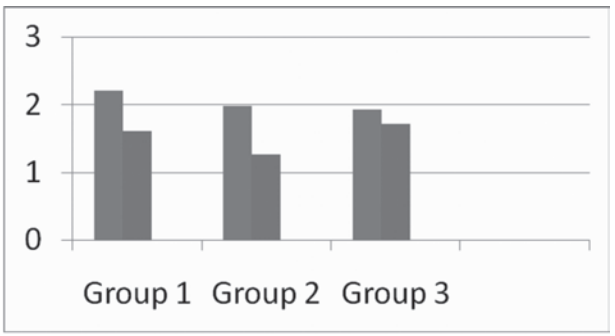

Fig 2 Gingival index

At base line plaque index (Silness and Loe 1964) and gingival index (Loe and Silness1963) were taken from all the participants. This was followed by full mouth oral prophylaxis. The Chlorhexidine mouth rinse and sesame oil was dispensed by the dental hygienist in the department. Group 1 patients used sesame oil (KPL Sudhi) one tablespoon in the morning before brushing and group 2 patients used 0.2% Chlorhexidine, 1:1 dilution 30 second twice a day. After 4 weeks the patient returned for clinical measurements.

Results

The base line (pre) plaque index and gingival index scores of three groups when compared were not statistically significant. The pre and post values of Plaque index and gingival index within the same group were compared using paired t test. The statistical analysis was done using medical soft ware (Med Calc V 10.2.0 version). P <0.05 was considered as level of significance. There was statistically significant reduction in PI ($p<0.05$) and GI score ($p<0.04$) in oil pulling (group 1). In Chlorhexidine group the reduction (group 2) PI ($p<0.01$) and GI ($p<0.008$). In group 3 (FMP alone) the PI and GI reduction were not statistically significant after completion of study. When the post PI and GI values of group 1 and 2 were compared the result was not statistically significant but when compared with post PI and GI values of group 3, the results were significant.

Staining was noted in almost all group 2 patients after one month of Chlorhexidine usage.

Discussion

Plaque control is fundamental to prevention and management of periodontal disease. Mechanical tooth cleaning through tooth brushing with tooth paste is the most common and effective form of oral hygiene. Unfortunately a significant proportion of all individuals fail to practice a high enough standard of plaque removal. Many individual removed only around half the plaque from their teeth even when brushing for 2 minutes. The adjunctive use of chemicals would therefore appear a way of overcoming deficiency in mechanical tooth cleaning habits. In this study orthodontic patients were selected because mechanical plaque control alone is often inadequate in the maintenance of good oral hygiene.

In this study there was significant reduction in PI and GI after oil pulling therapy and Chlorhexidine usage but there was no significant reduction in control group who underwent only oral prophylaxis.

Chlorhexidine gluconate is the standard mouth wash and most effective antiplaque, antigingivitis agent presently available.[4] several studies have confirmed the finding that 0.2% aqueous solution of Chlorhexidine gluconate almost completely inhibited the development of dental plaque, calculus and gingivitis in human model for experimental gingivitis.[5,19] Loe and Schiott[6] showed Chlorhexidine inhibited plaque re growth and development of gingivitis during orthodontic therapy since plaque control may be compromised. Chlorhexidine has been shown to reduce the incidence of traumatic ulcer during fixed orthodontic therapy.[7] Chlorhexidine has been reported to have a number of side effects like brownish discoloration of tooth, oral mucosal ulceration and taste perturbation. This has stimulated the search for an alternative anti plaque agent.[9]

Oil pulling therapy is a procedure that involves swishing oil in the mouth for oral and systemic benefits. It is mentioned in ***charaka samhita***, where it is called kavala or gandusha. It is claimed to cure about 30 systemic diseases ranging from headache, migraine to diabetes and asthma. It has been used extensively as traditional Indian folk remedy for many years to prevent decay, oral malodor, bleeding gums, dryness of throat, cracked lips and for strengthening gums.[10, 11]

Oil pulling can be done using oils like sunflower/

Table I Pre and post treatment Plaque Index scores

Group 1	Group 2	Group 3
Pre PI mean 1.460	Pre PI 1.872	Pre PI 0.978
Post PI mean 0.520	Post PI 0.605	Post PI 0.583
P value 0.04	P value 0.01	P value 0.06150

Table II Pre and post treatment Gingival index scores

Group 1	Group 2	Group 3
Pre GI 2.202	Pre GI 1.983	Pre GI 1.923
Post GI 1.604	Post GI 1.267	Post GI 1.717
P value 0.0481	P value 0.008	P value 0.2809

sesame oil.[11, 15, 18] The sesame plant (sesame indicum) of the pedaliaceae family has been considered a gift of nature to mankind for its nutritional and desirable health effect.[13, 14] Sesame oil is considered the queen of oil seed crops because of its beneficiary effect. Sesame oil [15] has three ligands –sesamin, sesamolin and sesaminol that have antioxidant properties and potentiates Vitamin E action. The viscosity of oil probably inhibits the bacterial adhesion and plaque co aggregation. The mechanism of plaque inhibition by oil pulling therapy is not exactly identified.

Review of studies on full mouth prophylaxis indicates that this treatment is effective and reliable [16]

The fixed orthodontic appliance in group 3 patients might have hampered oral hygiene maintenance. This might be the reason for no statistically significant reduction of PI and GI scores in control group in the present study.

The findings in the present study is in agreement with previous study by Ashokan et al [17,18] in which PI and GI scores were reduced after oil pulling using sesame oil in adolescent boys having plaque induced gingivitis. Recently an in vitro study[19] was done on the antibacterial ability of sesame oil and ligands isolated from sesame oil on oral microbes. Results indicated that sesamin and sesamolin isolated from sesame oil did not have any antibacterial effect against oral microbes like *s. mutans, s.mitis,* and *s.viridans*. Emulsification and possible saponification of sesame oil occurs during oil pulling therapy which enhances its mechanical cleansing action. Thus it can be proposed that oil pulling therapy is as effective as Chlorhexidine in reducing plaque accumulation and gingivitis. Oil pulling therapy is more economical as it is readily available in Indian house hold and side effects of Chlorhexidine like staining and taste perturbation are not reported. But time required for oil pulling is considerably more and this may affect patient compliance.

Summary and conclusion

The oil pulling therapy is as effective as Chlorhexidine in the maintenance of oral hygiene in patients undergoing orthodontic therapy. Therefore it has potential therapeutic value and long term studies using larges sample size and in patients having periodontitis should be carried out to determine its efficacy

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Full mouth rehabilitation of a patient with amelogenesis imperfecta

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Abstract

Amelogenesis imperfecta is a hereditary condition where enamel formation is disturbed resulting in defects in mineralization or matrix formation. Restoration of the dentition poses great difficulties especially when all the teeth are severely affected. Treatment aims to relieve pain or tooth sensitivity, to preserve as much tooth tissue as possible while preventing further tooth loss, to maintain masticatory function, and to improve the appearance as this has great psychological impact on the patient's confidence. This article describes the fixed prosthodontic treatment of a young female who presented with a moderate form of hypoplastic type of amelogenesis imperfecta.

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Introduction

Amelogenesis imperfecta (AI) is a genetically determined and rare enamel mineralization defect reported by Spokes[1] in 1890 as "hereditary brown teeth." Amelogenesis imperfecta was characterized as a clinical entity in 1945, and its clinical manifestations, histologic appearance, and genetic pattern are characterized by their heterogeneity. The enamel deficiencies can be quantitative and/or qualitative, and they can vary from affecting only a few teeth with small white spots to being more general and affecting the entire dentition. The latter is manifested as yellow-brownish teeth with soft enamel that is easily split. Generally, both the primary and secondary dentitions are affected.[2]

Patients with AI are often esthetically affected because of tooth discoloration, often with accompanying hypersensitivity and many other dental conditions.[3] Various classification systems based on genetic pattern, clinical manifestations, and histologic appearance have been presented. They range from two or three main groups (namely the hypoplastic and hypomineralized or the hypoplastic, hypomaturation, and hypocalcified types) to as many as 14 subgroups.[2] The prevalence of this condition has been expected to range from 1 in 718 to 1 in 14,000, depending on the population studied. Hypoplastic AI represents 60–73% of all cases, hypomaturation AI represents 20–40%, and hypocalcification AI represents 7%.[4]

Case report

A 24 yr old female reported to the Department of Prosthodontics, Govt. Dental College, Kozhikode, with a chief complaint of unesthetic smile due to yellowish teeth and hypersensitivity of back teeth. Family history revealed the presence of this condition in her elder sister. The patient's oral hygiene was good. Intra oral examination and panoramic radiograph revealed absence of mandibular right first molar. This tooth had been extracted due to caries. Disto-lingual rotation of the mandibular right second premolar was present. Due to the loss of enamel, generalized diastema were present. Left mandibular posteriors were restored with silver amalgam. Maxillary and mandibular anterior teeth were stained yellow and the maxillary anteriors showed loss of enamel in the cervical region. Maxillary and mandibular posterior teeth showed loss of enamel and dark yellow stains. The patient complained of hypersensitivity of all the posterior teeth. There was no loss of vertical dimension.

In treatment planning special attention was given to improve the aesthetics and function. Fabrication of metal-ceramic crowns and three unit FPD (in mand right posterior quadrant) for maxillary and mandibular posterior teeth and mandibular anteriors, and all ceramic crowns were planned for maxillary anteriors. The patient was informed of the diagnosis, the treatment planned and her consent was taken before the start of the procedure. The treatment was carried out in a phased manner.

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Fig. 1 Pre-operative Frontal view

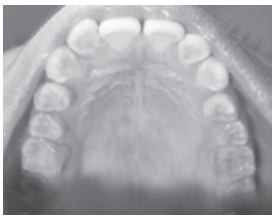

Fig. 2 Pre-operative Maxillary occlusal view

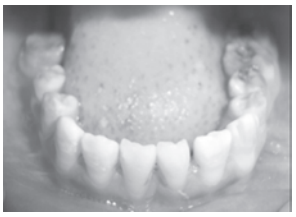

Fig. 3 Pre-operative Mandibular occlusal view

Fig.4 Post operative Frontal view. Maxillary Anterior teeth restored with All Ceramic Crowns (IPS e.Max)

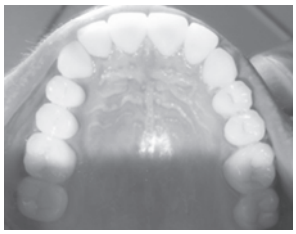

Fig.5 Post-operative Maxillary occlusal View

Fig.6 Post-operative Mandibular occlusal View

The first phase involved thorough oral prophylaxis and diagnostic impressions. Full mouth impressions were made using irreversible hydrocolloid impression material (Jeltrate, Dentsply, India) to obtain diagnostic casts using Type III dental stone (Labstone, Kalabhai Karson, Mumbai, India). Face-bow transfer (Quick Mount Facebow, Whip Mix Corp., Louisville, USA) was done and interocclusal records were made to mount the casts in centric relation on a semi-adjustable articulator (Whip Mix Model 8500, Louisville, U.S.A).

Second phase involved endodontic treatment of mandibular second premolar as there was lack of space to fabricate a three unit FPD in mandibular right posterior region.

Third phase involved tooth preparations in the anterior teeth- mandibular anteriors followed by maxillary anteriors- followed by temporization to check for the esthetics and phonetics. After the patient was satisfied with the esthetics and phonetics tooth preparations in the posterior quadrants were carried out. Fourth phase involved tooth preparations in the mandibular posterior quadrants followed by maxillary posterior quadrants and placement of temporary crowns.

The patient's response with the full mouth temporary restorations was evaluated with respect to esthetics, phonetics, occlusion and comfort of the temporomandibular joints for a period of two weeks. The patient was satisfied with the prospective treatment outcome.

The fifth phase involved cementation of the crowns and bridge. Maxillary anterior crowns were fabricated using all ceramic material (IPS e.Max, Ivoclar Vivadent, Amherst, NY, USA), and were cemented using resin cement (Variolink, Ivoclar Vivadent, Amherst, NY, USA). Mandibular anteriors and posteriors, and maxillary posteriors were restored with metal ceramic crowns and bridge and cemented with glass ionomer luting cement (GC Fuji, Japan).

The last phase involved recall and maintenance. The patient was instructed regarding oral hygiene procedures which included use of floss, chlorhexidine mouthwash and brushing teeth twice daily.

Recall was done at 1 month, 3 month and 6 months, followed by regular dental check up at 6 months interval.

Conclusion

This clinical report describes the use of metal-ceramic crowns and FPD and all ceramic crowns for restoration of a Hypoplastic type of amelogenesis imperfecta. Metal-ceramic crowns and FPD were placed on all the posterior teeth and mandibular anterior teeth, and all ceramic crowns were placed on the maxillary teeth to improve the function and esthetics.

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Management of nonvital permanent teeth with large periapical lesion and an open apex

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Abstract

Management of immature non-vital tooth is a challenge to the clinician. It often get complicated by subsequent infection. Calcium hydroxide as an agent to induce hard tissue barrier is well recognized. The effectiveness of combining calcium hydroxide and chlorhexidine as aintracanal medicament has been a topic of controversy. This article presents a successful case of apexification using calcium hydroxide and chlorhexidine paste.

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Introduction

The immature root with a necrotic pulp and apical periodontitis or abscess presents multiple challenges to successful treatment which include absence of apical barrier, thin root dentin and disinfection of the rootcanal.[1] The open apex and incomplete root formation occurs as a result of pulpal necrosis and damage to the Hertwigs epithelial root sheath, as a result of trauma to young permanent teeth. The completion of root development of teeth can take up to 3yr following eruption of teeth.[2] So any trauma which results in the loss of vitality of tooth during this period can result in arrest of root development. Later on this situation can get further complicated by infection which may result in the formation of a periapical abscess or a periapical cyst. Primary aim of the endodontic therapy in such situation is to remove infection and to provide a conducive environment for a continued root formation with apical closure or an apical barrier formation. This is achieved by apexification procedure. Glossary of endodontic terms defines apexification as 'a method to induce a calcified barrier in a root with an open apex or the continued apical development of an incomplete root in teeth with necrotic pulp'. Calcium hydroxide was widely used material for apexification. But in recent times interest has centered on the use of mineral trioxide aggregate (MTA) for apexification.[2] Revascularisation has also been used in many cases. Calcium hydroxide along with good technique can produce excellent results. The following is a case report on successful apexification done using calcium hydroxide

Case report

23yr old female patient with non –contributory medical history presented to Department of Conservative dentistry and Endodontics OPD, GDC, TVM with swelling and pain in relation to upper front tooth. She gave a history of trauma to the anterior tooth when she was young. On clinical examination upper left central incisor was discoloured with pain to percussion. Obliteration of labial vestibule was noted. No response was observed in 21 on electric pulp testing whereas 11,12 and 22 responded normally. Radiographic evaluation (fig.1) revealed a large periapical lesion 3.5cmX3.0cm with irregular borders in relation to 21.21 exhibited incomplete root formation characterised by wide root canals, thin root dentin and wide open apex. Above signs and symptoms suggested the pathology to be A/c Periapicalabcess from a

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Fig. 1 Preoperative view

Fig. 2 One month review

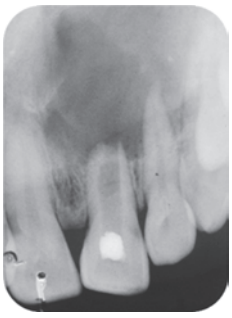

Fig. 3 Six month review

Fig. 4 Post obturation

Fig. 5 One month post obturation

chronic periapical lesion in relation to non-vital 21 with an open apex. Based on the above diagnosis, immediate as well as definitive treatment plan was formulated. At the first appointment emergency treatment was initiated. Access opening of 21 was done and pus was actively drained through the root canal. The canal was slightly over instrumented with no 30 k file. The canal was thoroughly irrigated with 2% betadine solution and saline. A mixture of calcium hydroxide and chlorhexidine 2% was placed in the canal and access cavity was sealed with zinc oxide eugenol cement. The patient was given a course of antibiotics and analgesics. On recall after 2 weeks patient was asymptomatic and apexification procedure was initiated. Mechanical debridement of the root canal was done using K files and irrigated with sodium hypochlorite. Thick paste of calcium hydroxide with chlorhexidine was packed into the canal and access was sealed. The dressing was changed 4 times over a period of 7 months (fig2-3). Radiographic evaluation revealed complete closure of apex with hard tissue barrier and resolution of periapical lesion. The root canal was obturated with cold lateral condensation of guttapercha and zinc oxide eugenolsealer (fig.4). Further healing was noted on one month post obturation (fig.5).

Discussion

Most of the cases of nonvital teeth become infected at some point of time which result in development of periradicular pathology. Such cases usually heal following orthograde root canal therapy. But managing an infected tooth with an open apex is a challenge. In such cases canal is often wider at the apex than coronally, no barrier exists to stop filling material from moving into and traumatizing apical periodontal tissues, chances of apical leakage is high. So the treatment strategy in such cases is to eliminate, root canal and periradicular infection and then to create a barrier at the apex (Apexification) so as to facilitate effective root canal filling. In the above case the infection was controlled by thorough irrigation of the root canal, systemic antibiotics and intracanal calcium hydroxide-chlorhexidine dressing. Thick paste of calcium hydroxide and chlorhexidine was used for apexification. The traditional calcium hydroxide apexification procedure has been extensively studied and is proved to have a high success rate.[1] Calcium hydroxide indirect contact with connective tissue, give rise to a zone of necrosis. The alkaline pH(12.5) provided by the hydroxyl ion encourages repair and active calcification. The alkaline pH neutralize lactic acid from osteoclast and activate alkaline phosphatases that play an important role in hard tissue formation. Alkaline phosphatases, liberate inorganic phosphates from phosphate esters which react with calcium ions from the bloodstream, to form calcium phosphate precipitate in the organic matrix. This result in dystrophic calcification.[3] The calcified material that forms over the apical foramen has been identified as an osteoid or cementoid material.

The antimicrobial property of calcium hydroxide when used as an intracanal medicament has been studied by many and the result are conflicting.[3] Some clinical studies have supported the efficacy of calcium hydroxide as an intracanal medicament, other studies have questioned its efficacy and indicated that chlorhexidine (CHX) as a better intracanal medicament.[3,4,5,6] But calcium hydroxide alone has shown efficacy in inactivating bacterial endotoxin.[7,8] Chlorhexidine was found to be more effective antimicrobial agent than calcium hydroxide when used as intracanal medicament. So combination of calcium hydroxide with chlorhexidine should improve the antimicrobial action of Ca(OH)2.[9] Studies has also shown that the physical properties of Ca(OH)2 improved on combination with chlorhexidine. The pH of calcium hydroxide is unaltered on combination with

chlorhexidine but the anti- microbial effectiveness of CHX seems to reduce.[10,11,12] So combining calcium hydroxide with chlorhexidine in case of an infected tooth with an open apex seems to be a better option than using calcium hydroxide alone for apexification.

The disadvantage of calcium hydroxide apexification is the duration of time for apical barrier formation it ranges from 6-24 months.[3] Even though MTA may replace calcium hydroxide for apexification in the long run it still remains the best cost effective material for apexification. In future, regenerative endodontics and stem cell technology seems to take an upper hand in the management of immature non-vital tooth.

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Intraradicular rehabilitation of an iatrogenically weakened root

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Abstract

Thin - walled roots of anterior teeth are at a high risk of getting fractured if they are rehabilitated by conventional custom cast metal post - cores. The roots of these teeth must be reinforced with a suitable material which can bond to the root canal dentin as well as give adequate support to the post and core which has to be restored later. In this article, a clinical case of excessive radicular dentin removal by injudicious cleaning and shaping and the management of this tooth by intraradicular reinforcement and FRC post – core rehabilitation is presented.

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Introduction

The use of fiber posts as a part of post endodontic restoration has gained much acceptance among dentists in general and endodontists in particular. It is important to keep in mind the biomechanical considerations while preparing the tooth to receive a post. One of the most important aspects of this is the post width. Increasing the fracture resistance of the root is considered as one among the required properties of a post. Hence the post width should not exceed a certain range according to the recommendations of Lloyd and Palik,1993.[1] Though the post width does not have any significant effect on its retention, the resistance to root fracture decreases with the decrease in the width of the remaining dentin[2]. The clinical case presented below is of an intraradicular reinforcement for an iatrogenic defect caused by the excessive radicular preparation during the cleaning and shaping procedure.

Case report

A 37 year old male patient reported to the Department of Conservative Dentistry and Endodontics, Rajas Dental College, Thirunelveli with a complaint of fractured maxillary right central and left lateral incisors. On taking his history he gave us a history of trauma 20 years back. There was no history of pain or sensitiveness and related intraoral or extraoral swelling. On clinical examination, there was an Ellis class I, class II and class III fracture on maxillary left central, right central and left lateral incisors respectively (fig.1)

The radiograph revealed a periapical radiolucency in relation to the maxillary right incisors and gave a negative vitality for all the incisors except the maxillary left central incisor. The treatment plan was conventional root canal treatment for maxillary right central and lateral and left lateral incisors followed by cast post for the left lateral and full coverage crown rehabilitation for all the three teeth involved.

During the cleaning and shaping stage on the left lateral incisor, it was seen that the dentin was friable as a result of chronic infection of tooth with pulp exposure. The principles for maintaining the working width was violated because of the injudicious circumferential filing. The master cone radiograph revealed excessive intraradicular preparation which led to weakening of the dentin walls….!!! (fig.2). The tooth was obturated with gutta – percha using cold lateral condensation technique and the patient was recalled for crown lengthening and intraradicular reinforcement with composite resin.

A post space was prepared by chemo mechanical method leaving behind 4 mm of gutta-percha at the apex (fig.3). The canal was etched with 37% phosphoric acid (PRIME DENTAL) for 15 seconds, washed thoroughly with water and air dried gently. Dual cure adhesive (Scotchbond, 3M ESPE) was then applied and light cured (QHL75, DENTSPLY) for 40 seconds. Flowable composite resin (Tetric Evo Flow, IvoclarVivadent) was injected and the light transmitting post (Luminex, DENTATUS) was centered in the canal and light cured (fig.4). This post helped in complete polymerization of the resin along the entire length of the canal space. After the light transmitting post was

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Fig.1 Pre-Operative photograph

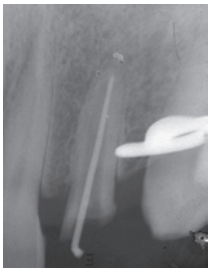

Fig. 2 Master cone radiograph revealing excessive inner dentin removal

Fig. 3 Radiograph showing post space preparation leaving 4 mm of GP

Fig. 4 Placement of Light transmitting post and light curing

Fig. 5 FRC post in newly prepared post space

Fig. 6 Core Buildup

Fig. 7 Prepared tooth after crown lengthening (gingivectomy)

Fig. 8 Post–Operative photograph

removed a dual cure resin cement (DUO LINK, Bisco, Inc) was placed into the newly prepared post space followed by a glass fiber post (Radix, DENTSPLY) and light cured for 40 seconds (fig.5). The excess length of the post was trimmed followed by a nano-hybrid composite (Tetric Ceram) build up (fig.6). A gingivectomy procedure in relation to the tooth was done as part of our planned crown lengthening with a no: 11 Bard Parker blade (fig.7). Final tooth preparation was done for porcelain fused metal - full veneer crown and crown was inserted in the next appointment (fig.8).

Discussion

The conservation of the inner dentin is mandatory to provide fracture resistance for the tooth structure. In cases where there is minimal radicular dentin remaining resulting from internal resorption, incomplete root formation or from an iatrogenic cause as in this case, it is imperative that the remaining radicular dentin should be able to support the core-crown complex.[3] The post and core design should not only provide sufficient retention to the core but it should also distribute the functional stress uniformly through out the root. A tooth is susceptible to failure without the crown encircling the tooth apical to core. In this case, gingivectomy was done in order to obtain sufficient tooth structure for the preparation of the ferrule.[4]

Resins have been advocated as the material of choice for the restoration of lost dentin by many authors.[5,6] The composite resins have become one of the most commonly used material for intraradicular rehabilitation, mainly because their modulus of elasticity is as close to dentin (17 GPa vs 18.6 GPa). Moreover, the clinical procedure is comparatively less time consuming and convenient to perform. Glass Ionomer cements (Type 9 GIC) have also been used for intra radicular rehabilitation.[7] Composite resin has been selected for use in this case for the reinforcement of lost dentin because, as a material it is elastically compatible to dentin and hence there is lower potential for stress concentration to the weakened surrounding dentin. Reinforcement of the structurally weakened roots can be conservatively managed with both flowable resin as well as glass fiber posts, which helps us to restore the aesthetic as well as the functional needs of the patient.

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Prosthodontic management of a patient with ectodermal dysplasia

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Abstract

Hypohidrotic ectodermal dysplasia is a hereditary disorder of ectodermal origin. Individuals affected by ectodermal dysplasia syndromes have abnormalities of the orofacial structures including glands, tooth buds, hair follicles, and nail development. The prosthodontic management of patients with such dysplastic condition necessitates a multidisciplinary approach. However the definitive treatment can be rendered only after the completion of growth, and till then a provisional treatment can be given to enhance the aesthetic and functional requirement of the patient. This case report describes the prosthodontic rehabilitation of a 14 year old male patient with ectodermal dysplasia.

Key words: Ectodermal dysplasia, hypodontia, prosthodontic rehabilitation

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Introduction

Ectodermal dysplasia **(**ED) syndromes have been described as a group of disorders of morphogenesis displaying two or more of the following signs and symptoms.[1]

1. Trichondysplasia (abnormal hair)
2. Abnormal dentition
3. Onchondysplasia (abnormal nails)
4. Dyshidrosis (abnormal or missing sweat glands)

Patients with ectodermal dysplasia have prominent supraorbital ridge, saddle nose and frontal bossing. The nose may appear pinched and alae nasi is hypoplastic. The skin of patient may appear hypopigmented or having maculopapular eruptions during infancy. Oral findings in patients with ectodermal dysplasia are significant and can include multiple abnormalities of the dentition such as anodontia, hypodontia or widely spaced peg like teeth, loss of occlusal vertical dimension, protuberant lips and lack of normal alveolar ridge development. Ectodermal Dysplasia is inherited as an X-linked recessive trait, and has two major types:

1. Hypohidrotic or anhidrotic (Christ-Siemens-Touraine syndrome)
2. Hidrotic EDs (Clouston syndrome)

This X-linked recessive disorder affects males and is inherited through female carriers. Early and extensive dental treatment is needed throughout childhood because of the absence of most of the deciduous and permanent dentition. ED is usually a difficult condition to manage prosthodontically because of the typical oral deficiencies and afflicted individuals are quite young to receive extensive prosthodontic treatment which restores their appearance for the development of positive self-image.

Case report

A 14-year-old boy had reported to the Department of Prosthodontics, Government Dental College, Trivandrum, Kerala with chief complaint of missing teeth and difficulty in chewing. The parents noticed presence of only a few teeth in his mouth. The patient had typical characteristics of ectodermal dysplasia such as protuberant supraorbital ridge, saddle nose, frontal bossing, scant eyelashes and eyebrow (Fig. 1,2).

Intraoral examination revealed partial anodontia of both maxillary

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Fig. 1 Frontal view

Fig. 2 Profile view

Fig. 3 Preoperative view

Fig. 4 Preoperative diagnostic casts

Fig. 5 Preoperative OPG

Fig. 6 Minimal tooth preparation

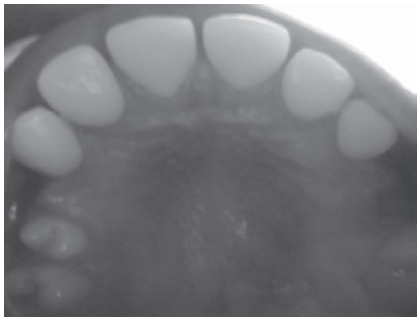

Fig. 7 Cemented acrylic crowns

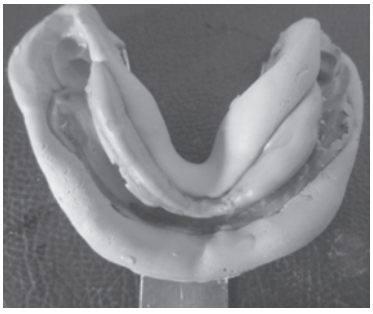

Fig. 8 Final impression

and mandibular arches. In maxillary arch six anterior teeth were extremely tapered (peg-shaped) and widely spaced (Fig. 3). All mandibular teeth were missing except permanent first molars. The alveolar ridges were underdeveloped. Radiographic examination revealed that alveolar ridges were atrophic except in areas where teeth were present. Orthopantomogram unveiled absence of any developing tooth buds (Fig. 5).

Treatment plan and procedure

Diagnostic impressions were made with irreversible hydrocolloid impression material (Alginoplast) and diagnostic mounting was done. Maxillary central, lateral incisors and canines were restored to give appropriate shape with help of acrylic crowns (Fig. 6,7). Final impressions were made with addition silicone elastomeric impression material (3 M ESPE, express STD, firmer set) in lower arch (Fig. 8). Master casts were made with dental stone. Centric relation was recorded after establishing vertical jaw relation (Fig. 9). Then casts were mounted on mean value articulator and teeth arrangement was done (Fig.10). Try in was done in the patient's mouth to verify vertical relations, centric relations etc. Then acrylisation was carried out to fabricate maxillary and mandibular acrylic removable partial dentures. Partial dentures were then inserted in the patient's mouth and checked for occlusal interferences (Fig. 11). The patient was instructed to handle the partial dentures carefully and to wear them at all times except while sleeping. The dentures were adjusted carefully and regular recall appointments were scheduled at two-month intervals

Fig. 9 VD measurement

Fig.10 Teeth arrangement

Fig. 11 Postoperative view

to make necessary adjustments and monitor the oral hygiene. The patient adapted well to the dentures. The treatment improved his functions like mastication, speech and facial aesthetics. Moreover the treatment also helped to improve patient's confidence. The patient will be evaluated regularly and a more definitive treatment will be performed once the growth of child is complete.

Discussion

Prosthodontic rehabilitation of patients with ectodermal dysplasia is usually challenging because of the typical oral deficiencies and growing age. The patient as well as his parents must be explained of the limitations in treatment and should be properly motivated before initiation of treatment.[5] In recent years, endosseous dental implants have been recognized as an important alternative for ectodermal dysplasia patients to support and stabilize the prosthesis. Considering the age and potential growth of the patient, it was deemed desirable to postpone osseointegrated implants.

Prosthodontic management of this patient was challenging during the various stages right from impression making to use of dentures because of fragile mucosa, decreased salivation, poor alveolar ridge and underdeveloped mandible.

Maxillary and mandibular primary impressions were made by irreversible hydrocolloid impression (Alginoplast) material because of the fragile nature of oral mucosa. During recording of jaw relationship, vertical dimension of occlusion was reduced slightly to reduce vertical forces on underdeveloped alveolar ridge.[2,3] The patient was advised to observe meticulous oral and denture hygiene so as to develop healthy oral tissues for future treatment. Frequent relining or refabrication of the removable partial denture would be required to accommodate these morphologic changes brought about by the growth. This will also help to maintain the patient's vital oral functions such as speech mastication and deglutition. The maxillary and mandibular partial dentures were fabricated using heat polymerizing acrylic resin.

Summary and conclusion

Young patients with ectodermal dysplasia need to be evaluated by a dental professional as early as possible to determine the oral ramifications of the condition. When indicated, appropriate care should be rendered throughout the child's growth cycle to maintain oral functions as well as to address the aesthetic needs of the patient. This case report shows that an early intervention will provide a better and stable foundation for the definitive treatment.

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Osteoradionecrosis of mandible

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Abstract

The treatment of head and neck cancer remains a challenge. Despite advances in surgical reconstructive techniques, most patients will require adjuvant therapy in the form of radiotherapy or chemo-radiotherapy to improve regional control. Although postoperative radiotherapy has proved effective in improving local control and survival in these patients, its complications especially osteoradionecrosis reduces the quality of life 1. The purpose of this paper is to report a case of osteoradionecrosis in a 70 year old male patient with a review on its underlying pathology, predisposing factors, management options and possible preventive measures.

Key words: Head and Neck Tumors; Radiotherapy; Osteoradionecrosis

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Introduction

Osteoradionecrosis (ORN) is defined as necrosis of the bone following irradiation.[2] Despite several hypotheses to address the pathophysiological process behind ORN, the hypothesis put forward by Marx in 1983 has been the most widely accepted. He postulates the combination of Hypoxia, Hypovascularity and Hypocellularity the 'three H' hypothesis, to describe post-radiation injury.[3] This proposes that, the radiation induced cellular injury damages the microvasculature resulting in hyperemia, endarteritis, thrombosis and eventual obliteration leaving the irradiated bed unable to meet its metabolic and nutritional requirements and thus unable to replace the normal collagen and cellular components lost through routine wear and tear, resulting in tissue breakdown and necrosis.[4]

ORN is induced by trauma in 90 % of the cases and occurs spontaneously in 10%. The risk factors considered as predisposing factors for ORN are the anatomic location of the tumor, total radiation dose, fractionation of dose /day, mode of radiation delivery, time from radiation therapy until the onset of ORN and the dental factors such as poor oral hygiene, periodontal disease, dental abscesses, extensive caries and breach in the tissue integrity caused by dentoalveolar surgeries such as tooth extractions, biopsies and periodontal procedures in the irradiated field during radiotherapy or in the early postoperative period.[5,12] Even apparently innocuous forms of trauma such as denture-related injury can overwhelm the reparative capacity of the radiation-injured bone resulting in poor healing and bone exposure due to compromised vasculature of the tissues. Depending on the patient's co-morbid factors such as diabetes mellitus, small exposures will heal spontaneously within weeks to months. Persistent exposure of bone beyond 3 months is suggestive of ORN.[3] Clinical findings may include soft tissue necrosis, wound dehiscence, purulent discharge with or without seqestrum and bone exposure. Radiological features include lytic areas, sequestrum formation and with or without pathological fracture.[6]

Case report

A 70 year old man reported to our department of oral diagnosis with persistent pain and pus discharge from the right lower border of the mandible. The patient gave a history of receiving external beam radiotherapy for the treatment of squamous cell carcinoma tongue with a dose of 7080 cGy in 37 fractions during a period of 7 weeks. Three months after radiotherapy, patient underwent extraction of 48 (root stump) in a private dental clinic.

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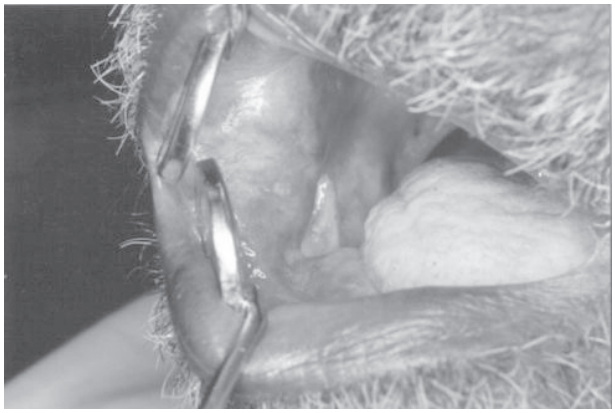

Fig. 1 Grade 1 ORN with exposed alveolar bone.

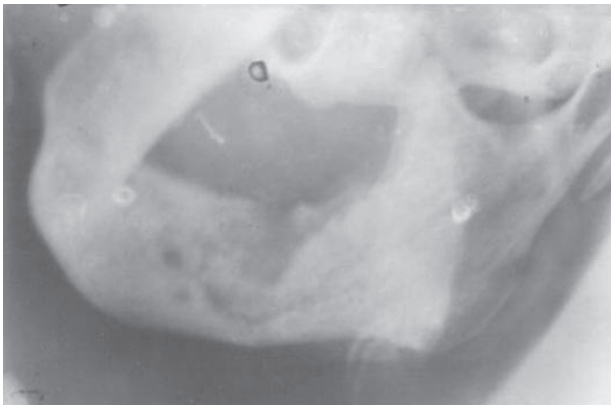

Fig. 2 Radiograph revealing areas exhibiting moth eaten appearance.

Following which the patient noticed failure of healing in the extraction site. Extra oral examination revealed a localized area of hyper pigmentation, atrophy of skin, loss of hair and a draining cutaneous sinus discharging pus and gritty material suggestive of necrotic bone fragments. Intra oral examination revealed an exposed yellowish white sequestrum in the extracted site of right molar region of the mandible (Fig. 1). The radiographic examination (Fig.2) revealed areas of mixed radiopaque and radiolucent area exhibiting moth eaten appearance. After ruling out tumor recurrence with clinical and laboratory studies, the diagnosis of ORN of the right mandible was made. Treatment was planned which included sequestrectomy with pre and postoperative Hyperbaric Oxygen therapy. According to Marx protocol, 20 dives of 100% HBO was delivered for 90 minutes prior to sequestrectomy and 10 dives of 100% HBO post operatively. The wound was closed with primary closure. The healing of the wound was uneventful.

Discussion

ORN was first described by Regaud in 1922[2]. The incidence of ORN varies widely in the literature ranging from 1% to 37%.[7] ORN is rare in patients who receive less than 60 gray in radiotherapy. ORN usually presents within the first 12 to 24 months following radiation therapy, but it has been described to present up to 20 to 30 years after the initial radiotherapy. Early presentation within 2 years is thought to be related to high doses of radiotherapy (>70 gray) whereas late presentation is usually secondary to trauma.[8] However ORN in our patient cannot be attributed to higher doses of radiotherapy as he received doses lesser than 60 gray. ORN can be classified into 3 grades.

- Grade I The most common presentation with exposed alveolar bone.
- Grade II Does not respond to hyperbaric oxygen therapy and requires Sequestrectomy or Saucerization.
- Grade III Full-thickness involvement and/or pathologic fracture.

Therefore the patients can demonstrate with any grade at initial presentation.[9] Our patient reported to us with grade 1 ORN with exposed alveolar bone (Fig 1).

According to Marcos and Luciano the most commonly affected site was mandible (95.2%) followed by the maxilla (4.8%). Of which 89.4% were trauma induced and 10.6% were spontaneous ORN.[10] In accordance to Marcos and Luciano, the site involved in our patient was mandible and induced by trauma. The susceptibility of mandible especially the buccal cortices of the premolar and retromolar trigone as a primary site of ORN after the treatment of head and neck malignancies by radiation therapy is compounded by the fact that the mandible is essentially an end-artery system supplied by the inferior alveolar artery, with minor supply from the bony attachments. With ageing and atherosclerotic changes there is increased dependence on blood supply from the attachments. In addition, both the mandible and maxilla are unique in being the only bones in the body that are exposed directly to the external environment through the gingival attachment of the teeth. Thus any breaches in the integrity of the tissues may result in delayed healing and ORN.[11]

The management of ORN remains controversial yet if diagnosed at the early stage it can be successfully managed with conservative treatment such as saline irrigation, analgesics, antibiotics, local debridement, sequestrectomy, hyperbaric oxygen therapy (HBO) and observation.[12] Marx et al claimed a success rate of

95% in treating ORN. Surgical debridement combined with HBO has a higher rate of pain resolution, reconstruction, and restoration of function within 18 months compared to HBO and irrigation alone. Our patient was treated according to Marx protocol which recommends 20 dives of 100% HBO for 90 minutes before sequestrectomy and another 10 dives following the surgery. 30 dives of HBO are required for neo-angiogenesis and wound healing in hypoxic tissues. At least 20 to 30 mm Hg of wound Po2 is needed to induce fibroblastic proliferation, capillary budding and collagen formation in bone and soft tissue. Moreover HBO is bacteriostatic, bactericidal and anti edematous by mobilizing macrophages and fibroblasts.[13]

ORN can be prevented with an effective pre and post irradiation oral care. The pre irradiation oral care should include a comprehensive radiographic evaluation of both the jaws to check for unerupted teeth and any bony pathology, evaluation of each tooth for its caries and periodontal status, educating the patient regarding meticulous oral hygiene and to rinse with fluoride and antibacterial mouth wash, fabrication of custom trays to assist in regular fluoride treatment for high risk patients, a thorough scaling prior to radiotherapy, radiographic evaluation of edentulous patients to check for buried teeth, inspection of dentures for its fitting to ensure minimal trauma to the tissues and extraction of unrestorable teeth in a non-traumatic manner with minimal damage to the surrounding tissues 2-3 weeks prior to radiotherapy to ensure timely healing.[14] Full mouth extractions are not recommended for healthy or restorable teeth, as they increase the chances of developing ORN. The post irradiation oral care includes regular follow-up and extractions in the post irradiation phase is yet controversial. It was believed earlier that extractions delayed 9 to 12 months postirradiation reduces the risk of ORN. However the recent studies states that the risk of developing ORN remains for 231 months post irradiation.[15]

Moreover as radiotherapy carries a long-term risk of complications such as ORN even upto 20 to 30 years later,[8] the incidence of ORN can be greatly reduced by adhering to the principle of keeping radiation doses As Low as Reasonably Achievable (ALARA) and minimizing radiation dose to surrounding normal tissues by using newer radiotherapy regimes such as 3D conformational and intensity modulated radiotherapy.[15] The fact that the number of patients developing ORN following radiotherapy is thought to be falling is due to our better understanding of the etiology of the condition, multidisciplinary approach, developments in radiotherapy protocols, better patient education and institution of more preventive measures.

Conclusion

ORN can be a cruel blow to the patients and their families. As the risk of developing ORN remains 20 to 30 years[9] post irradiation care should be taken by the clinician to oxygenate the tissues pre and post operatively whenever surgical explorations are required in these patients. A multidisciplinary approach with improved radiotherapy regimes, preventive measures, early diagnosis and regular follow-up can render a better quality of life for these patients.

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Restoration of mutilated dentition

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Abstract

Generalized attrition of teeth and the resultant loss of vertical dimension of occlusion is a great cause of concern to the patients and a challenging situation to the Prosthodontists. Very often such patients realize the defect when it reaches an extreme condition affecting esthetics, function and even their well being. Treatment planning and its execution are further complicated by the partial loss of natural teeth. Successful rehabilitation of such a patient is discussed in this clinical report.

Key words: Complete mouth rehabilitation, Full mouth rehabilitation, Vertical dimension of occlusion, Acrylic resin jig.

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Introduction

Prosthodontic principles are aimed at establishing esthetics, function and preservation of remaining oral structures.[1] Judicious application of these principles becomes mandatory in the prosthetic rehabilitation of individuals who have suffered marked attrition of teeth and resultant decrease in vertical dimension of occlusion (VDO).[2,3] Often integrity of the dental arches may be lost due to partial absence of natural teeth which makes the complete occlusal rehabilitation further difficult.[4,5]

Case report

A 51 yr old female patient reported to the Department of Prosthodontics, Government Dental College, Trivandrum, with complaints of difficulty in chewing food and poor esthetics both due to missing and worn out teeth. She had a history of trauma 5yrs back that resulted in the loss and fracture of anterior teeth.

Clinical examination revealed that #16 #14 #21 #22 #25 #36 #37 #46 and #47 were missing. Ellis class III fracture of #11 due to previous trauma was noticed. There was also pulp exposure of #34 due to attrition. The mandibular posterior teeth were missing and there was supra eruption of #26 and #27. Attrition was present in all the mandibular teeth (Fig.1,2). A fractured FPD was present in the maxillary anterior region. Preoperative radiographic examination revealed root canal treated #11 #12 #26 and #27 (Fig.3).

Treatment plan was designed based on the clinical findings. Root canal treatment (RCT) was planned for #34 because of its pulp exposure. A diagnostic wax up was done to appreciate the changes that could be brought about by this treatment plan (Fig.4). The esthetic expectations, limitations, complications and oral hygiene requirements were discussed with the patient so as to select most appropriate restoration. Metal ceramic crowns were planned on all the mandibular teeth. In the maxillary arch metal ceramic crown was planned on #12 and metal ceramic FPD's were planned on #11 - #23, #13 - #17 and #24 - #27. It was also decided to increase VDO by 2mm and to establish group function occlusal scheme.[6,7,8] A cast removable partial denture was also planned for the replacement of missing mandibular posterior teeth. After completion of RCT in #34, another set of casts were made for mounting onto the articulator.

Face bow transfer was done to orient the maxillary cast to the articulator (Fig. 5,6). Artex arcon articulator was used for diagnostic mounting as well as mounting the casts at an increased VDO. As the patient's mandibular posterior teeth were missing, an autopolymerized acrylic resin record base with

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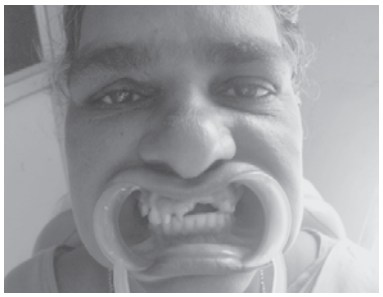

Fig. 1 Pre treatment view

Fig. 2 Pre treatment view

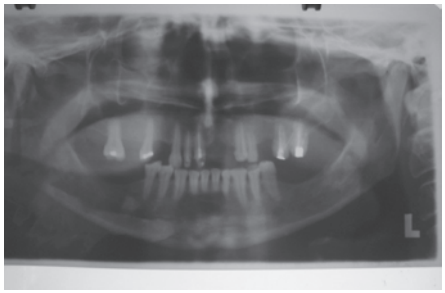

Fig. 3 Pre treatment OPG

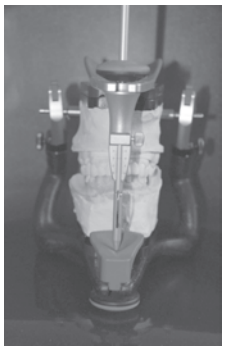

Fig. 4 Diagnostic wax up

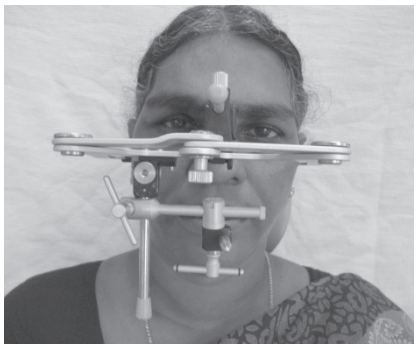

Fig. 5 Face bow transfer

Fig. 6 Face bow transfer

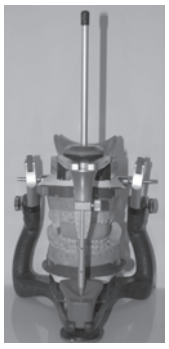

Fig. 7 Acrylic jig in the articulator

occlusal rims were fabricated. Vertical dimension of occlusion was registered at an increased height of 2mm. The casts were mounted on to the articulator after registering the centric relation at the established VDO. An acrylic resin jig was fabricated using auto polymerizing acrylic resin. (Fig.7) This acrylic resin jig was used as an index to ensure the required occlusal clearance during preparation of teeth.[9,10] Root canal of #11 was prepared to receive a dowel and composite core. Tooth preparation was completed in both the arches and provisional restorations were luted at the increased VDO. The patient was followed up for six weeks to ensure that the increased VDO was acceptable to her. The provisionals were evaluated for function and esthetics and were found satisfactory. Hence preparation of teeth was considered to be optimum.

Maxillary and mandibular impressions were made using poly vinyl siloxane impression material. The metal substructure of metal ceramic crowns and FPD's were tried in the patient to check the marginal integrity and adequate occlusal clearance for ceramic. A bisque trial was carried out to verify overall esthetics and occlusion. A group function occlusal scheme was established. Rest seats were provided on the occlusal surfaces of crowns of #35 and #45 and lingual surfaces of #33 and #43. After glazing, the restorations were luted using glass ionomer cement (Fig.8).

Impression of both the arches was now made using irreversible hydrocolloid impression material and casts were prepared. A custom impression tray using autopolymerizing acrylic resin was fabricated for making final impression of mandibular arch for the construction of cast partial denture. Border molding of edentulous area was done using green stick compound and final impression was made using zinc oxide eugenol impression paste. Finally a pick up impression with alginate was made. Try in of frame work was done and centric jaw relation and vertical dimension were recorded with the use of wax occlusal rim attached to the frame work. Occlusion of the trial denture is verified. Finally finished cast partial denture is inserted and instructions regarding maintenance were given (Fig.9, 10).

Conclusion

The ideal goal of modern dentistry is to restore the patient to normal contour, function, comfort, esthetics, speech and health. But often we come across clinical situations in which the ideal goal cannot be

Fig. 8 Final fixed restorations

Fig. 9 Cast partial denture

Fig. 10 Post treatment view

achieved. However detailed evaluation of the stomatognathic system and derivation of an appropriate treatment plan could bring a reasonable result. For the treatment to be completely successful the forces of destruction must be halted so that continued breakdown ceases. The execution of such a treatment plan requires great skill and commitment from the part of the prosthodontist and extreme co-operation of the patient.

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Molar incisor hypomineralisation

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Abstract

Molar incisor hypomineralisation is the hypomineralization of systemic origin affecting one or more first permanent molars and also affecting the incisors. In this particular condition, defective enamel is lost shortly after tooth eruption, exposing underlying dentine leading to exacerbation of underlying pulpal inflammation causing extreme sensitivity in young patients. This clinical condition is a separate entity which is of variable etiology. The clinical features of the affected tooth vary from mild enamel opacity to severe attrition of the tooth leading to disturbance in the pulp-dentine complex. The treatment varies in different individuals depending on the clinical features of the condition. This article reports a clinical case of molar incisor hypomineralization in a 9 year old female patient and its management.

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Introduction

Dental enamel is a unique, highly mineralized tissue of ectodermal origin. Disturbances in the initial matrix secretion phase of amelogenesis will most likely present as quantitative or morphologic defects (hypoplasia), whereas disruptions to the calcification or maturation processes may produce morphologically normal but structurally or qualitatively defective enamel (hypomineralization / hypomaturation).[1] Molar incisor hypomineralization (MIH) is a clinical diagnosis used to describe hypomineralization of systemic origin of 1 to 4 permanent first molars, frequently associated with affected incisors.[2,3] The prevalence ranges from 4-25%. MIH was first described in Switzerland, in the late 70's.[4,5] Typical appearance of this lesion clinically is asymmetrical appearance, where enamel of a molar or an incisor can be severely affected while enamel of the tooth in the opposite side is either not clinically affected or present smaller surface defects.[4,6] Affected molars present with well-demarcated white/yellow or brown/yellow enamel opacities. In severe cases, the defective enamel is lost shortly after tooth eruption, exposing underlying dentin. MIH enamel has a lower calcium and phosphate content than normal teeth which relates to its inherent weakness.[2] MIH is considered as a separate clinical entity as it is neither chronological in expression such as tetracycline staining or linear enamel hypoplasia, nor does it affect the entire dentition as seen in congenital conditions such as amelogenesis imperfecta[1]. MIH's clinical management is challenging due to (1) the sensitivity and rapid development of dental caries in affected PFMs (2)the limited cooperation of a young child (3) difficulty in achieving anesthesia (4) the repeated marginal breakdown of restorations[7]. The purpose of this article is to describe a clinical case and treatment of MIH and to discuss review and recommendations for its clinical management.

Case report

A 9 year old girl reported to the department of Pediatric Dentistry, K.V.G Dental College, Sullia complaining of decay and sensitivity in the teeth in the upper front and lower left and right back region. There was no positive findings related to natal, prenatal and postnatal history. On clinical examination enamel hypoplasia was found only in the maxillary and mandibular central incisors and permanent first molars (fig. 1 & 2). Maxillary permanent first molars had just yellowish brown discolorations evident in the buccal and palatal aspect and the two teeth were restored with silver amalgam, 6 months back from a private practitioner (fig 3). The mandibular permanent first molars were severely attrited. Hence the patient

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Fig. 1

Fig. 2

had intense sensitivity in the right and left lower permanent first molars.

The treatment was done by the excavation of carious lesion on mandibular first permanent molars and calcium hydroxide dressing was placed and restored with glass ionomer cement and stainless steel crowns were given. The upper central incisors were acid etched, dentine bonding agent was applied and composite veneering was done (fig 4). Post restorative instructions were given and importance of maintaining oral hygiene was emphasized.

Discussion

The ameloblasts are highly susceptible to relatively minor changes in the environment, eg: increase in temperature, hypocalcemia and pH levels can disrupt the normal process of amelogenesis The various etiological factors include (1) environmental factors; (2) childhood illnesses; and (3) medical complications. The extent and severity of the enamel defects are de-pendent on the phase of amelogenesis occurring at the time of the insult.[2] Any maternal or childhood illness or exposure to medications during first 3 years of life, environmental contaminants like polychlorinated biphenyls (PCBs) and polychlorinated dibenzo-p-dioxins (dibenzofurans) can cause the development of defective enamel. Many factors acting simultaneously (as in the preterm, low birth weight, respiratorily compromised neonate) or sequentially (as in the child with otitis media with associated fever subsequently treated with antibiotics) also contribute to the development of MIH. Pre-, peri-, and neonatal problems increase the prevalence of developmental dental defects in general, particularly in the primary dentition. Genetic susceptibility may play a role in the aetiology of this challenging disorder.[1]

Polychlorinated biphenyls (PCBs) and polychlorinated dibenzo-p-dioxins (dibenzofurans or PCDD/F) originate from chemical manufacturing of herbicides and chlorinated phenols; and paper and pulp processing. They produce acute and chronic health effects on immune, nervous, endocrine, and reproductive systems, and potential carcinogenic effects. Because of their lipophilic nature, PCDD/Fs accumulate in matrices rich in organic matter, such as soil, aquatic sediment, and biota for long time due to longer half life. From these they enter the food chain of human beings through fruits and vegetables cultivated or through breast milk.[7] The relationship between contaminant levels in children and duration of breast feeding is supported by the results of Wang et al. In contrast studies conducted by Rugg Gumm et al reported a positive association between defects and malnutrition as breast feeding had a protective effect against enamel defects.[1]

Histologic examination of hard tissues in MIH showed that the affected enamel is very porous. Frequently the patients with MIH complain of symptoms suggestive of dentinal hypersensitivity. In a study conducted by Helen D Rodd et al it was found that innervation density was significantly greater in the pulp horn and subodontoblastic region of hypomineralised teeth than in sound teeth. Immune cells were most abundant within the pulps of these hypomineralised teeth exhibiting enamel loss. Vascularity was also found to be significantly greater in hypersensitive hypomineralised teeth. So it appears that some hypomineralised teeth remain sensitive to instrumentation despite the use of local anesthesia. So one approach of management is by occluding the dentinal tubules using topical fluoride preparations or dentin bonding agents.[2] Preventive management is by identifying children at risk for MIH based upon a relevant history of putative etiological factors in the first 3 years and from careful study under magnification of the unerupted molar crown on any available radiographs.[8]

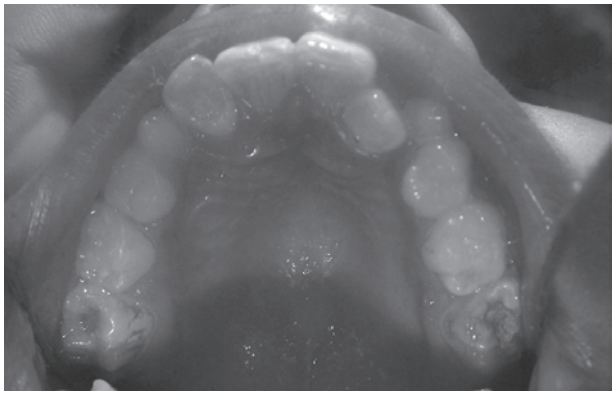

Fig. 3

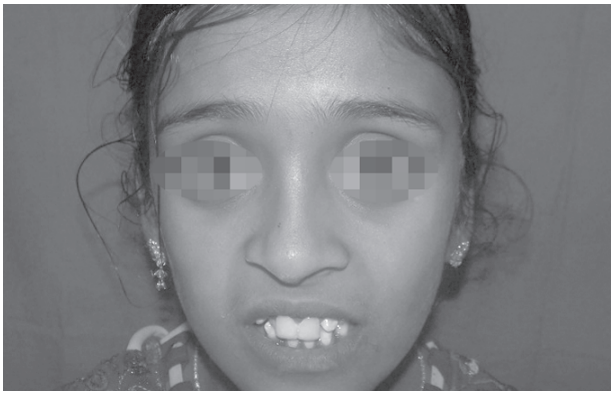

Fig. 4

During eruption of permanent first molars the cariogenicity and erosivity of the childs diet should be assessed and appropriate recommendations should be made for dietary modification. Remineralisation is accomplished with casein phosphopeptide-amorphous calcium phosphate in the form of a topical tooth crème or a sugar free chewing gum or lozenges. Topical fluoride can remineralise enamel, reduce sensitivity and enhance resistance to demineralization.[4] Oral hygiene instructions can also be given to patients such as to

1. Brush affected molars gently with a desensitizing tooth paste on soft brush.

2. Apply a CPP, ACP topical cream daily using a cotton bud.

3. Apply a low concentration fluoride treatment gel regularly using a cotton bud.

For restoration, adhesive materials can be chosen due to atypical cavity outlines following caries removal. The choice of material depends on defect severity, age and cooperation of child. Restoration of glass ionomer cement and resin modified glass ionomer cement is not recommended in stress bearing areas but may suffice under a definitive restoration is achievable. The Polyacid modified resin composite is restricted to non stress bearing areas with limited application in hypomineralised permanent first molars. If PFMs have moderate to severe post eruptive break down, then preformed SSCs are the treatment of choice as they establish correct interproximal contact and proper occlusal relationship, prevent further tooth deterioration and control tooth sensitivity. Partial and full coverage indirect adhesive or cast crown and onlays may be considered in the late mixed and permanent dentition for MIH. For permanent hypomineralised incisors ie, for shallow defects microabrasion can be carried out for yellow brown hypomineralised enamel, first etching the lesion with 37% phosphoric acid and then bleaching with 5% sodium hypochlorite to remove the protein amelogenin encasing hydroxyapatite followed by re etching the enamel prior to placing a sealant over the surface to occlude porosities and prevent restaining.[8] Composite veneering can also be done. But porcelain veneers are generally delayed until late adolescence when the gingival architecture gets stabilized. For severely hypomineralised PFMs where restorations are impossible extraction must be considered.[8]

Pediatric dentists are more likely to encounter this clinical entity with complex treatment options in their clinical practice. So knowledge regarding etiologic factors preventive and clinical management will assist in identifying the children at risk for MIH and also help in clinically managing the condition with proper management technique.

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Histopathological evaluation of granulation tissue of chronic and aggressive periodontitis

* Rajesh K.S., ** Tazeen, *** Shashikanth Hedge, * Arun Kumar M.S.

Abstract

Background: Granulation tissue is the perfused, fibrous connective tissue that replaces a fibrin clot in healing wounds. An excess of granulation tissue is informally referred to as "proud flesh". Aggressive periodontitis is universally distinguished from chronic periodontitis by the age of onset, the rapid rate of disease progression, the nature & composition of the associated subgingival microflora, alterations in the host's immune response & a familial aggregation of diseased individuals. This study explains the histopathological features of granulation tissue which is retrieved from the cases of Chronic & Aggressive periodontitis & deals with the comparison of the cellular & subcellular mechanism underlying the pathogenesis of both the diseases.

Method: Fifteen patients with chronic generalized periodontitis and fifteen patients with generalized aggressive periodontitis were recruited from patients reporting to the Department of Periodontics, Yenepoya Dental College, Mangalore.

Results: There appears to be no difference between aggressive and chronic periodontitis in terms of their histopathology.

Conclusion: Generalized aggressive periodontitis may represent advanced chronic periodontitis in a young individual with extreme susceptibility, which explains the common histopathology.

Key words: Chronic periodontitis, Aggressive periodontitis, Granulation tissue, Histopathology

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Introduction

Periodontal disease results from the interaction of hosts defence mechanisms with micro-organism in dental plaque biofilm. Biofilms containing complexes including P.gingivalis, Fusobacterium Nucleatum, Tannerella forsythia, T.denticola have been related to clinical measures of periodontal disease, particularly pocket depth and bleeding on probing. It is now recognized that many people carry the organisms without manifesting disease progression (*Erica Gemell, Gregory J).*[3] Lymphocytes and plasma cells are numerous and occupy a large volume of gingival lesion in subject with advanced periodontal disease in such lesions T cells and B cells employ similar proportions. T cells exhibit immunoregulatory features. B cells upon activation transforms into antibody producing plasma cells (*Burglundh, Lindhe J).*[4]

Chronic periodontitis was previously known as 'Adult periodontitis' or 'slowly progressive periodontitis'. It's an infectious disease resulting in inflammation within the supporting tissues of the teeth, progressive attachment loss & bone loss. Causative organisms of chronic periodontitis are: Porphyromans gingivalis, Prevotella intermedia, capnocytophaga, A. actinomycetemcomitans, Campylobacter rectus.[6]

Aggressive periodontitis is characterized by rapid loss of attachment & bone loss occurring in an otherwise clinically healthy patient with the amount of microbial deposits inconsistent with disease severity & familial

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aggregation of diseased individuals. It was classified as early onset periodontitis i.e Localized Juvenile periodontitis has been changed to localized aggressive periodontitis, generalized aggressive periodontitis was previously classified as generalized juvenile periodontitis & rapidly progressive periodontitis. Causative organisms are Porphyromans gingivalis, A.actinomycetemcomitans & Bacteroids forsythus.

Although periodontal diseases are plaque-induced infections, not all patients are equally prone to developing these diseases and, as such, the concept of individual risk has arisen. A risk factor for periodontal disease is a characteristic, aspect of behavior or an environmental exposure associated with periodontal disease (Valerie Clerehugh & Aradha Tugnait).[5, 18, 19, 20]

Chronic periodontitis and aggressive periodontitis share the clinical features of bone loss and clinical attachment loss in response to colonization of the tooth surface by a bacterial biofilm (dental plaque).[6]

Methodology

Patient Population:

Fifteen patients with chronic generalized periodontitis and fifteen patients with generalized aggressive periodontitis were recruited from patients reporting to the Department of periodontics, Yenepoya Dental College, Mangalore.

Selection Criteria:

Chronic generalized periodontitis

Clinical features:

- Age : above 30yrs
- Detection of Supragingival & Subgingival plaque accumulation associated with calculus formation.
- Gingival bleeding either spontaneous or in response to probing.
- Detection of chronic inflammatory changes in marginal gingiva.
- Presence of periodontal pockets.
- Loss of clinical attachment & alveolar bone should be present.

Radiographic features:

- Evidence of bone loss present.
- Pattern of bone loss may be vertical or horizontal.

Generalized aggressive periodontitis

Clinical features:

- Age: less than 30 yrs
- Generalized interproximal attachment loss affecting at least 3 permanent teeth other than first molars & incisors should be present.
- Presence of small amounts of bacterial plaque associated with affected teeth.
- Pronounced episodic nature of the destruction of attachment and alveolar bone.
- Subgingival calculus may or may not be present.

Radiographic features:

- Evidence of severe bone loss associated with minimal number of teeth, to advanced bone loss affecting the majority of teeth in dentition

Exclusion criteria:

- No history of systemic problems.
- No history of any periodontal therapy for past 6 months.
- Patient shouldn't be on any drugs or medication.

The patients who fulfilled the above criteria had to undergo the Non- Surgical phase.

Non-surgical phase 1 therapy was carried out.

- Scaling & Root planing was done
- Oral hygiene instructions were given
- Chlorhexidine gluconate mouth wash (0.2%) was prescribed.
- Re-evaluation was done after 1 week & reinstrumentation was carried out.

After the non-surgical phase, surgical phase was carried out.

Surgical phase:

- The patients fulfilling selection criteria were briefed on the procedure & informed consent was taken.
- A crevicular incision was made from the bottom of the pocket to the bone and Flap reflection was done with an elevator primarily to provide improved visual access to the periodontally involved tissues of both chronic as well as aggressive periodontitis.
- Fine curettes were used to remove remnants of pocket epithelium and granulation tissue.
- The granulation tissue was collected in a vial containing formalin and was later sent for histopathological examination to the Department of Oral pathology.

Fig. 1 Clinical picture showing chronic generalized periodontitis

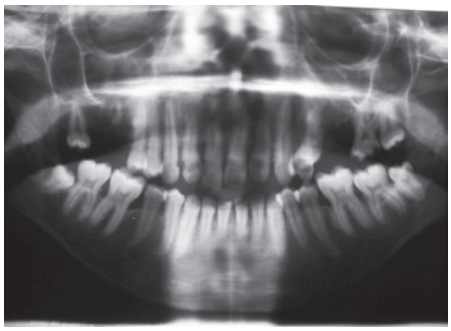

Fig. 2 Opg of chronic periodontitis

Fig. 3 Clinical picture which shows generalized aggressive periodontitis

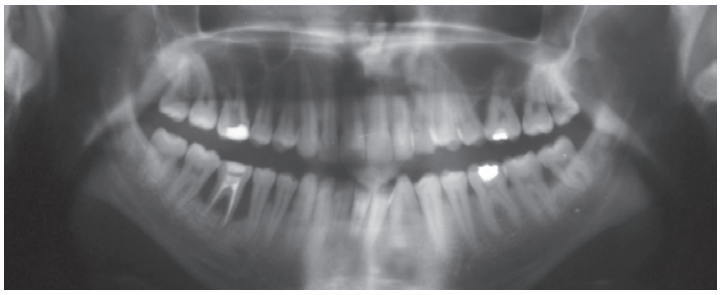

Fig. 4 Opg of generalized aggressive periodontitis

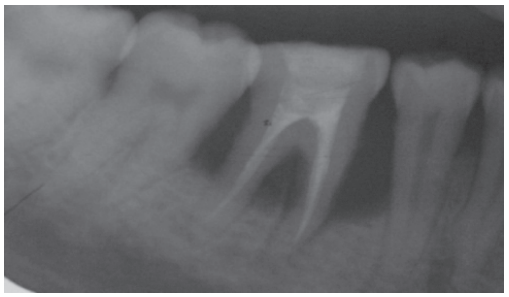

Fig. 5 IOPA of aggressive periodontitis

Fig. 6 Flap reflection done of periodontally involved tissues of both chronic & aggressive periodontitis

Fig. 7 Debridement of granulation tissue done & collected in a vial contained formaline

Result

Histological features of Chronic Periodontitis:

- The soft tissue specimen obtained during periodontal flap surgery, was subjected to H&E staining & the light microscopic picture showed hyperplastic stratified squamous hyperparakeratinized and non keratinized epithelium with elongated rete ridges.
- Underlying connective tissue was fibrocellular and it composed of loosely arranged collagen fibers and showed the presence of numerous blood vessels and plenty of extravasated RBCs.
- Inflammatory infiltrates was chiefly composed of lymphocytes.

Histological features of generalized aggressive periodontitis

- The given H&E stained slide showed small fragments of stratified squamous non keratinized epithelium.
- Connective tissue was delicate & edematous which composed of loosely arranged collagen fibres showing focal areas of chronic inflammatory cell infiltration, areas of necrotic material and plenty of extravasated RBCs.

Table I

References	Subjects	Age(year)	Classification criteria	Principal findings
Stambolieva & Bourkova 1970.[7]	15 periodontosis 10 healthy controls	15-18 15-18	Early form of periodontosis	Increase number of phagocytic macrophages in periodontosis patients compared with controls
Johnson et al 1980.[8]	10 LJP 11 Periodontitis 10 healthy control	14-20 27-56 22-42	Molar/incisor, gingiva relatively healthy,rapid progression	Plasma cell, lymphocyte infiltrate in LJP & adult periodontitis biopsies after initial hygienic phase of treatment
Van Swol et al 1980.[9]	6LP 17 CP(advanced)	12-20 20-63	Not provided other than pockets >8mm in both groups	Increase IgG in tissues of periodontosis group
Waldrop et al 1981.[10]	9 periodontosis 4 periodontosis Controls	18-20 40-58	Baer 1971	Predominantly plasma cells in pre-treatment biopsies, impaired expression of heavy chain immunoglobulins, esp IgG
Syrjanen et al 1984.[11]	9JP or post JP 10 relatives 19 Controls	25±11 28±13 matched	Not specified	IgG Plasma cells predominated over IgA & IgM plasma cells in all groups. Higher TH/Ts ratio in JP patients & their relatives than control
Joachim et al 1990.[12]	5 JP / post JP untreated5 JP / post JP treated 5 Adult periodontitis untreated5 Adult periodontitis treated 3 Control	23±3 28±6 46±9 49±10 25±2	Not provided	Abundance of plasma cells in all biopsies except controls, untreated refers to no treatment within last 6 months. Treated refers to complete of oral hygiene phase.
Celenligil et al 1993.[13]	16 Rapidly progressive periodontitis	22-33	Page et al 1983	Plasma cell dominated lesions with equal numbers of T & B cells
Lappin et al 1999.[14]	10 generalized early onset periodontitis 9 adult periodontitis	24-39 42-62	Hart et al 1991	Increased B:T cells ratio in adult periodontitis compared with GEOP
Lappin et al 2001.[15]	Same group as above	As above	As above	More Th2 cells than Th1 in both GEOP & Adult periodontitis tissues
Kleinfelder et al 2001.[16]	20 GEOP	25-35	Hart et al 1991	Predominantly plasma cells in pre- treatment biopsies.
Liljenberg & Lindhe 1980.[17]	8 LJP 7 Post-JP generalized 7 adult periodontitis	14-20 27-56 22-42	Molar/Incisors, gingival relatively healthy, rapid progression	Plasma cell, Lymphocyte, Infiltrate in LJP & adult periodontitis biopsies after initial hygienic phase of treatment.

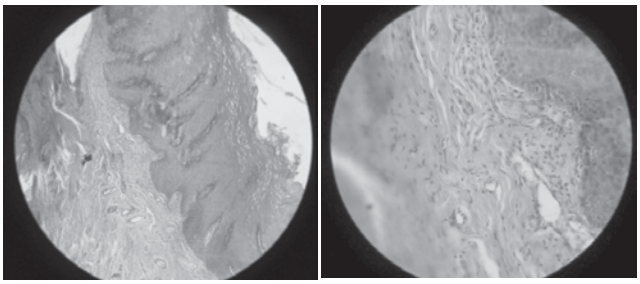

Fig. 8 Histopathological picture showing chronic periodontitis

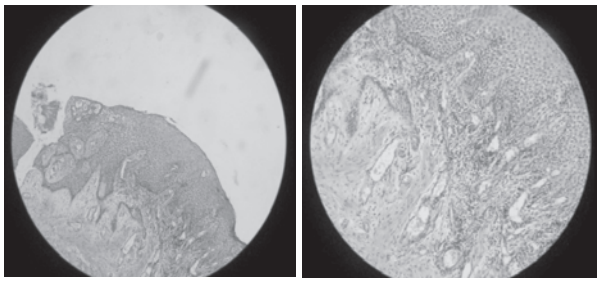

Fig. 9 Histopathological picture showing aggressive periodontitis.

Discussion

The development of gingivitis and subsequently of chronic periodontitis lesion has been classically described as progressing through series of stage:-

The initial lesion of chronic periodontitis is a subclinical entity occurring within the first 4 days of plaque accumulation. The characteristic immune response to bacterial enzymes and metabolic end products is observed as a result of complement activation of alternative pathway. The anaphylatoxins C3a and C5a stimulate mast cells to release vasoactive amines which in turn induce increase vascular permeability, resulting in oedema. There is increase in gingival fluid flow, accumulation of neutrophils, local connective tissue disruption and release of TNF-α.

Presence of an organized plaque biofilm induces the neutrophils to release their lysosomal agents in an act of abortive phagocytosis. The action of these extremely active agents exacerbates local tissue damage, the lesion is not clinically discernible, only occupies 5-10% of surrounding connective tissue. The early lesion becomes discernible after 4-7 days of uninterrupted plaque accumulation. It results from inability of host defence mechanisms activated in the initial lesion to clear the infection and involves a change in balance of inflammatory cells. This early lesion is characterized at cellular level by increase number of lymphocytes, macrophages, engagement of capillary vascular and development of perivascular inflammatory infiltrate of plasma cells was observed in pre-treatment biopsies from adolescent localized aggressive periodontitis patients in several studies as well as in localized aggressive periodontitis patients following initial hygienic phase of treatment. This was also case in generalized aggressive periodontitis.

In chronic periodontitis lesion, majority of infiltrating cells are immunoglobulin positive plasma cells. Similar findings were also reported from biopsies of treated and untreated chronic, juvenile and post juvenile periodontitis patients. Polymorphonuclear neutrophils are found adjacent to the pocket lining epithelium and migrating through this epithelium and into the gingival sulcus where they form a barrier between the plaque biofilm and tissues in both aggressive and chronic periodontitis. The root surfaces of individuals with aggressive periodontitis were observed to be heavily covered by neutrophils. However, neutrophils are usually found in very low number in infiltrated connect tissue in both conditions.

Therefore it would appear that neutrophil migration through the epithelium and into the gingival sulcus together with release of lysosomal enzymes as a result of abortive phagocytosis leading to localized connective tissue destruction is an integral component of both chronic and aggressive periodontitis. It would appear that, although the stages in development of aggressive periodontitis lesion is unknown, the fully developed lesion is characterized by plasma cell dominated inflammatory infiltrate in connective tissue, with neutrophils migrating through pocket lining epithelium and forming a layer between the tissues and plaque biofilm. Although this profile is identical to histopathology of chronic periodontitis, it doesn't necessarily mean that they are not different diseases *(Michael Smith, Gregory J).*[1]

Summary

There appears to be no difference between aggressive and chronic periodontitis in terms of their histopathology.

The subsequent colonization of the periodontal pocket by periodontopathic bacteria may lead to a superimposition of chronic periodontitis, which in turn complicates the histological picture.[1]

On the other hand, based on the limited data available, generalized aggressive periodontitis may

represent advanced chronic periodontitis in a young individual with extreme susceptibility, which explains the common histopathology.

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Improving school health programs - closing the knowledge gap

* S. Santhosh Kumar

Abstract

School Dental Health Education is a widely advocated as an effective measure in community programs for the prevention and control of oral diseases mainly gingival and periodontal diseases and dental caries. In most of the countries, schools provide the primary setting in which educational activities are carried out. Each of these programs is slightly different but has many characteristics in common-

- Targeted to school children
- Emphasis on tooth morphology
- Functions of teeth, plaque, diet, caries and dental care

The school health programme is critical since the school helps in socializing and teaching children and developing their behaviour, that society views as appropriately lawful and important in preparation for a responsible community membership. The major problem for education is the gap between the scientific knowledge base of the field at a specific point in time and the information taught to the public, including school age children about oral health and prevention of oral diseases. In this article, the knowledge gap is illustrated and steps are identified that should be useful in pointing towards new directions for program development in schools, in order to close the gap.

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Health education is the provision of health information to people in such a way that they apply it in everyday living. Primary objective of any dental health educational programme is to provide provision of dental health information to individual patients and to community to affect desirable behaviour. Schools have more influence on the lives of young people than any other social institution, next to the family and provide a setting in which friendship networks develop, socialization occurs, and norms that govern behaviour are developed and re-inforced.

Even though the objectives are to provide information and to encourage individual oral hygiene, diet and dental care behaviour the major emphasis is on removal of plaque and its relationship to dental caries process. Less attention is given especially at the secondary level to the relationship between plaque and gingivitis which should be made especially relevant to adolescents. Ideally school health programs should prepare students to make knowledgeable decisions about oral health not only as an individual but also as a future parent, opinion leader and community decision maker.

As a social institution the school functions as society's one of the major instruments for socializing or teaching children, information and behaviour that the society views as appropriate, legitimate and important in preparation for responsible community membership

Most of the school dental programs through slightly different, have targeted to school children with emphasis on tooth morphology, functions of teeth, diet, caries and dental care. As a drawback there is heavy reliance upon entertainment value and student participation on mechanical plaque removal. Priority should be given to teaching about the relative and comparative effectiveness and deficiency of the information taught and those implemented at the level of the individual and the

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community level in preventing dental caries and gingivitis.

Fluoride is having the top most position in hierarchy in caries. Although the information of fluoride is included in contemporary school health programs, the preventive strategy of making the tooth less susceptible to dental caries through optimal and systemic and topical fluoride exposure is not given the top educational priority. Though not more, fluoride information and the appropriate use of it to prevent tooth decay at the level of both individual and community should be made at least as relevant as oral hygiene. A survey in United States conducted in adults in the early twentieth century revealed that most of them do not why fluorides are used. A major group thought that it was used for purification of water. Many people in the survey did not know that their water is fluoridated. It is a great failure of dental health education that the public, particularly the school children who constitute the parents and policy makers of near future has been inadequately informed about the most critical public health measure. Over emphasis on oral hygiene alone, with regard to caries could be misleading by providing a false sense of security. In fact may be dysfunctional in the near future to the next generations understanding of preventive measures which have a higher degree of effectiveness and scientific support.

A major challenge for school health programs is to develop creative instructional material at all levels to explain and demonstrate the effectiveness and efficiency of fluoride in preventing tooth decay and emphasis of the importance of individual in preventing tooth decay. The American Academy of Public Health in be late 90's published a report on the applicability of mass control programs which rely heavily on individual plaque control techniques. They said that state of performance for mass programs to control plaque in preventing caries activity presents even less encouraging background of scientific support than that examined for preventing periodontal disease. One explanation for persistent educational emphasis on plaque and its control, is that plaque provides a tangible and visible entity around which educational activities can be easily focused and structured. With regard to diet and dental care, consistency should be there between what is taught in the curriculum and that which is available to the school age child in school setting.

Educational methods (Secondary level)

Trained instructors use materials and methods to gain a high level of interest and attention.

Students are actively involved following demonstrations and participate in small groups. Students directly visualize the problem of plaque and are encouraged to remove it. They are involved in self assessment through use of disclosing agents. The small group approach is supplemented by several methods of individual reinforcement as well.

What is lacking is

- Encouraging individual goal setting
- Periodic review of individual achievement over long periods of time

Elementary school health programmes and entertainment

As many elementary school programs rely heavily upon the use of entertainment, three additional principles should be mentioned regarding the role of entertainment in instruction. The entertainment portion of the instruction should function and should be

- Brief
- Generate interest in learning the information or skill
- Should not constitute the total educational experience, because control may be lost over what is actually learned.

It has been found from surveys that even though the entertainment part has scored high on appeal, audiences find it difficult to distinguish factual material from statements made for dramatic purposes.

Programme evaluation

Well conceived and carried out programme evaluations provide information upon which the worth of the programme may be judged in terms of degree of success in achieving stated goals and objectives. Evaluating effectiveness provides opportunity to test the validity of assumptions which may underlie any particular programme. Poorly conceived and conducted evaluations will be misleading, and may lead to a false sense of security.

The short term activation criteria include two types

1. Knowledge
2. Behaviour

Knowledge:

If information transmission is important objective, pre and post tests of knowledge gain and later retention is required.

Behaviour

If programme has objectives aimed at improved oral health, then behavioral measures should focus on several levels.

o Degree to which cariogenic foods are available

o Access to recommended regimen of fluorides said in school

o Quality of supervision of oral hygiene

o Extent to which treatment referrals are followed up

If programme includes long term objectives related to improving oral health through prevention and increased dental care utilization, then appropriate baseline measures are required for comparisons overtime, including measures of preventing caries gingivitis and treatment needs

o Health education in the classroom must be reinforced and coordinated with other components of the school health programme.

o A coordinated school health programme can lead to healthier students and community and can ultimately reduce cancer risks.

School health council

The school health council is comprised of faculty and staff. It includes school nurses, health educators, physical educators, administrators, counselors, food service personal, parents, members of community health association and students. Members should be committed to the health of children and youth. Even though initially it may seem difficult, the best option is to set up a school health council to coordinate a school health programme. There are no set rules. Consider what will work best in your school community.

Conclusion

Many barriers such as societal and professional constraints and financial resources may stand in the way of a well integrated school health programme. Society however depends on the dental profession to provide direction in programs designed to improve the oral health of the members. Given this responsibility

o We should begin closing the knowledge gap between what is known, what is taught and what is implemented

o Adapt Existing programs to focus on objectives and methods designed to improve oral health

Include appropriate evaluation programs to assess oral health outcomes in school programs

To implement effective preventive measures in school programs, based on scientific evidence, school personal and community policy makers should also be aware about the value and social benefits of these measures and how they should be provided most efficiently.

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Bacteremia following dental extraction

* John Aby, ** Mohan Baliga

Abstract

Bacteremias resulting from dental procedures are attributed to the invasion of vascular system by oral microorganisms. Bacteria can be present even in healthy gingival sulcus which are probably the most significant source of bacteremias. Traditionally the diagnosis of bacteremia depends upon recovery of blood culture isolates 24-72 hrs after blood cultures are obtained. This study proves the efficacy of buffy coat smears in the detection of post extraction bacteremias.

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Introduction

Bacteremia is induced by wide variety of clinical procedures and manipulations, particularly those involving heavily colonized mucous membranes or infected sites. Transient invasion of blood stream by bacteria following dental extractions was first demonstrated by okell & elliot[2] in 1935. Rushton[1] was first to report this phenomenon and its relationship to bacterial endocarditis. Bacteremia is a potential hazard to patients with abnormal heart valves or other cardiac abnormalities predisposing them for infective endocarditis.

Humphrey[3] described a method of wright staining the buffy coat layer to detect bacteremia before blood cultures become positive.

Hobson[4] reported that post extraction bacteremia is more severe and prolonged when there is gross dental sepsis. Lockhart[10] reported that severity of odontogenic disease did not co-relate with results of blood cultures and mouth rinses with chlorhexidine did not significantly alter the number of positive blood cultures or nature of organisms. This study was done to detect incidence of bacteremia following dental extraction and to study efficacy of buffy coat smear in detection of post extraction bacteremia.

Materials & methods

This study was conducted on two groups of 50 patient's each who underwent normal intraalveolar dental extractions in the oral & maxillofacial clinic, college of dental surgery, mangalore. Patients who were on antibiotic therapy at the time of extraction were not included in the study. Routine medical examination were done for all cases. All patients had undergone single tooth extraction under local analgesia using 2% lignocaine with 1:200000 adrenalin.

In the first group of 50 patients, 41 were males and 9 females, average age was 41 years.

Indications for extraction were 10 cases due to periodontitis, 40 cases due to periapical disease.

Method (for blood culture study)

Skin of antecubital area was prepared with 5% povidone iodine and spirit. 5 ml blood was collected from antecubital vein using sterile disposable syringe and needle before tooth extraction. 2.5 ml was inoculated into 25 ml of brainheart infusion broth and 2.5 ml into 25 ml of thioglycollate medium. Second sample of 5ml blood was collected from other antecubital vein after extraction of tooth; all samples being collected in the second to fifth minute after extraction.[8] 2.5 ml each of samples inoculated into 25ml of brainheart infusion broth and thioglycollate medium. Samples were incubated at 37°C under aerobic and anaerobic conditions.

After incubation for 24 hrs, 72 hrs and 7 days in culture medium, broth was subcultured onto chocolate agar and incubated under aerobic condition in the presence of 5-10 % carbon dioxide and under anaerobic condition.

In the second group of 50 patients, 36 were males and 14

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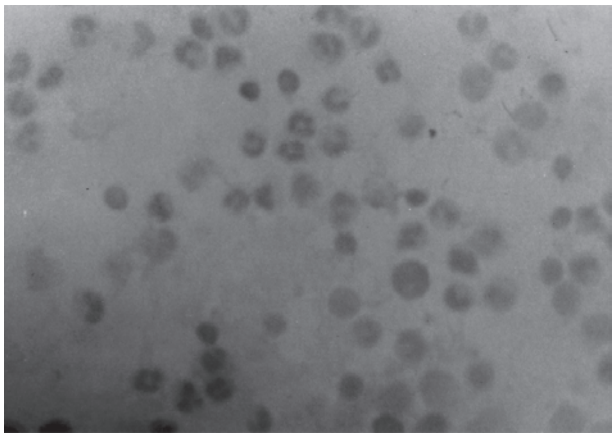
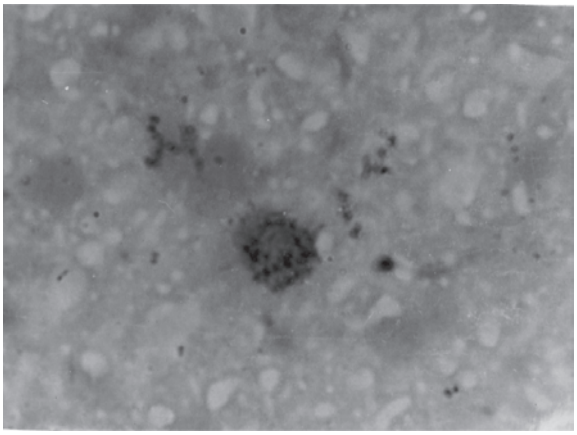


Buffy coat smear negative



Gram stained buffy coat smear- positive

females, average age was 38 years.

Indications for extraction were 22 cases due to periodontitis, 28 cases due to periapical disease.

Method – (for buffy coat smear study)

2 ml of blood was collected from antecubital vein just before tooth extraction under strict aseptic precautions. Another 2 ml of blood was collected after tooth extraction in second to fifth minute after extraction. Blood samples were collected in EDTA bottles (ethyl diamine tetra acetic acid) 0.1 ml of venous blood was centrifuged in a sterile wintrobe tube at 2500 rpm for 15 minutes to prepare buffy coat smear. Supernatant plasma was aspirated with a sterile pasteur pipette and buffy coat layer was aspirated onto sterile slide.

Four smears were prepared using two slide technique according to Brooks & associates.[8] Smears were stained with methylene blue and scanned for 15 minutes before it was considered negative. If organisms were identified the gram stained smears were examined. Presence of intracellular organisms were used as an index of bacteremia.[8]

Results

First group- Blood culture study

All pre-extraction cultures were sterile. Total of 20 positive post extraction cultures were obtained. Most commonly isolated organism was streptococcus viridans (10 cases). Hemophilus species was isolated from 3 cases, staphylococcus aureus from 2 cases. Bacteroides, actinobacillus. actinomycetemcomitans, pseudomonas, bacillus, acinetobacter, actinomyces, neisseria were isolated from 1 case each.

Second group –Buffy coat smear study

All pre-extraction cultures were sterile, total of 23 post extraction buffy coat smears were positive. Most commonly isolated organism was streptococcus viridans (18 cases). Hemophilus species was isolated from 6 cases, bacteroides from 2 cases and staphylococcus aureus from 3 cases.

Incidence of post extraction bacteremia in cases with periodontitis were 50% by culture study and 40.1% by buffy coat smear study.

Incidence of post extraction bacteremia in cases with periapical disease were 37.5% by culture study and 50% by buffy coat smear study.

Discussion

In the present study, positive post extraction blood cultures were obtained from 40% cases and positive buffy coat smears from 46% cases. Streptococcus viridans were the commonest organisms isolated from both studies. Streptococcus viridans bacteremia get special mention as this organism is still the most common cause of infective endocarditis. Nature of odontogenic disease, whether periapical or periodontal had no co-relation with results of blood culture and buffy coat smear studies. In this study, buffy coat smears were stained using fadens methylene blue technique,[7] smears were searched for 15 minutes before considered negative. If organisms were identified, gram stain smears were then examined. Presence of intragranulocytic microorganisms were considered as positive smears.[9] In several studies[5,6] it has been stipulated that organisms must be visualized intracellularly in the buffy coat smear.

Table -I

Type of organisms Isolated	blood culture studies Number of cases in which isolated	buffy coat smears Number of cases in which isolated
1. Streptococcus viridans	10 (50%)	18 (78.3%)
2. Hemophilus species	3 (15%)	6 (26.1%)
3. Staphylococcus aureus	2 (10%)	3 (13.1%)
4. Bacteroides	1 (5%)	2 (8.7%)
5. A.Actinomycetemcomitans	1 (5%)	
6. Actinomyces	1 (5%)	
7. Bacillus	1 (5%)	
8. Acinetobacter	1 (5%)	
9. Pseudomonas	1 (5%)	
10. Neisseria	1 (5%)	

Conclusion

Incidence of post extraction bacteremia was 40% in blood culture study and 46% in buffy coat smears. Streptococcus viridans were the most commonly isolated organism in both studies which underlines the necessity of prophylactic antibiotic therapy for all patients with history of congenital cardiac defects, heart valve abnormalities or cardiovascular prosthesis. Buffy coat smear examination is a simple, quicker and reliable method in the detection of post extraction bacteremia.

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Red tooth powder - A boon or to ban

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Abstract

Red tooth powder is a fine tobacco powder that is red in color and contains many additional ingredients including herbs and flavouring agents. It is manufactured commercially and marketed as a herbal product. It is used in South East Asia area, as a dentifrice. It is actually found to be a form of smokeless tobacco. Several smokeless tobacco preparations like mishri, gudhaku, bajjar and creamy snuff and red tooth powder are intended primarily as a dentifrice but their use soon becomes an addiction. On prolonged use it causes, Addiction, Gum disease, Oral leukoplakia and submucous fibrosis, likely precursor lesions to oral cancer. Here a review of literature is done so that an awareness can be created among the dental professionals and public.

Keywords: Red tooth powder , Smokeless tobacco , Tobacco specific nitrosoamines , addiction.

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Introduction

Oral cancer is one of the most common cancers in India with rates among the highest in the world. In many regions of India, oral cancer incidence rates exceed 6 per 100,000 males and in some parts they are as high as 10.8 per 100,000.[1] Smokeless tobacco products account for over one-third of all tobacco consumed in India. There are approximately 100 million users of smokeless tobacco products in India and Pakistan. Traditional forms of smokeless tobacco include betel quid containing tobacco, tobacco with lime and tobacco tooth powder but there are also new products with increasing popularity. Tobacco is a well-established cause of oral cancer in India. Oral leukoplakia and submucous fibrosis, likely precursor lesions to oral cancer, are also strongly linked to smokeless tobacco use.[1]

Red tooth powder - a form of smokeless tobacco

According to IARC Monograph 2007 Red tooth powder is classified as a form of smokeless tobacco that is used orally.[2]

Smokeless tobacco products have been in existence for thousands of years among population in south America and South East Asia.[3,4] Overtime these products have gained popularity throughout the world. Smokeless tobacco is consumed without burning the product and can be used orally or nasally. Oral smokeless tobacco products are placed in the mouth, cheek/lip and sucked/chewed. Tobacco pastes/ tooth powders are used in similar manner and placed on the gums/ teeth.[3,4] Several smokeless tobacco preparations like mishri, gudhakhu, tuibar, gul and red tooth powder are intended primarily as a dentrifice but their use soon becomes addiction.[5,6]

Red tooth powder

Red tooth powder is a commercially available dentrifice that contains a significant proportion of tobacco.[5] (Fig. 1)

User group: All age group,[7] more often by women[3]

Distribution

The GYTS (Global Youth tobacco survey) which focuses on school students in the age group of 13-15 years, found the prevalence of its use to be 49% in Bihar, 29% each in UP and Uttaranchal, 25% in Orissa, 9% in Mizoram, 5% in Nagaland, 4% each in Arunachal, Assam and Meghalaya, 3% in Tripura, and 2% each in Goa, Maharashtra, Manipur and Sikkim.[8] (Fig. 2)

Alarming report

Red tooth powder is a pyrolised tobacco powder (main ingredient) with added herbs and flavouring agent. In India the misconception is widespread that tobacco is good for teeth. Many companies take

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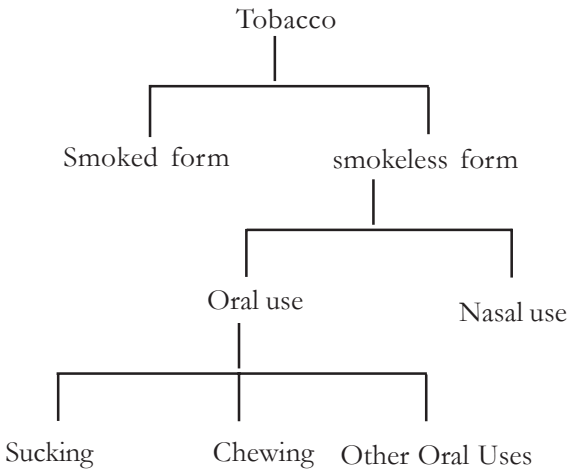

[Creamy Snuff, Gudhakhu, Tuibar, Gul, Mishri, "Red Tooth Powder"]

Fig. 1 Red tooth powder [courtesy- Dhirendra N. sinha, School of preventive oncology, Patna, WHO SEARO 2004]

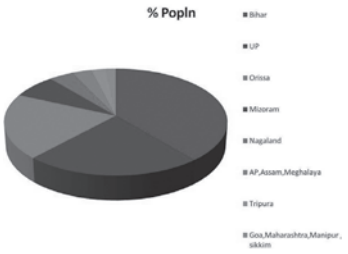

Fig. 2 Distribution

advantage of this misconception by packing and positioning their products as dental care products.[6] Traditionally, it contained tobacco but after the passage of law banning the use of tobacco as an ingredient it was stopped. A Laboratory test of five samples of red tooth powder that did not declare tobacco as an ingredient found a tobacco content of 9.3-248 mg/gm of tooth powder.[2,6] Small amounts of nicotine and trace amounts of tobacco specific nitrosamines were observed in these products raising concerns about their safety.[1] Tobacco-specific nitrosamines are the most prevalent strong carcinogens in smokeless tobacco products and are widely believed to play a significant role as causes of oral cancer in people who use these products.

Disease consequences

On prolonged use it causes, Addiction, Gum disease, Oral leukoplakia and submucous fibrosis, likely precursor lesions to oral cancer, Increase in blood pressure and heart rate, adverse reproductive outcome, pancreatic cancer.[1,2]

Conclusion

In India and other parts of southern Asia, smokeless tobacco use is a major public health problem. Red tooth powder is used as a dentifrice all over India.[9] But latest WHO Reports clearly bring out the fact that it is a form of smokeless tobacco with small amount of nicotine and trace amounts of tobacco specific nitrosamines. It is remarkable that a product containing potential carcinogen as an addictive agent is marketed for the purpose of dental hygiene. These products are thus used as a regular tooth powder but users soon become addicted. They are promoted through all Medias and all other avenues that can influence the youth and people a large. Such products should be banned without doubts. We dental practitioners should take this responsibility to Create public awareness, Mobilise media support, Ban direct and indirect advertising of such products and Influence and direct governmental decision against the manufacturing of such products.

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Dentine hypersensitivity

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Abstract

Dentine hypersensitivity is a common condition in which individuals experience brief episodes of sharp, well-localised pain when their teeth are exposed to common stimuli such as cold water, air currents and touch. The pain is sharp in nature but short in duration and is often described by patients as annoying but bearable. This condition is becoming more common as the population ages and people retain their natural teeth longer. In this brief article, the basic anatomic and physiological mechanisms responsible for sensitivity are reviewed and the commonly available treatments are described that have been developed to treat tooth hypersensitivity. This article provides a superficial view and individual patient needs must be assessed prior to any treatment decisions.

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Dentine hypersensitivity is a common condition in which individuals experience brief episodes of sharp, well-localised pain when their teeth are exposed to common stimuli such as cold water, air currents and touch. The pain is sharp in nature but short in duration and is often described by patients as annoying but bearable. This condition is becoming more common as the population ages and people retain their natural teeth longer. In this brief article, the basic anatomic and physiological mechanisms responsible for sensitivity are reviewed and the commonly available treatments are described that have been developed to treat tooth hypersensitivity. This article provides a superficial view and individual patient needs must be assessed prior to any treatment decisions.

Prevalence

Clinical reports suggest that the prevalence of dentine hypersensitivity ranges from 10-20%, with a peak in patients aged between 20 and 40 years old, even though the condition can be found in teenagers and patients in their 70s[1]. Females may have a higher prevalence than males and this could be accounted for by differences in diet and oral hygiene habits.[2]

In the maxilla, the most common location is anterior to the first premolar, while in the mandible the first molar and premolars are more commonly affected.

Aetiology

Dentine hypersensitivity is the symptomatic manifestation of significant dental problems, such as erosive wear and other forms of non-carious tooth structure loss. Often, the loss of enamel and cementum can be traced back to a combination of erosion, abrasion and possibly abfraction.[3] In older patients, dentine hypersensitivity is often associated with root surface exposure due to gingival recession; however, in younger patients, the lesions may be surrounded by enamel with no exposed root surfaces. Clinically, the condition is frequently the consequence of salivary dysfunction, aggressive oral hygiene practices, habits like bruxism leading to attrition and diets rich in acids.[4] A number of case-control studies have shown that intrinsic and extrinsic acids are the primary aetiological factors and their erosive effect is accelerated in those patients who lack the protection of healthy saliva.[5]

Diagnosis

Effective management of dentine hypersensitivity requires proper identification of the

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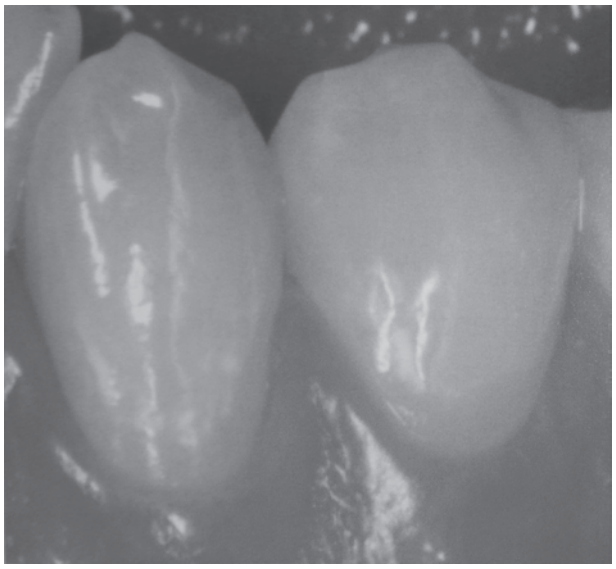

Fig. 1 Hypersensitive area difficut to visualise

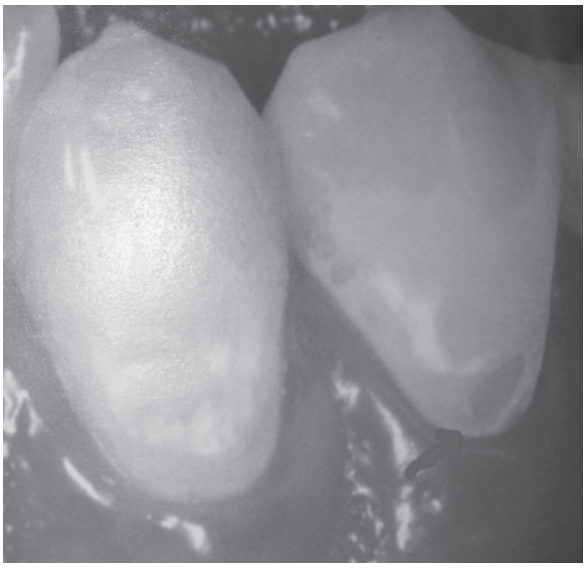

Fig. 2 Mild acid etching (2s) enables visualisation of lesion

contributing factors through history taking, examination and saliva analysis.[6]

Few dentists consider diet analysis during management of this condition[7]. Enamel in the cervical area of the tooth is thin and this area is frequently the first to manifest the symptoms of hypersensitivity due to the loss of this enamel and exposure of the underlying dentine. In the early stages, dentine exposure can be difficult to identify (Fig 1) other than by air blast or tactile exploration. The use of a two-second acid etch can be used to reveal the area of exposed dentine[8] (Fig 2). The intact border of enamel along the gingival margin is a typical feature of the early lesions, which is due to the acid neutralizing and protective capacity of gingival crevicular fluid.

Mechanisms of pain transmission

As the intra-dentinal nerve fibres are confined to the pre-dentine zone, it is most likely that dentine hypersensitivity is evoked by indirect stimulations. The three major theories on the mechanism of pain transmission in dentine are:[9]

- dentinal receptor theory: the odontoblast has a sensory function;
- transducer theory: the nerve impulses in the pulp are modulated through the liberation of polypeptides from the odontoblasts, when these are injured;
- hydrodynamic theory: when a stimulus is applied to the outer dentine surface, there is a displacement of fluid in the dentinal tubules, giving rise to a mechanical stimulation of the nerve receptors at the pulpo-dentinal border.

The diameter of the tubule is also very important, as the rate of fluid flow is dependent on the tubule diameter. If the tubule diameter doubles, the fluid flow may increase by as much as 16 times.[10]

Management

The first principle in managing multi-factorial and chronic conditions is to relieve the *symptoms* and to *address* the aetiological factors which are specific to individuals.[11] Patients should be led through a tiered management program of progressively more intensive treatments. The first step is the removal of contributory factors and habits, to be followed by the use of desensitizing agents, which can be applied in-office or by the patient as part of their daily home care.

The currently available products and methods aim at either occluding the dentine tubules or preventing sensory nerve transmission

Desensitising agents

These can be roughly divided into in-office and take-home categories:

In-office

Calcium hydroxide: this method of desensitising is only of historical interest; it consists of the application of a calcium hydroxide paste and burnishing it with a wooden stick or rubber tip.[12] The mode of action is unclear, but it was suggested by Bal et al (1999) that the high pH provokes protein coagulation in the tubules,

leading to their closure and to a decrease in the hydraulic conductance of dentine.

Fluoride varnishes: the most commonly used product is 5% neutral sodium fluoride (e.g., Duraphat, Clinpro White Varnish). The mode of action is through occlusion of tubules by the formation of calcium fluoride. Other fluoride compounds which have been used in the treatment of hypersensitivity are amine fluoride, stannous fluoride and titanium tetrafluoride.[13]

Fluoride iontophoresis: this method uses a small electrical charge to deliver fluoride deeper into dentine. The application tray can be used with 1.23% acidulated phosphate fluoride (APF) or 2% sodium fluoride (NaF) gels.[14]

Desensitising polishing paste: the active ingredients are calcium carbonate and arginine.[15] Similar to calcium hydroxide, the paste works best when it is burnished onto the tooth surface with a rubber cup, running at slow speed.

Placement of physical barriers: where lesions are shallow, a layer of a dentine bonding agent can be used to cover the affected areas, while more advanced lesions can be successfully restored using glass-ionomer or resin modified glass-ionomer cements. One product containing both resin and glutaraldehyde has been shown to be somewhat effective against dentine hypersensitivity.[16] The manufacturer claims that the glutaraldehyde leads to precipitation of serum albumin in the tubules.

Lasers: a review of four different types of lasers used to reduce dentine hypersensitivity indicated highly variable rates of success.[17] Low level laser melting of the dentine surface seal dentinal tubules without damage to the pulp. Gas lasers with helium-neon & carbon dioxide as the active medium are used. Diode lasers with galium-arsenaide as the active medium is also being used. Solid –state lasers like Neodymium – yttrium-aluminum-garnet (Nd:YAG) & Erbium: yttrium (Er:YSGG) are currently used. There is no conclusive evidence yet to show that lasers alone can be used for management hypersensitivity.

Take-home

Toothpaste: there is a range of toothpastes designed for hypersensitivity relief; these can contain strontium chloride, strontium acetate, potassium chloride and arginine and calcium carbonate.[18] The proposed mode of action of potassium is by blocking nerve transmission while strontium, calcium and arginine act by the occlusion of dentine tubules.[19]

Stannous fluoride: this ingredient is effective in management of dentine hypersensitivity and also useful in caries prevention, reduction of plaque formation and gingivitis and suppression of breath malodor. The mechanism of action for stannous fluoride appears to be the creation of a calcific barrier via induction of high mineral content.[20] Studies have reported the development of a tin- rich surface forming in vitro and in situ after a two week application of 0.4% stannous fluoride gel. It has also been proposed that stannous ions may precipitate into a large enough mass to sufficiently inhibit the hydrodynamics of tubule fluid.[21]

Oxalate salts: compounds containing oxalate salts have also been shown to produce relief from the symptoms of dentinal hypersensitivity. Commercially available preparations more commonly include potassium oxalate or ferric oxalate, both of which have been shown to provide effective reduction in sensitivity.[22]

New generation tooth paste for hypersensitivity includes a revolutionary molecule called NovaMin. NovaMin reduces sensitivity, promotes healthier gums and re-calcifies the tooth enamel naturally. NovaMin replicates the way saliva in our mouth naturally, re-calcifies dentine and enamel and achieves this more quickly and more effectively than nature itself. NovaMin® a white, tasteless powder—is a compound made from elements found in healthy bones and teeth: calcium, phosphorus, silica and sodium (Ca, P, Si and Na). Together, they create the perfect ion balance to ensure tooth remineralization and provide the most powerful sensitivity relief available. NovaMin's critical fourth ingredient—sodium—causes the saliva to become alkaline, speeding the formation of the HCA layer for faster sensitivity relief. Applied in one easy step, NovaMin continue releasing sodium ions for up to seven days, providing long-lasting desensitizing and remineralization.

Calcium phosphopeptide-amorphous calcium phosphate (CPP-ACP): there is evidence to show that CPP-ACP has a clinical application in the management of dentine hypersensitivity by enhancing surface mineralisation and tubule occlusion.[23]

Conclusion

The diagnosis and management of dentine hypersensitivity can be a difficult clinical challenge and requires a systematic approach. Patients will have variable levels of tolerance and any management strategies must take into consideration the multifactorial nature of the condition.

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Aesthetic & functional management of periodontally compromised anterior teeth by combined treatment approach

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Abstract

Periodontitis is the multifactorial inflammatory disease characterized by destruction of the periodontal tissues. Three main etiologic factors responsible for the disease are pathogenic bacteria, susceptible host and the environment. It affects the periodontium with varying degree of severity, & it ranges for the individuals, for the tooth and for different sites on tooth. Advanced cases are difficult to manage. In case of anterior tooth with severe involvement, aesthetic and functional limitations play a major role in deciding the treatment plan. Extraction is often considered as the only treatment option for many of such periodontally compromised teeth. But it is associated with highly unaesthetic appearance, and such sites are often difficult to treat by prosthesis. In such cases, for preserving the tooth, each and every aspect of the treatment need has to be considered for the best possible outcome. Based on these facts we are presenting, a case report on aesthetic & functional management of periodontally compromised anterior teeth by combined treatment approach.

Key words: Periodontitis, aesthetic and function, combined treatment approach

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Introduction

Advanced periodontal diseases generally cause aesthetic and functional problems. Gingival recession, dark triangle formation in the interdental area due to loss papilla and pathological tooth migration, especially at the anterior area can be considered as unaesthetic consequences of periodontitis.[1-3] Advanced loss of periodontal support may contribute the tooth mobility and may result in secondary endodontic problems associated with severe periodontitis.[4-6] Combined treatment approach including periodontal, endodontic, orthodontic and prosthetic rehabilitation can be chosen in these kinds of complicated cases. The aim of treatment plan is 'total' treatment that is the coordination of all treatment procedures for the purpose of creating a well functioning dentition, in a healthy periodontal environment. The master plan of periodontal treatment encompasses different areas of therapeutic objectives for each patient according to his or her needs. Various surgical and non-surgical therapies were described to reach these goals.[7,8] In some clinical cases such as advanced periodontitis with extensive periodontal support loss, it is hard to achieve these tasks. Extreme tooth mobility and presence of difficult-to access areas can limit the removal of deposits on the root surfaces and also the effectiveness of periodontal treatment as well.[9]

Aesthetic problem may remain even after successful periodontal treatment. Esthetic rehabilitation of dark triangles in the embrasure areas due to papillary gingival recession is possible with conservative restorations. When conservative restorations are unable to provide desired esthetics, prosthetic restorations such as

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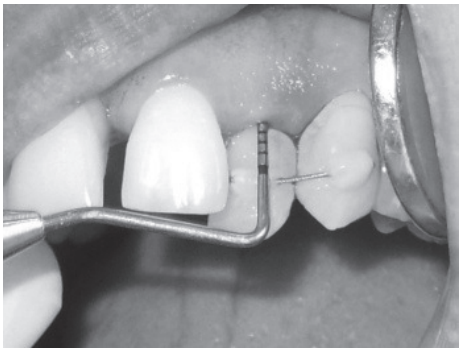
Preoperative Photographs



Splinting & Pre-op Pocket Depth

After Endodontic Treatment

Intra-operative photograph after flap reflection showing Osseus Defect

removable gingival epithesis can be used.[10-14] In this paper, periodontal, aesthetical, functional and conservative management of symptomatic, extremely mobile, over-extruded and pathologically migrated upper anterior teeth is reported.

Case report

A systemically healthy 34 year old female patient reported to the Department of Periodontics, Govt. Dental College, Trivandrum, with the complain of pain, mobility & unaesthetic appearance in the upper anterior teeth. On examination it was found that patient had:

Ø Mobility Grade III with 22 & Grade II with 11, 21.

Ø Supra-erupted and palatally placed 22

Ø Deep periodontal pockets of ≥10 mm around 22.

Ø Pathologic migration of 11, & 21 with midline diastema & labial migration of 11.

Ø Deep periodontal pockets and radiographic horizontal & vertical bone resorption were observed in the many sites of the mouth during the complete periodontal examination.

Ø Upper left lateral incisor was presenting pain during night and gave delayed response to electro-vitalometric test, so considered as devital because of secondary pulpal infection due to advanced periodontal involvement.

Ø On full mouth periodontal charting it was found to have mean CAL of 3.9mm, therefore the diagnosis was considered as 'chronic generalized moderate periodontitis' with 'pulpo-periodontal' lesion with 22.

Treatment plan

Severe periodontal involvement with 22 left us with the treatment option of extraction and replacement of new tooth. The patient was female and was highly concerned about aesthetics, so she demanded not to lose any teeth. Therefore, considering the patients demand the treatment plan was decided to save the tooth with combined treatment approach involving periodontal, endodontic, orthodontic and restorative aspects. Patient was well instructed of the overall prognosis & was well motivated to maintain good oral hygiene. The overall treatment is followed as following phases.

Phase I:- Initially full mouth scaling and root

Bone graft (synthetic hydroxyapatite (biograft)) placed

Suturing

After Completion of Orthodontic Treatment

Post-op Pocket depth reduction & IOPA X-ray

After composite build-up on proximal surfaces of anterior teeth for Black Triangles

Final photograph with lower partial denture

debridement was done and patient was prescribed with systemic antibiotic Doxycycline 100mg twice daily for first day followed by 100 mg once daily for 1 week and analgesic Ibuprofen & Paracetamol combination. Temporary splinting was done for 22, to control mobility while treatment procedure.

Phase II:- The endodontic therapy was carried out with 22.

Followed by endodontic treatment after 1 month, regenerative periodontal therapy with 'Synthetic Hydroxyapatite' (Biograft) bone graft was done with 22. Subsequently the periodontal surgical therapy was done in other sites.

Phase III:- After 2 months of surgical treatment, light force 'straight wire' orthodontic treatment was started in upper anterior segment from 15 to 25 for alignment of anterior teeth. Within 3 months teeth got properly aligned.

After the alignment the orthodontic appliance is kept & will be there as provisional splint & orthodontic retainer for additional 6 more months.

After the periodontal & orthodontic therapy black triangles were visible in upper anterior region due to shrinkage of the surrounding tissues. To correct this, composite build up was done on proximal surfaces of 11, 21, 22 & 23.

Removable partial denture was given for replacing missing 31, 32 as the condition of abutments was not favorable for fixed partial denture.

Phase IV:- The whole treatment duration till now was 8 months. Patient maintained good oral hygiene throughout the treatment period. After the completion of treatment patient was again, instructed to maintain oral hygiene with use of interdental brushes and appropriate brushing techniques.

Discussion

Periodontal treatment requires the long-range planning. Its value to patient is measured in years of healthy functioning of the entire dentition, not only the number of teeth remaining at the time of treatment. The treatment is directed to establishing and maintaining the health of the periodontium throughout the mouth rather than to spectacular efforts to "tighten loose teeth." The periodontal condition of teeth to be retained is more important than the number of teeth. Teeth that can be retained with minimal doubt and a maximum margin of safety provide the basis for total treatment plan. Teeth on borderline hopelessness do not contribute to the overall usefulness of the dentition, even if they can be saved in somewhat precarious state. Such teeth become the source of recurrent infection & annoyance to the patient. Teeth with hopeless

prognosis should be considered for extraction if they are so mobile that function becomes painful, it can cause acute abscess & there is no use of it in overall treatment plan. This treatment strategy applies well for the posterior teeth because of restricted access, complex anatomical limitations and low aesthetic value.[15]

In contrast for anterior teeth along with of proper function of the dentition, esthetic consideration plays an increasingly important role in many cases. Different patients values esthetic differently. The clinician has to carefully evaluate and consider a final outcome of treatment that will be acceptable to the patient without jeopardizing the basic consideration of attaining health.[15] In this case the patient was female, was esthetically concerned, demanded for retention of teeth and tooth involved was in the highly esthetic zone i.e. upper anterior region. Therefore we opted to preserve the tooth, along with the periodontal care for other teeth. For orthodontic therapy, it has been stated that, there is no contraindication of orthodontic treatment for periodontally compromised teeth but, cardinal rule to be followed is "Before tooth movement begins there should be no inflammation in the periodontal attachment."[16] Therefore after 2 months of required periodontal therapy we started the orthodontic alignment of upper anterior teeth.

On reexamination at 6 month after the completion treatment there was definite improvement of patient status both clinically and radiographically. The mean probing attachment gain around 22 was 4mm. With such combined treatment approach we could obtain an esthetically pleasing outcome for the patient.

Conclusion

Therefore it can be concluded that in compromised cases, along with the basic consideration of attaining health the clinician should carefully evaluate and consider a final outcome of treatment that will be acceptable to the patient. In case of severe periodontitis this criteria fits better for teeth in esthetically important zone, i.e. upper anterior region. In this case report, combined treatment approach for the management of periodontally compromised upper lateral with is reported. The patient was well satisfied both aesthetically and functionally after the treatment.

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Healing potential of PRP

* Satheesh Kumar, ** Joseph Paul, *** Kiran Kishore

Abstract

Periapical surgery includes the curettage of all periapical soft tissues and sometimes application of different biomaterials to facilitate degranulation of the lesion and enhance the new bone formation. All these approaches are known as regenerative therapies. Bone grafts and barrier membranes have been used for the optimal healing. Platelet-rich plasma (PRP) - a concentrated suspension of the growth factors found in platelets along with graft material have found to promote healing. This article quotes a case of faster healing following periapical surgery…

KDJ 2012; Vol. 35, no.1 Supplement: 193-194

Introduction

PRP can be considered as a method in obtaining better wound healing process, more over autologous product eliminate the concerns about immunogenic reactions and disease transmissions. Using PRP along with bioactive synthetic bone graft can be considered in treatment of periapical pathology, associated with significant bone loss, requiring surgery. The basic concept of PRP addition to bone grafts is that high concentrations of platelets in a bony lesion will increase the local concentration of secreted growth factors and subsequently enhance the initial bone healing response. Later on, the direct influence of PRP will fade away and physiological mechanisms of bone repair will continue to work on an accelerated level. Platelet-rich-plasma (PRP) is a type of natural source of autologous growth factors.

Case report

A 18 year-old male patient was referred to Department of Conservative and Endodontics, VMSDC, Salem with pus discharge and tenderness to percussion in relation to mandibular incisors. Radiograph showed an oval 1x 2 cm radiolucency in relation to 31, 41, 42 and the rest of the dentition was healthy. Clinically, gingiva had lost its contour and was hyperemic and edematous. 41 showed grade II mobility. Patient was informed about the treatment options

Treatment plan was formulated, it included root canal therapy followed by peri apical curettage and placement of graft material soaked in PRP First step of the treatment plan was to complete the root canal therapy. The canals were instrumented using step-back technique.An apical preparation till K file #40 was achieved. During the preparation 2.5% NaOCl irrigating solution was administered between file applications. The roots were obturated with gutta-percha by the lateral condensation technique.

The endodontic treatment of 31, 41, 42 was completed After local anesthesia, intrasulcular incision was made.Full thickness mucoperiosteal flap was raised. Granulation tissues around the roots were removed, scaling and root planning was performed by ultrasonic and hand instruments There was a crater shaped bony defect with no residual buccal and lingual walls.

PRP was prepared from blood collected in the immediate preoperative period. The result was a sticky gel that can be applied easily to the surgical defects. Then PRP gel was mixed with graft particles (Unigraft_, Unicare Biomedical Inc., Laguna Hills, CA, USA).. PRP including graft material was placed into the defect.

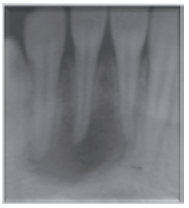
The flap was sutured with 4.0 Vicryl sutures. The patient was prescribed 500 mg. Amoxicillin t.i.d for a week, 400mg. metronidazole t.i.d for three days and a mouth rinse of chlorhexidinegluconate 0.12% for 2 weeks.

The patient was seen in every 2 weeks.. The radiolucent area around the root was remarkably reduced at sixth month and bone fill was seen especially at the apical and distal side of the root, which was detected radiographically. (At the end of 12 months radiograph showed that radiolucent area around the tooth had reduced and the bonefill was detectable on apical, distal and also on the mesial side of the root.

Clinically, the gingiva was firm and pink and there was no bleeding on probing at the time of examination. Patient was very satisfied with the outcomes of the treatment.

* Professor, ** Professor & HOD, *** PG student, Dept of Conservative & Endodontics, VMSDC, Salem.


Preoperative photograph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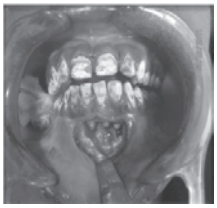
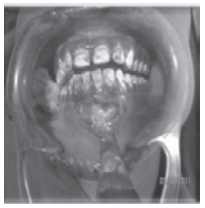

A crater shaped bony defect in relation to 31,41,42


PRP gel was mixed with graft particles to fill the defect


Sutures were removed after 2 weeks. The surgical site healed uneventfully.


Follow up IOPA

Discussion

PRP is, frequently used for bone tissue replacements such as bone augmentation/regeneration procedures. The first clinical dental results with PRP were reported by Marx et al.[1] Their data strongly suggested that adding PRP to bone grafts accelerated the rate and the degree of bone formation.[1] Platelets are very important in the wound healing process. They arrive quickly at the wound site and play an important role in coagulation. They release multiple wound-healing GFs and cytokines, including PDGF, TGFs/b1 and b2, vascular endothelial growth factor, platelet-derived endothelial cell growth factor, interleukin-1, basic fibroblast growth factor, and platelet activating factor-4.[2]

PDGF is chemotactic for polymorphonucleocytes, macrophages, fibroblasts and smooth muscle cells. PDGF also stimulates cell replication of important stem cells for fibroblasts and endothelial cells (increasing budding of new capillaries), stimulates production of fibronectin—a cell adhesion molecule used in cellular proliferation and migration during healing, including osteoconduction—and hyaluronic acid and helps bring about wound contraction and remodeling.

TGF-ß stimulates fibroblast chemotaxis and the production of collagen and fibronectin by cells, while inhibiting collagen degradation by decreasing proteases and increasing protease inhibitors, all of which favor fibrogenesis.[3,4]

IGF-I stimulates bone formation by proliferation and differentiation[5], and it is synthesized and secreted by osteoblasts.[6]

A stable clot is very important in wound healing process.[7] The PRP gel is a very stable and adhesive clot, which may have affected especially the soft tissue healing of the replanted tooth. Also the biological mediators of PRP might have, a positive effect on the healing process and the outcome of the treatment.

Advantages of PRP[8]

• Decreases the frequency of intraoperative and postoperative bleeding

• Facilitates more rapid soft tissue healing

• May promote rapid vascularization of the healing tissue by delivering growth factors

• Decreases the incidence of postoperative pain at the donor and receptor sites by facilitating a more rapid soft tissue healing and maturation rate

• Aids in the initial stability of the grafted tissue at the recipient sites (as a result of its cohesive and adhesive nature

• In combination with bone replacement materials, induces regeneration

• It is safe because it is an autologous preparation

• It contains a dense fibrin network that is highly osteoconductive

• It has hemostatic properties

• It is an affordable modality

Conclusion

Placement of PRP & bone grafts facilitates high concentrations of platelets in a bony wound.There will be increased local concentration of secreted growth factors which enhances the initial bone healing response. In addition the autologous adhesivePRP also stablises the graft material and facilitates healing.

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Old saying "Eye for an eye and a tooth for a tooth" Now "Tooth for an Eye" –MOOKP

* V. I. Paul, ** Tessa Paul

Abstract

Patients own canine tooth root is harvested along with the surrounding layer of bone and periosteum is used for the treatment. The tooth root with optic cylinder is then implanted to develop a layer of vascularised connective tissue. After four months, this implanted tissue is removed along with its blood vessels and is reimplanted in the centre of the damaged eye. The blood vessels wrap this structure and establish connections with the surrounding tissue. The dental lamina becomes the patient's new cornea and helps in vision.

Key Words: Modified Osteo Odonto Prosthesis, Cadaveric, Transplantation, Osteo odonto lamina, biological cover, mucosal graft, periosteum.

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Conditions such as chemical and thermal burns and allergic drug reactions can cause severe damage to the ocular surface of the eye, consisting of the cornea and conjunctival epithelium, due to the nonfunctioning of the tear film. In such situations, available techniques of corneal transplantation will not work very well, as the new cornea will be scarred once again by dryness. A special surgical technique, Osteo Odonto Kerato Prosthesis, (OOKP) which involves cementing a plastic optic cylinder onto a tooth implanted in the patient's eye, is the best solution to patients rendered blind by dryness of the surface of the eye.

The OOKP originated in Italy. . This procedure is done in two stages. In the first phase, a tooth is removed from the patient and fashioned into a lamina. A hole is drilled into its centre and a plastic optical cylinder is fixed with the help of dental cement. This composite graft is then placed in the tissues of the patient's cheek for about four months allowing it to develop a covering rich in blood vessels.

During the second stage of the procedure, the tooth was removed and placed in the patient's eye, with the optical cylinder fixed in the central damaged corneal tissue. This complex is protected by a mucous membrane flap from the cheek allowing clear vision for the patient.

The procedure has a success rate of 80 % according to Dr. Falcinelli, an Italian Ophthalmic surgeon, who has been implementing the OOKP procedure over the last 30 years.

Another case has been reported from England in which the same procedure has been done. But the above said procedure was completed in a single stage. A piece from the root of a tooth was used to reinforce the damaged optical tube. Tissue from the cheek was used to create a new surface for the damaged cornea, and a tooth and a piece of jaw bone were used to create a rectangular plate to sit behind the eye.

Cadaveric corneal transplantation is generally successful for reversing corneal blindness. There are, however, some patients who are not amenable to such transplantation. They typically have severely dry eyes and the only procedure that may work is kerto prosthesis. Strampelli described the original technique of osteo-odonto-kerato prosthesis [OOKP] surgery nearly 40 years ago, using the

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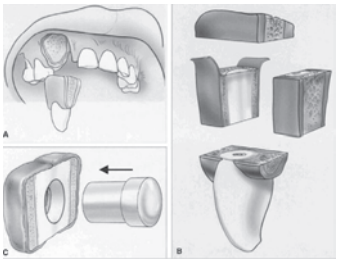
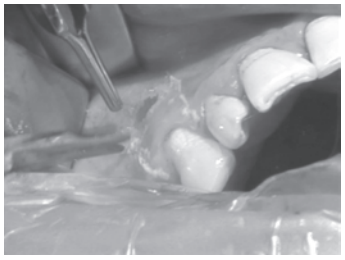
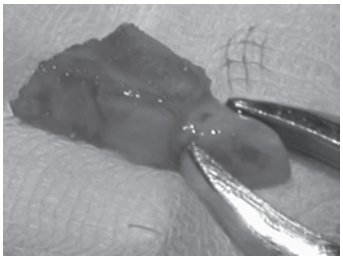


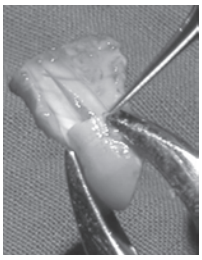
Modified osteo odonto keratoprosthesis



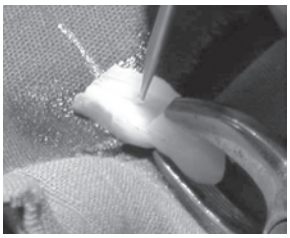
Dental lamina-preparartion



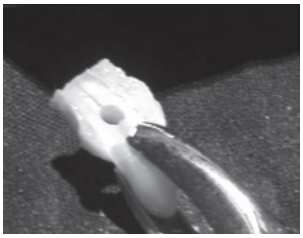
A canine tooth with alveolar bone is harvested from the mouth using surgical motorized saw



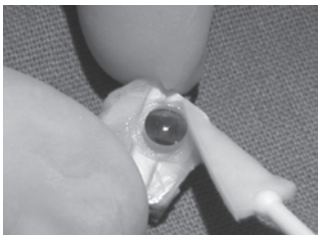
The pulp in the root canal is scraped off and a hole is drilled in the widest part of the root



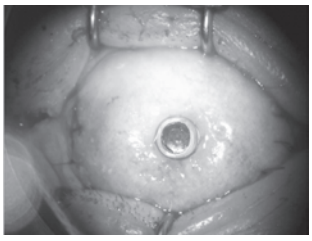
Drilling the dental lamina for the lens



Drilled hole to place lens



Appearance of lamina with lens



Final appearance of the eye

patient's own tooth root and alveolar bone as vital support to an optical cylinder. Earlier British followers of his technique reported poor retention results. Dr. Falcinelli modified the technique in a stepwise fashion[1].

MOOKP Procedure

Modified Osteo Odonto Kerato Prosthesis surgery is performed usually in two stages spaced two to four months apart. The gap allows soft tissue to grow around the osteo-odonto lamina and for ocular surface reconstruction with buccal mucous membrane grafting to become vascularised.

Each stage takes approximately six hours and special anesthetic precautions are necessary. Prior to OOKP surgery, it is important to treat pre-existing glaucoma by cyclodestruction. Fornix reconstruction, where necessary, can be carried out before hand or at the time of stage I procedure.

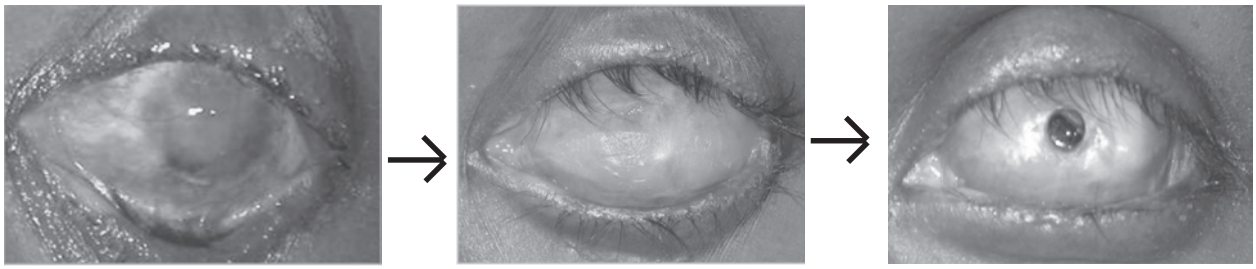
Stage I

Stage I involves ocular surface reconstruction and fashioning of an osteo-odonto lamina and its optical cylinder. A large circular piece of buccal mucosa is harvested from cheek. The graft is trimmed of excess fat and soaked in cefuroxime solution. A lateral canthotomy is performed, followed by division of symblephara and superficial keratectomy. The buccal mucous membrane graft is sutured to sclera bounded by insertion of the rectus muscles to create a new ocular surface. The crown of the harvested tooth is used as a handle; whilst the attached tooth root and surrounding bone is worked in to a lamina with dentine on one side and bone on the other. Periosteum is conserved and where possible glued back the fibrinogen adhesive. A hole is drilled through the dentine to accommodate a PMMA optical cylinder, which is cemented in place. The resultant osteo-odonto lamina is placed into a sub-muscular pocket under orbicularis oculi, usually in the lower lid of the fellow eye; in order to acquire a soft tissue covering.

Stage II

This stage starts with retrieval of the osteo-odonto lamina from its sub-muscular pocket and excess soft tissues removed from the bone surface. On the dentine surface, no soft tissue is allowed to remain. The lamina is reinserted into its pocket until the eye is ready to receive it. The buccal mucosal graft is reflected to allow access to the cornea. A Flieringa ring is sutured in place. The centre of the cornea is marked, and a small hole is trephined, the diameter of which corresponds to that of posterior part of the optical cylinder. Relieving incisions are made and total iridodialysis, lens extraction and anterior vitrectomy are performed. The posterior part of the lamina is inserted through the central corneal hole and the lamina is sutured onto the cornea and sclera. The eye is re-inflated with filtered air. The

WHY MOOKP?



Uses the patient's own tooth root and alveolar bone to support an optical cylinder covered by the buccal mucous membrane, a biological cover.

mucosal flap is replaced after cutting a hole to allow the protrusion of the anterior part of the optical cylinder.

Case report

Patient aged 45 yrs with a chemical burn on both eyes came to the op requesting for radiographic evaluation of all the teeth, especially all the canines. On the same day we received an e-mail of an Ophthalmologist from Italy requesting the same. This patient with a history of chemical burn of both his eyes when he tried to close the valve during an emergency situation, if otherwise cause loss of many lives near the Chemical Plant. He had a severe chemical burn of both cornea and conjunctiva in that hazard.

OPG and intra oral peri apical x-rays of 13, 23, 33&43 were taken and evaluation for its alveolar bone support and periodontium were send to the ophthalmologist. Out of our curiosity we enquired to the doctor about the details of treatment. They send the photographs and details about the surgical procedure. The patient's right lower canine was harvested along with its surrounding bone and periosteum. After the procedure the patient was rehabilitated with metal ceramic fixed partial denture.

Patients own canine tooth root is harvested along with the surrounding layer of bone and periosteum is used for the treatment. The tooth root with optic cylinder then implanted to develop a layer of vascularised connective tissue. This implanted tissue is removed after four months with the blood vessels and then implanted in the centre of the damaged tissue. The blood vessels wrap this structure and establish connections with the surrounding tissue. The tooth becomes the patient's new cornea and helps vision.

In this case surgical part was done by Dr. Falcinelli himself at Italy. We prepared fixed partial denture for the patient at the area of extracted tooth.

Conclusion

This procedure OOKP has stood the test of time in terms of long term results and complications. Despite the fact that it is a time consuming and demanding procedure, the long term results have been satisfying and worth the effort in terms of helping these otherwise hopeless corneal blind patients in returning back to an almost normal life.

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Correction of localized marginal tissue recession by laterally positioned flap

* Roshni Ramesh, ** Arun Sadasivan

Abstract

Gingival recession (marginal tissue recession) is an intriguing and complex phenomenon. It frequently disturbs patients because of sensitivity and aesthetics. Many surgical techniques have been introduced to treat gingival recession, which may be broadly classified as pedicle soft tissue graft procedures and free soft tissue graft procedures.

One of the standard techniques of pedicle graft procedure is the lateral sliding flap. This technique was introduced by Grupe and Warren in 1956. The technique is indicated in areas where there is gingival recession that is narrow, adjacent to which a wide band of attached gingiva exists which can be used as the donor site.

This article reports a few cases of isolated marginal tissue recession treated by laterally displaced flap technique. The advantages and disadvantages of the technique are also discussed.

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Introduction

Gingival recession (marginal tissue recession) can be defined as the displacement of the gingival margin apically from the cementoenamel junction (CEJ), or from the former location of the CEJ where restorations have distorted the location or appearance of the CEJ. Recession can be localized or generalized, and be associated with one or more surfaces.[1]

Many people exhibit gingival recession without any awareness of the condition and without symptoms. However, patients are often anxious about recession for one or several reasons, including fear of tooth loss, dentinal hypersensitivity or poor esthetics. Because many possible contributing factors interact to cause gingival recession, it is difficult to predict whether further changes in gingival recession may occur at a given site.

Recession increases with age and studies show a substantial increase for each decade of life.[2-5] Albander and Kingman[6] studied the prevalence of gingival recession among subjects 30 to 90 years old and found that the prevalence of 1mm or more recession on persons 30 years and older was 58%, and increased with age. Untreated recession sites in patients not receiving regular dental care are more likely to progress than sites treated with a gingival augmentation procedure.[7] Since additional gingival recession increases attachment loss, appropriate treatment is indicated at progressing sites to prevent additional loss of periodontal tissues as well as to improve function and approximate a normal appearance.

Over the years, numerous surgical techniques have been introduced to correct labial gingival recession defects. Aesthetic concerns are usually the reason to perform these procedures. The techniques to treat gingival recession may be broadly classified as: *pedicle soft tissue graft procedures and free soft tissue graft procedures*. One of the standard techniques of the pedicle graft procedure is the lateral sliding flap (laterally positioned flap, laterally displaced flap). The main objective of this technique is to halt recession and to restore denuded areas cosmetically with attached gingiva.

Indications for lateral sliding flap

- To cover isolated denuded roots
- In areas with narrow, long gingival defects
- When there is adequate attached gingiva at donor site
- Periodontium of donor site healthy
- Minimal loss of bone at donor site

Contraindications

- Presence of deep inter proximal pockets
- Excessive root prominences

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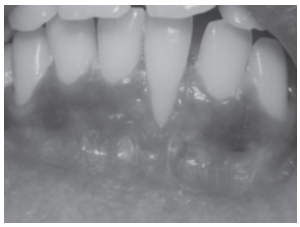
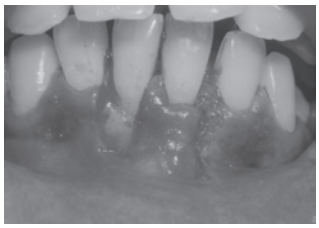

Case 1 a


Case 1 b


Case 1 c


Case 1d

- Deep or extensive root abrasion or erosion
- Significant loss of inter proximal bone height

Advantages

- One surgical site
- Good vascularity of the pedicle flap
- Ability to cover a denuded root surface
- Good colour match

Disadvantages

- Limited by the amount of adjacent keratinized attached gingiva
- Possibility of recession at the donor site
- Dehiscence or fenestration at the donor site
- Limited to one or two teeth with recession

Methods to prevent donor site recession

- Marginal tissue at donor site left intact
- Free gingival graft placed at donor site after lateral positioning
- Using an edentulous area as donor site

Basic procedure of laterally positioned flap[8]

The first step prior to the start of surgery is root planing to remove softened cementum and to reduce or eliminate prominent root convexity. For root biomodification, citric acid (pH1.0), tetracycline or EDTA (pH7.0) is burnished in with a moistened cotton pledget for 3-5 minutes.

Incision

A no.15 scalpel blade is used to make a V-shaped incision about the denuded root, removing the adjacent epithelium and connective tissue (Fig.1). The V-shaped incision is beveled out on the opposite side from the donor area, permitting overlap and increased vascularity for the donor tissue in this area (Fig.2).

Donor flap

The donor flap can be a full thickness or a partial thickness flap. It should be at least one and half times the size of the recipient area to be covered and 3-4 times longer than it is wide (Fig.3).

A vertical incision is made with a no.15 scalpel blade at the donor site, but it is not made down to bone. It is extended far enough apically into the mucosal tissue to permit adequate mobility of the flap. The base of the flap must be wide but not wider than the coronal portion, to permit adequate vascularity.

Pedicle flap

The pedicle flap is raised and reflected forward. The flap should be free enough to permit movement to the recipient site without tension. If tension is encountered, a cut-back or releasing incision is given (Fig.4). The pedicle flap is positioned coronally 1-2mm onto the enamel of the recipient tooth or to the maximum height that the interproximal tissue will allow. The concept that the maximum height for gaining root coverage is determined by the interproximal tissue height has been termed as the peak theory. Suturing is done with 4-0, 5-0, or 6-0 silk or gut suture. All sutures are interrupted except for a sling suture, which is used to pull the papillae interproximally and hold the tissue tightly against the neck of the tooth.

Common reasons for failure

1. Tension at the base of the distal incision.

This is easily corrected by using a releasing or cut back incision

2. Pedicle that is too narrow.

There is no correction for this, and failure is almost ensured. The basic rule is that the pedicle should be at least one and half times the size of the recipient bed.

3. Exposure of bone over the radicular surface.

This is a common fault of the full thickness flap. This permits bone loss, fenestration and/or dehiscence formation. Hence full thickness flaps are contraindicated in the presence of a thin periosteum

4. Poor stabilization of the flap.

Movement prevents intimate contact between the tooth and the flap and generally results in failure.

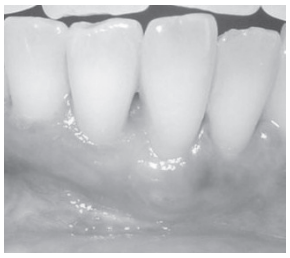
Case reports

CASE 1:

A 22year old female patient reported with complaint of receding gum in relation to lower front tooth. On examination, Miller's grade II recession was seen in relation to 31 (case1a). A full thickness flap was raised (case1b) and laterally positioned to cover the defect (case1c). The flap was sutured in place. (case 1d) shows the 2 weeks postoperative photograph.

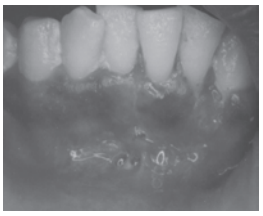
Case 2a

Case 2b



Case 2c

Case 3a



Case 3b

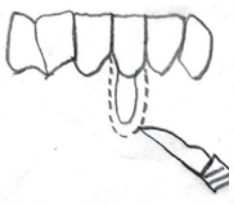


Fig. 1

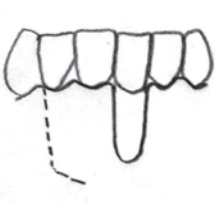


Fig. 2

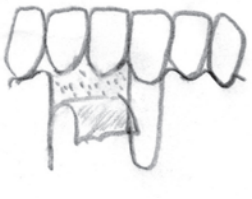


Fig. 3

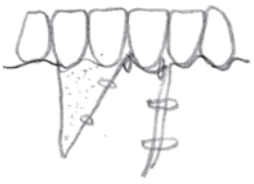


Fig. 4

CASE 2:

A 20 year old female patient presented with complaint of receding gum. On clinical examination, a Miller's grade I recession was noted in relation to 31 along with a shallow vestibule. Initial treatment done was vestibuloplasty (case 2a), followed by a laterally displaced flap (case 2b). (case 2c) shows the 3 months postoperative photograph.

CASE 3:

A 25 year old male patient reported with complaint of receding gum and sensitivity in relation to lower front tooth (case3a). A laterally positioned flap was done and (case3b) shows the 3 weeks postoperative photograph

Root coverage after lateral sliding flap

Coverage of the exposed root surface after the lateral sliding flap procedure has been reported to be 60%[9], and 72%[10] in two different studies. Histologic studies in dogs have reported 50% coverage.[11] Recent studies show a mean defect coverage ranging from 61% to 74% with a mean of 67%.[12]

Conclusion

Root coverage using the laterally positioned flap technique presents many potential benefits to patients with localized recession defects.[13] By using the tissue adjacent to the recession defect, the lateral sliding flap allows for correction of the defect without the discomfort encountered during other grafting techniques associated with palatal donor sites. This procedure is a time efficient, less invasive and highly esthetic treatment option for managing isolated recession defects.

References

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