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Cover images depict the various treatment modalities and the research work being routinely carried out by all the departments at Terna Dental College & Hospital.

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EDITORIAL

Foreword

"Embracing a spirit of multidisciplinary approach"

Huge strides forward in the field of modern dentistry have thrust the spotlight onto specialized and personalized patient care. Currently, the dental treatment employs knowledge from various disciplines for the benefit of the patient. It ensures multi-level care as well as team approach with equal involvement of various specialties. This unified team approach guarantees appropriate treatment strategies and expertise. Not only this, the treatment planning also becomes streamlined and simplifies the process of referrals. Let us embrace this spirit of multidisciplinary approach to provide the best possible patient care at every step of the treatment process. Let us make comprehensive treatment plans that solve patient's problems and meet his expectations, subsequently leading to consistent long-term results. Thus the journal is an attempt to culminate this multidisciplinary approach in order to facilitate systematic exchange of knowledge for the overall benefit of the patient and for the society at large.

Dr. Shishir Singh
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CBCT - seeing beyond the conventional in pediatric dentistry

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Abstract

CBCT, the three-dimensional imaging technology with its recent advances holds a significant importance in pediatric dentistry. In pediatric patients, the major advantages are: lesser scan time and decreased amount of radiation exposure. The discomfort experienced with intraoral film placement is avoided, thereby decreasing the child's anxiety.

CBCT provides more accurate assessment of anatomical structures making it useful in visualization of development of teeth, diagnosis of caries, impacted or supernumerary teeth, root resorption, root fractures, cleft lip and palate. CBCT done for diagnosis of supernumerary teeth yields accurate information about the location, orientation, sagittal position, root resorption and aberrations associated with neighboring anatomic structures. The decrease in clarity due to superimposition of structures in 2-D methods is avoided. Thus, CBCT can be a valuable diagnostic tool that helps enhancing treatment modalities. **(Terna J Dent Sci 2019;5(1):5-8)**

Key words: CBCT, supernumerary teeth

Introduction

Cone-beam computed tomography (CBCT) was introduced into dentistry by Arai et al in Japan in 1999.[1] CBCT provides high-quality three-dimensional (3D) images of the maxillofacial region as well as the dental and craniofacial anatomy. It is frequently done before orthodontic treatment, maxillofacial surgery, dental implants placement, evaluation of benign and malignant tumours, bone diseases or other pathological conditions.[2]

CBCT images have been used in children for airway analysis, periodontal and endodontic purposes, anchoring device treatment and maxillofacial morphology in orthodontics, diagnosis of root resorption, fractures and for the evaluation of impacted and supernumerary teeth.[2]

The term supernumerary tooth is defined as the presence of tooth or tooth-like structure in a number greater than normal in primary or permanent dentition. Supernumerary teeth are more often found in the maxillary anterior region than in any other area of either dental arches. Unless supernumerary teeth are diagnosed early and managed properly, they may exert a variety of pathological effects on the developing permanent dentition. It has been reported that if a significant delay or ectopic or asymmetric eruption of the maxillary permanent incisors is observed clinically, the presence of mesiodens should be suspected.[3]

Radiographic examinations are used to evaluate the number, location, path and sagittal position of the impacted supernumerary tooth.[4] Two dimensional techniques such as panoramic and periapical radiography may be inadequate to determine the exact localization of supernumerary teeth and their relations with neighboring structures. Therefore, multiplanar visualization assists practitioner to decide appropriate treatment plan. Recently CBCT has been used extensively to detect impacted and supernumerary teeth. The purpose of this article is to review various applications of CBCT in pediatric dentistry with insight into the assessment and the uses of CBCT in the management of supernumerary teeth.[4]

Conflict of interest and source of funding

The authors declare that there is no conflict of interest concerning the contents of the study.

This study has been self-supported by the authors.

Fundamental principles of CBCT imaging

There are two main components to CBCT imaging namely, image production and image display.

Image production: CBCT imaging is performed using a rotating platform or gantry to which an X-ray source and

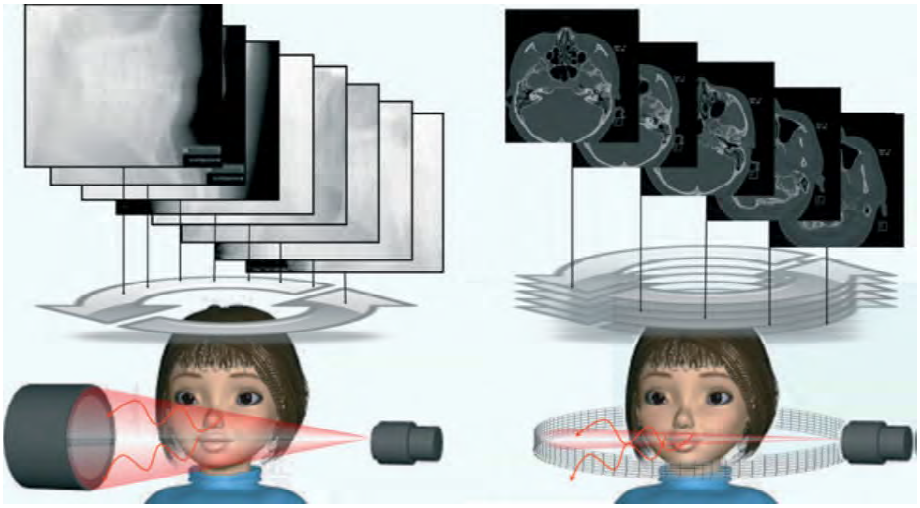

Fig 1: CBCT Image production

detector are fixed. The x-ray source emits a cone-shaped beam of ionizing radiation that passes through the center of the scan region of interest (ROI) in the patient's head and the attenuated radiation is projected onto an area X-ray detector on the opposite side. During the rotation, multiple sequential planar projection images are acquired.[5] *(Fig 1)*

Software programs incorporating sophisticated algorithms are applied to the image data to generate a 3D volumetric data set, which can be used to provide primary reconstruction images in 3 orthogonal planes (axial, sagittal and coronal).[6] The most widely used filtered back projection algorithm for cone beam acquired volumetric data is the Feldkamp (FDK) algorithm.[7] CBCT allows the creation in "real time" of images not only in the axial plane but also 2-D images in the coronal, sagittal and even oblique or curved image planes - a process referred to as multiplanar reformation (MPR). In addition, CBCT data are amenable to reformation in a volume, rather than a slice, providing 3-D information.[8]

Applications in Pediatric Dentistry

• *Development of teeth*

CBCT helps evaluate eruption patterns of teeth along with any anomalies in number or shape.[9] Thus CBCT aids clinicians to plan eruption guidance and serial extraction required for that individual patient.

• *Diagnosis of impacted/supernumerary teeth*

CBCT imaging is used broadly for diagnosing impacted teeth in pediatric patients. Maxillary canines are the most frequent teeth to get impacted. Tooth impaction may often be seen in presence of supernumerary teeth such as mesiodens.[10]

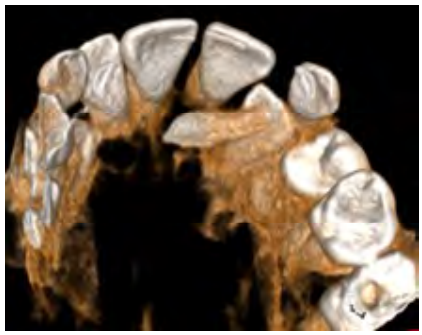

Fig 2: CBCT 3D view

• *Diagnosis of temporomandibular (TMJ) disorders*

The application of CBCT in TMJ imaging is very substantial in evaluating hard tissue or bony changes of the joint. Pathologic changes, such as fractures, ankylosis, dislocation and growth abnormalities such as condylar hyperplasia are viewed very well on CBCT imaging.[10]

• *Diagnosis of root resorption and root fractures*

CBCT assists in determining the exact site of resorption and this is particularly useful when resorption is occurring on the lingual or facial side of the tooth. CBCT provides a superior view with finer details.

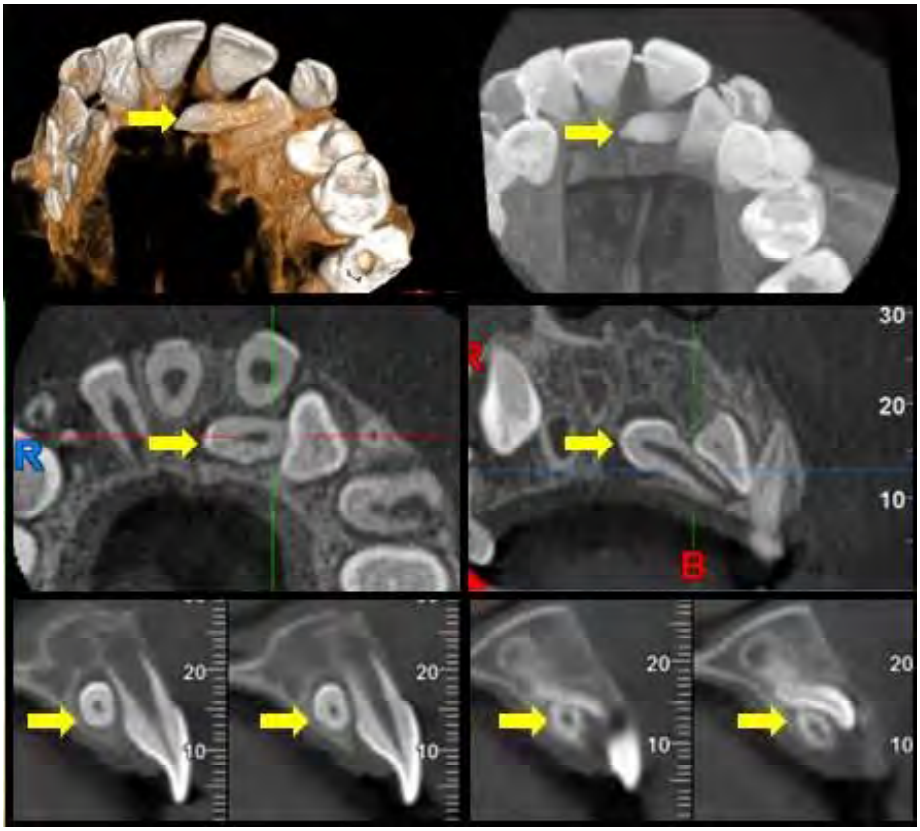

Fig 3: Axial and sagittal views of CBCT

Another advantage is that it can be acquired easily in trauma cases when periapical radiographs are difficult due to swelling, bleeding and discomfort experienced by patients. The ability to view the fracture of a single tooth in three planes of space makes treatment planning much easier.[11]

- *Craniofacial morphology*

Most commonly used diagnostic imaging for craniofacial morphology are lateral cephalograms. However, CBCT gives better image clarity as extraneous superimposing structures can be removed. In addition, unilateral posterior crossbites can be detected more specifically. A determination of an asymmetric maxilla or mandible can be accomplished more simply by viewing and measuring the bones in 3D.[11]

- *Orthodontic temporary anchorage device (Mini implants) placement*

Thorough knowledge of root positioning can greatly enhance the opportunity for proper placement and success of Temporary anchorage device or mini implants in children requiring orthodontic treatment. CBCT data can be used to construct placement guides for positioning mini-implants between the roots of adjacent teeth in anatomically difficult sites.[13] CBCT images give accurate assessment of the volume of bone present at the proposed location.[12]

- *Cleft lip and palate*

CBCT can detect the exact anatomic relationships of the osseous defect and bone thickness around the existing teeth in proximity to the cleft or clefts. This is not possible with 2D imaging modalities. Thus, it provides more accuracy and ease in graft placement and other surgical procedures.[12]

- *Airway analysis*

Airway analysis is of great importance in understanding complex conditions such as obstructive sleep apnea and enlarged adenoids. Conventionally, lateral cephalograms were used to analyze the airway of a patient but these were limited due to the fact that a flat projection is seen in a sagittal or coronal plane. CBCT is of utmost value in this regards as there is a clear distinction between the soft-tissue of the pharynx and the airway space. This allows for clear segmentation of the airway while doing volumetric analysis.[12]

- *Endodontic applications*

CBCT provides an enhanced view for analyzing the extent of periapical pathologies, canal morphology, root fractures, exact location of broken instruments in root canal, in locating missed canals, calcified canals and curvature of roots.[13] It has also been proven to be an effective tool in planning periapical microsurgery even in difficult accessible areas such as palatal roots of maxillary first molars.[14]

- *Diagnosis of hard tissue lesions of the oral cavity*

It can offer valuable information regarding cystic lesions and their extent, various bony pathologies such as tumors, fracture lines in case of traumatic injuries, condensing osteitis and focal apical osteopetrosis.

Use of CBCT in supernumerary teeth

Supernumerary teeth are often found in the maxillary anterior region of dental arch.[15] Unless supernumerary teeth are diagnosed early and managed properly, they may exert a range of pathological effects on the developing permanent dentition.[16] Supernumerary teeth may even remain asymptomatic. However, complications such as failure of eruption, displacement, root resorption and crowding of adjacent teeth, as well as cyst formation have been reported. Therefore, proper localization of the supernumerary teeth is very important for the diagnosis, treatment planning and operative removal. Traditionally supernumerary teeth were diagnosed and located using two-dimensional (2D) radiographic methods such as panoramic views, cephalometric, apical or occlusal radiographs.[17]

Using 2D radiographic imaging modalities, determining the precise 3D location of the tooth in relationship to neighboring structures and adjacent teeth was difficult. In order to overcome the limitations of 2D imaging, CBCT for 3D assessment and location of super-numerary teeth has been encouraged.[9]

The following analyses (qualitative) and measurements (quantitative; in mm) can be performed for supernumerary tooth using cbct :

1. Type and location of the supernumerary tooth: *(Fig 2)*
   (a) **Type:** the supernumerary teeth can be grouped into supernumerary mesiodens, lateral incisors, canines, premolars, paramolars or distomolars.
   (b) **Vertical:** depending upon location of the cusp tip of the supernumerary tooth in relation to the long axis of the closest erupted adjacent tooth.
   (c) **Bucco-oral:** location of the crown of the supernumerary tooth can be classified as labial/buccal, median/within arch, or oral (palatal/lingual).
2. Shape of the supernumerary tooth: classified into conical, tuberculate, supplemental, odontoma or developing tooth bud.[17]
3. Position (in relation to normal tooth eruption) of the supernumerary tooth: divided into normal, inclined, transverse, inverted or undefinable.
4. State of eruption of the supernumerary tooth.

5. Follicle size measurement can be performed (in millimeters) at the widest area of the follicle perpendicular to the crown of the impacted tooth.[18]

6. Root resorption of adjacent teeth and its location in relation to the long axis of the involved tooth. Resorption can be classified as the cervical, middle or apical third of the root or the tip of the root.[19]

7. The closest distance between the supernumerary tooth and the nearest adjacent tooth can be measured (in millimeters).[20] *(Fig 3)*

8. Presence of associated local aberrations such as inclusion or malposition of the adjacent permanent tooth.

9. For the mesiodens, the relationship of the supernumerary tooth to the cortex of the nasal floor, the nasopalatine canal and the labial cortical bone can be additionally evaluated.

Conclusion

Impacted supernumerary teeth are frequently in close proximity to the cortical bone. Although this facilitates surgical access, there is a risk of damaging surrounding anatomical structures. Therefore, CBCT evaluation of impacted supernumerary teeth for accurate case planning is suggested. The indications for the use of CBCT in paediatric dentistry must be justified on a patient case individual basis, where benefits must clearly outweigh the potential risks.

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Prosthodontic management of gag reflex: A review

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Abstract
The gag reflex is a complex physiologic phenomenon. The problem leads to compromising the quality of dental treatment and is a barrier to optimal patient care. The function of the reflex is protective in nature. However, when the reflex is abnormally active, the dentist may be presented with a bewildering and frustrating problem in various dental procedures, resulting in a strong potential for suboptimal treatment. The purpose of this article is to help a practitioner understand the basic aetiology, and management of gag reflex to aid his routine practice. **(Terna J Dent Sci 2019;5(1):9-14)**

Key words: Gagging, trigger zones, vomiting, reflex, management.

Introduction

Gag reflex is an involuntary defence mechanism to protect the pharynx and throat from foreign objects. Gagging is a common problem encountered during dental treatment, which makes therapeutic procedures distressing and often difficult or even impossible to perform.[1] The gag reflex prevents something entering the throat except as part of normal swallowing and helps prevent choking. Gagging is defined as "An involuntary contraction of the muscles of the of the palate or pharynx that results in retching".[2]

Etiology of gag reflex:[3]

Local and systemic disorders	Anatomic factors-	Psychological factors	Physiologic factors	Iatrogenic factors
• Nasal obstruction Nasal polyp Postnasal drip • Sinusitis Mucosal congestion of Upper respiratory tract • Dry mouth • Chronic Gastrointestinal disease Chronic gastritis peptic ulceration • Carcinoma of stomach • Hiatus hernia • Uncontrolled diabetes	• A long soft palate Sudden drop at the junction of hard and soft palate. An atonic and relaxed soft palate elicits gagging by allowing the uvula to contact the tongue and the soft palate to touch the posterior pharyngeal wall.	• Temporo mandibular pain dysfunction syndrome • Atypical facial pain • Denture intolerance • Burning mouth syndrome. • Stress	**Extraoral stimuli**: • Acoustic stimuli • Olfactory stimuli **Intraoral stimuli:** • Tactile stimuli	• Inadequate Posterior Palatal Seal - loose denture • Overloaded impression trays Unstable & poorly retained prosthesis- tingling sensation and gagging • Overextended border of prosthesis particularly in the posterior area of palate and retromylohyoid space, distolingual part of mandibular denture • Placing maxillary teeth too far in a palatal direction and mandibular teeth too far lingually, so that dorsum of the tongue is forced into pharynx during the act of swallowing.

Conflict of interest and source of funding
The authors declare that there is no conflict of interest concerning the contents of the study.
This study has been self-supported by the authors.

Prosthodontists and general dentists frequently serve patients who have such extreme oral sensitivity that they are unable to tolerate a foreign substance in the mouth. So, management, or rather

prevention of gag reflex is an extremely significant part of any dental treatment.

Management of the gag reflex:
The gag reflex can sometimes be psychologically driven. Hence, it is very important to know if the patient is a true gagger or pseudo gagger to initiate appropriate treatment.

According a study by Hearing CM, Bind RH, Tabacco MJ and Hallock RM the following 10-question *Predictive Gagging Survey* was filled about gag-related experiences and behaviours.[4] A maxillary impression was made while the gagging response was quantified from 1 to 5 on the Fiske and Dickinson Gagging Intensity Index. A moderate positive correlation between the *Predictive Gagging Survey* and Fiske and Dickinson's Gagging Severity Index.[4]

Thus, it is possible to predict the gagging intensity and sensitivity of a patient and understand whether he/she needs only a psychological approach or a more specific treatment.

Techniques of managing gag reflex :
The various management options for patients with exaggerated gag reflex can be broadly classified into three types:

1) Assessment
2) Basic techniques
3) Specific treatment modalities[5]

Let us discuss these treatment categories in detail.

Assessment:
Assessing the cause and severity of the gag reflex can be done by:

1) A detailed history: To know how the previous treatment experience was, if the patient is willing/suitable for treatment, how motivate the patient is for the treatment etc.

Appendix A.[4]

Patient # ……
The gag reflex is a contraction of the muscles of the pharyngeal sphincter (upper oesophagus or throat). The gag reflex is a natural protective measure of the body to protect an airway from blocking and remove material from the throat and upper gastrointestinal tract (Fiske & Dickinson, 2001). Although the gag reflex typically serves this protective function, a strong gag reflex may impact daily life.

For the following questions, please use the scale of 1-7, in which 1 is the least severe and 7 is the most.

1. Do you have a gag reflex ? YES/NO
2. How strong would you say your gag reflex is? Please circle the corresponding number on the following scale.

   1 2 3 4 5 6 7
   Not strong at all……
   moderately strong……
   very strong
3. Have you ever had a negative incident with gagging ? YES/NO
4. Have you ever gagged at a dentist/ orthodontist office before ? YES/NO
5. Please circle any of the following experiences that have caused you to gag:
   Routing teeth-cleaning Root canal
   Cavity filling Dental impression
   Dental x-ray Other orthodontic work
   Other dental work
6. When you are going to the dentist, how much stress (if any) do you experience that is related to your gag reflex ? Please circle the corresponding number on the following scale.

   1 2 3 4 5 6 7
   none ……somewhat……
   ……much……a great deal
7. Have daily activities, like brushing or flossing your teeth, ever made you gag ? YES/NO

   How often are these occurrences?

   1 2 3 4 5 6 7
   never …… seldom ……
   …… sometimes …… often
8. Do you ever worry that daily activities other than brushing or flossing your teeth will cause you to gag ? YES/NO
9. Does coughing ever cause you to gag ? YES/NO
10. Have you ever gagged while trying to swallow pills ? YES/NO

Survey Scoring

1. yes = 1, no = 0
2. 1-2 = 0, 3-5 = 1, 6-7 = 2
3. yes = 1, no = 0
4. yes = 1, no = 0
5. 1 point for each item circled
6. 1-2 = 0, 3-5 = 1, 6-7 = 2
7. yes = 1, no = 0 / 1-2 = 0, 3-5 = 1, 6-7 = 2
8. yes = 1, no = 0
9. yes = 1, no = 0
10. yes = 1, no = 0

Hearing CM, Bind RH, Tabacco MJ, Hallock RM.
J Oral Maxillofac Res 2014 (Apr-Jun);5(2):e3. doi:10.5037/jomr.2014.5203

2) **Identifying the initiating event**: Gag reflex can be initiated by some events like chocking due to impression material or a panic attack due to difficulty in removing the prosthesis. It is important to identify these to prevent them in future.

3) **Ascertain the trigger zones to gagging**: Gag reflex can be initiated due to stimulation of the trigger zones by tactile sensations like IOPA radiographs, oral examinations, impressions, dentures or gustatory simulants like taste of impression material, olfactory sensations like smell of surgery or even auditory stimulants like sound of handpiece.

4) **Identifying associated clinical features**: like panic attacks, fainting, mood changes or other features associated with gagging. [6]

Basic Techniques: :

These include treatment that are generally used for all patients to prevent gagging while dental treatment. They are:

I. **Sympathetic approach**: The approach of the dentist towards the patient is of utmost significance especially while dealing with gag reflex. At no point should the patient feel neglected or looked down upon during the treatment.

II. **Positive attitude**: The patient's attitude towards the treatment depends a lot on the dentist's attitude and body language. An optimistic approach for the treatment will lead to success in most of the cases.

III. **Reassure the patient**: This is important for the psychological component of gag reflex. Simple words like "you are doing good" can boost up the patient.

IV. **Careful intraoral examination avoiding trigger zones**: The 5 trigger zones in the oral cavity are: Palatoglossal and palatopharyngeal folds, base of tongue, soft palate, uvula and the posterior pharyngeal wall. These areas should not be stimulated while oral examination.

V. **Obtain patient feedback and reassure consent**: At every step, it is important to obtain patient's feedback about his experience.

VI. **Deep and slow breathing from the nose.**

VII. **Explain and demonstrate stop signal**: The patient should be told to signal the dentist (by for example raising his hand) about discomfort so that he can stop the treatment.

Specific treatment modalities:

A) ***Behavioural Techniques***

i) **Relaxation:** Gag reflex may be a manifestation of an anxiety state. Relaxation techniques are helpful in reducing the gag reflex like ask the patient to tense and relax certain muscle groups, starting with legs and working upwards, while continually providing reassurance in calm atmosphere.[7]

ii) **Distraction:** These techniques are to divert the patient attention and to allow short dental procedures to be performed by engaging the patient in conversation, by asking the patient to breathe audibly through the nose and at the same time rhythmically tap the right foot on the floor, by instructing to patient to raise one leg and hold it in air.[7]

iii) **Suggestion/Hypnosis:** Done only if the patient agrees and if the clinician is well trained.[5]

iv) **Systematic desensitization:** The concept of this technique is, "Behaviour that has been learned by classic conditioning, can be unlearned by reversing the conditioning process". It consists of incremental exposure of the patient to the feared stimulus.[5] (Singer's Marble technique)

v) **Cognitive behavioral therapy (CBT):** This method invites patient's to challenge hard held beliefs. For example: A patient might feel that water from the hand piece will cause choking.[5]

vi) **Sensory flooding:** It relies on a rapid extinction of the link between the stimulus (for example a denture) and gagging. It is accomplished by encouraging the patient to retain the denture in the mouth for as long as possible with the reassurance that the aversive reactions encountered will diminish.[8]

B) ***Pharmacological Management:***

i) **Local anaesthesia (LA)**: The LA agents may be applied in the form of sprays, gels, lozenges, mouth rinses, or injection. But various authors have disapproved the use of local anaesthesia in the management of gag reflex as it may increase nausea and vomiting.[9]

ii) **Conscious sedation**: The use of conscious sedation with inhalational, oral, or intravenous agents may temporarily eliminate gagging during dental

treatment while maintaining reflexes that protect the patient's airway. Nitrous oxide alters the perception of external stimuli and it is suggested that this altered perception depresses the gag reflex.[10]

iii) **General anaesthesia:** For the minority of patients do not respond to any form of sedation or behavioural therapy, dental treatment under general anaesthesia may be appropriate as a last resort.[6]

C) ***Surgical Management:***
Persistent gagging results from an atonic and relaxed soft palate. In such cases, the uvula touches the tongue and the soft palate rests back on the pharyngeal wall. This produces a tendency to gagging and

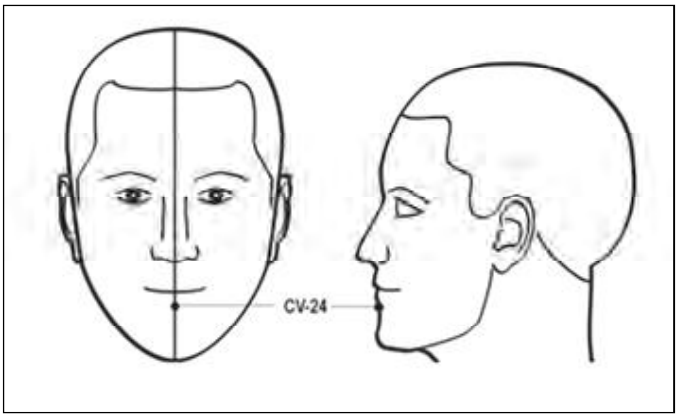

***Fig. 1(a)**: Acupressure point: Cheng jiang (CV – 24). Location: Labio-mental fold*

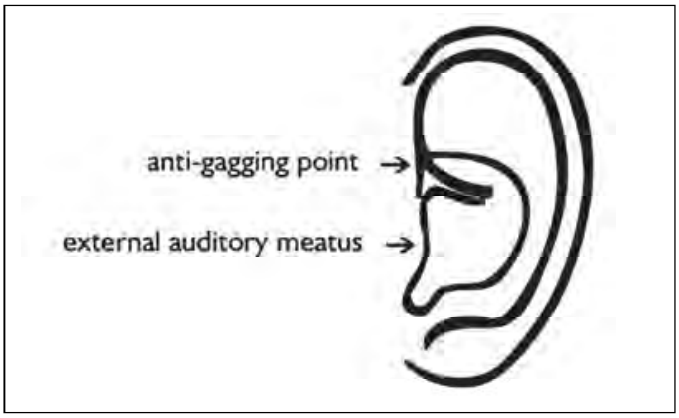

***Fig. 1(b)**: Acupressure point: Er – men (TB - 21). Location: Above tragus*

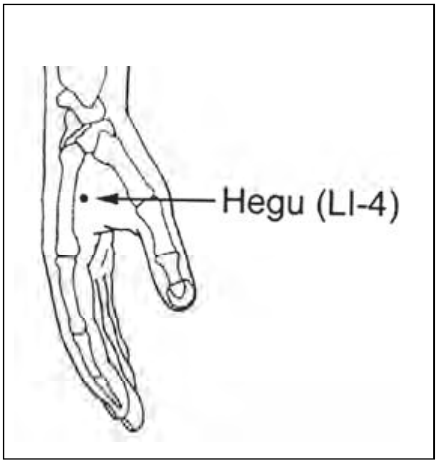

***Fig. 1(c)**: Acupressure point: Hegu (LI – 4). Location: Dorsum of hand between 1st and 2nd metacarpals*

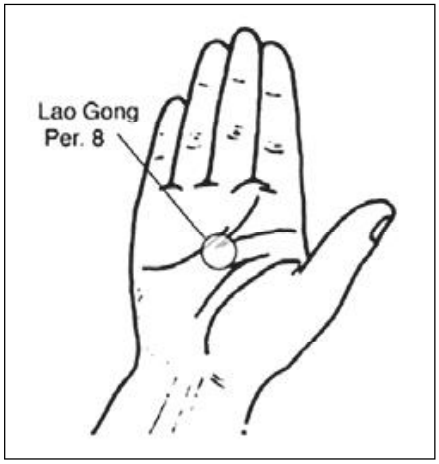

***Fig. 1(d)**: Acupressure point: Lao gong (P-8/ PC-8). Location: Centre of the ventrum of hand, between second and third metacarpals*

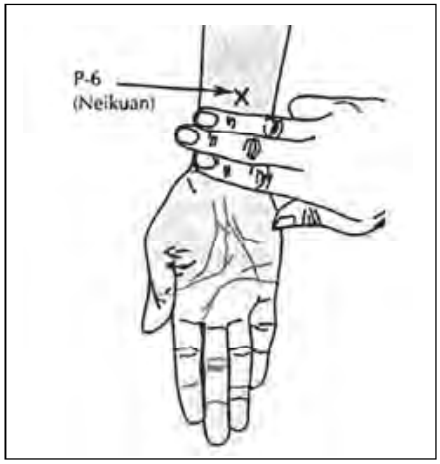

***Fig. 1(e)**: Acupressure point: Nei guan/ nei kuan (P-6/ PC-6). Location: Ventral surface of the wrist, 2 inches above the crease of the wrist*

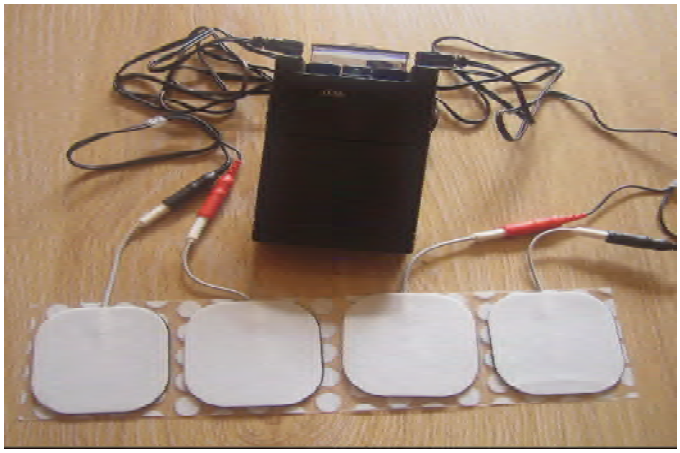

***Fig 2**: Transcutaneous electric nerve stimulation (TENS) device*

***Fig 3**: Palate-less denture*

nausea that often results in vomiting. To correct this situation, Leslie et al advocated an operation to shorten and tighten the soft palate on healing after the removal of the uvula.[11] This radical solution has not been widely accepted or used.

D) **Acupressure and Acupuncture:** Acupressure involves applying constant pressure to acupoints; this could be with thumb or finger pressure or devices such as travel sickness bands. *(Fig. 1)*[9]

Acupuncture is a system of medicine in which a fine needle is inserted through the skin to a depth of a few millimetres, left in place for a time, sometimes manipulated and then withdrawn. These methods are not widely used in dentistry on a routine basis.[11,12]

Transcutaneous Electric Nerve Stimulation (TENS) Device (Morrish 1997):
It's a preventive approach which uses electric current to stimulate the nerves for therapeutic purposes. It is suggested that the sensory stimulation of the cranial nerves of the superior laryngeal nerve branch, (Cr N, IX), pharyngeal branch of X, Cr. N. V, and Cr N. X.) would block the physiologic response of gagging and retching. *(Fig 2)*[9]

While making an alginate impression:

1. The patient should be seated in an upright position with the occlusal plane parallel with the floor.
2. When indicated, the maxillary tray should be modified using modelling plastic. A narrow band of unrelieved modelling plastic should be maintained at the posterior border of the impression area. This band of modelling plastic should prevent alginate from running posteriorly as the tray is inserted.
3. The patient should be directed to use an astringent mouthwash and cold-water rinse just before the impressions made. The use of an anaesthetic spray is usually contraindicated. Anaesthetic spray will cause numbness of the tongue and soft palate and may contribute to gagging.
4. The impression tray should not be overfilled with impression material.
5. The posterior portion of the impression tray should be seated first. Then, the anterior portion of the tray should be rotated into position. This permits excess impression material to be displaced in an anterior direction - away from the soft palate and airway.
6. The patient should be instructed to keep the eyes open during the impression procedure. This encourages the patient to focus upon the surroundings rather than the impression procedure. It may be helpful to have the patient focus on a small object.
7. The patient should be directed to breathe through the nose. The dentist should encourage slow, deep breaths.
8. All instructions should be given in a calm, firm manner.[13]

Palate-less denture or roofless denture:
The maxillary denture can be reduced to a U-shaped border situated approximately 10 mm from the dental arch.[14] It is very much comfortable to patients, because of the less palatal coverage, better heat, cold and taste perception.[14] These dentures tend to stimulate less trigger zones on the palate than the normal full coverage prosthesis and thus reduce the probability of gagging. *(Fig 3)*

Palate-less maxillary magnet retained over denture function on similar lines to prevent gag reflex however they are retained by magnetic forces.[15]

Conditioning Prosthesis:
A conditioning denture is an excellent device to control gagging. This prosthesis is similar to an orthodontic appliance (Hawley's) consists of alveolar palatal prosthesis fabricated in acrylic resin. Patient gradually adapts to the reduced taste sensations. This appliance must be worn for one week continuously and followed by interval of one week for the absolute adaptation.[14]

Controlled breathing method:
This method advocated by the National Child Birth Trust for use by women in labour in similar to that advocated by Morphy. All patients were instructed in controlled rhythmic breathing and told to practice it for one or two weeks before prosthetic treatment commenced.[11]

Other simple techniques:
Common table salt can minimize the reflex. Placed on the tongue or in liberal amounts on the palatal region of the denture, salt may help gagging patients tolerate complete dentures.[14] Modification Of Edentulous Maxillary Custom Tray to prevent gagging by attaching a disposable saliva ejector to the base plate wax in the midline of the tray. According to Jordan, finishing and polishing should give a matte finish to the denture.[14] While Krol suggested that inter occlusal space should never be inadequate in patients with hyper active gag.[16]

Conclusion
Gagging although a protective mechanism, hyperactive gag is always an obstacle for us dentists. There is never a single etiologic factor in gagging patients. Assessing the severity and etiology is extremely important while deciding the management. Amongst the various methods to manage gag

behavioural therapy is the most commonly used for mild to moderate gaggers. Usually a combination therapy is most successful.

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Restoring smiles, the smart way

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Abstract
Over the past three decades, dentistry is seeing a shift from reactive treatment of dental disease to a preventive and aesthetic model with bioactive technologies. Bioactive materials are "smart," moisture-friendly and dynamic. By responding to ambient conditions in the mouth, these materials knit the restoration and tooth together. These materials remineralize dentin, maintain long-term bonded restorations, guard against recurrent caries and prevent the staining associated with microleakage and failure.

ACTIVA KIDS is the first dental resin with a bioactive ionic resin matrix, shock-absorbing rubberized resin component and reactive ionomer glass fillers that mimic the physical and chemical properties of natural teeth. It is a two-part, light and self-cure material, available in an opaque, light B shade suited for pediatric dentistry. This paper highlights one of the currently available "smart materials" in pediatric dentistry which may over the course of years help us move towards a new era of aesthetic bio-smart dentistry.

Terna J Dent Sci 2019;5(1):15-18)

Key words: Bioactive material, primary teeth, anterior teeth, aesthetics, ACTIVA™ KIDS, anterior restoration

Introduction

Early childhood caries (ECC) is one of the most prevalent diseases in children worldwide.[1] By definition, early childhood caries is the presence of one or more decayed, missing or filled tooth surfaces in any primary tooth in a child 71 months of age or younger. It mainly affects the primary maxillary incisors followed by maxillary and mandibular first molars and mandibular cuspids.[2] The early loss of primary teeth may result in reduced masticatory efficiency, loss of vertical dimension and development of parafunctional habits. Esthetic-functional problems such as malocclusion and space loss, and psychologic problems that can interfere in the personality and behavioral development of the child.[3] Dentofacial aesthetics is an important determinant of overall physical esthetics. From the standpoint of child psychology, a healthy smile is conducive in building up interpersonal relationships and self-esteem.[4]

ACTIVA™ KIDS was reported by the manufacturer, Pulpdent, to be the first bioactive dental material with an ionic resin matrix, shock-absorbing resin component, and bioactive glass fillers that display similar chemical and physical properties to natural teeth.[5] They are durable, wear and fracture resistant. ACTIVA™ KIDS chemically bonds to teeth and seal against bacterial microleakage. It also releases and recharges with calcium, phosphate, and more fluoride ions as compared to glass ionomer cement. In addition, ACTIVA™ KIDS contains no bisphenol A (BPA), bisphenol A glycidyl methacrylate (bis-GMA), or BPA derivatives.[6] This case report describes esthetic restoration of primary anterior teeth using bioactive material - ACTIVA™ KIDS in a 4½ year old female patient.

Case Report

A healthy 4 1/2 year old girl child reported to Department of Paedodontics and Preventive Dentistry, Terna Dental College with the chief complaint of decayed upper front teeth. Intra oral examination in relation to the area of chief complaint revealed smooth surface caries with respect to 51, 52, 61 and 62 (*Fig 1*). Radiographic examination using intraoral periapical radiograph of 51, 52, 61 and 62 showed no pulpal involvement and there were no pathologic findings in the surrounding area.

Local anesthesia was achieved by infiltration of 2% lignocaine with 1:80,000 adrenaline (Lignox 2%) and rubber dam isolation was carried out (*Fig 2*). Caries debridement was performed using a slow-speed round bur (*Fig 3*). After complete caries excavation, the prepared surface was etched with 37% phosphoric acid for 20 seconds, followed by rinsing with water (*Fig 4*). The surface was later air dried. ACTIVA™ KIDS was applied slowly, from the bottom of the preparation to

Conflict of interest and source of funding
The authors declare that there is no conflict of interest concerning the contents of the study.
This study has been self-supported by the authors.

Fig 1: *Pre-operative photograph*

Fig 2: *Rubber dam isolation*

Fig 3: *Caries excavation*

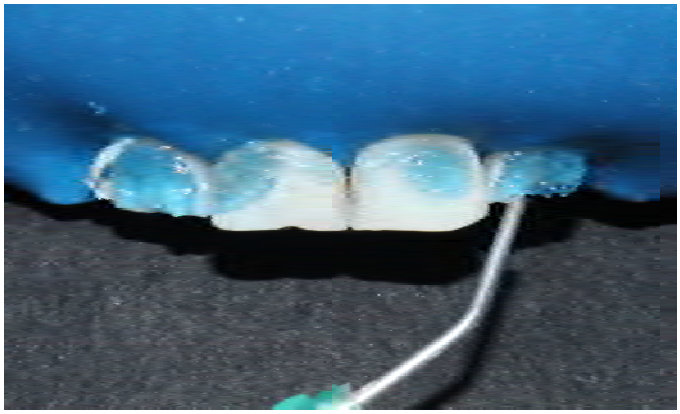

Fig 4: *Etching with 37% phosphoric acid*

Fig 5: *Application of activa kids-restorative*

Fig 6: *Curing for 20 seconds*

Fig 7: *Finishing and polishing*

Fig 8: *Post-operative photograph*

Fig 9: *6 months follow-up*

the top, taking great care to cover every surface with the cement while avoiding air incorporation (*Fig 5*). The proximal surfaces were contoured using matrix with wedges. After a delay of 20 seconds to allow for the acid component to react with the tooth surface, it was light cured for 20 seconds (*Fig 6*). The restoration was then finished and polished using Shofu's Super Snap kit (*Fig 7,8*). After a follow up period of six months, the teeth showed no detectable wear, all margins were clinically sound, and no fracture lines could be detected in the filling material or associated enamel margins (*Fig 9*).

Discussion

ACTIVA™ KIDS is an esthetic, bioactive resin restorative material that stimulates apatite formation and the natural remineralization process with discharge and recharge of calcium, phosphate and fluoride. It is an opaque white shade ideally suited for pediatric dentistry. ACTIVA is the first bioactive restorative with an ionic resin matrix, a shock-absorbing resin component, and bioactive fillers that mimic the physical and chemical properties of natural teeth.[7]

It is a two-part, light- and self-cure material loaded in double-barrel automix syringes. It eliminates safety concerns for children and does not contain bisphenol A (BPA) and its derivatives. ACTIVA™ KIDS delivers all the benefits of glass ionomers and has the esthetics, strength and durability of composites.[8]

Various studies have been conducted on ACTIVA restorative material over the past several years.[9] In summary, those test results show that ACTIVA has physical characteristics closely resembling the strengths and wear resistance of composites. Physical properties for ACTIVA listed by the manufacturer are shown in Table below.

Physical properties	ACTIVA™ KIDS
Light-cure setting time	20 sec
Depth of light-cure	4 mm
Self-cure setting time at 37°C	2 min
% filler by weight	56%
% reactive glass by weight	21.8%
Fluoride release, 1 day	230 ppm
Fluoride release, 28 days (cumulative)	940 ppm
Flexural strength	102 MPa/14,790 psi
Flexural modulus	4.3 GPa
Compressive strength	280 MPa/40,600 psi
Diametral tensile strength	42 MPa/6,090 psi
Water sorption, 1 week	1.65%
polymerization shrinkage	1.7%

A study conducted by Theodore P Croll using ACTIVA-RESTORATIVE, observed that the material handles like most injectable resin-based composites. Also, no bonding agent was needed while repairing primary teeth. Although in most cavity preparations, mechanical undercutting augments retention achieved with adhesive bonding. He also stated that the chemical cure of the ACTIVA products was reassuring to the dentist, if in some cases the light-beam penetration is not ideal. In such cases the material hardening is completed by chemical curing reaction and the acid/base neutralization hardening reaction of the glass ionomer components.[6]

Two common pediatric restorative techniques are interim therapeutic restorations (ITR) and atraumatic restorative technique (ART). Although the techniques of these procedures are similar, their therapeutic goals are quite different. ITR is primarily for patients who are very young and uncooperative, or who require special care. ITR is also used for caries control (prior to restoration) in children with multiple open carious lesions. The purpose of ART is to restore and prevent caries specifically in populations with little access to dental care.[5]

A case report by Ewoldsen described a modified ART technique using ACTIVA in the management of caries. The author

concluded that the bioactive materials exceed the service of the previously classified interim or temporary materials owing to their ionic properties and remineralization potential. Thus, these materials provide long-term therapeutic restorations with aesthetics and durability comparable to composite restoratives which are technique sensitive.[10]

ACTIVA™ KIDS has an unparalleled combination of physical and chemical properties which delivers bioactivity, toughness, resilience, durability and marginal integrity. The other key properties include:[11]

- Provides natural esthetics as it is highly polishable
- Resists fracture, wear, chipping and crumbling
- Moisture tolerant, thus making it a pediatric dentistry friendly material
- Automix syringe allows unique precise placement of material
- No bonding agents required when retention form is adequate
- Ideal for bulk filling
- Light cure and self-cure

Conclusion

ACTIVA is a moisture-friendly, flowable material applied directly from the syringe using an injection technique. Because of its low surface tension and intimate adaption to tooth structure, ACTIVA penetrates and flows into every nook, which is unusual for a resin-based material. We can now quickly deliver esthetic restorative solutions with materials that have a great affinity for tooth structure, provide the ionic exchange and full benefits of bioactivity and rival the physical properties of composites on the market today.

The judicious use of Activa may offer certain clinical advantages in restorative procedures, although further evidence is needed to substantiate any benefits in these indications. The mechanisms of adhesion, integration, and sealing of dentin for these new bioactive materials are still not proven and require more research before we can fully understand and prove whether bioactive materials are able to restore the form and function of the natural tooth.

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Odontome - A Case Report

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Abstract
Odontomes are the most common odontogenic hamartomas worldwide. Depending on the level of organisation of the tissues inside, these can be differentiated into compound type or complex type. As these are asymptomatic and do not cause any changes in the bone, they are often diagnosed during the routine dental examination. Complex odontomas are commonly found to occur in posterior mandible while compound odontomas are found in the anterior maxilla. Early detection of these tumours is essential to avoid lengthy corrective treatments. **(Terna J Dent Sci 2019;5(1):19-21)**

Keywords: Odontome, compound odontome, odontogenic tumour, impacted tooth

Introduction

Odontomes were first described by Paul Brocain in 1867. He used the term odontome for all odontogenic tumours; however, currently, the usage of the term has become much more restricted.[1] Odontomes are now considered as hamartomatous odontogenic lesions as they comprise of both epithelial and ectomesenchymal components, having morphologically normal cells with defective structural organisation.[2] Odontomes are included in the WHO classification of head and neck tumours as a group of lesions affecting the odontogenic epithelium with odontogenic ectomesenchyme, with or without hard tissue formation.[3] These hamartomas have been described as either complex type or compound type. In complex odontome, the enamel, dentin and cementum are present in a disorganised manner, whereas in compound odontome, varied numbers of tooth-like elements are present.[3]

Conflict of interest and source of funding
The authors declare that there is no conflict of interest concerning the contents of the study. This study has been self-supported by the authors.

Odontomes are characterised by slow and painless growth and may be associated with retention of primary tooth or delay in the eruption of primary and permanent teeth.[4] Several factors have been associated with the pathogenesis of odontomes. These are trauma in the primary dentition period, hereditary anomalies like Gardner's syndrome, hyperactivity of odontoblasts or changes in the genetic components responsible for dental development.[5]

While posterior mandible and anterior maxilla have been reported to be the most common location for complex odontome, compound odontomes are mostly found in the anterior maxilla.[6] This case report presents an unusual case of compound odontome in the anterior mandible of a 27 yr old female.

Case Report

A 27 yr old female patient reported to the department with the chief complaint of pain and mobility of teeth in mandibular anterior region since 15-20 days. The patient reported occasional episodes of diffuse pain and discomfort in left mandibular anterior region. It was found that left mandibular canine was missing.

The extra oral examination did not show any facial asymmetry. Orthopantomogram and intra-oral X-rays revealed multiple radiopaque tooth like structures close to the apex of 32 with the impacted canine at the lower border of mandible *(Fig. 1)*. To better characterize the formation, a computerized tomography

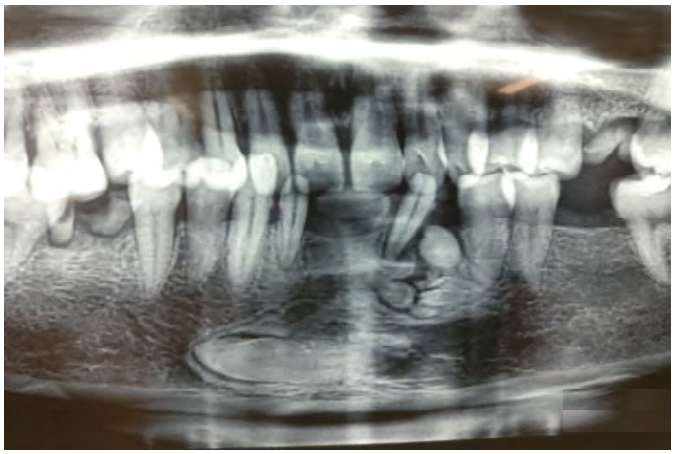

Fig. 1: *Radiograph*

Fig. 2: *Incision*

Fig. 3: *Exposure of the tooth like structures*

Fig. 4: *Bony cavity after the mass removal*

scan was advised which revealed the bony integrity around the lesion to be clear as well as integrity of the neuro-vascular structures of the region.

The enucleation procedure was carried out under local anaesthesia. Perioral structures were prepared with betadine, and a rectangular mucoperiosteal flap was raised in the region from right mandibular lateral incisor to left first premolar to expose the bone *(Fig 2)*. A window was made in the bone close to the apex of 72 using a straight slow-speed handpiece bearing a round tungsten carbide bur under normal saline irrigation. Denticles were exposed, and a total of seven denticles of various sizes and shapes were removed along with the follicle *(Fig 3,4,5)*. Extraction of 72 was done and thorough irrigation of the enucleated site was done. The flap was repositioned and sutured with 3-0 Vicryl.

Discussion

In the literature, the incidence of odontomes has been reported to range from 20% to 67% of all odontogenic neoplasms. While odontomes are pseudo-tumours made up of both epithelial and mesenchymal cells, they rarely lead to the pathological development of cysts, such as a calcifying odontogenic cyst or a dentigerous cyst.[4]

Fig 5: *Specimen after the enucleation*

Odontomes show several variations with regard to the age of occurrence, gender predilection and the number of denticles removed. Several studies have documented the age of occurrence and gender predilection of odontomes.[2,4] It has been stated that although odontomes may be diagnosed at any age, it is usually detected before the age of 20 years.[7,8] Complex odontome has been known to have a slight predilection towards females, whereas compound odontome is more common in males, contrary to previous reports that claimed there was no gender predilection.[2,4] The number of denticles removed during enucleation of odontomes ranged from 4 to 37; however, a recent case reported the removal of 232 denticles of a patient.[9,10,11]

Since a lot of variation is seen with regard to the age of occurrence of odontome, it has been said that the age and location predilection for these malformations are on account of them being pathogenetically different. It has been postulated that since complex odontomes are considered to be a terminal stage lesion that is a hamartoma, they are seen in older people at the time of diagnosis with a predisposition for posterior mandibular regions. However, local hyperactivity of the dental lamina has been found to be the reason for the formation of compound odontomes. The present case agrees with the hypothesis that compound odontome is generally seen in younger people, as hyperactivity of the dental lamina is found to be high among them. However, in this case, the trigger for hyperactivity of the dental lamina is not known. There was no familial history nor history of trauma or infection as speculated in earlier studies. In most cases, it is found to be associated with an impacted tooth.[12]

Odontomes are known to cause eruption disturbances in the form of delayed eruption, impaction of teeth, over-retention of primary teeth or abnormalities in the alignment of teeth-like tipping or displacement of adjacent teeth. Studies have shown that compound odontomes are seen more frequently in the anterior maxilla.[1] In the present case, odontome was found in the anterior mandible, which is an uncommon site of occurrence. A previous report had mentioned a greater frequency for the odontomes to arise in the region of incisors and canines,[9] which is confirmed in our case. However, the tendency of the odontomes to occur on the right side[1] of the jaw was contrary to our finding.

Surgical exposure followed by enucleation of the odontome is the accepted choice of treatment in order to allow the eruption of the permanent tooth. Small-sized odontomes do not pose any difficulty while removal; however, the proximity to nearby structures must be kept in mind to prevent unnecessary injury to them. In the present case, 32 was extracted, and the odontome was enucleated. This procedure was done under local anaesthesia. The specimen enucleated was sent for histopathology to rule out ameloblastic fibro odontomas and odonto ameloblastomas. A follow-up was recommended to plan for the management of the unerupted 33.

Conclusion

The present case report is of a compound odontoma in anterior mandible, associated with an impacted tooth. In order to prevent adverse effects of odontomas, the author suggests that greater emphasis should be given on routine dental check-ups so that these anomalies can be detected earlier, thereby, minimising the interventions needed after enucleation.

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Varied Root Patterns of Extracted Maxillary Third Molars

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Abstract
Diversity of root morphology in maxillary third molars poses a great challenge to the oral and maxillofacial surgeon for extraction of these teeth. The purpose of this paper was to show anatomic variations in permanent maxillary third molars. The different root morphologies are discussed in this paper. **(Terna J Dent Sci 2019;5(1):22-23)**

Key words: Third molars, root convergence, extraction, elevation.

Introduction

The difficulties encountered in the extraction of maxillary third molars are due to anatomic variants of the roots, with fine apices curved towards distal, and in some cases to the difficult access to the tooth crown.[1] Extractions are routine procedures in dental surgery. The instruments and techniques used for this purpose are within relatively narrow specifications. Nevertheless, we must note that patients still regard the extraction of wisdom teeth as a notorious event. This can be attributed, to some extent, to the much-feared surgical removal of retained third molars. But the extraction of fully erupted maxillary third molars can also be an unpleasant procedure for patients and dentists, for such root fractures are made more likely by the wide anatomic variance, and more difficult to manage by the poor access and visibility, than for other groups of teeth.

As root fusion is common in these cases, the extraction of the upper third molars can be less difficult than the extraction of the other molars of the human dentition. On the other hand, the often-cited complication of tuberosity fracture and the connected discussion about the optimum instrumentation for extracting an upper third molar – forceps or elevator– indicate that the extraction of the upper third molars is fraught with a range of difficulties, arising from the particular anatomic and topographical conditions:

- Poor access to the tooth crown, especially if the latter does not reach the level of the occlusion plane and/or is slanted towards buccal.
- Root(s) often (strongly) curved towards distal, in some cases with very fine apices.
- The maxillary bone can be significantly weakened at the transition to the maxillary tuberosity, notably with very distinct third molar roots, high position of the third molar or strong pneumatization of the maxillary sinus.[4]

Conflict of interest and source of funding
The authors declare that there is no conflict of interest concerning the contents of the study.
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Materials and Methods

The patient's chief complaints were recorded, clinical examination was done, and observations noted. This was followed by radiological examination. The positions of the patient, chair, and operator are critical for successful completion of the extraction. The dental chair was tilted backwards so that the maxillary occlusal plane was at an angle of 60 degrees to the floor. The patients were prepared in the usual aseptic fashion. Pre-operative antibiotics and analgesics were given. Extraction of maxillary third molars was done under 2% Lignocaine with 1:80,000 adrenaline using PSA nerve block.

In all cases it was observed that there was a lot of resistance to elevation and in cases where the roots were delicate/ slender, limited elevation was carried out to prevent obvious fracture of the apical 1/3rd. [2]

Sr.No	Root Description	Intervention
1	3 fused roots	Uneventful extraction
2	3 curved roots	Uneventful extraction
3	4 flared roots resembling a Lotus	Uneventful extraction
4	A single dilacerated root	Uneventful extraction
5	3 long fused roots	Uneventful extraction
6	3 roots of different lengths	Uneventful extraction
7	2 roots, 1 root dilacerated	Uneventful extraction
8	2 divergent & dilacerated roots	Open method
9	A single dilacerated root	Uneventful extraction
10	3 divergent bulky roots	Tuberosity fracture seen. Open Method
11	3 long roots, 1 root dilacerated	Uneventful extraction
12	1 long dilacerated root	Uneventful extraction

Conclusion

Unusual root morphologies associated with molars have been recorded in several studies in the literature. The most common root pattern seen with maxillary third molars is conical.[3] But, we encountered different root morphologies like more than multiple roots (two cases with 4 roots), dilaceration, convergent roots (which were not evident in the radiographs). Preoperative radiographic evaluation of the sinus proximity and bone thickness can help anticipate tuberosity fracture.[4] Possible preventive measures to avoid tuberosity fracture include use of periosteal elevator to ensure separation of the periodontal ligament from the tooth and palpation with a finger from the non-operating hand to evaluate the expansion of the cortical plate upon luxation. When sensing any movement of maxilla during extraction of the upper molars, the procedure should be terminated immediately. If only a small bony fragment is involved, the tooth and bone can be removed after dissection of the soft tissues. When a large bony fragment is present, it is recommended that the extraction should be abandoned, and surgical removal of the tooth performed by using root sectioning. Displacement of a maxillary third molar into the maxillary sinus also can occur and has been reported.[5] Excessive apical force and incorrect surgical technique are thought to be the most common causes. The accepted treatment of such a displaced tooth is removal to prevent future infections.

Fig 1: *Maxillary third molars with variable root patterns*

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Recent modalities in diagnosis and treatment of trigeminal neuralgia - A review article

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Key words: Neuralgia, MRI

Abstract
Trigeminal neuralgia is a well-recognized disorder characterized by lancinating attacks of severe facial pain. The diagnosis is based primarily on a history of characteristic pain attacks that are consistent with specific, widely accepted research and clinical criteria for the diagnosis. Various drugs and surgical procedures have been used for the management of trigeminal neuralgia (TN). Despite numerous available approaches, the results are not completely satisfying. The preferred medical treatment for TN consists of anticonvulsant drugs. Number of patients become drug resistant, opting for a surgical procedure to treat the neuralgia. Pain recurrence after one or more surgical procedures is also frequently seen. These facts reflect the lack of the precise understanding of the trigeminal neuralgia pathogenesis. However, it has been evidenced that in the pain onset and recurrence, various neurophysiological mechanisms other than the neurovascular conflict are involved. Recently, the introduction of new magnetic resonance techniques, such as three-dimensional time-of-flight magnetic resonance angiography, and 3D FIESTA MRI has provided new insight about the pathogenesis of trigeminal neuralgia. Some of these new techniques have also been used to better the preoperative evidence of the neurovascular conflict in the surgical planning of micro-vascular decompression. This article makes an attempt to present a brief insight into the current treatment modalities that are available to treat this condition. The pharmacotherapy constitutes the cornerstone in the management of trigeminal neuralgia. At the same time, it is also important to be aware and updated of the role of investigations and surgeries available for treating trigeminal neuralgia. **(Terna J Dent Sci 2019;5(1):24-26)**

Introduction

Trigeminal neuralgia is defined by the International Headache Society (IHS) as "unilateral disorder characterized by brief electric shock-like pain, abrupt in onset and termination, and limited to the distribution of one or more divisions of the trigeminal nerve". The IHS suggest a classification of trigeminal neuralgia as either classic (essential or idiopathic) trigeminal neuralgia or symptomatic trigeminal neuralgia (STN); pain indistinguishable from that of CTN, but caused by a demonstrable structural lesion other than vascular compression.[1] According to the recent clinical criteria given by IHS, a diagnosis of trigeminal neuralgia can be made when facial pain: a) occurring in one or more divisions of trigeminal nerve, with no radiation beyond trigeminal distribution b) pain recurring in paroxysmal attacks lasting from fraction of a second to 2 minutes with severe intensity and electric shock-like shooting stabbing or sharp in quality.[1] The maxillary branch is most commonly affected followed by the mandibular branch of trigeminal nerve. It is more common on the right side. Pain in trigeminal neuralgia is precipitated by a light touch on a "trigger zone" present on the skin or mucosa within the distribution of the involved nerve branch. Common sites for trigger zones include the naso-labial fold and the corner of the lip. Shaving, showering, eating, speaking or even exposure to wind can trigger a painful episode. As the attack occurs, the patient may clutch his face in fear of pain.[2]

Conflict of interest and source of funding
The authors declare that there is no conflict of interest concerning the contents of the study.
This study has been self-supported by the authors.

Investigations

Investigations are done to find identifiable cause of the disease. Approximately 10% of trigeminal neuralgia cases are caused detectable underlying pathology such as tumor of the cerebellopontine angle, a demyelinating plaque of multiple sclerosis and vascular malformation. Therefore, MRI of the brain *(Fig 1)* is indicated.[2]

High Resolution MRI *(Fig 2)* also known as 3D FIESTA (3-Dimensional Fast Imaging Employing Steady-state Acquisition) MRI also provides an optimal anatomic detail of cranial nerves and tiny vascular structures. It helps to identify the cause and site of trigeminal nerve compression in patients with unilateral classic trigeminal neuralgia.[3]

In MRI there is no differentiation between nerves and vessels. TOF MOTSA MRA (3 D Time of Flight Multiple Overlapping

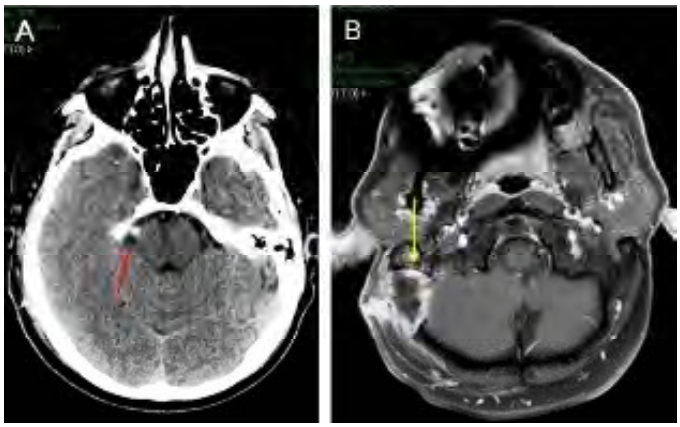

Fig 1: *Gadolinium enhanced axial MRI of brain showing trigeminal nerve of right side (Red arrow).*

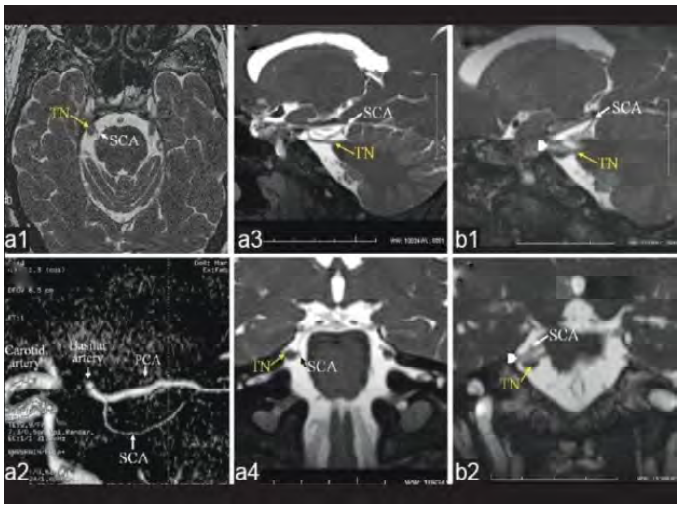

Fig 2: *Preoperative (a) and postoperative (b) 3D FIESTA and 3D TOF MOTSA MRI scans. (a1) Transverse 3D FIESTA image at the level of pons. The small rounded structure medial to the trigeminal nerve (TN) corresponds to the right superior cerebellar artery (SCA). (a2) The SCA loop can be easily identified on the sagittal reformatted 3D TOF MOTSA image. Sagittal (a3) and coronal (a4) reformatted 3D FIESTA images demonstrate rostral-medial compression of the TN by the SCA loop. Postoperative sagittal (b1) and coronal (b2) reformatted 3D FIESTA images reveal the proper position of the Teflon implant (white arrowhead) between the SCA and the TN. PCA, posterior cerebral artery*

Thin Slab Acquisition Magnetic Resonance Angiography) *(Fig 2)* can be used to objectively distinguish blood vessels from nerves.[3] MRA with gadolinium enhancement is extremely sensitive and specific method to demonstrate compression of nerve in trigeminal neuralgia.[4]

The combination of High-Resolution 3D MRA and contrast enhanced 3D SPGRI (3D Spoiled Gradient Recalled Imaging) is an extremely sensitive and specific technique to demonstrate vascular contact with trigeminal nerve in patients with trigeminal neuralgia.[5]

Double dose contrast enhanced 3D-FSPGR (3-dimensional fast spoiled gradient echo) sequences is a useful technique in detecting neurovascular compression.[6]

According to the European Federation of Neurological Societies (EFNS) guidelines on neuropathic pain assessment and the American Academy of Neurology (AAN) guidelines on trigeminal neuralgia management, the neurophysiological recording of trigeminal reflexes is the most useful and reliable test for the neurophysiological diagnosis of trigeminal pain.[7]

Management of trigeminal neuralgia

Pharmacotherapy:

Phenytoin, an anti-convulsant with dosage 300-400 mg/day was the first drug used for trigeminal neuralgia and was reported to have positive effects.[1] According to AAN and EFNS and other recent guidelines, carbamazepine (100-1200 mg/day) and oxcarbamazepine (600-1800 mg/day) are the first-line medical treatment for pain control in patients with trigeminal neuralgia.[1] The most common side effects of carbamazepine include drowsiness, dizziness gastro-intestinal distress and skin reactions. Initially carbamazepine is given in the dosage of 100 mg/day. Carbamazepine may become less effective over time and that progressively higher doses may be required for pain control. At no time it should exceed 1200 mg/day. After beginning therapy, every 1-3 months a serum level should be determined. In patients treated for longer periods, a complete blood cell count and liver function test should be done periodically.[8] If a patient is presumed to have trigeminal neuralgia does not respond rapidly to carbamazepine in 24-48 hours then the diagnosis is seriously in doubt.

Patients who had to discontinue carbamazepine due to its adverse effects were switched to oxcarbamazepine. Oxcarbamazepine is the 10-ketoanalogue of carbamazepine with a similar mode of action. It is preferred over carbamazepine due to minor risk for drug interactions and better tolerability than carbamazepine.[1]

Gabapentin (300-3600 mg/day) a newer anti-convulsant is effective in some patients and has fewer side effects than carbamazepine. Low dose gabapentin in adjunct with carbamazepine was effective in some patients.[9] Gabapentin was safe and effective in treatment of trigeminal neuralgia when used in combination with local injection ropivacaine to block the trigger points.[9]

Baclofen was effective in 70% of patients at dosage of 10-60 mg/day.[10] Lamotrigine a relatively newer anti-convulsant drug has an action similar to that of carbamazepine but it has fewer side effects.[8]

Pregabalin, a new gabapentin potent synthetic analogue, was effective in reducing trigeminal neuralgia pain by 50% in 74% patients with minor efficacy reduction over the 1yr observational

period. It is given in the dosage of 150-600 mg/day.[9]

Topiramate is the newest drug for treatment of trigeminal neuralgia. Those patients who were refractory to combination therapy with a variety of conventional treatments all became free of pain with topiramate therapy.[8]

Trigeminal neuralgia may have temporary or permanent spontaneous remissions; therefore drug therapy should be slowly withdrawn if a patient remains pain free for 3 months.[2]

Emerging medical therapy

The therapeutic efficacy and safety of injection botulinium toxin type A (BTX-A) is useful in 70% to 100% of patients with trigeminal neuralgia and no major adverse events were reported. They may be given to patients before surgery or patients who are unwilling to undergo surgery.[1]

Surgical therapy

Those patients in whom drug therapy is ineffective or in which the patients are unable to tolerate the side effects of drugs, surgical therapy is indicated.[2] Peripheral neurectomy was the earliest form of treatment for trigeminal neuralgia. Peripheral surgery also includes cryosurgery and is usually effective for 12 to 18 months, at which time it must be repeated or another form of surgery must be instituted.[2]

There are various surgical approaches for trigeminal neuralgia with MVD (Microvascular Decompression) being the most common treatment for providing pain relief for longer period.[1] PBC (Percutaneous Balloon Compression) provides immediate post-operative pain relief in patients ranging from 80% to 90% and pain free duration of 2-3 years without medication.[1] Radiofrequency Thermocoagulation provides initial pain relief but has a high recurrence rate.[1] Glycerol Rhizotomy has remained relatively unchanged, with patients experiencing no pain for 3 years.[1]

Gamma Knife stereotactic radiosurgery is a new minimally invasive technique for the treatment of trigeminal neuralgia and is helpful for elderly patients with a high surgical risk and those with concurrent medical illness.[2] Local anesthetics or alcohol injected near the peripheral branches of the trigeminal nerve provide temporary pain relief and help in the diagnosis.

Conclusion

Among the many diagnostic and treatment options in the management of trigeminal neuralgia only very few have proven their efficacy to modern evidence-based medicine standards. For thorough and accurate management, a stepwise diagnostic and treatment approach is recommended. In most cases the diagnosis can be made clinically. Unilateral involvements of the trigeminal nerve are suspicious of trigeminal neuralgia and routine imaging (MRI) may be considered. Electrophysiological testing may also be considered to confirm trigeminal neuralgia. First-line therapy is carbamazepine or oxcarbamazepine switching to or adding-on lamotrigine, pregabalin, gabapentin or topiramate may also be considered. If sufficient and compliant medical therapy failed, surgical management should be recommended. Surgical interventions such as gamma knife surgery, microvascular decompression should be discussed intensively with the patients with regards to their own individual wishes and overall medical condition. Controlled studies with long-term follow-up will be needed to compare surgical and medical therapy directly with one another and determine the optimal timing for surgical intervention.

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Nanodentistry : the next gen dentistry

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Abstract
Nanotechnology creates incredibly useful structures from individual atoms or molecules, which provides a new alternative and a possibly superior approach for the identification of oral health related problems and also in designing of more biocompatible dental materials with better properties and anticaries potential. It is a multidisciplinary field of scientific research that highlights the application of new nanomaterials and devices in all the areas of human activity. The present article discusses the use of nanotechnology in dentistry and also the latest innovations in oral health care, nanoincorporated products and issues of patient safety and occupational health.

(Terna J Dent Sci 2019;5(1):27-31)

Key words: Nanodentistry, nanotechnology, implant surface modifications.

Introduction

Human civilization and human science have always progressed and will continue to do so. The accelerated rate of innovations we are witnessing in dental material sciences, digital technology and patient services is no coincidence. If we do not seek new outlooks, we pave our path inward we realize that sometimes the most profound effects will be achieved by going smaller and smaller down to the nanoscale. Either we will introspect and discover the Universe within ourselves, or we try to delve deeper into the mysteries of the living cells, or molecules, or even single atoms. We are thinking and researching methods that have an absolutely precise effect.

Nanotechnology is bringing a revolution in the world of science. It works at the level of atoms and molecules and manipulates them according to the need. The word "nano" is derived from a Greek word "nannos" which means "dwarf." Nanometer means one millionth of a meter (10^{-9} meter). Nanostructured materials are stronger or have different magnetic properties compared to other forms or sizes of the same material. Literature has given two concepts of nanotechnology, i.e., broad and narrow concepts. Broad concept signifies a technology smaller than microtechnology, while the narrow concept programs and manipulates matter with molecular precision.[1,2]

Nanotechnology which intergrated into dentistry gives rise to a new stream of nanodentistry. This novel scale of technology has appealed to researchers of various fields including medicine and dentistry. This review will focus on the current applications of nanotechnology in dentistry, and the novel materials and techniques that have been developed using its principles for disease diagnosis, prevention, rehabilitation, and pulp/ periodontal regeneration.[3]

Nanodentistry is defined as 'the science and technology that will make possible the maintenance of comprehensive oral health by employing use of nanomaterials, biotechnology including tissue engineering and ultimately dental nanorobotics.

Course of evolution

The ancient period (fourth century), saw the use of The Lycurgus Cup (Rome) which is an example of dichroic glass; colloidal gold and silver in the glass which allows it to look opaque green when lit from outside but translucent red when light shines through the inside. 'Rasa Shastra' (7th century AD) has revolutionized ayurvedic system of medicine in which metals and minerals were converted into very fine and absorbable powders called 'Bhasma', which were therapeutically most effective and least toxic.[4]

Vibrant stained glass windows in European cathedrals in the mid fourteenth century owed their rich colors to nanoparticles of gold chloride and

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other metal oxides and chlorides; gold nanoparticles also acted as photocatalytic air purifiers. The use of 'Damascus' saber blades in the late eighteenth century contained carbon nanotubes and cementite nanowires - an ultrahigh-carbon steel formulation that gave them strength, resilience and the ability to hold a sharp edge.

The later developments were based on increasingly sophisticated scientific understanding and instrumentation, as well as experimentation. With the discovery of colloidal 'ruby' gold by Michael Faraday (1857) demonstrating that nanostructured gold under certain lighting conditions produced different-colored solutions. The vision of nanotechnology was born, when the renowned physicist Richard P Feynman in 1959 speculated the potential of nanosize devices in his historic lecture 'there is plenty of room at the bottom'. The term 'nanotechnology' was coined by Professor Kerie E Drexeler (1986), in his book named 'Engines of Creation', who promoted the technological significance of nano scale phenomena. In 1999 to early 2000's nanotechnology companies began to operate, and manufacture nanotechnology enables products.[3]

Nanodentistry

The dental products, ranging from implants to oral hygiene products can be developed based on nanoscale properties. The application of atomic force microscopy (AFM) and optical interferometry to a range of issues in dentistry, including characterization of dental enamel, oral bacteria, biofilms and the role of surface proteins in biochemical properties and nanomechanics of bacterial adhesions, is being reviewed.

Developments in nanodentistry, such as saliva exosomes based diagnostics, designing of biocompatible and antimicrobial dental implants are revolutionalizing.[4]

Nanodentistry products which we come across in today's time are as follows[5,6]:

- Nanocomposites with nanosolutions
- Nano light-curing glass ionomer restorative materials
- Nano impression materials
- Nano composite denture teeth & Nano engineered acrylic resin
- Prosthetic implants
- Bone graft materials

Nano composite resins

Nanohybrid and nanofilled resin-based composites are generally the two types of composite restorative materials referred to under the term 'nanocomposite', usually in a context of particle size. They are characterized by filler-particle sizes of ≤100 nm and with a higher elastic modulus[7] *(Fig 1)*. Advantages of nanofillers in dental composites:[8]

1. They do not thicken the resin.
2. Size below absorption of visible light (0.4-0.8 mm) – makes fillers invisible.
3. Enhances the polish ability of resin.
4. Extreme surface to volume ratio and the ability to fit between several polymer chains-high filler loading in workable consistencies.
5. Increased hardness and wear resistance.
6. Fifty percent reduction in polymerization shrinkage and less staining.
7. Superior translucency and esthetic appeal.
8. Superior flexural strength and modulus of elasticity.

Nanosolution

Nanotechnology in bonding agents ensures homogeneity and so the adhesive is perfectly mixed every time.[10] As discrete particles, their extremely small size keeps them as a colloidal suspension. They reduce the interstitial spacing and increase the filler loading.

Nano light curing glass ionomer cement

In this product, conventional glass ionomer technology has been interlaced with nanotechnology to give its unique handling characteristics.

The 'new material' comprises of two stable hydrates: the minerals katoite and gibbsite. Katoite is a calcium-alumina-hydrate and is built as crystals, each being between 10 and 40 nanometers in size. Gibbsite is an aluminum-hydroxide and is formed first as an amorphous gel which transforms over time into crystalline gibbsite. The material attaches itself to the tooth surface by so-called nanostructural integration makes it possible to minimize leakage between tooth and material over time and therefore, by definition, product, belongs to the material group, nanostructurally integrating bioceramics (NIB).[8,10,13,]

Nano impression materials

Nanofillers are integrated in vinylpolysiloxanes, an addition-reaction silicone elastomer impression material producing a material that has better flow, improved hydrophilic properties and has fewer voids at margin and better model pouring with enhanced detail precision.[10] Advantages:[6]

- Increased fluidity & Hydrophilic properties
- High tear resistance
- Resistance to distortion and heat resistance
- Snap set that consequently reduces errors caused by micro movements.

Nano engineered acrylic resin:[11]

Polymethyl methacrylate resin with TiO2 and Fe2O3 nanoparticles as pigments

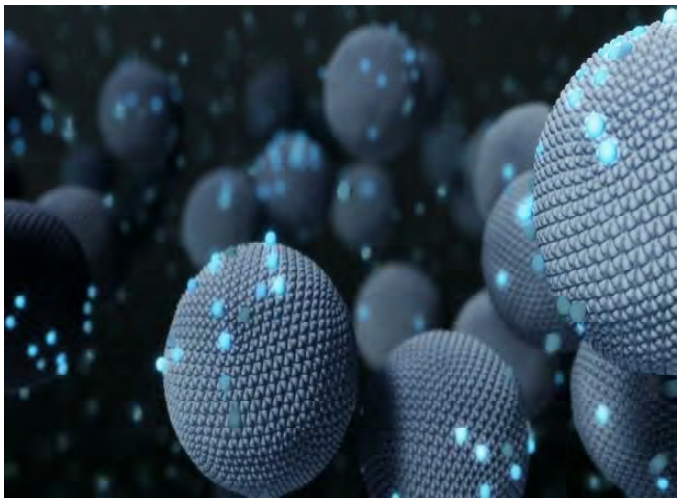

Fig 1: *Type of nanocomposite to be used in the treatment of damaged bone.*

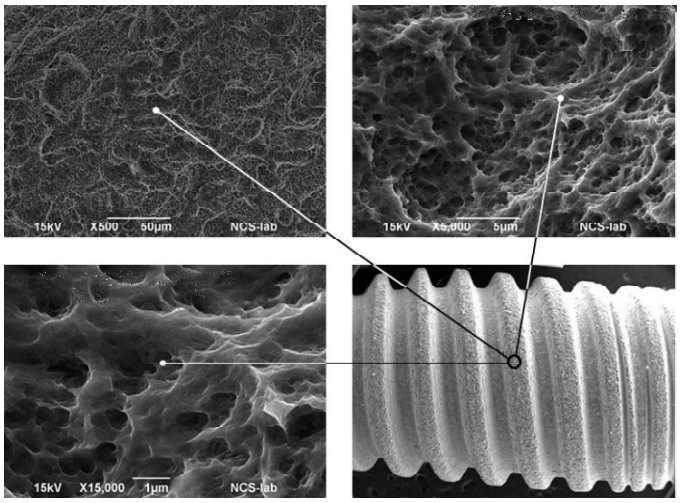

Fig 2: *Surface treatment achieves ideal morphology for accelerated integration, initial stability, long term bone healing and solid biological fixation of the implant.*

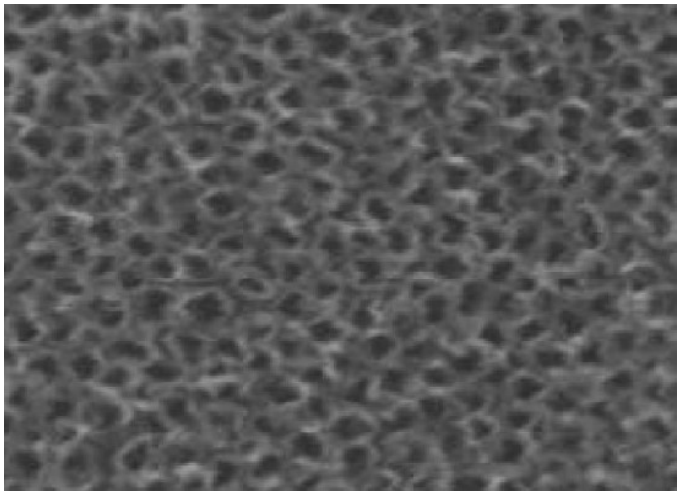

Fig 3*: Nanostructured titanium*

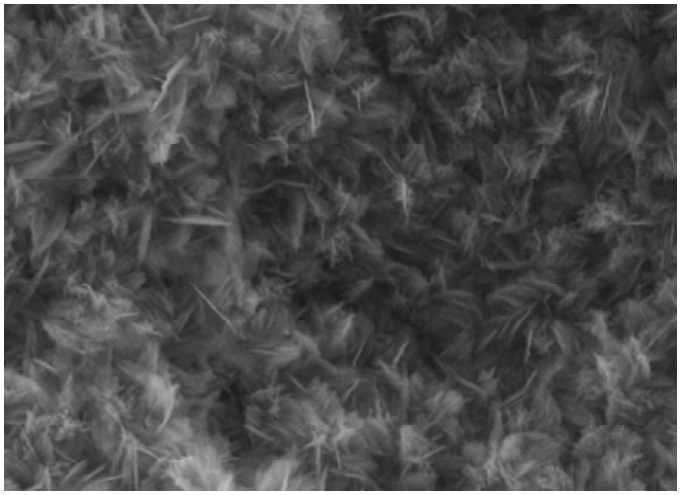

Fig 4: *Nanosized CaP crystals*

that provide the same color, as the gingiva, are being manufactured. This material presented a higher molecular weight, lower porosity, and a capacity to prevent Candida albicans adherence.

Nano composite denture teeth:[6]

New type of denture tooth, fabricated of nanocomposite resin, consists of uniformly dispersed nano-sized filler particles. It has the advantages such as:[12]

1. Highly polishable, stain and impact resistant material
2. Lively surface structure
3. Available in different shades, matching the morphology of natural teeth.

Bone graft material

Biologically, inspired rosette nanotubes and nanocrystalline hydroapatite hydrogel nanocomposites can be used as improved bone substitutes. Helical rosette nanotubes (HRN) are formed by chemically immobilizing 2 DNA base pairs, are 3.5 nm in diameter and are self assembled.[14] It demonstrated improved mechanical properties, increased osteoblast adhesion upto 236% compared to hydroxyl apatite/collagen assembly pattern in natural bone.[4,15]

Nano technology in dental implants

Implant surface composition, surface energy, surface roughness and surface topography are the four material related factors which can influence events at bone-implant interfaces. Surface textures are of three types: macro, micro and nano.

The 'nanostructured' materials can exhibit enhanced mechanical, electrical, magnetic and/or optical properties compared with their conventional micron-scale or macroscale (larger) counterparts.

A variety of biomimetic coating implants with nanotextured titanium, hydroxy apatite, and pharmacological agents, such as bisphosponates may induce cell differentiation and proliferation and may promote greater vascularity in highly

cortical bone, thereby improving conditions for early and long-term (in response to functional loading) bone remodeling.

Surface Modifications[16]

Surface profiles in the nanometer range play an important role in the adsorption of proteins, adhesion of osteoblastic cells and thus the rate of osseointegration. There is an increased vitronectin adsorption on nanostructured surfaces when compared to conventional surfaces *(Fig 2).* A great variety of techniques are used to create nanofeatures on dental implant surfaces. These can be divided into chemical and physical processes.[17]

Chemical Modifications

Anodic Oxidation

The outcome of the anodization of titanium in diluted hydrofluoric acid at 20 V for 20 minutes is the creation of surface nanotubes, while the anodization at 10 V for the same time produces nanoparticles.[18] Studies provided the confirmation that implant surface with interface features of 30 nm TiO2 nanotubes positively influence bone-to-implant contact (BIC) and peri-implant bone formation.[19]

Combinations of Acids (Bases) and Oxidants

The solution of strong acids, e.g. H_2SO_4 and H_2O_2, is etched at a constant temperature, for a specific duration is effective in creating a thin grid of nanopits on a titanium surface (diameter 20-100 nm). Etching is then stopped by adding distilled water. The recovered disks are washed further with ethanol in an ultrasonic bath for 20 minutes and dried.[20]

Studies confirmed this observation, stating the promotion of stem cells growth provided by oxidative nanopattering.[21] Further studies characterized the most suitable nano arrangement of TiO_2 nanotubes, noting that a diameter of 15 nm with a vertical alignment was associated with a high spreading and differentiation of rat mesenchymal stem cells into the osteogenic lineage.[22]

Physical Modifications

Plasma Spray

The titanium particles are projected on to the surface of the implants where they condense and fuse together, thickness must reach 40 to 50 μm to be uniform. The resulting titanium plasma-spray coating has an average roughness of around 7 μm, which increases the surface area of the implant. It has been shown that this three-dimensional topography increased the tensile strength at the bone/implant interface, increased the osteoblast density on the implant surface both in *in vitro* and in *in vivo* studies. Particularly, Reising et al detected a greater deposition of calcium on the nano Ti-coated surfaces when compared to uncoated surfaces.[23]*(Fig 3)*

Blasting

The blasting material should be chemically stable, biocompatible and should not hamper the osseointegration of the titanium implants. Various ceramic particles have been used, such as alumina (mostly used), titanium oxide and calcium phosphate particles.[24,25,26]

Particularly TiO_2 blasted implants were associated in humans to a significant enhancement of BIC when compared with machined surfaces.[27]

Biomimetic Calcium Phosphate Coatings on Titanium Dental Implants.[28] *(Fig 4)*

In this biomimetic method, the precipitation of calcium phosphate apatite crystals onto the titanium surface from simulated body fluids (SBFs) formed a coating at room temperature.

Incorporation of Biologically Active Drugs into Titanium Dental Implants[29]

The surface of titanium dental implants may be coated with bone-stimulating agents, such as growth factors in order to enhance the bone healing process locally.

Safety issues[30]

Nanoparticles have a greater specific surface area and decrease of particle size, the more chance it could lead to increase rate of absorption through the skin, lungs, or digestive tract, and can easily cross the blood-brain barrier, leading to unwanted effects in the body as non-degradable nanoparticles could accumulate.

Accumulation of metal and metal oxide nanosized materials is seen also in lower animals, such as fruit flies shows the environmental risk of nanotechnology.

Proper care should be taken about nanoparticles and nanotechnology safety issues for the personal health and safety of the workers who are involved in the nanomanufacturing processes and also the consumer to eliminate its effect on the environment. 'Research is needed to determine the key physical and chemical characteristics of nanoparticles that determine their hazard potential'.

Conclusion

Nanotechnology opens a new spectrum of possibilities for advancement in implant dentistry. Nanotechnology is still advancing and need much more testing before appreciating its maximum potential. Although all the research activities for this promising field are at the initial stage, the results of the clinical studies have a strong potential to revolutionize the diagnosis and treatment planning as well as tissue regenerative materials for improving esthetics in dental field. Nanomaterials can be pyrogenic as well, so manufacturing biofriendly nanomaterials is also an obstacle. Social challenges such as ethics, public acceptance, and human regulation are also major concern.

Instead of waiting for things to happen, let us start believing and contribute our part for a healthier future.

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Bridge flap technique - A case series

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Abstract
Gingival recession along with a decrease in the width of attached gingiva is a common occurrence in the mandibular anterior region. It leads to various problems including root sensitivity. Several surgical techniques have been recommended for root coverage. Bridge flap technique is one such technique used to achieve both increase in the width of attached gingiva as well as root coverage. Therefore, we performed a case series to evaluate the feasibility and success of bridge flap technique. In this case series, a vestibular deepening technique with 810 nm diode laser along with a coronally advanced flap was performed for the treatment of multiple recessions in the lower anterior region. Clinical parameters such as probing pocket depth (PPD), depth of recession and width of attached gingiva was evaluated at baseline, 1 month and 3 months. This procedure gave predictable results along with gain in the width of keratinized tissue. Bridge flap technique may be used for successful management of multiple teeth recessions.

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Key words: Bridge flap, root coverage, multiple gingival recession

Introduction

Periodontal plastic surgery is defined as surgical procedures performed to prevent or correct anatomic, developmental, traumatic or disease induced defects of the gingiva, alveolar mucosa or bone.[1] The most commonly encountered problems are gingival recession (GR), shallow vestibule, inadequate width of attached gingiva (AG) and aberrant frenulum which may need treatment either for aesthetic reasons or due periodontal problems. Several treatment procedures have been proposed for the treatment of isolated recession with lower anteriors. However, there have been very few techniques to treat multiple recession with lower anteriors.

To overcome this mucogingival problem related to multiple Class I and Class II recession in lower anteriors, bridge flap procedure has been proposed.

Bridge flap procedure is a combination of vestibular deepening procedure and coronally repositioned flap. The following case series represents a cost-effective single-step entity to correct multiple mucogingival problems at one time with less morbidity to donor tissue and to evaluate the correction gained by this bridge flap procedure.

Case report

Six patients in the age group of 20-50 years reported to the Department of Periodontology, Terna Dental College and Hospital, with the chief complaint of recession in the lower anteriors. On examination, the patients had Millers Class I/II recession in relation to 31, 32, 41, 42, region along with a shallow vestibule. These patients were systemically healthy.

The following clinical parameters were evaluated at baseline,1 month and 3 months

- Probing pocket depth (PPD)
- Gingival recession (GR), by measuring the distance between the cement-enamel junction (CEJ) and the free gingival margin using a UNC 15 probe.
- Width of the attached gingiva, by determining the distance from the base of the pocket to the mucogingival junction.

The procedure was explained to the patient and informed consent was obtained.

Surgical Technique: Bridge flap technique was first introduced in literature by Marggraf in year 1985[2] and later the modification was proposed by Romanos in 1993.[3] A semi-circular incision was given in vestibule using 810 nm diode laser *(Fig 1)*. Following this a sulcular incision was given which extended till the vestibular incision *(Fig 2)*. Thus, elevating a mobile split thickness flap *(Fig 3)*. This flap was repositioned coronally covering the denuded root surfaces and sutured using 4-0 mersilk suture. Aluminium foil was placed on the operative area covering the exposed bone followed by placement of Coe pack to protect the wound *(Fig 4 & 5)*. Antibiotics and analgesics were

Conflict of interest and source of funding
The authors declare that there is no conflict of interest concerning the contents of the study.
This study has been self-supported by the authors.

Fig 1: *Vestibuloplasty done using 810 nm diode laser*

Fig 2: *Sulcular incision given*

Fig 3: *Elevating mobile split thickness flap*

Fig 4: *Repositioned flap coronally covering the denuded root surfaces and sutured using 4-0 mersilk suture. Aluminium foil was placed on the operative area covering the exposed bone.*

Fig 5: *Coe pack dressing to protect the wound*

Fig 6: *3 months follow-up*

prescribed, post-operative instructions given. Suture was removed on the 15th day of the surgery and patient was asked to maintain oral hygiene. Case was followed up to 3 months *(Fig 6)*.

Result

Examination of the surgical site 3 months post-surgery showed significant root coverage, increase in the depth of vestibule and gain in the width of attached gingiva.

Discussion

Gingival recession is defined as exposure of the root surface caused by an apical shift of the gingival margin, resulting in root hypersensitivity, unesthetic appearance as well as root caries. The correction of gingival recessions is important in the field of periodontal plastic surgery.[4] Various techniques in the periodontal literature are presented such as pedicle flaps, free gingival graft, subepithelial connective tissue graft, acellular dermal matrix graft, and guided tissue regeneration, to cover denuded root surface.[5,6]

There are many articles in literature pertaining to mucogingival problems and

their solutions. There still remain unanswered questions in the literature regarding the adequate width of attached gingiva for periodontal health maintenance. There have been different opinions on the ideal width of attached gingiva.[7] The current literature suggests that the regions with less than 2 mm attached gingiva and thin gingival biotypes are at increased risk of gingival recession. And so, mucogingival therapy should be advocated for gingival augmentation and to create adequate vestibular depth in areas with insufficient attached gingiva.[7]

The bridge flap technique comprises of two surgical techniques simultaneously. The bridge flap technique is indicated when a single surgical procedure is desired to cover the denuded root surfaces, in circumstances where in addition to recession there is inadequate keratinized gingiva. It increases the vestibular depth along with a gain in the width of attached gingiva in one step.[8]

Studies done by E. Marggraf reported that recession is reduced by the simultaneous extension of the vestibule. Since the alveolar bone is covered with periosteum rapid healing is accomplished. The main advantage of this procedure is that it does not require a second surgical site. On the other hand, adequate width and height of attached gingiva is achieved.[2]

In a case report by Yadav et al in 2013 on bridge flap technique, they concluded that the procedure results in an aesthetically healthy periodontium, along with gain in keratinized tissue and good patient acceptance.[8]

In another case series by Farista et al in 2015, 6 months after the surgery the surgical site demonstrated significant root coverage and an increase in the depth of vestibule and gain in the width of attached gingiva.[9]

Evaluating the adequacy of width of the attached gingiva in patients with multiple gingival recessions is an important factor for deciding on any procedure for root coverage. To accomplish optimal aesthetic outcome, the gingival form, tooth anatomy, and the correlation of the underlying bone to the cementoenamel junction must be completely understood. Accurate determination of the position of cemento-enamel junction and mucogingival junction prior to periodontal surgery and precise placement of incisions are a must in order to accomplish this goal. The amount of attached gingiva needs to be measured as a part of the assessment. It has been proposed in literature that to maintain periodontal health there should be at least 2-3 mm of attached gingiva.[7] In the present case, vestibular deepening was included as treatment of choice to increase the inadequate vestibular depth in order to maintain the periodontal health and root coverage with coronally advanced flap was done to improve postoperative esthetics of the patient. The patient was examined after 15 days,1 month and 3 months. Postoperatively the esthetic outcome was satisfactory for the patient. The secondary outcome of reduced root sensitivity was also achieved. This treatment protocol, used in the cases, suggest that the combination of two surgical modalities can be successful for the management of multiple teeth recessions.[8]

Conclusion

Several surgical techniques are described in the literature to correct mucogingival problems. This surgical endeavour, "Bridge Flap Procedure," gave a successful solution by achieving root coverage, increasing the width of attached gingiva, deepening the vestibule to a desired extent, and simultaneously correcting the problem of high frenum if present, in one step only, along with gain in CAL and reduction of PPD.

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Oroantral fistula with maxillary sinusitis - A case report

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Abstract
Oroantral communication (OAC) is one of the complications that can occur after traumatic extraction of upper posterior teeth. When undetected, OAC may turn into a oroantral fistula (OAF) which is permanent epithelized communication track between antrum and oral cavity. Such fistulas may cause ingress of micro-organisms into the antrum leading to maxillary sinusitis. OAF usually persists if the infection in the antrum is not treated. Therefore, management of both sinusitis and OAF has to be undertaken. This paper presents a case of oroantral fistula with maxillary sinusitis.

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Introduction

Oro-antral communication is an abnormal communication between maxillary sinus and oral cavity. A persistent oroantral communication will generally lead to epithelialization of the tract that is termed as oroantral fistula. It generally occurs as a complication of trauma, surgery, irradiation, infection, cysts or neoplasm.[1] The roots of the maxillary premolar and molar teeth are in close proximity to the sinus and those of the second premolars and those of the first molars may be observed within it.[2] As a result, extraction of maxillary posterior teeth where roots are in close proximity to the antrum is the leading cause of OAC.[1,2] Symptoms of OAF ranges from pain to escape of fluid and air from mouth to nose or vice versa. If OAC is not treated with in adequate time, epithelialization of the tract takes place leading to formation of Oro-antral fistula (OAF). Symptoms of OAF ranges from pain to escape of fluid and air from mouth to nose or vice-versa. Eventually, there is passage of saliva and bacteria through the tract which causes sinusitis and hence Sinusitis can generally be found as a complication of OAF. Historically, 10-12% of maxillary sinusitis (MS) cases have been attributed to odontogenic infections.[3,4] However, in recent publications, up to 30-40% of chronic maxillary sinusitis cases contribute to dental cause.[5] Long-term symptoms, i.e. more than 3 months, and objective findings of mucosal inflammation are criteria for chronic sinusitis. Once the diagnosis of OAF is done and any complications like chronic maxillary sinusitis if present, it has to be treated first followed by surgical closure of OAF.[6] The purpose of this article is to report a case of Oro-Antral Fistula with chronic maxillary sinusitis.

Conflict of interest and source of funding
The authors declare that there is no conflict of interest concerning the contents of the study.
This study has been self-supported by the authors.

Case report

A 45 yr old patient reported with a chief complaint of pain in upper left posterior region and nasal discharge. The medical history and family history were non-contributory. The dental history revealed that 25 (maxillary left second premolar) was extracted one week ago. Pre-extraction radiograph revealed periapical pathology of dimensions 2cmX1.5cmX1.7cm (Fig 1). On clinical examination, a deep extraction socket and a through and through communication was seen. Escape of air was seen through the nose on blowing air through the socket. A provisional diagnosis of OAC was done. Radiographic examination revealed bony defect involving the floor of the maxillary sinus. Examination of CBCT scan (Fig 2,3) revealed a diffuse hypodense area measuring approx 7.2 mm x 4.2 mm in the greatest buccopalatal and mesiodistal dimensions is noted in the region of 25 extending from the alveolar crest till the maxillary

sinus resulting in a breach in the continuity of the sinus. There was complete effacement of the buccal cortical plate in the region of 25 along with the loss of cortication in the adjoining bone at the margins. There appeared to be an increase in the density in the contents of the left maxillary sinus accumulation of fluid inside the sinus. Thickening of the lining of the maxillary sinus was noted in the adjoining areas of discontinuity. The lining of the maxillary sinus appeared to be intact in the neighbouring sections. Hence, a diagnosis of OAF with chronic maxillary sinusitis was confirmed. The Patient was given antibiotics, nasal drops and decongestants for a week. Patient was recalled after 20 days, examination revealed no improvement. Hence a decision for surgical approach was made and so the Caldwell-Luc approach with buccal advancement flap procedure[7,8] for closure of OAF were carried out within a week. The soft tissue obtained after antrostromy was sent for histopathological examination. The macroscopic examination revealed tissue was soft in consistency, 2cmX1.5cmX1.75cm in size, brownish, irregular in shape. Histopathological report revealed multiple bits of fibrous connective tissue and infiltrated by

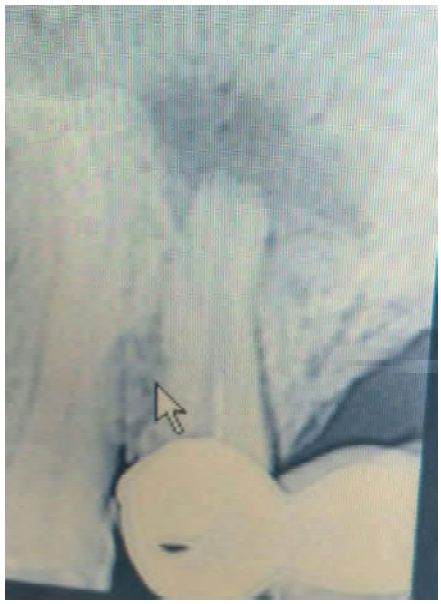


Figure 1: *Peripaical pathology wrt 25*

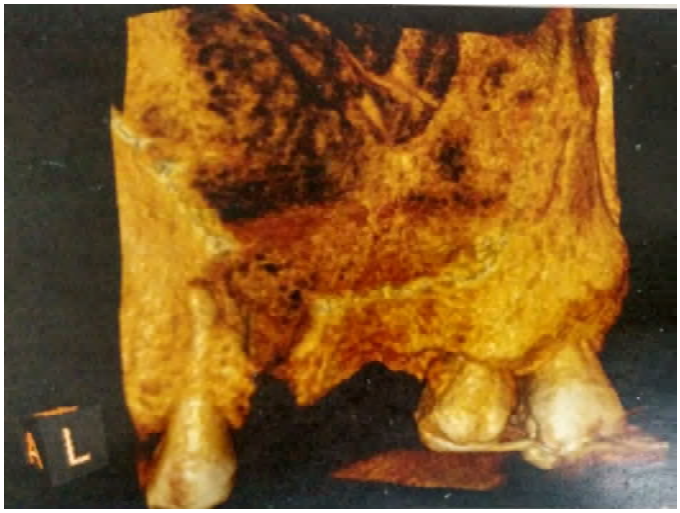
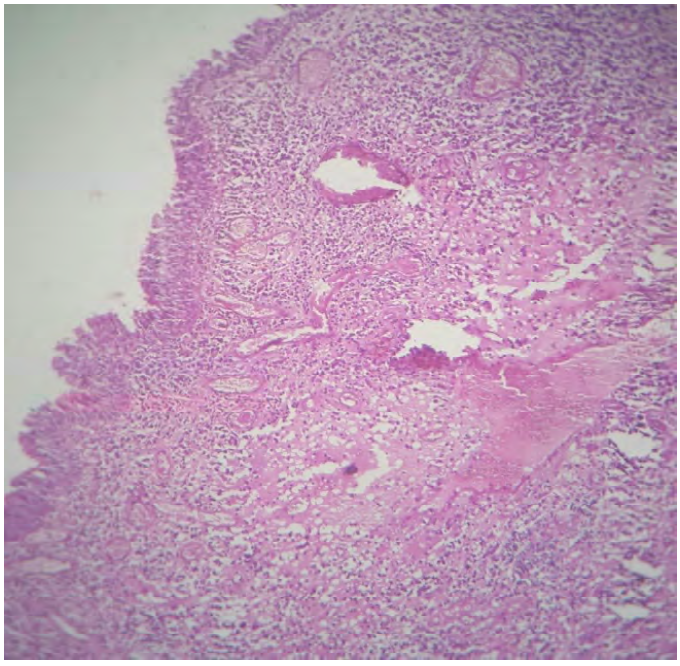


Figure 2&3: *CBCT Scan showing diffuse hypodense area wrt 25*



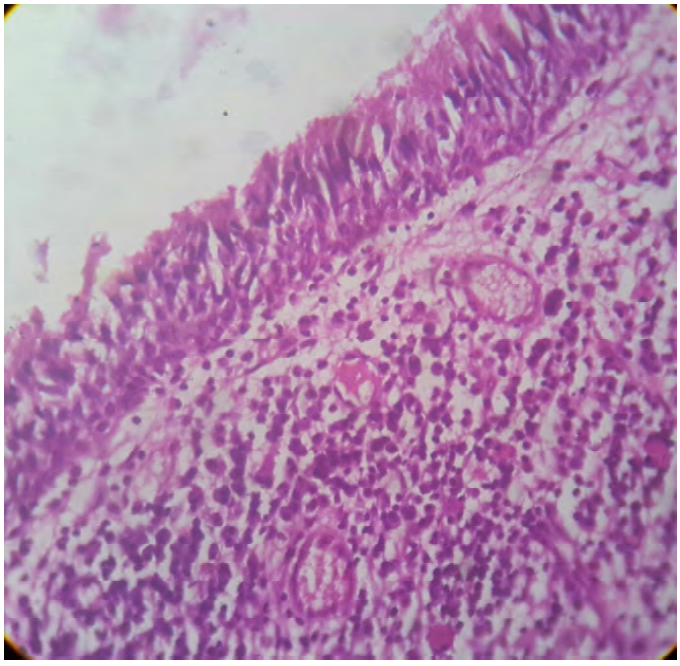


Fig. 4&5: *Histopathology: H&E low and high power respectively*

Legen

moderate to dense amount of chronic inflammatory cells, predominantly lymphocytes and plasma cells. At places, necrotic and haemorrhagic areas were noted. Sinus epithelium was present in majority of the areas (Fig 4,5). The histopathological features suggested chronic maxillary sinusitis. The patient was followed up for next three months; post operative period showed proper uneventful healing of the sinus and closure of the communication.

Discussion

As we know oroantral communication and subsequent formation of an oroantral fistula (OAF) is a common complication of dental extraction**.** The extraction of second premolar and of first and second molar are the most frequent causes for OAC and they are also referred to as antral teeth, primarily due to the proximity between apexes of these teeth and the maxillary sinus.[2,9]

The complication may also occur if patient does not follow proper post operative instructions and performs some actions that might increase the antral pressure. In the present case, extraction of 25 might have been traumatic and the primary cause of perforation of the floor of the maxillary sinus. Since**,** it is not a practice to check for such a communication after every extraction, chances for the operator to miss such an occurrence are really high and hence, operator might have missed it and so no treatment was carried out to close it in the present case. Eventually the communication gave rise to a fistula which after persisting for some time lead to the violation of sinus membrane by the infection leading to maxillary sinusitis. Once the diagnosis was confirmed, maxillary sinusitis was treated first and then the surgical closure of the communication was carried out.[6]

Conclusion

The Intimate anatomical relation of the upper teeth to the maxillary sinus promotes the development of odontogenic infection into maxillary sinus. Also, the practice of checking for the communication after extraction of maxillary posterior teeth should be undertaken so as to treat the opening in the first place if found any so as to prevent the formation of a fistula and subsequent sinusitis.

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Endodontic management of open apex in non-vital teeth

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Abstract

Patients presenting with immature apical formation pose a great challenge due to the presence of large open apices along with divergent and thin dentinal walls that are susceptible to fracture. Short roots compromise the crown-root ratio, often affecting long-term prognosis.

Historically, studies have shown that formation of an apical barrier by repeated placement of calcium hydroxide over many months. Ideal management would involve regeneration of new pulp dentine complex and continued root formation. Novel techniques for dealing with immature apices such as apexogenesis sometimes claim to be regenerative techniques. However, assessment of the composition of this regenerated tissue has proven to be difficult and it seems that it is made up of periodontal and bone tissue rather than tissue of pulpal origin. As clinicians we need to consider whether this is better than formation of an apical barrier and obturation by conventional means. The aim of this case series is to demonstrate various treatment modalities for endodontic management of open apex.

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Key words: Mineral trioxide aggregate, apexification, open apex, immature apex, non-vital teeth, rolled cone obturation, apicoectomy.

Introduction

The golden rule in the practice of endodontology is to debride and obturate the canals three dimensionally to achieve effective apical and coronal seal. The root canal treatment of immature teeth with open apices is considered as a challenge for dentists.[1] Because of the wide apical region and lack of apical constriction, the procedures of working length determination, gutta-percha compaction and prevention of extrusion of material from the apical region are very difficult.[2, 3]

Incomplete root development often arises secondary to pulpal necrosis arising as a result of caries or trauma which can interrupt dentin formation and arrest root development. As a result, canal walls will be thin and fragile and apex of tooth remains open. Both foraminal and peri-foraminal resorption of the root end may also arise in the presence of a periapical lesion. This may alter the anatomy of a pre-existing open apex further. Such cases are also associated with thin dentinal walls, short roots, and frequent periapical lesions. They usually present with discoloration of the tooth and fractures of crown.[1,2] Therefore, root canal instrumentation is impaired and achievement of an adequate apical stop is impossible.

Conflict of interest and source of funding

The authors declare that there is no conflict of interest concerning the contents of the study.

This study has been self-supported by the authors.

Case reports

Case No. 1:

A 14 yr old female patient reported to the Department of Conservative Dentistry and Endodontics of Terna Dental College and Hospital with the chief complaint of discoloured anterior teeth. Patient gave a history of trauma 5 years ago. On examination, discolored upper central incisors were seen *(Fig 1.1)*. On performing vitality test using electronic pulp tester and cold test the tooth gave a negative response with respect to 11 & 21. Radiographic examination revealed incompletely formed root with open apex and blunderbuss canal with 11 & 21. Periapical radiolucency was also seen associated with 11 & 21 *(Fig 1.2)*. The patient was also undergoing orthodontic treatment. The treatment planned was pulp space therapy and MTA apexification.

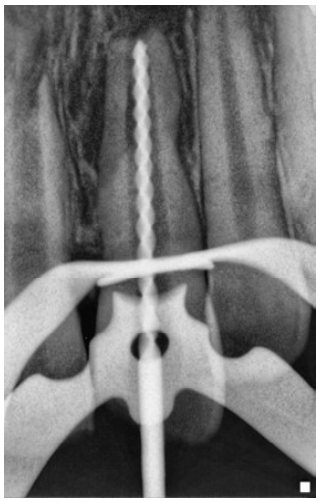
The First Visit: After administration of local anesthesia with 2% lignocaine with 1:80000 adrenaline, teeth were isolated under rubber dam. Access opening *(Fig 1.3,1.4)* using high speed air turbine, Endo access bur and Endo Z bur (Dentsply-France Ballaigues, Switzerland) was done followed by working length determination using radiographic technique *(Fig 1.5, 1.6)*.

Disinfection of canal was done using irrigation protocol of gentle copious irrigation with 10ml 5.25% sodium

Fig 1.1: *Intraoral picture 11 & 21*

Fig 1.2: *Pre-operative radiograph*

Fig 1.3, 1.4: *Access opening 11 & 21*



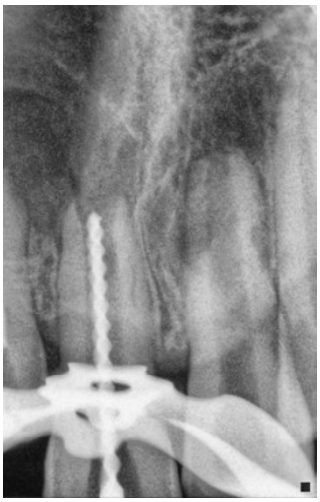
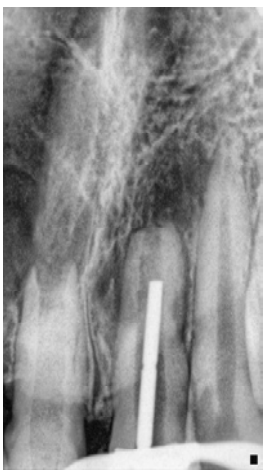


Fig 1.5, 1.6: *Working length determination using radiographic method for 11 & 21*

Fig 1.7: *Calcium hydroxide intracanal medicament*



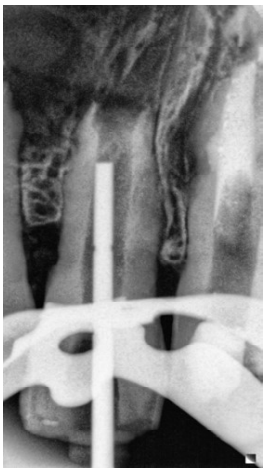


Fig 1.8, 1.9: *Working length determination 5 mm short of working length using Machtou plugger wrt 11 & 21*

Fig 1.10: *MTA apexification*

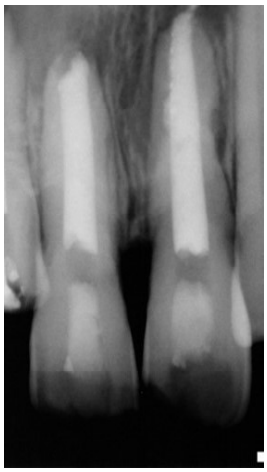


Fig 1.11: *Obturation IOPA*

Fig 2.1: *Intraoral picture, discolored 11*

Fig 2.2: *Pre-operative radiograph*

Fig 2.3: *Working length determination using radiographic method for 11*

Fig 2.4: *Calcium hydroxide intracanal medicament*

Fig 2.5: *Master cone prepared with rolled cone technique*

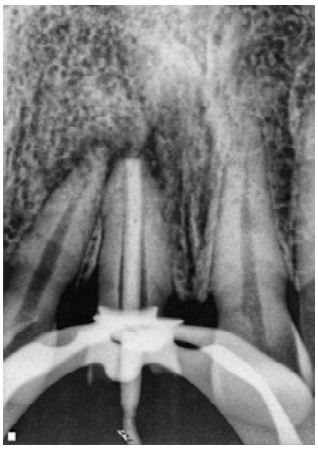


Fig 2.6: *Master cone IOPA*

Fig 2.7: *Obturation IOPA.*

Fig 3.1, 3.2: *Intraoral picture, discolored 21 with sinus opening seen*

Fig 3.3: *Pre-operative radiograph*

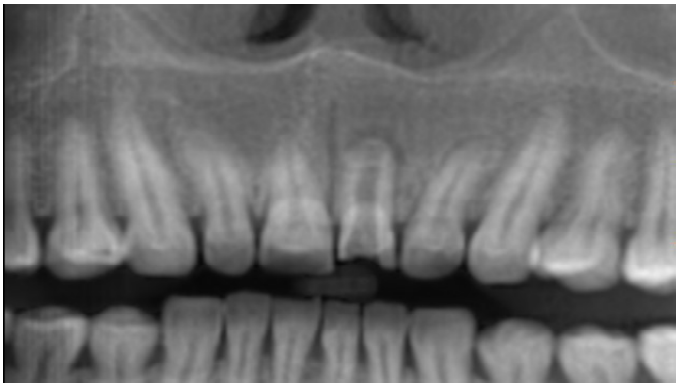


Fig 3.4: *OPG view*

hypochlorite and 10ml of saline. Care was taken to remain well short of the apex while inserting the irrigation needle to prevent apical extrusion of the irrigating solutions. Placement of calcium hydroxide dressing as intracanal medicament in increments for 1 week *(Fig 1.7)*.

The Second Visit: Removal of calcium hydroxide was done using irrigation with 3ml 17 % liquid EDTA for 1 minute (Smear Clear, Sybron Endo, CA, USA). Working length was re-established at 5 mm short of apex and the length was confirmed radiographically *(Fig 1.8)*. MTA was mixed in 1:1 ratio of powder and liquid, increments of MTA was inserted into the canal using messing gun and condensed using the Machtou plugger no. 4 (Dentsply Maillefer, Ballaigues, Switzerland). Care was taken to prevent extrusion of the material apically. Wet cotton pellet was placed over MTA and tooth was sealed with Cavit-G (3M ESPE, USA) and patient was recalled after 72 hours *(Fig 1.10)*.

Obturation was done using thermoplastiscized gutta-percha with warm vertical compaction using backfill gun (Dentjoy, China), followed by post endodontic restoration with composite (Z250, 3M ESPE, USA) *(Fig 1.11)*.

Case No. 2:

A 35 yr old patient reported to Department of Conservative Dentistry and Endodontics of Terna Dental College and Hospital with the chief complaint of anterior tooth discoloration. The patient gave a history of trauma due to fall during childhood. The patient also gave a history of root canal treatment 2 years ago. On examination, 11 was discolored with fractured incisal edge *(Fig 2.1)*. On electric and thermal pulp testing, the tooth gave a negative response. Radiographic examination revealed an incompletely formed root with open apex and wide canal with periapical radiolucency, remnants of old root canal filling material in the canal was also seen *(Fig 2.2)*.

First Visit: After administration of local anesthesia with 2% lignocaine with 1:80000 adrenaline, 11 was isolated using rubber dam. Access opening was modified followed by removal of old gutta -percha using #60 stainless steel H-file followed by working length determination using radiographic method *(Fig 2.3)*. Irrigation protocol of copious irrigation using 10ml 5.25% sodium hypochlorite and 10ml saline was done. Calcium hydroxide powder was mixed with saline and the dressing was placed in the canal followed by Cavit-G (3M ESPE, USA) placement to seal the access and patient was recalled after a week *(Fig 2.4)*.

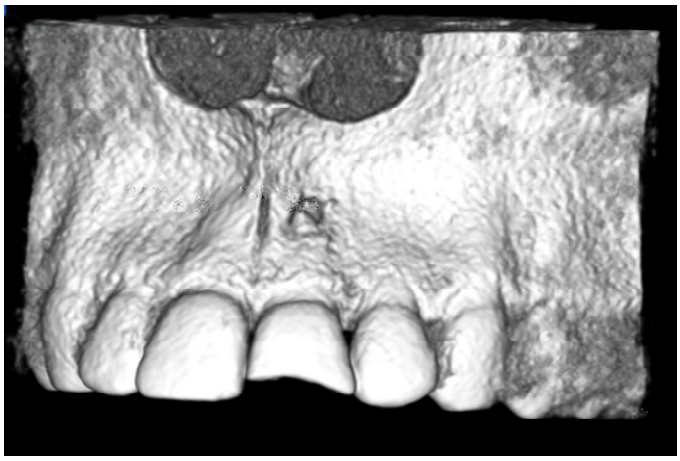
Second Visit: Removal of calcium hydroxide dressing was done using irrigation protocol with 3 ml 17% liquid EDTA for 1minute (Smear Clear, Sybron Endo, CA, USA) followed by copious irrigation with 10ml of saline and 10ml of sodium hypochlorite. The gutta percha was customized using rolled cone technique and canal was obturated. A no. 80 size gutta percha and a no. 40 gutta percha cone (Meta BioMed, Korea) were rolled between two heated glass slabs to prepare a single rolled cone. Zinc oxide powder was placed on the glass slab to prevent the cones from sticking to the glass slab. Subsequent cones were added and rolled until a proper tug at apex was obtained *(Fig 2.5)*. The rolled cone thus obtained was used as master cone *(Fig 2.6)*. The cone was coated in sealer and inserted as master cone followed by lateral compaction of accessory cones *(Fig 2.7)*.

Case No. 3

A 34 yr old patient reported to the Department of Conservative Dentistry and Endodontics of Terna Dental College and Hospital with the chief complaint of discolored tooth and recurring pus discharge. On examination discoloration was seen with 21. A draining sinus was present in association with 21 *(Fig 3.1, 3.2)*. The tooth gave a negative response to vitality test done. Preoperative radiograph revealed an incompletely formed root was seen with periapical radiolucency *(Fig 3.3)*. CBCT examination was done to evaluate the size and extent of the lesion. It revealed a wide canal with incompletely formed root was seen with a large periapical radiolucency *(Fig 3.4)*. Denudation of buccal cortical plate was seen of size 5mm x 6mm *(Fig 3.5, 3.6)*.

After administration of local anesthesia with 2% lignocaine with 1:80000 adrenaline, 21 was isolated using rubber dam. Access opening was done using Endo access bur and Endo Z bur (Dentsply-France Ballaigues, Switzerland). Working length was established using radiographic technique *(Fig 3.7)*. This was followed by thorough irrigation with saline and 5.25% sodium hypochlorite was done. Calcium hydroxide dressing as intracanal medicament was placed and patient was recalled after 1 week *(Fig 3.8)*. A repeat calcium hydroxide dressing was given for 1 week. After which the sinus had resolved. Canal was obturated with down-pack and backfill using warm vertical obturation technique (Denjoy, China) *(Fig 3.9, 3.10)*.

The patient reported 2 months later with the draining sinus, following this surgical management of 21 was planned. The canal was disinfected again after removal of old root canal filling material followed by re-obturation. Pre-surgical manage-ment of the patient was done. Complete blood count, bleeding and clotting time and blood sugar levels were measured. After administration of local anesthesia *(Fig 3.11),* a papilla preservation full thickness flap was raised *(Fig 3.12)*. The bony denudation was located *(Fig 3.13)*



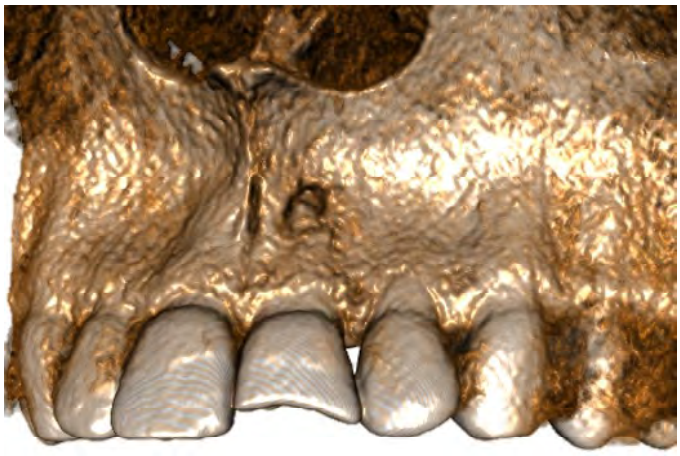


Fig 3.5,3.6: *CBCT 3D view-denudation of buccal cortical plate seen with 21*

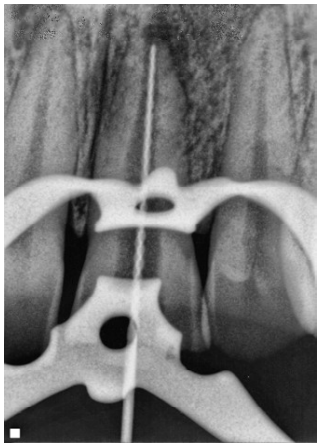


Fig 3.7: *Working length determination using radiographic method*

Fig 3.8: *Calcium hydroxide intracanal medicament*

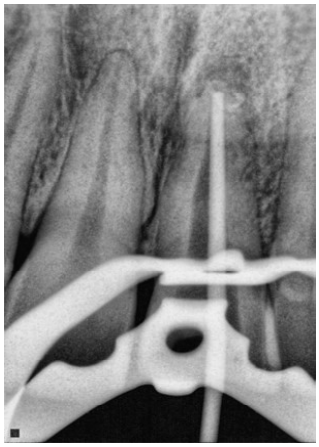


Fig 3.9: *Master cone IOPA*

Fig 3.10: *Obturation IOPA*

Fig 3.11: *Administration of local anesthesia*

Fig 3.12: *Incision and raising of the flap*

Fig 3.13: *Location of bony defect*

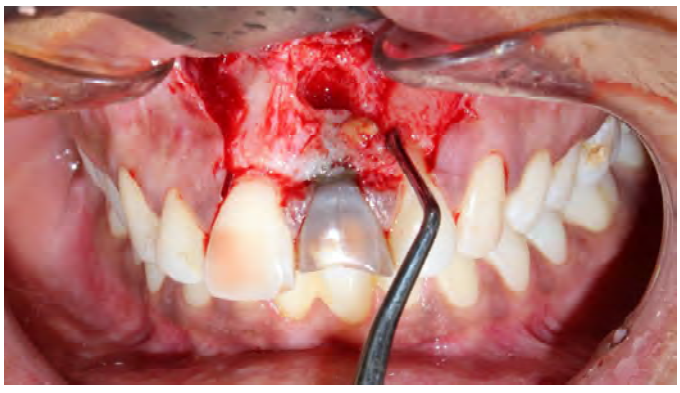


Fig 3.14: *Bony window made and curettage of granulation tissue*

Fig 3.15: *Root end resection*

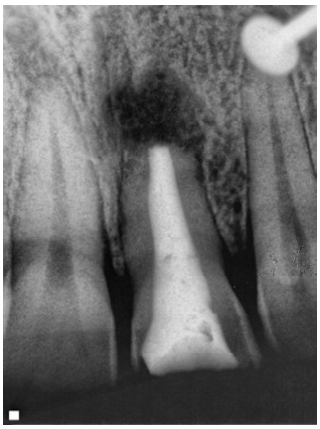


Fig 3.16: *IOPA showing root end resection*

Fig 3.17: *Root end preparation using ultrasonic retropreparation*

Fig 3.18: *IOPA showing root end retro preparation*

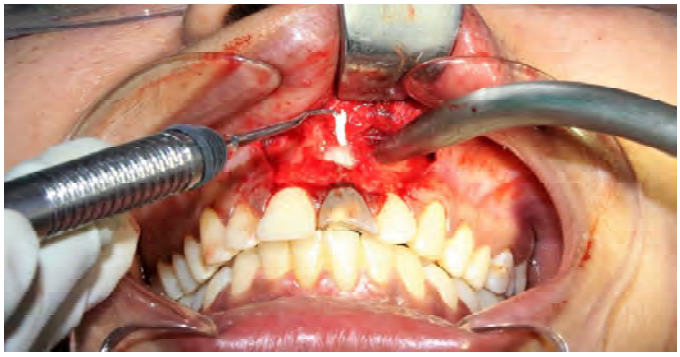


Fig 3.19: *MTA placement in retropreparation*

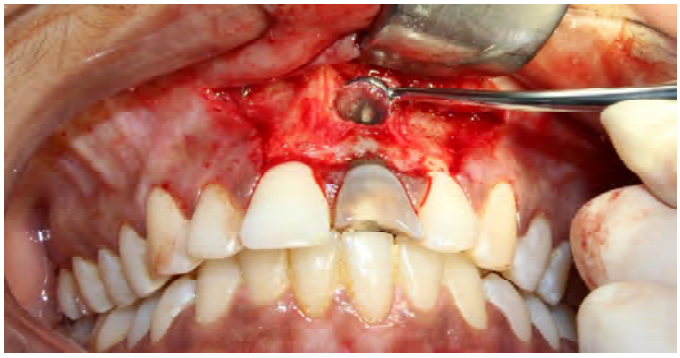


Fig 3.20: *MTA placement till apex*

Fig 3.21: *IOPA showing MTA filling in root end preparation*

Fig 3.22: *Flap repositioned and sutures placed*

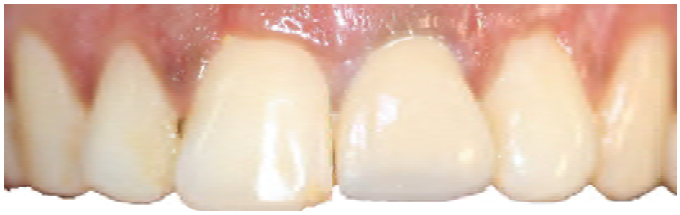


Fig 3.23: *Post prosthetic rehabilitation*

and a bony window was created to access the lesion, curettage of the granulation tissue and excision of the lesion was done *(Fig 3.14)*. Apical 3mm of root was resected *(Fig 3.15)* with lindemann bur no. 161 (Prima Dental) and slow speed micromotor under constant saline irrigation *(Fig 3.15, 3.16)*. This was followed by root end preparation using ultrasonic retropreparation tip AS3D, 3mm Satelac *(Fig 3.17)*. Retropreparation was confirmed using radiograph *(Fig 3.18)*. MTA Angelus (Angelus, Londrina, PR, Brazil) was filled into the retropreparation *(Fig 3.19, 3.20)*. MTA placement was confirmed using a radiograph *(Fig 3.21)*. The flap was repositioned and sutured back using black silk 3-0 (Ethicon) *(Fig 3.22)*. Post-surgical medications and instructions were given and patient was recalled after 1 week for suture removal and follow up. Prosthetic rehabilitation using a porcelain fused to metal crown was done after 1 month *(Fig 3.23)*.

Discussion

An open apex refers to the absence of sufficient root development to provide a conical taper to the canal and is referred to as blunderbuss canal (this means that the canal is wider toward the apex than near the cervical area). The walls of the canal are divergent and flaring, more especially in the buccolingual direction.

Types of open apices

- *Blunderbuss* - the walls of the canal are divergent and flaring, the apex is funnel shaped and typically wider than the coronal aspect of the canal. *(Fig 4)*

- *Non-blunderbuss* - the walls of the canal may be parallel to slightly convergent. The apex, therefore can be broad shaped or convergent. *(Fig 4)*

- Types of open apices by Frank (1966)[4] *(Fig 5)*
  1. Continued apical development with a definite though minimal, recession of the root canal
  2. Continued apical development without any change in the root canal space (dome apexification)
  3. Thin calcific bridge, formation at the apex without apical development.
  4. Lack of apical development with a calcific bridge just coronal to the apex.

5th type of canal closure (Cathey's apexification treatment) - Continued apical development with calcific bridge just coronal to apex.

According to Morse et al there are at least 5 methods of treating a tooth that has a necrotic pulp and an open apex. These methods are

1. A customized cone (Blunt end, rolled cone) filling the root canal with the large (blunt) end of a gutta percha cone or customized gutta percha cones with a sealer.
2. A short fill technique filling the root canal well short of the apex (before the walls have diverged) with gutta percha and sealer.
3. Periapical surgery (with or without a retro grade seal): Filling the root canal with gutta percha and sealer as well as possible and then performing periapical surgery with or without a reverse seal.
4. Apexification (Apical closure induction): Inducing apical closure by the formation of an apical stop [Calcium hydroxide, Ca(OH)2 is generally used)] against which a permanent root canal filling can subsequently be inserted.
5. One visit apexification placing a biologically acceptable substance in the apical portion of the root canal thus forming an apical barrier. This is followed by filling the root canal with gutta percha and sealer.
6. Revascularization is a new treatment procedure. It is highly desirable as it attempts to revive tissues in the pulp space and continue root formation in immature teeth with non-vital pulp.

Apexification is defined 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.' - Morse 1990[5]

Apexification with calcium hydroxide $Ca(OH)_2$ was described by Frank in 1966. Before 1966, the clinical management of a "Blunder buss" canal usually required a surgical approach for the placement of an apical seal into the often fragile and flaring apex. But high alkaline pH of $Ca(OH)_2$ can cause desiccation of dentinal proteins thereby leading to the weakening of the tooth structure and predisposing them to fractures. Due to detrimental effects of prolonged dressing, clinicians discarded this approach. The most promising alternative is MTA.

Torabinejad in 1995 reported the ingredients in MTA as tri calcium silicate, tricalcium aluminate, tricalcium oxide and silicate oxide with some other mineral oxides that were responsible for the chemical and physical properties of aggregate.[5] The powder consists of fine hydrophilic particles that set in the presence of moisture. The hydration of the powder results in a colloidal gel with a pH of 12.5 that will set in approximately 3 hours.

The advantages of MTA material are (i) reduction in treatment time, (ii) immediate restoration of the tooth, (iii) no adverse effect on the mechanical properties of root dentin. In a prospective study, apexification treatment

with MTA showed a high prevalence of healing and apical closure. MTA has the ability to induce cementum like hard tissue when used adjacent to the periradicular tissues. MTA is a promising material as a result of its superior sealing property, its ability to set in the presence of blood and its biocompatibility.[6]

Lemon advocated the use of a matrix when the diameter of the perforation is larger than 1 mm to prevent the extrusion of sealing material. Similarly, a matrix can be used for the predictable placement of MTA in apexification procedures. Use of matrix provides a base against which the MTA can be packed.[7]

MTA offers the option of a two-visit apexification procedure, which must have the benefit of better compliance and reduced number of radiographs over the multiple visit calcium hydroxide apexification, particularly in younger patients.[8] Several clinical studies report that MTA provides a viable alternative to achieve root closure in immature teeth or root fracture, even in cases with an open apex. The time required for the formation of the barrier is significantly less in teeth treated with MTA compared to teeth treated with $Ca(OH)_2$.[9]

Newer materials like biodentine and calcium enriched mixture have also been used for apexification. The use of Biodentine has been demonstrated to induce faster periapical healing for single visit apexification of the cases with large periapical lesions. The material is still under study and many more advancements in its clinical applications are expected in near future. Although the efficacy of BioDentine as a dentine substitute is yet to be clinically proven for its therapeutic indications, it may be a promising material for apexification.[10]

Conclusion

In case of non-vital open apex root with periapical lesion, proper disinfection and controlled placement of barrier at the apex will result in predictable healing.

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A survey on awareness of Aggressive periodontitis amongst General Dental Practitioners, Periodontists and General Medical Practitioners

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Abstract
Aggressive periodontitis is characterized by a rapid loss of clinical attachment and alveolar bone and normally affects young adults. Proper treatment time is usually missed without early detection of disease and teeth are lost as a result of progression of aggressive periodontitis. Even though there have been attempts to analyse aggressive periodontitis biochemically and microbiologically, there is no specific way to discover aggressive periodontitis early. Currently, early detection depends primarily on clinical and radiographic examination methods. This study is aimed at the awareness of aggressive periodontitis as a disease entity, amongst the dental practitioners, periodontists and general medical practitioners. A questionnaire-based survey including 20 questions was being assessed by practitioners in Mumbai and Navi Mumbai region reflecting their knowledge about aggressive periodontitis. This study will help us to understand the awareness levels in clinicians about aggressive periodontitis and their skill to diagnose this disease condition. **(Terna J Dent Sci 2019;5(1):46-49)**

Key words: Aggressive periodontitis, Medical Practitioners, General Dental practitioners, Periodontists, awareness, survey, paradontosis, juvenile periodontitis, chronic periodontitis.

Introduction

Periodontal diseases range from the relatively benign gingivitis to chronic and aggressive forms of the disease. Throughout the 20th century, chronic periodontitis was considered as an inflammatory disease associated with local irritants and dental plaque on tooth surfaces. Aggressive periodontitis is characterized by a rapid loss of clinical attachment and alveolar bone and normally affects young adults.[1]

As opposed to chronic periodontitis, the amount of biofilm and calculus accumulation in aggressive periodontitis subjects is inconsistent with the severity and progression of the periodontal destruction.[2] These infections are further subdivided into localized and generalized cases, based on the extent of the periodontal destruction. Diagnosis of aggressive periodontitis is a challenge for the clinician which requires exclusion of the presence of systemic diseases that may severely impair host defences and lead to premature tooth loss.[3]

Even though there have been attempts to analyse aggressive periodontitis biochemically and microbiologically, there is no specific way to discover aggressive periodontitis early. Currently, early detection depends primarily on clinical and radiographic examination methods.[4]

Although similar in many respects, chronic and aggressive forms of periodontitis have a number of significant clinical differences including but not limited to: age of onset (i.e., detection), rates of progression, patterns of destruction, clinical signs of inflammation and relative abundance of plaque and calculus.[5] Indeed, combinations of these clinical differences are the primary basis for placing affected individuals into one of the three major categories of periodontitis (i.e., chronic periodontitis, localized aggressive periodontitis and generalized aggressive periodontitis).[6]

This study is aimed at assessing the knowledge and skills of clinical practitioners to diagnose and refer the patients to Periodontists for further evaluation and treatment.

Materials and Methods

This survey was conducted in Mumbai and Navi Mumbai regions in the state of Maharashtra. Total sample group consisted of total 75 health professionals in these regions.

The sample group was further subdivided into three groups; first one consisting of General Dental Practitioners, second group consisting of Periodontists and

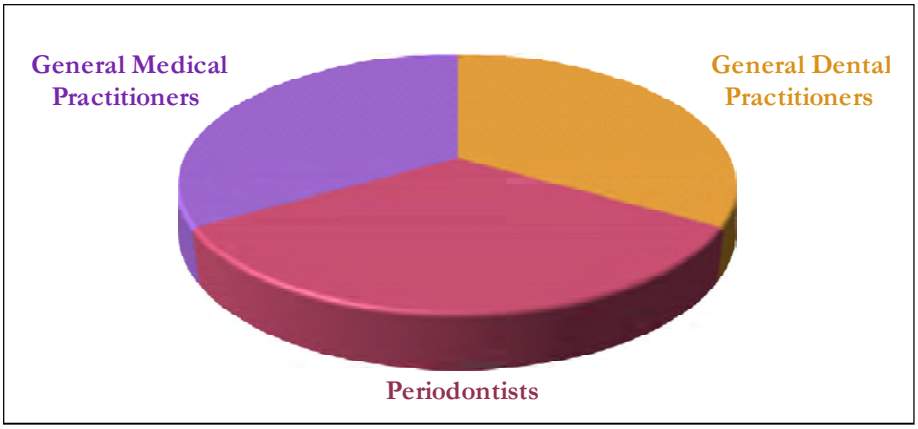
Conflict of interest and source of funding
The authors declare that there is no conflict of interest concerning the contents of the study.
This study has been self-supported by the authors.

third consisted of General Medical Practitioners. Each group had 25 professionals each.

25 General Dental Practitioners;
25 Periodontists;
25 General Medical Practitioners

A Quessionaire based survey was carried out amongst these Professionals which was specifically designed to assess their awareness about the disease entity known as Aggressive Periodontitis and their responses were recorded.

The Questionnaire was as follows:
Statistical analysis was carried out using SPSS software.



Results

No statistically significant differences in responses of three sample groups were found regarding their age and sex of the professionals. Only statistically significant differences were seen in responses corresponding the field of work of these professionals.

All the professionals including General Dental Practitioners, Periodontists and General Medical Practitioners were aware of the term aggressive periodontitis. Only 24% of the General Medical Practitioners said that aggressive periodontitis totally differed from chronic periodontitis. Respectively only 7% of General Dental practitioners and 8% of General Medical practitioners responded as no calculus and plaque being sign of aggressive periodontitis *(Graph 1)*.

83.3% of Periodontists said that genetic and hereditary factors were the main cause of aggressive periodontitis while only 24% of General Medical

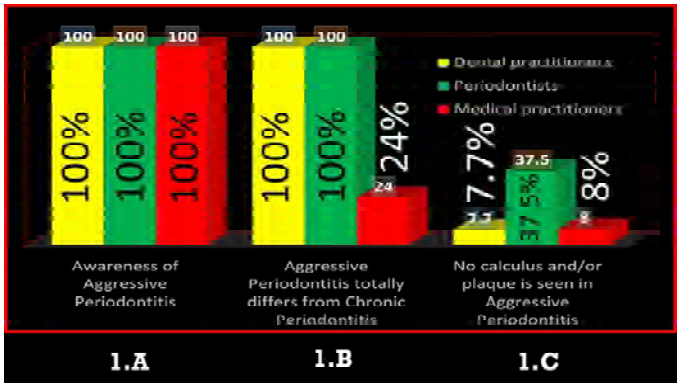
Name:
Date:
Age:
Sex:
Field of Works :
1) Dental Practitioner 2) Periodontist 3) Medical Practitioner

1) Are you aware of 'Aggressive Periodontitis ?
   a) Yes
   b) No
2) How does it differ from Chronic Periodontitis ?
   a) Not much
   b) Totally
3) What are the classic signs of Aggressive Periodontitis ?
   a) Mobility
   b) Migration of teeth
   c) Heavy calculus and/or plaque
   d) No calculus and/or plaque
4) Which are group of patients are affected ?
   a) Below 12 years
   b) 12 to 20 years
   c) 21 to 25 years
   d) 26 to 30 years
5) What do you feel is the cause ?
   a) Poor oral hygiene
   b) Diabetes
   c) Any other systemic disease
   d) Genetic/Hereditary
6) Who will be more affected ?
   a) Males
   b) Females
7) What will be your first line of definitive treatment ?
   a) Investigation
   b) Investigation and scaling
   c) Refer to specialist
   d) Treat yourself
8) What will be the treatment of choice ?
   a) Extract mobile teeth
   b) Leave it to the specialist to decide
   c) Only scaling
9) In your opinion the diagnosis will be ?
   a) Juvenile Periodontitis
   b) Aggressive Periodontitis
   c) Aggressive Periodontitis
10) Which antibiotics will your prescribe ?
   Mention four names
   i. .....
   ii. .....

Practitioners stated genetics and hereditary factors as cause of aggressive periodontitis. When asked about whether males or females would be more affected, 87.5% of Periodontists said that females would more likely to be affected than males, on the contrary 48% of General Medical Practitioners said that females would be more affected. 61.5% of General Dental Practitioners responded as females would be more affected.

72% of general medical practitioners cited aggressive periodontitis as a diagnosis of the said disease condition. In contrast only 34.6% of general dental practitioners cited the causes aggressive periodontitis *(Graph 2)*.

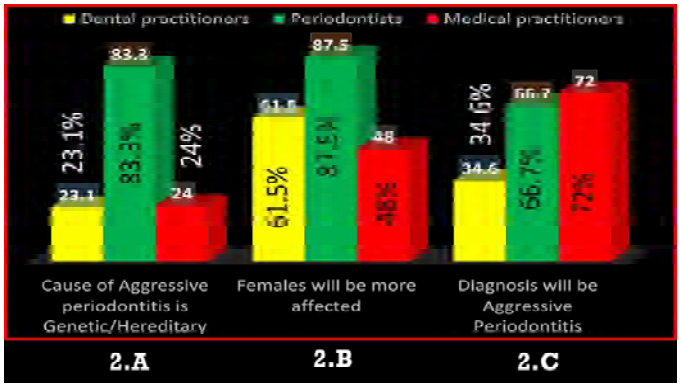
When asked about which age group is more likely to be affected by aggressive



Graph 1a: *Response of professionals about awareness of Aggressive Periodontitis in percentage of whole.*

Graph 1b: *Response of professionals about difference between Aggressive and Chronic Periodontitis.*

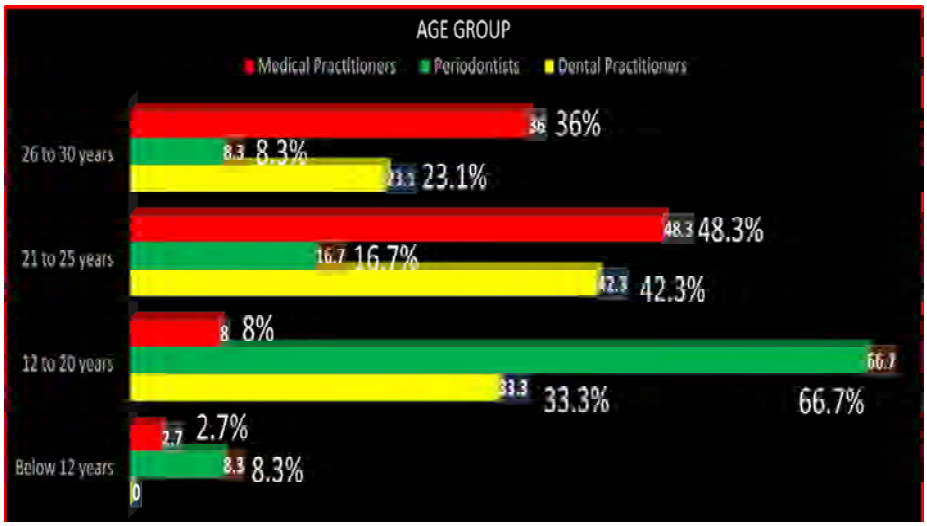
Graph 1c: *Response of professionals regarding the absence of plaque and/or calculus.*



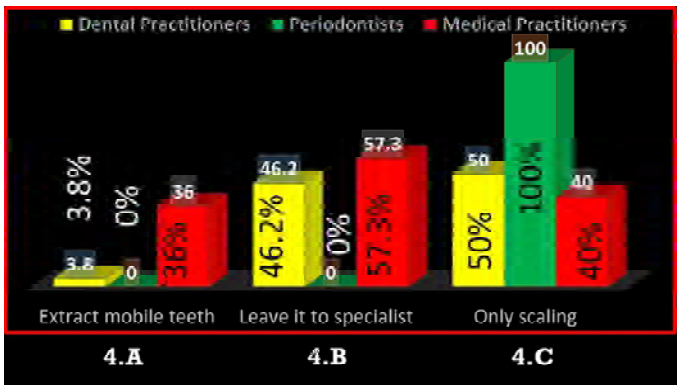
Graph 2a: *Response of professionals about the cause of Aggressive Periodontitis*

Graph 2b: *Responses of professionals regarding the predilection of the disease towards a particular gender.*

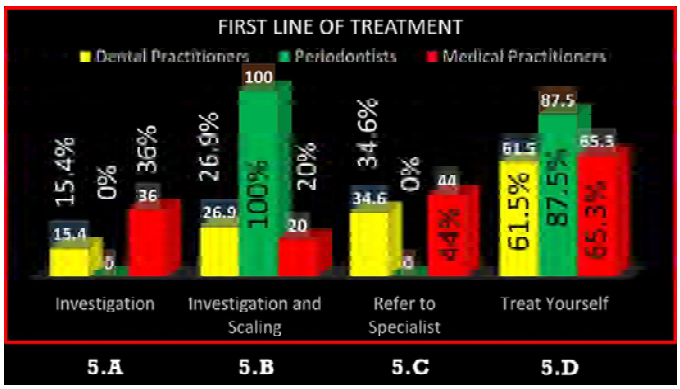
Graph 2c: *Responses of professionals regarding the diagnosis of the said disease entity.*



Graph 3: *Responses of professionals regarding the age group which is more likely to be affected by Aggressive periodontitis.*



Graph 4*: Preferred choice of treatment of the professional.*



Graph 5*: Preferred first line of treatment.*

periodontitis, 48.3% of General Medical Practitioners responded that 21 to 25 years of age group likely to be more affected. Various 66.7% of periodontists cited as the age group of 12 to 20 years to be more affected by aggressive periodontitis. 42.3% of general dental practitioners attributed 21 to 25 years of age group to be more affected by aggressive periodontitis. *(Graph 3).*

36% of General medical practitioners said that they would extract the mobile teeth while 0% General Dental Practitioners and Periodontists said that they would extract the mobile teeth. More medical practitioners that is 57.3% in contrast to 46.2% of general medical practitioners were willing to refer the patient to periodontists *(Graph 4).*

87.5% of general medical practitioners and 61.5% of general dental practitioners expressed that they would like to provide some form of primary care to the patient *(Graph 5).*

Discussion

Aggressive periodontitis is an infectious disease in young subjects harboring an immuno-predisposition to develop the pathology. It is characterized by rapid and severe periodontal destruction in otherwise healthy individuals. Two forms of aggressive periodontitis; localized aggressive periodontitis and generalized aggressive periodontitis have been distinguished based on the number of teeth affected and the distribution of the lesions within the dentition. The presence of Aggregatibacter actinomycetemcomitans (previously named Actinobacillus actinomycetemcomitans) has been correlated with Aggressive periodontitis, including localized aggressive periodontitis in particular.

Aggressive periodontitis is an insidious disease which does not show overt patient perceptible symptoms such as pain. Only when the disease has progressed to its late stages, the patient becomes aware of the disease mostly in the form of mobile teeth.[7] Patients sometimes report these finding to their general physician. Therefore, it is essential for general physicians to be aware and be able to properly diagnose this disease condition.[8]

The awareness of aggressive periodontitis in dental practitioners as compared to Periodontists is almost comparable though Periodontists seem to be more aware of the said disease.

Though many Medical practitioners claimed to be aware about aggressive periodontitis many were not aware of the causes, signs and symptoms, genetic involvement, predeclination towards gender, systemic involvements and primary treatment of the disease. Majority of medical practitioners cited diabetes as an underlying associated cause of the disease which is not the case as the definition of aggressive periodontitis states that there is no underlying systemic involvement in these patients.

Majority of medical practitioners felt that age group of 20 to 25 is more affected which is not the case and their opinion of more male predeclination has not been established through evidence but on the contrary it the is females who are more affected.

These differences show that General Medical Practitioners lack awareness about aggressive periodontitis. Therefore, it becomes necessary for general medical practitioners to be made aware of this disease entity as they are more often than not also the primary health care providers for the general population.

More number of medical practitioners as compared to general dental practitioners were willing to send the patient to a specialist for further treatment. That makes it all the more important for General Medical practitioners to be able to identify these cases. Moreover, general medical practitioners were also keen at providing some form of primary treatment to these patients which would make the patients more co-operative for further periodontal treatment.

Conclusion

Though Medical practitioners are more inclined to refer the patients to the periodontists for the treatment of Aggressive periodontitis; it is imperative that the awareness about diagnosis, etiopathogenesis, clinical signs and symptoms should be spread amongst Medical practitioners.

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Regenerative endodontic treatment: A case report

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Abstract
An immature tooth with pulpal necrosis and apical periodontitis presents a unique challenge to the endodontist. Endodontic treatment options consist of apexification, apical barriers, or more recently, revascularization. With appropriate case selection, regenerative treatment can be effective, providing a desirable outcome. However, there is still no consensus on the optimal disinfection protocol or the method to achieve predictable clinical outcome. This paper presents a case report of regenerative treatment in necrotic immature teeth, using mineral trioxide aggregate (MTA) as coronal barriers which led to successfull clinical outcomes. **(Terna J Dent Sci 2019;5(1):50-54)**

Key Words: Regeneration, endodontics, dental pulp necrosis, platelet rich plasma, stem cells.

Introduction

The purpose of pulp treatment is to maintain the integrity of tooth structure in order to preserve optimal function. Maintaining the vitality of teeth post trauma or dental caries is also one of the purposes of pulp treatment; especially, in case of immature permanent teeth, maintaining the pulp vitality for continuous root development and apical closure and to regenerate pulp-like tissue, ideally pulp dentin complex.

Endodontic treatment of necrotic immature teeth is a challenge to the dentist. Proper preparation and obturation of the apical portion of immature teeth is difficult to achieve because of the thin, fragile dentinal walls and the blunderbuss anatomy.[1] Traditionally, multiple-session apexification using calcium hydroxide was the treatment of choice for such cases.[2] Later one-step apexification by the induction of artificial barriers using materials such as mineral trioxide aggregate (MTA) greatly decreased the frequency of sessions and duration of treatment.[3] However, the disadvantage of both traditional apexification and artificial apical barriers is that neither allows for thickening of the root wall or continued development of the root.

A recently suggested approach is based on creation of an environment that induces root maturation. This approach includes disinfection of the root canal system and use of antibiotic paste as an intracanal medicament. The American Association of Endodontists Glossary of Endodontic Terms defines regenerative endodontics as *"biologically-based procedures designed to physiologically replace damaged tooth structures, including dentin and root structures, as well as cells of the pulp-dentin complex"*. In contrast to the conventional apexification and artificial formation of an apical barrier, revascularization enables root maturation.[4,5] Regenerative Endodontic Procedures (REPs) capture the ability to use stem cells that reside naturally in and around the tooth to extend the life of the tooth. In particular, periradicular tissues of immature teeth are rich in blood supply and contain stem cells that have the potential for tissue regeneration.

Induced bleeding and blood clots are integral parts of these procedures as they provide an appropriate scaffold and sufficient stem cells.[6,7] Platelet-rich plasma (PRP) has also been recommended as a potential scaffold for regenerative endodontic treatments.[8] It has been shown that stimulated platelets release secretory granules that contain a variety of growth factors.[9] PRP releases growth factors rapidly within 7 to 14 hours, which then declines. A second-generation platelet concentrate, platelet-rich fibrin (PRF), was developed by Choukroun et al.[10] PRF has high concentrations of fibrin clots; no supplementary thrombin is needed during its preparation. PRF is formed during a gradual polymerization protocol that incorporates a higher concentration of cytokines into fibrins.[9] Therefore, growth factors meshed in these fibrins are released more slowly between 7 and 14 days.

In this case report, a regenerative procedure using PRF was performed on immature single-rooted teeth with pulp necrosis and then evaluated clinically and radiographically for up to 3 months.

Conflict of interest and source of funding
The authors declare that there is no conflict of interest concerning the contents of the study.
This study has been self-supported by the authors.

Case Report

A healthy 13 yr old male patient was referred to the Department of Endodontics at the Terna Dental College. On clinical examination Ellis Class II fracture and coronal discoloration of 11 were observed *(Fig 1)*. On radiographic examination, 11 were found to have immature root with periapical lesion *(Fig 2)*. The patient recalled a history of an impact trauma of the right maxillary incisor 8 years earlier. Tooth was not responsive to cold test, using Endo-Frost cold spray (Roeko; Coltene Whaledent, Langenau, Germany). There was no traceable sinus tract at that time. The diagnosis of necrotic pulp with asymptomatic apical periodontitis was made.

Regenerative endodontic treatment was initiated after obtaining consent from parents. After obtaining profound anesthesia with 2% lidocaine with 1:80,000 epinephrine (Darupakhsh, Tehran, Iran), the tooth was isolated with a rubber dam and the access cavity preparation was done using a round bur and endo Z bur (Dentsply Maillefer, Tulsa, OK). The working length of canal was determined using an electronic root canal length measurement device and confirmed by taking a digital periapical radiograph. The root canal was irrigated copiously with 20 mL 1.5% sodium hypochlorite (NaOCl) solution for 5 minutes with a 27-G needle followed by

Fig. 1: *Anterior view of the upper incisor*

Fig. 2: *Pre-operative radiograph of the upper incisor*

Fig. 3: *Radiograph after calcium hydroxide placed and temporary placement in 11*

Figu. 4a, 4b: *Blood collected in sterile tubes from the medial cubital vein*

Fig. 5a, 5b: *The sterile tubes centrifuged at 3000 rpm for 10 minutes*

Fig. 7a, 7b: *The small pieces of PRF clot were placed in the root canal*

Fig. 6: *Removal of PRF clot from test tube*

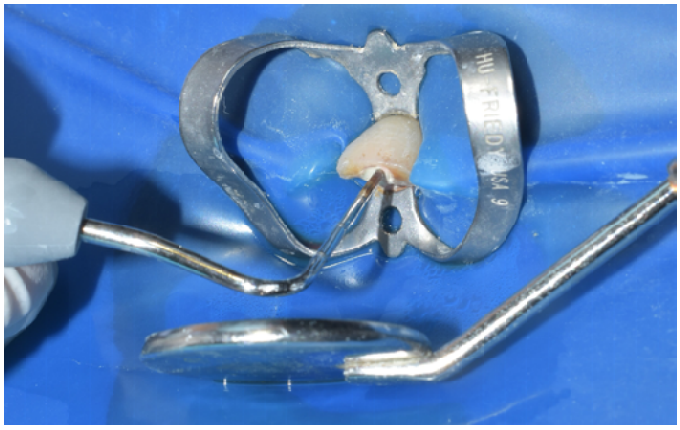

Fig. 8a, 8b: *MTA placement*

Fig. 9: *GIC barrier placed*

Fig.10: *Immediate radiograph of 11 after composite restoration done*

Fig. 11: *Radiographs at 3 months follow-up*

20 mL normal saline for 5 minutes. The canal was then dried with paper points. Calcium hydroxide was placed into the canal ensuring that the mixture remained below the cementoenamel junction. The pulp chamber was then filled with 3–4 mm of Cavit (3M ESPE Dental Products) and the patient was dismissed for 2 to 3 weeks *(Fig 3)*.

In the next visit, the patient was asymptomatic. Local infiltration anesthesia was performed with 3% plain mepivacaine, without vasoconstrictor to facilitate bleeding as suggested by Petrino.[11] The calcium hydroxide was washed out with 20 mL 17% Ethylenediaminetetraacetic acid (EDTA) and the root canal was dried with paper points. Bleeding was induced by inserting a needle beyond the apex. For the PRF preparation, 10mL of the patient's whole blood was collected in sterile tubes from the medial cubital vein from the patients left arm *(Fig 4a, 4b)*. The tubes were centrifuged for 10 minutes with a speed of 3000 rpm (REMI Model R 4c, India) *(Fig 5a, 5b)*. Three layers were formed inside each test tube: a base layer containing erythrocytes, an intermediate layer of PRF clot and a surface layer of acellular plasma. The PRF clot was removed from the test tube with the help of sterile tweezer *(Fig 6)* and placed on glass slab. It was then immediately sectioned into pieces using sterile scissors and gently condensed into the canal of #11 using size 3 and 4 endodontic machtou pluggers (Dentsply Maillefer Ballaigues) until the cementoenamel junction and the coronal part of the canal was sealed with white mineral trioxide aggregate (MTA; ProRoot MTA, Dentsply) over the blood clot *(Fig 7a, 7b and 8a, 8b)*. A moist cotton pellet was placed over the MTA in the access cavity, and the tooth was temporarily restored with cavit. One week later, the patient was recalled to ensure the setting of MTA, glass ionomer cement restoration of 3–4 mm thickness was placed over the MTA *(Fig 9)* and permanent restoration of the tooth was performed with composite resin *(Fig 10)*.

After three months follow-up there were no signs or symptoms *(Fig 11)*.

Discussion

PRP is a first-generation platelet concentrate with an autologous platelet concentration of 1–2 million/mL after centrifugation.[11] It constitutes of growth factors such as platelet-derived growth factor (PDGF), transforming growth factor (TGF-â), insulin-like growth factor (IGF), vascular endothelial growth factor (VEGF), epidermal growth factor, and epithelial cell growth factor. These growth factors get released during the degranulation of alpha granules in platelets and eventually stimulate proliferation of stem cells that induce tissue formation.[12,13]

PRF is a second-generation platelet concentrate. It consists of a mixture of glycan chains, cytokines and structural glycoproteins enmeshed within a slowly polymerized fibrin network. PRF consists of a 3D architecture, containing various growth factors such as PDGF, TGF â1, VEGF, and IGF.[14] These growth factors can stimulate scaffold remodeling and dental pulp stem cells that can result in angiogenesis and pulp tissue formation.[15] PRF consists of 210-fold higher concentration of platelets and fibrin.[16] The advantages of PRF over PRP are ease of preparation and the absence of biochemical handling of blood. Moreover, PRF is strictly autologous since it requires no addition of external anticoagulants.[17]

The success rate of regenerative endodontics is relatively high if the procedure is done properly and the patient is compliant. Murray et al show a success rate of upto 90%. The rate of root maturogenesis is variable because of unique individual immune systems.[18]

In this case, calcium hydroxide is used as an intracanal medicament. According to Ruparel and Teixeira FB, calcium hydroxide can be used as the intracanal medicament, which will properly disinfect the canal space and stimulate proliferation of SCAPs without causing any severe allergic reactions or staining.[19] Triple antibiotic paste (TAP) are also used but according to Kim et al it can be toxic to living tissue in such high concentrations.[20]

17% ethylenediaminetetraacetic acid (EDTA) was used at the second appointment to promote survival of the stem cells and assist with adhesion of the stem cells on the dentin.[21] EDTA is a chelating agent and decalcifies the surface of the root canal dentin to expose its collagen fibers, promoting differentiation of the stem cells which is vital in the regenerative procedure.[22]

Blood contamination was shown to exacerbate the color change using white MTA, which happens due to the blood clot which forms the scaffold of the regenerative procedure.[23]

In this, even though there were minor discolorations, the treatment showed a resolution of symptoms. Although root lengthening was not consistently evident, further long-term follow-ups (more than 36 months) are required to achieve a better results in terms of root lengthening.

Conclusion

REPs have emerged as viable alternatives for the treatment of immature teeth with pulpal necrosis. Developments in regeneration of a functional pulp-dentin complex have a promising impact on efforts to retain the natural dentition: the ultimate goal of endodontic treatment. Future in regenerative endodontics is very promising owing to the discoveries and advancements in scaffold technology.

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Alternate technique to enhance stability in Single dentures opposing natural dentition

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Abstract
While fabricating a Single denture, it is challenging to adjust the occlusal plane with the opposing natural teeth. The primary requirement to achieve adequate stability in Single dentures is to establish the harmonious occlusion. This case report mentions a technique to use Broadrick's Occlusal Plane Analyzer & Putty template to adjust the occlusal plane and achieve stability in dentures. This method eliminates the risk of arbitrary grinding & reduces the errors in intraoral reduction of opposing natural teeth.

(Terna J Dent Sci 2019;5(1):55-57)

Key words: Broadrick's Occlusal Plane analyzer (BOPA), stability, Single Dentures

Introduction
The incidence of one edentulous arch opposing a healthy natural or restored dentition is a rarity. In such cases, the clinical challenge is to produce & maintain the conditions necessary for long-term treatment success. Every individual case will have its own conditional problems, so similar appearing conditions do not always dictate the same treatment. Single dentures should not be confused with the tooth-supported complete dentures or complete dentures as those have different philosophy.[1–3] ***Single Denture*** (S.D.) is a prosthesis, which replaces the lost natural teeth & its associate structure functionally & esthetically as a single unit, which opposes all or some of the natural teeth.[4]

S.D. is also called as a prosthesis, which replaces the teeth & associate structures of either maxilla or mandible & is opposed by natural dentition with or without fixed or removable partial denture in the opposing arch. [4]

Conflict of interest and source of funding
The authors declare that there is no conflict of interest concerning the contents of the study. This study has been self-supported by the authors.

Broadrick's Occlusal Plane Analyzer:[5–7]
Broadrick's Occlusal Plane Analyzer (BOPA) can be attached to any type of semi-adjustable articulator that can accept a facebow. BOPA has been used in reproduction of Curve of Spee and stable occlusal contacts in full mouth rehabilitation cases. This same principle can be applied in Single denture cases too.

George Monson proposed that the mandibular teeth are arranged too close around a sphere of 4-inch radius, with the mandibular incisal edges & cusp tips touching the sphere, thus permitting protrusive & lateral excursions free from posterior interferences.[8]

The irregular occlusal plane of every individual case in S.D. is the commonest and critical problem. To achieve harmonious occlusion in these cases is the ultimate success. This article describes an innovative combination method wherein the occlusal plane is adjusted with use of BOPA & Javid - Esquivel's Putty template method. So, this alternate technique allows guided intraoral reduction, eliminates arbitrary grinding and achieves best of the stability in Single dentures.[9]

Case report
A 62 yr old male patient reported to Dept of Prosthodontics, Terna Dental College, Nerul, Navi Mumbai, to get his maxillary dentures replaced for the purpose of mastication. Examination revealed that the maxillary denture didn't have stable occlusal contacts with the remaining natural teeth. The dentures were improper in fit too. Due to this, the patient's intake of diet was unsatisfactory. Intraoral examination showed upper edentulous arch & a few anterior teeth missing in the lower arch. The remaining mandibular natural teeth were all in good condition. The case was planned to fabricate maxillary Single denture & mandibular interim removable partial denture.

***Fig. 1**: Due to attrition of canine, the disto-incisal point angle is used as anterior survey point (**asp**)*

***Fig. 2**: Distobuccal cusp of third molar is used as the posterior survey point (**psp**)*

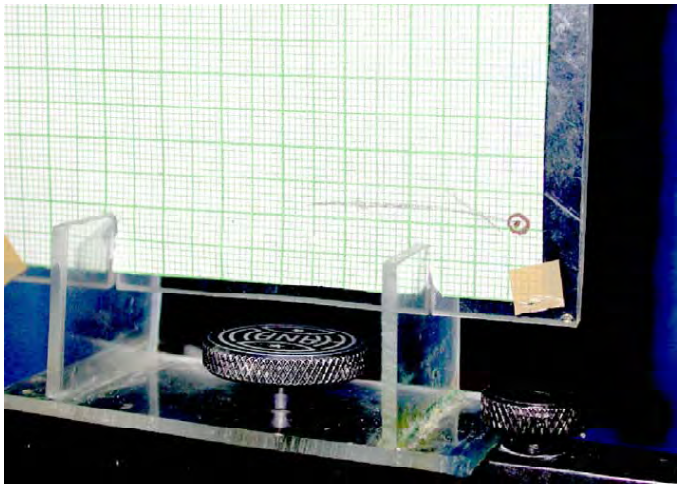

***Fig. 3**: Occlusal plane survey center (**opsc**) can be shifted 10-mm anteriorly to establish a favorable occlusal plane*

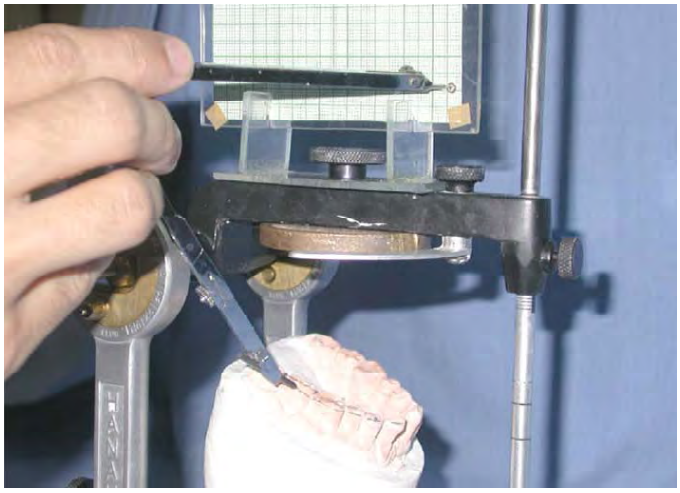

Fig. 4**: Marking the acceptable occlusal plane through **opsc

Preliminary impressions were made for both the arches & primary casts were prepared. Final impressions of maxillary & mandibular arches were made & orientation relation was recorded with the help of Face-bow & transferred to Hanau Articulator (model #190-291101, Teledyne Waterpick, USA). The mandibular cast was mounted with a tentative centric record.

The Broadrick's Occlusal Plane Analyzer (BOPA) was secured to the upper member of the articulator & graph paper was snapped onto one side. Bow compass was adjusted to 4-inch radius for marking survey lines. Anterior survey point (ASP) was than selected from cusp tip to disto-

***Fig. 5**: Guided intraoral reduction done by putty template*

incisal line angle of mandibular canine. ASP was taken as disto-incisal line angle. An arc of 4-inch radius was scribed on the flag *(Fig 1)*.

Posterior survey point (PSP) was selected on disto buccal cusp of distal molar *(Fig. 2)*. If position of this tooth were deemed unacceptable, anterior border of condylar element on articulator could be selected. PSP was taken as disto buccal cusp tip of third molar. An arc was drawn on the graph with ASP & PSP & point of intersection determines the occlusal plane survey center (OPSC). It can be altered 1cm forward in order to establish an acceptable plane *(Fig 3)*.[6,7] A line was scribed from the OPSC onto the mandibular teeth *(Fig 4)*. Similarly, line was scribed on other side of the cast.

Fabrication of Poly-Vinyl Siloxane Putty template was done by adapting over mandibular cast. After putty sets it was trimmed with a sharp knife up to the marked plane.[9] The template was removed from the cast & placed intraorally for achieving a harmonious occlusal plane. The portions of teeth that were protruding through the template were reduced with the use of diamond points in a high-speed air rotor hand piece *(Fig 5)*. Fluoride application was followed after the mouth preparation stage.

Teeth arrangement according to the corrected occlusal plane & try-in was done. Care was taken to check the retention and stability of the Single Denture. Later the maxillary Single Denture & mandibular removable partial denture were processed using heat cured poly-methylmethacrylate resin. The dentures were polished & denture insertion was done.

Discussion[1,3,9–11]

The Single Denture patient is usually younger than Complete denture wearer & can tolerate & adapt to dentures more readily. Various techniques have been mentioned in the literature for modifying the occlusal plane prior to denture fabrication. The first of the methods was originally mentioned by Swenson. The next popular techniques to be followed were by Yurkstas, Bruce, Vig and Boucher.

It is always a challenge to achieve success in S.D. as we face problems like cross-bite relationship, irregular occlusal plane, mesially drifted teeth and overall the stresses applied on edentulous ridges through the opposing natural teeth are detrimental. In few cases achieving bilateral balanced occlusion and stability becomes a difficult situation. The required adjustments that may be necessary could be planned while fabricating Single Dentures. Prosthodontic management includes narrowing the cuspal inclines & width of natural teeth, directing the occlusal forces to increase the stability of Single dentures and reduce the working side interferences.

The decision to make a single denture should not be considered lightly, as the procedure is not one that takes half as much time and effort compared to making of complete dentures. Careful observation and recording of all the diagnostic information must be considered before a decision is reached to construct a single denture. Utmost care and time has to be devoted while fabricating a Single denture as what is given for making a pair of complete dentures. So this article mentions an easy & authentic technique of establishing the Occlusal Plane. The opposing natural teeth are properly reduced intraorally with the help of guided Putty template which makes this technique unique.

Conclusion

The patient requiring a Single denture opposing a natural or restored dentition challenges the clinician even more than the completely edentulous patient does. This article presents a technique of using Broadrick's Occlusal Plane Analyzer (BOPA) & Putty template to provide favorable occlusal plane & minimize guesswork.

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Evaluation of oral hygiene and perception of patients undergoing orthodontic treatment attending OPD at Terna Dental College, Nerul, Navi Mumbai

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Key words: Fixed orthodontic treatment, oral hygiene

Abstract

The aim of this study was to evaluate oral health awareness and hygiene practices among patients undergoing fixed orthodontic treatment. A total of 500 patients in the age group of 15-35 years who had permanent dentition were selected using random sampling technique. A self-administered structured questionnaire including 15 multiple choice questions was given to them. The results were analysed using percentages. The results of the study showed that nearly 62% patients did not follow the oral hygiene instructions, and despite being given instructions, most of them hesitated in practicing them consistently. An excellent finding was that all the patients used the toothbrush as an aid to clean teeth. The knowledge and attitude of patients towards oral hygiene among orthodontic patients was minimal. Non-maintenance of oral health practices can be due to many factors; to name a few, may be ignorance and lack of motivation. Hence, intense oral hygiene programs should be established and should be inspected in the future.

(Terna J Dent Sci 2019;5(1):58-61)

Introduction

Oral health is the window to systemic disease. Sometimes, systemic diseases remain undiagnosed or untreated because of this missing oral hygiene awareness.[1,2] Oral hygiene is important to maintain healthy dentition and oral cavity and prevent caries, halitosis, xerostomia, cold sores and tempromandibular disorders.[3] Orthodontic treatment has great impact on dentofacial complex. Thus, it is a widely practiced branch of dentistry.[4] Majority of the people don't brush teeth regularly after principal meals. Thus, there is food lodgement.[5] According to previous studies there is a rapid fall in oral hygiene compliance after the initial bonding, and the appliance favours plaque build-up and it is a hindrance to the hygiene practice like tooth brushing and flossing.[6] This can even lead to gingivitis. Enamel decalcification may occur due to plaque build-up around the bracket base. Orthodontic patients are advised to rinse two times a day with 20 mL of Listerine as an adjunct to brushing and flossing.[7] Demineralization generally follows fixed orthodontic treatment, if oral hygiene is not maintained.[8] The reason for this are the bacteria's acidic residues in the plaque and it has a negative impact on aesthetics.[9] This study aims to assess the oral health awareness amongst orthodontic patients of Terna Dental College and to provide insight into oral hygiene awareness program.

Conflict of interest and source of funding

The authors declare that there is no conflict of interest concerning the contents of the study.

This study has been self-supported by the authors.

Materials and Methods

The study sample consisted of 500 patients, 15-35 years of age attending orthodontic OPD at Terna Dental College and Hospital, Navi Mumbai. A pilot study was initially conducted with 10 patients. They were asked to answer many questions relating to oral hygiene awareness. Furthermore, irrelevant questions were omitted. Worthy questions were used the in main study. A self-made questionnaire was prepared consisting of questions which aided to assess oral hygiene awareness. Out of the 15 questions, 5 are related to knowledge, 5 are related to attitude and 5 are related to practice. After approval from concerned authorities, the preformed questionnaire was handed over to the subjects. They were explained the purpose of the study. After collection, the data was analysed using percentage.

Questionnaire

The present survey was conducted by simple random sampling method among 500 orthodontic patients from the Department of Orthodontics and Dentofacial Orthopaedics, Terna Dental

College, Navi Mumbai, Maharashtra, India. Male and female patients were asked closed-ended questions. To assess awareness towards practices of oral hygiene in patients undergoing fixed Orthodontic treatment, questions were given with answer choices that were easily understandable and brief. All the doubts that the participants had were clarified. All answers were kept confidential. Patients who completed their minimum of 3 months of orthodontic treatment were included. The study was conducted from October 2017 to October 2018, which consisted of 15 questions assessing the awareness of oral health and the attitude of orthodontic correction-seeking individuals.

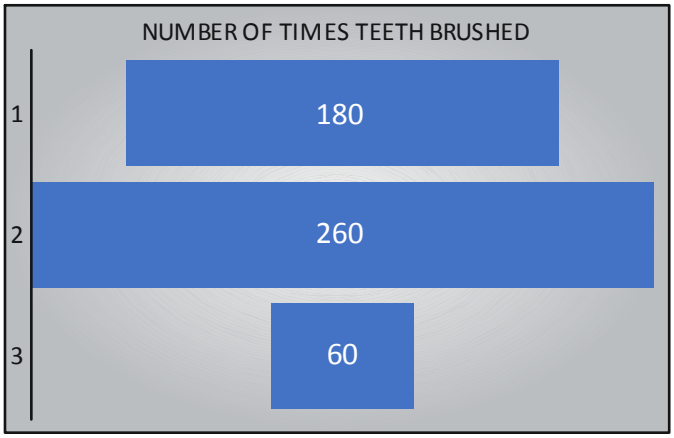

Fig. 1: *Number of times samples brushed their teeth*

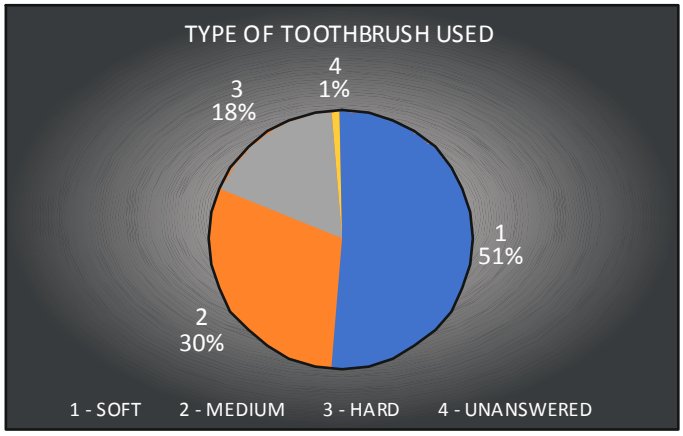

Fig. 2: *Type of toothbrush used*

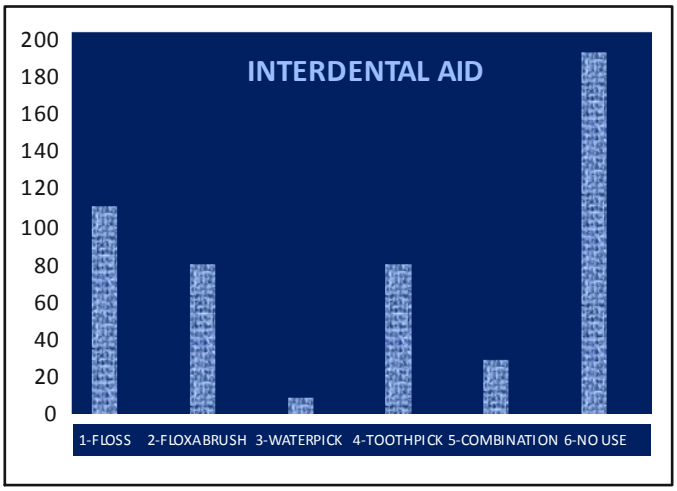

Fig. 3: *Type of inter-dental aid*

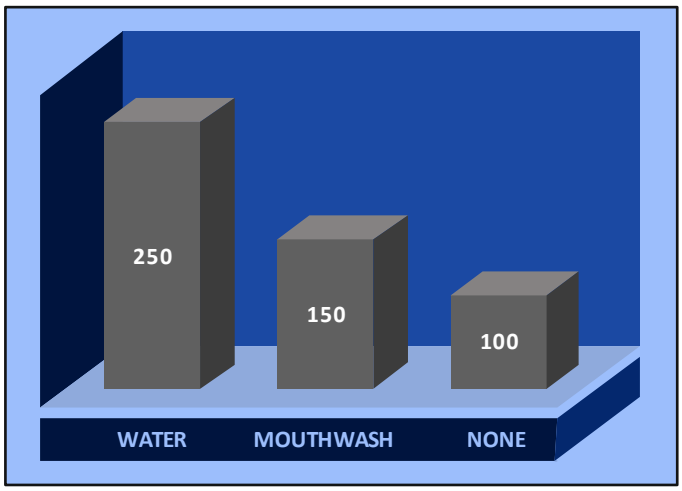

Fig. 4: *Rinsing material used*

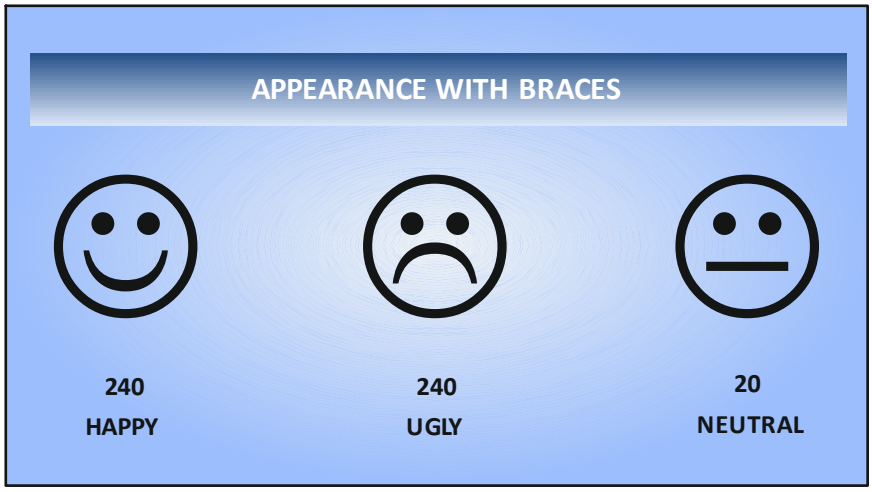

Fig. 5: *Appearance with braces*

Ethical clearance

Ethical clearance was obtained from the institutional review board of Terna Public Charitable Trust Dental Hospital (TPCT) Ethical Committee. All answers were collected and recorded. All recorded data were analysed using percentage.

Results

In this survey, 65% were males and 35% were females. 100% of total sample used tooth brush as a method to clean their teeth *(Fig 1)*. 36% of them were brushing once a day, 52% brushed their teeth twice a day, 12% were brushing thrice a day. 52.6%, 40%, 7.2% used soft, medium, hard material toothbrush respectively. 0.2% did not answer the question *(Fig 2)*. 62% of the patients used inter-dental aid to clean the proximal areas in which 16% used inter-dental brush, only 22% showed evidence of using dental floss, 16% used toothpick which should not be used, 2% used water-pick which is often recommended, 6% used combination of floss, inter-proximal brush and water pick which is the best approach *(Fig 3)*. Only 16% used mouth wash and 74% rinsed with water post meal, 10% did not rinse *(Fig 4)*. 48% were ok with their appearance with braces, 48% felt that they looked ugly, 4% did not answer the question regarding their appearance *(Fig 5)*.

Discussion

Oral hygiene is highly neglected in developing country like India. Preventive oral health knowledge and its implementation are the important ways of keeping our oral cavity healthy. Hence, in this study attempts were made to evaluate preventive oral health knowledge and its implementation by patients undergoing orthodontic treatment in Terna Dental College, Navi Mumbai. 100% patients in this study used toothbrush for brushing, which was better than the study conducted in the Department of Orthodontics and Dentofacial Orthopaedics, Rural Dental College, Loni, Maharashtra where 91.33% used toothbrush.[4] In a study for assessment of Oral Hygiene awareness in Geriatric patients, 70% uses toothpaste, 10% indicated use of neem stick and 20% used tooth powder with finger.[10] The percentage of subjects brushing their teeth twice daily is 44 % which is quite good as compared with 23% of the geriatric patients at Vyas Dental College and Hospital, Jodhpur but very less as compared to 75% of the elderly.[11] This suggests that geriatric patient's frequency of brushing teeth is greater. Reason may be due to more amount of time for oneself in retired life. In this study, 22% used floss as interdental aid which is poor finding as compared to Hamilton who

Questionnaire

Questionnaire (Oral Hygiene in Fixed Orthodontic Patients)		
Name -		Age -
Gender -		Occupation -
Address -		
Socio-economic status - Upper class/Middle class/Lower Class		
1.	Do you brush your teeth?	Yes/No
2.	If yes, then how many times ?	1/2/3
3.	Which material do you use to brush your teeth ?	Tooth Paste/Neem Powder/Salt
4.	What tool do you use to brush your teeth ?	Tooth Brush/Finger/Else
5.	If brush, then what type of brush ?	Soft/Medium/Hard
6.	What direction do you brush in ?	Straight/Horizontal/Vertical
7.	Do you change your brush often ?	Yes/No
8.	If yes, then in how much time ?	After 3 months/6 months/1 year
9.	Do you use any tool to clean between your teeth ?	Yes/No
10.	Do you use any of the following ?	Floss/Toothpick/Inter-dental/Brush/Water pick
11.	Do you rinse after eating food ?	Yes/No
12.	If yes, then with what?	Water/Mouth Wash
13.	Have you ever had malodour ?	Yes/No
14.	Have you ever brushed very forcefully ?	Yes/No
15.	Do you think your teeth look ugly with braces ?	Yes/No

cited 44% of the subjects studying in north eastern Ontario used dental floss.[12] In contrast, subjects at Rural dental college only 6% subjects used floss.[4] Reason for this may be the significant oral hygiene awareness programs that were carried out in Canada. This emphasizes the urgent need for educating and motivating the public to use this efficient method for oral health care in rural region. Furthermore, 90% subjects used to rinse after meals. It is much better than 39% of the sample population rinsing their mouth after eating food in Rural dental college. Out of 90%, 16% subjects used mouth wash and 74% patients used water. They used it to treat malodour. Furthermore, 48% reported halitosis.

This study is in contrast with that of an epidemiologic survey of the general population of Japan where 24% of the individuals examined had complained about halitosis.[13,14] Cost of mouth wash can be the reason for its less use. Regarding other oral hygiene practices, in a study by Kallio *et al*[14] only 31.5% used mouthwash as an oral hygiene aid while in this study, only 31.33% of the individuals used mouthwash in their oral hygiene practice and 22.66% of the individuals used interdental toothbrush. Participants who received a post-treatment communication reported higher level of oral hygiene compliance than participants in the control group. 46% of subjects experienced malodour and 54% are aware that their teeth look dirty.[10] The need for educating and motivating orthodontic patients on oral hygiene was elicited by the end of the study.

Conclusion

It is the need of an hour to establish and demonstrate a connection between good oral hygiene and its relation directly to overall health. We, as dentists, will have to keep reinforcing the importance of brushing and flossing along with the importance of regular check-ups. "Prevention is always better than cure". Adding mouthwashes like Listerine as an adjunct to oral hygiene regimen may have positive effect on orthodontic patients in maintaining hygienic oral environment, thus reducing the likelihood for development of white spot lesions and gingival inflammation. To create oral hygiene awareness, various public health awareness programs through mediums such as camps, media, news and awareness events in public areas like railway and bus stations are encouraged. Such innovative methods of reaching the public not only ensure a healthy individual but overall a healthy society.

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Evaluation of self-medication practices among dental interns of Terna Dental College, Nerul, Navi Mumbai

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Key words: Awareness, dental students, self-medication

Abstract

The concept of self-medication which encourages individuals to look after minor ailments with simple and effective remedies has been adopted worldwide. This study was undertaken to assess such practices among dental interns of Terna Dental College, Nerul, Navi Mumbai. A descriptive cross-sectional survey was conducted among dental interns using a self-administered validated questionnaire written in English. Questionnaire included demographic information, practice of self medication, reasons and types of medicine used, source of information etc. The study comprised of 100 interns with mean age of 22.43±1.2 years. 100% of the subjects accepted that they have used medicines of their own without consulting a doctor in the preceding one year to treat illness. 50% of the interns accepted that they go for self-medication routinely for conditions such as fever, headache, stomach ache etc. This observation among dental interns is possibly due to their education on drug use and related pharmacology; however, as this knowledge is incomplete in certain aspects as it may sometimes lead to adverse outcomes.

(Terna J Dent Sci 2019;5(1):62-65)

Introduction

In most societies, a person suffering from physical discomfort or emotional distress has a number of ways of helping himself or seeking help from other people. One of such means is by self-medication. Self-medication is the taking of drugs, herbs or home remedies on one's own initiative or on the advice of another person without consulting a doctor.[1] According to Chang, Trivedi and Porteous *et al.*,[2] self-medication when practiced correctly can save time and is economical to patients where professional care is relatively expensive and not readily available, thereby making the former an apparent choice.

The concept of self medication which encourages individuals to look after minor ailments with simple and effective remedies has been adopted worldwide [3-6]. Evidently, there has been an increasing interest to gauge the self medication trends in a developing country like India[7,8] owing to the availability of a wide variety of over 7000 drugs at local chemist shops and a skewed doctor-population ratio coupled with a lack of awareness and literacy on proper medicine use. In a bid to save time and due to limited availability of financial resources, the concept of self-medication is quite rampant among adolescents and college-going students[9,10] with drug use and abuse being promoted among peer groups.[10-12]

There is a lot of public and professional concern about the self medication. The menace of self-medication prompted World Health Organization to select the World Health Day theme for the year 2011 as "combat drug resistance-no action today, no cure tomorrow" in order to skirmish drug resistance by involving policy makers, planners, public, patients and finally the pharmacists and pharmaceutical industry.[13]

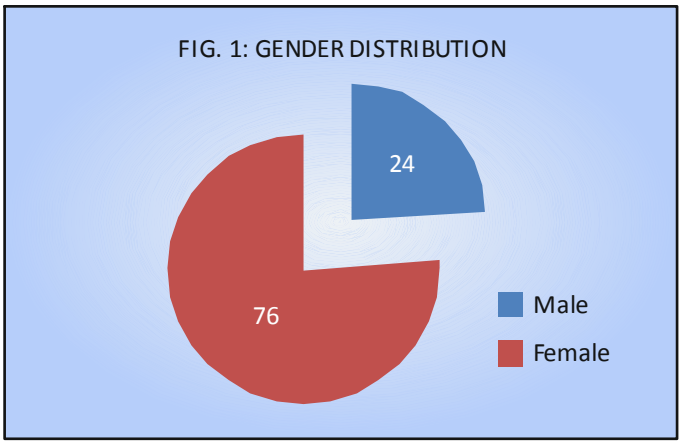
A major short fall of self-medication is the lack of clinical evaluation of the condition by a trained medical professional which could result in missed or delayed diagnosis, delays in appropriate and effective therapy, increased inorganic risks due to inadequate drug therapy or of unnecessary expense and drug interaction between prescription and non-prescription drugs.[14-17] This negates the principle of the rational use of antibiotics and herald danger for organisms developing resistant. Irrational drug combinations and indiscriminate use of drugs like antibiotics have led to the evolution of Multi-Drug resistant bacterial strains in India, a prime example of the recent New Delhi Beta Lactamase strain.[18]

Health workers are societal role models. Self-medication by health workers could

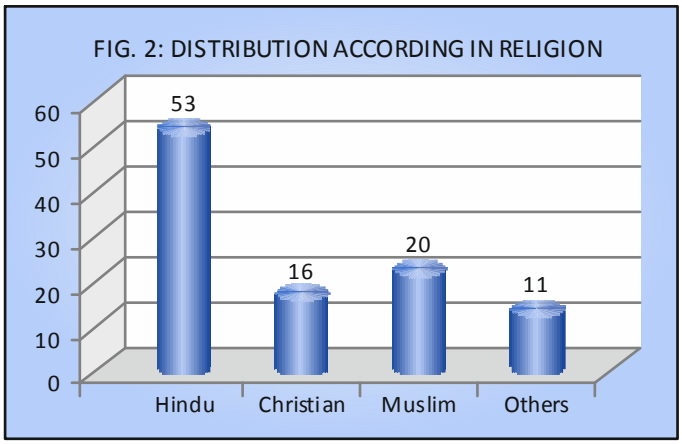
Conflict of interest and source of funding

The authors declare that there is no conflict of interest concerning the contents of the study.

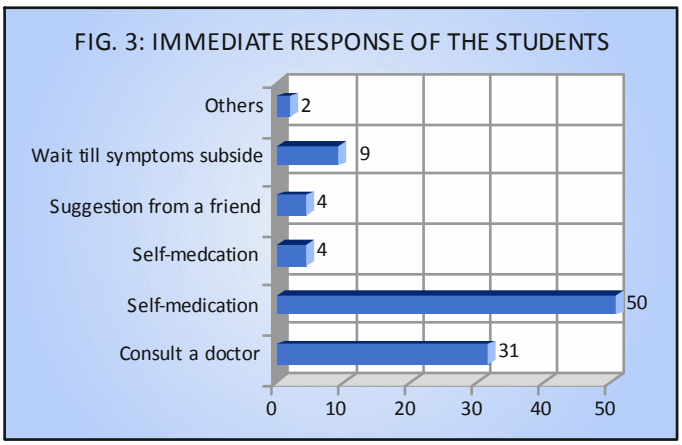
This study has been self-supported by the authors.



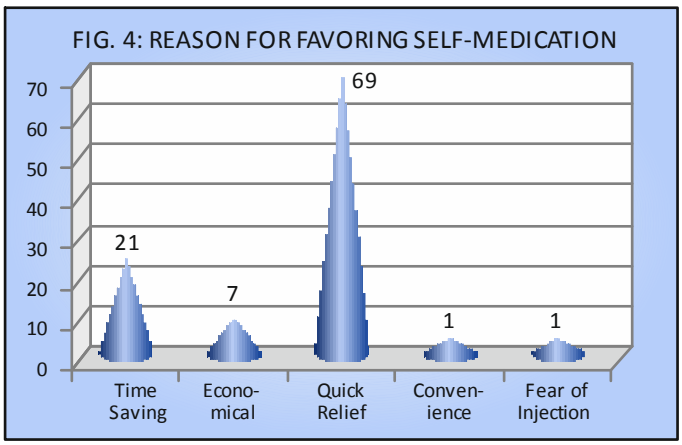
Graph 1: *Gender distribution*



Graph 2: *Distribution according to religion*



Graph 3: *Immediate response of the students*



Graph 4: *Reasons for favouring self-medication*

result in an extraordinarily negative impact in the society. Studies have shown many reasons for the increased likelihood of self medication among medical students.[19] These students have easy access to information from drug indices, literature, self diagnose and self medicate. In addition, they have easy access to the medication itself through physician samples provided by pharmaceutical representatives, and "The White Coat" guarantees trouble free access to drugs available in pharmacies.[19]

Studies on self-medication have been conducted on university students, medical, pharmacy and other professional students[14,21-25]. There are fewer studies on self medication among dental students. Hence this study had been undertaken to assess the prevalence of self medication and its profile among dental students in Terna Dental College, Nerul, Navi Mumbai.

Methodology

A descriptive cross-sectional survey was conducted among dental Interns from Terna dental college, Nerul, Navi Mumbai, using a self-administered structured questionnaire. Questionnaire was designed and written in English; and validated through a pilot survey. All the interns were included in the survey. Ethical clearance was obtained through Institutional review board. Study was conducted in the month of October 2018.

The questionnaire included demographic information age, gender and questions regarding prevalence of self medication, reason and source, conditions for which self medication was used, commonly used drugs for self-medication, frequency etc.

The students were asked to respond to each item according to the response format provided in the questionnaire. The students received a full explanation of how to fill in the questionnaire. Furthermore, the investigator was always available during the completion of the questionnaire and the participants were encouraged to approach the investigator whenever they needed clarification of any point. The students, who were asked to fill in the questionnaire without discussion with each other, took an average of 15 minutes to complete the procedure. Anonymity of the respondents was assured. Participation was voluntary and no incentive was offered. Informed consent was obtained from the students before commencement of the survey.

Statistical Package of Social Sciences (SPSS version 17.0. Chicago: SPSS Inc.) was used for data analysis. Descriptive statistics was done and results were presented in tabular and graphic forms.

Results

Demography:

A total of 100 dental interns participated in the study in which 24% were males and 76% were females *(Graph 1)*. Mean age of participants was 22.43±1.2 years. Distribution according to religion showed that 53% were Hindus, 20% were Muslims, 16% were Christians *(Graph 2)*.

Immediate response of the students when they fall sick.

All the participants accepted that they have used self medication at least once in previous one year. *Graph 3* represents the data regarding immediate response of the students when they fall sick. Majority of the students opted for self medication (50%), followed by consulting a doctor (31%).

Reasons for opting self-medication

The most common reasons cited for self medication was quick relief (69%) followed by time saving (21%). Economical, fear of injections and convenience were the other reasons *(Graph 4)*.

Conditions for self-medication:

There were several reasons quoted by interns. Most common reason were headache (82%), fever (70%), cough, cold, sore throat (69%) and stomach ache (61%). Pertaining to oral heath, most common indications were tooth ache, halitosis and stained teeth *(Table 1)*.

Drugs used as self-medication

Table 2 represents the data pertaining to drugs used as self medication. The most common drugs were analgesics (68%), antibiotics (54%) and antipyretics (48%).

Frequency of use

About 58% of the students under study practiced self-medication 2-3 times a month. While 20% of them practiced self-medication once in 2-3 weeks.

Source of information regarding the self-medication used

Textbook and related materials (30%), Physicians (34%), family and relatives (19%) were the major sources of information. Internet, advertisements, health magazines and senior friends were other sources mentioned by the participants *(Table 3)*.

Table 1: Conditions for which self-medication was used commonly

Condition	Percentage
Headache	82
Cough, cold, Sore throat	69
Fever	70
Stomach ache	61
Ear problems	24
Vomiting	27
Eye infections	22
Skin problem	24
Diarrhoea	12
Menstrual symptoms	11
Tooth ache	89
Halitosis	78
Stained teeth	67
Periodontal problem	23
Mouth ulcers	67

Table 2: Commonly used drugs for self medication

Drugs used as self-medication	Percentage
Analgesics	68
Antibiotics	54
Anti-pyretic	48
Antacids	29
Anti-diarrheal	15
Sedatives	6
Ophthalmic preparations	7
Anti-allergic	19
Cosmetic products	13
Home remedies	32
Others	12

Table 3: Source of information regarding self medication

Source of Information	Percentage
Family and Relatives	19
Seniors and friends	14
Physicians	34
Pharmacist	10
Textbook and related materials	30
Others	5

Discussion

Self-medication is a prevailing problem among health-care students.[1,4,12-17] It has grave consequences because it can influence their future professional decisions.[15] It may also affect the student's ability to counsel the patients regarding best health-care practices.

The prevalence of self-medication is 50% in the present study. This could be attributed to the white coat,[20] which signifies the professional look and thus facilitates easy purchase of drugs without prescription. Unlike in some of the developed countries[21] where stringent rules are applied to dispense the drugs, in many developing nations including India it is easier to procure drugs off the counter. This is also seen as a reason that students in our study could indulge in the practice of self-medication without check. A few studies[16,22] reported that the presence of pharmacology as a subject in the undergraduate curriculum could have led some students to opt for self-medication. Aditya et al[23] also reported a high prevalence of self medication among House Surgeons. This could be due to higher level of knowledge of medicine and greater exposure to drugs among the House Surgeons.

Quick relief was the most common reason cited by the respondents to use self-medication. However, it is observed that preferring self-medication for minor illnesses might lead to self-medication of prescription drugs, intake of excessive or inadequate doses, misdiagnosis and delay in seeking professional care.[2] In agreement with various studies,[6,4,14,24] head-ache, common cold, sore throat and fever were the most common indications of self-medications cited by our respondents.

As stated earlier, analgesics, antibiotics and antipyretics were used by the majority of the students in our study for self-medication. It is a known fact that medical knowledge increases the prescribing behaviour of medical students.[2] But inappropriate use of these

groups of drugs can lead to various side-effects such as a reduction in the ability of oral flora to resist the colonization of detrimental micro-organisms,[25] addiction, gastric irritation, liver toxicity and rebound head-ache syndrome. Therefore, such kind of practice should be discouraged.

Limitations

The present study included only dental interns. Aspects such as educational background of family, socio-economic standards, urban/rural culture, beliefs in different systems of medicine and gender-based differences were not evaluated in our study. Further studies considering such factors will be helpful in assessing the reasons for self-medication behaviour.

Conclusion

Study showed that there is high prevalence of self medication practice among dental interns. Regulations should be made to sensitize the health care students regarding the ills of such practice. The concerned authorities should frame certain policies such as continuous monitoring of dispensaries/ drugstores to issue drugs only on proper prescription and accounting should be mandatory for every purchase made by the consumer.

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Management of ridge defect with Ovate pontic site preparation

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Abstract
The design of the prosthetic tooth will be dictated by aesthetics, function, ease of cleaning, maintenance of healthy tissue on the edentulous ridge and patient comfort. An ovate pontic has been recommended to fulfil both aesthetic and functional requirements. The convex design of this pontic was intended to form a concave soft tissue outline in the site of the alveolar ridge mucosa. Clinically healthy conditions can be established at pontic sites if appropriate plaque control is performed. As the ovate pontic suffers from certain disadvantages, the modified ovate pontic design was developed to circumvent the problems encountered with the ovate pontic.

(Terna J Dent Sci 2019;5(1):66-68)

Key words: Pontic, ovate pontic, modified ovate pontic.

Introduction

The restorations of edentulous areas with fixed partial dentures (FPDs) present a particular challenge for the clinician. Because of their ease of use and favorable long term results, conventional FPDs represent the most popular treatment measure today. In these restorations, the pontic must fulfill the complex roles of replacing the function of the lost tooth, achieving an esthetic appearance, enabling adequate oral hygiene and preventing tissue irritation. In addition, the pontic must meet certain structural requirements to ensure the mechanical stability of the restorations.[1]

In the anterior region, where esthetics is a concern, the pontic should be well adapted to the tissues to make it appear that it emerges from the gingival. Ovate pontics in contrast require a larger contact area with the tissue and light pressure to form the tissue and papilla and create the appropriate gingival esthetics. Another consideration is that the ovate pontics require an adequate thickness of tissue and width of the ridge.[2,3]

Conflict of interest and source of funding
The authors declare that there is no conflict of interest concerning the contents of the study.
This study has been self-supported by the authors.

Case report

A 45 yr old male patient reported to the Department of Prosthodontics, Terna Dental College, with the chief complaint of missing teeth. A complete medical and dental history of the patient was taken. No relevant medical history was found. A complete intraoral examination was carried out. It was found that 21 was missing and 36 was restored. Radiographic examination using IOPA of 21 and 36 were carried out. There was bone and soft tissue loss wrt 21 region *(Fig 1)* and 36 was endodontically treated. Endodontic evaluation of 11 and 22 was done.

The ideal treatment planned was to give fixed dental prosthesis wrt 11, 21, 22 and modified ovate pontic design and crown wrt 36. Diagnostic impressions were made with irreversible hydrocolloid impression material. Face-bow transfer and a mock-up was done on the diagnostic cast using semi-adjustable articulator (Hanau wide-hue). Tooth preparation was carried out in relation to the right central and left lateral incisors and finish line was extended to the gingival margin. Provisionals were fabricated to create a modified ovate pontic with a shallow convexity.

Ridge augmentation procedure was done by harvesting connective tissue graft from palate *(Fig. 2).*[1] Provisional restorations were cemented with zinc oxide non-eugenol cement. After analyzing soft tissue contour, decision was made to make final impression using elastomeric impression materials for FPD. Gingival displacement was carried out and impressions were made. Coping trial and bisque trial were carried out for FPD and cemented using dual cure composite resin (dentsply- caliber) *(Fig. 3).* Recall was done after 2 weeks.

Discussion

Pontic selection depends primarily on esthetics and oral hygiene. The type of pontic influences the surgical procedure if the edentulous area has a ridge defect. Four basic pontic designs have been

used over the years: sanitary (hygienic), ridge lap (full ridge lap, total ridge lap), modified ridge lap, and ovate.[4] In the anterior region, where esthetics is a concern, the pontic should be well adapted to the tissues to make it appear that it emerges from the gingiva.[1] Conversely, in the posterior regions (mandibular premolar and molar areas), esthetics can be compromised in the interest of designs that are more amenable to oral hygiene.

In 1983 Seibert classified ridge defects into three general categories:[1,5]

Fig. 1: *Preoperative extraoral frontal view*

Fig. 2: *Graft placed on surgical site and provisional cemented*

Fig. 3: *Cementation of all ceramic prosthesis*

Class I. Buccolingual loss of tissue with normal ridge height in an apicocoronal dimension

Class II. Apicocoronal loss of tissue with normal ridge width in a buccolingual dimension

Class III. Combination buccolingual and apicocoronal loss of tissue resulting in loss of normal height and width

The available ridge-management techniques to esthetically enhance restorations are socket preservation technique, full-thickness soft tissue grafts, pouch procedure, ridge augmentation-improved technique, subepithelial connective tissue graft and immediate pontic technique.[1]

In this case we have done ridge augmentation using full thickness tissue graft to modify vertical ridge defect. Meltzer published the first clinical report on using a soft tissue graft solely to correct an esthetic, anterior, vertical ridge defect. Seibert described a free-gingiva onlay graft technique to reconstruct the deformed, partially edentulous ridges.[4,5]

The controlled pressure applied by gingival surface of provisional restoration can be harnessed to achieve

Table 1: The characteristics of ovate and modified ovate pontic designs

Characteristic	Ovate, Abrams (1980)[3]	Modified ovate, Liu (2003)[4]
Indication	Anterior and posterior teeth, high smile line	Anterior and posterior teeth, high smile line
Contraindication	A thin, knife edge ridge	-
Esthetic concern	Excellent esthetics and emergence profile	Excellent esthetics and emergence profile
Tissue surface of pontic	Convex	Convex
Hygiene	Easier than modified ridge lap; sometimes floss cannot pass in center of pontic	Easiest to floss and maintain hygiene
Disadvantages	Ridge augmentation surgery needed if ridge collapsed high smile line	May leave shadow in apical area of tooth-gingival margin in class I ridge defect and
Advantages	1. Creates illusion of free gingival margin and papilla	1. Creates illusion of free gingival margin and papilla
	2. Minimizes "Black triangle"	2. Minimizes "Black triangle"
		3. Requires less ridge augmentation surgery than ovate pontic.

the desired contour of the ridge area without any overt signs of inflammation.[6] Silness and colleagues reported that clinically healthy conditions can be established at pontic sites if appropriate plaque control with dental floss and/or super floss is performed.[7]

The modified ovate pontic has less soft tissue contacting surface and less curvature than the ovate pontic. This modified pontic fulfils not only the aesthetic and functional demands but also the hygienic requirements. It is much easier to clean than the ovate pontic.

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Laminate veneers in maxillary anterior region to correct post orthodontic spacing

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Abstract
Re-establishing a patient's lost dental esthetic appearance is one of the most important topics for contemporary dentistry. New treatment materials and methods have been developed and conservative and aesthetic approaches, such as direct and indirect laminate veneer restorations, are preferred instead of full-ceramic crowns for anteriors where aesthetics is really important. Laminate veneers are restorations which are envisioned to correct existing abnormalities, esthetic deficiencies and discolorations and are processed in two different ways: direct or indirect. In this case report, indirect porcelain laminate veneer technique is used for the patients with esthetic problem related to spacing in the maxillary anterior region. **(Terna J Dent Sci 2019;5(1):69-72)**

Keywords: Laminate veneers, dental esthetic, dual cure resin cement.

Introduction

The word esthetic implies beauty, naturalness and youthful appearance relative to one's age. Esthetic dentistry created new dimensions in providing esthetics and functional rehabilitation. Because of esthetic demands as well as increased patients' awareness over the period of years, it becomes imperative for clinicians to evolve better treatment modalities to deliver higher standard of therapies using new generation materials along with improved clinical procedure.

Veneers were invented by California dentist Charles Pincus in 1928 to be used for a film shoot for temporarily changing the appearance of actors' teeth. Later, in 1937 he fabricated acrylic veneers to be retained by denture adhesive, which were only cemented temporarily because there was very little adhesion.

Advances in dental materials and techniques have enabled porcelain laminate veneers to evolve into the treatment of choice for minimally invasive aesthetic dentistry.[1] Color, shape, and structural and position abnormalities of anterior teeth might lead to important esthetic problems for patients. In order to solve such problems, the technique preferred frequently is to cover the teeth with dental crowns.[2] However, excessive preparations of teeth and damages to surrounding tissues, such as gingiva, are some disadvantages of crowns.[3] Therefore, in recent years, laminate veneer restorations have become more popular as a more esthetic and conservative treatment option.[3,4]

Indirect laminate veneers

Indirectly fabricated veneers are much less sensitive compared to an operator's technique and if multiple teeth are to be veneered, indirect veneers can be usually placed much more expeditiously. Indirect veneers last much longer than the direct veneers. Therefore, indirectly fabricated veneers are more advantageous than directly fabricated veneers in many cases.

Conflict of interest and source of funding
The authors declare that there is no conflict of interest concerning the contents of the study.
This study has been self-supported by the authors.

Case report

A 19 yr old male with esthetic complaints due to spacing between the upper anterior teeth and lower missing teeth reported to the Department of Prosthodontics and Crown & Bridge, Terna Dental College, after completion of the orthodontic treatment for generalized spacing *(Fig. 1 a, b, c)*. No further orthodontic correction for space closure was possible and hence prosthodontics referral for the same was advised. No carious lesions or periapical and periodontal pathologies were detected on clinical and radiographic examination. No sensitivities to percussion were detected horizontally

Fig.1: *Preoperative* ***(a)*** *extraoral and* ***(b & c)*** *introral images*

and vertically. The case was planned for indirect composite laminate veneer restoration in order to complete the treatment.

Preliminary impressions were made for both arches and primary casts were prepared. Diagnostic facebow was recorded and transferred to Hanau wide vue Articulator (model no.R-020510-12J010). Diagnostic wax up of the models was done preserving the canine guided occlusion of the patient and temporization of the upper maxillary anterior teeth was done without tooth preparation *(Fig. 2)*. In the next appointment after a week, evaluation of the temporary restorations was done. Tooth preparation for laminates was done with feathered incisal edges *(Fig. 3)*. Final impression was made using vinyl polysiloxane putty and light body impression material (DENTSPLY AQUASIL IN#2607242). Bisque trial of

Fig. 2(a): *No preparation provisionalization extraoral &* ***(b)*** *intraoral images*

Fig.3 (a,b,c): *Tooth preparation* ***(a & b)*** *and* ***(c)*** *shade selection*

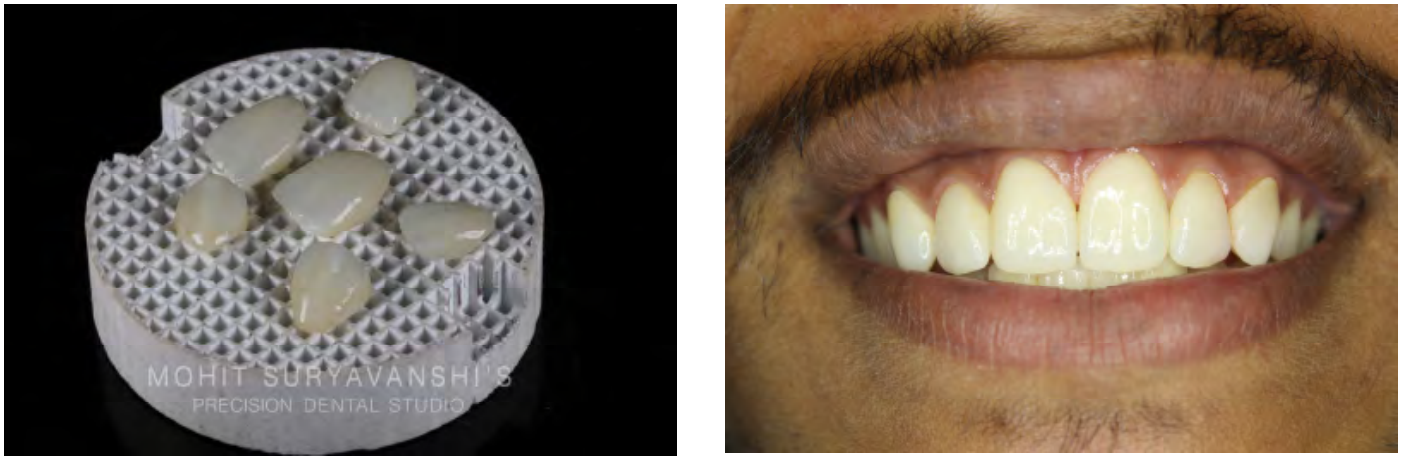

Fig.4 (a,b): *Bisque trial of the laminates*

Fig.5 (a,b,c,d): *Etching and bonding of the laminates*

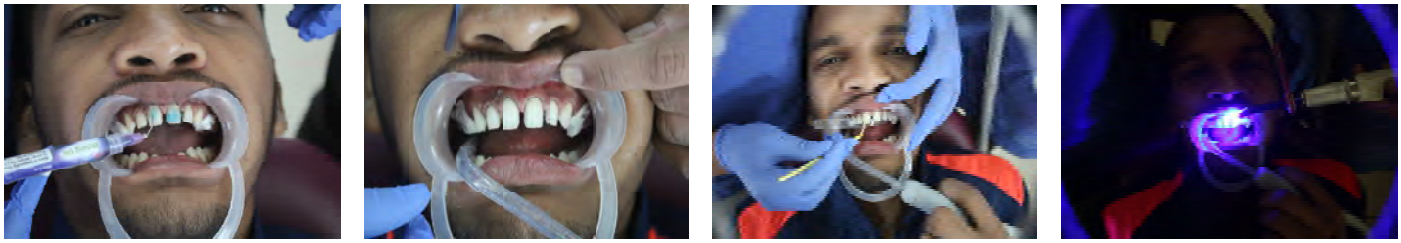

fig.6 (a, b, c, d): *Etching and bonding of the prepared teeth*

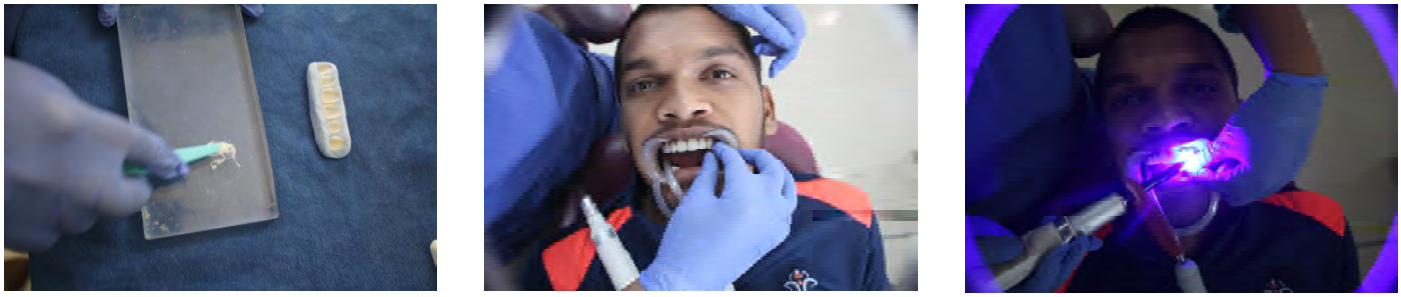

Fig.7 (a,b,c): *Cementation*

the indirect laminates and assessment of the margins, contour, interferences and occlusion was done *(Fig. 4)*. After the final finishing and polishing of the laminates, final cementation was done using dual cure resin cement (ivoclar vivadent Variolink X10791) *(Fig 5, 6, 7, 8)*.

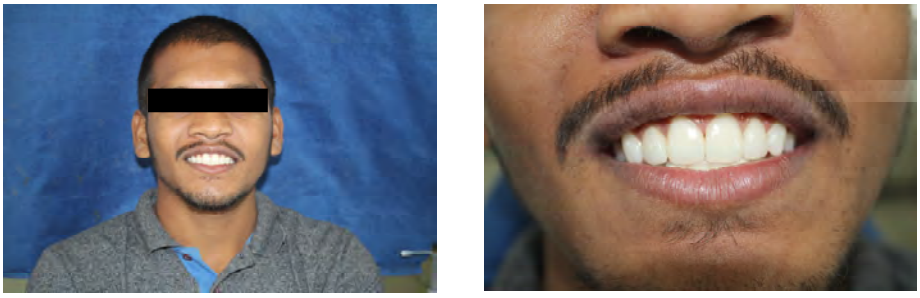

Fig.8 (a,b): *Post-operative images*

Discussion

Patient selection is integral for success of laminate veneers, in the present case because of young age a conservative method of treatment laminate veneers was selected.[5,6] Presence of normal overjet and overbite with favorable smile line and absence of parafunction and presence of sufficient enamel made laminate veneers most acceptable treatment option. The advantages of using these restorations are that they are biologically acceptable to the body owing to their increased chemical stability, lesser cytotoxicity and reduced risk of causing irritation or sensitivity. These restorations exhibit reduced plaque build-up and its easy removal due to their smoothly glazed surface. Castelnouvo et al (2011)[7] compared the fracture load of laminate veneers with 4 different preparations with no incisal reduction, 2 mm reduction without palatal chamfer, 1 mm incisal reduction and 1 mm palatal chamfer height and recorded the greatest fracture loads from first two groups. Owing to their ceramic thickness (0.3- 0.5mm), the laminate veneers can be easily fractured even before they are bonded. However, once bonded to the etched enamel surface they integrate with the tooth structure and become extremely durable. The union of etched enamel and porcelain combined with the bonding composite resin-luting agent with a silane coupling agent provides a long-lasting restoration. This is in accordance with the studies proposed by H. Serdar Çöterta et al (2009)[8,9] who observed the duration of porcelain laminate veneers and the influence of the categorical covariates such as location, tooth vitality, preparation depth, incisal, gingival and proximal finishing lines and peripheral tissue type on the survival

rates of laminate veneers. Laminate veneers should be avoided when enamel is insufficient, tooth is pulpless, parafunction, unsuitable anatomical presentation of teeth and poor dental care.[10,]

Conclusion

Porcelain laminate veneers have been one of the most used restorations for aesthetics. Aesthetics is a subject that is objective and necessitates excellent communication among the dentist, patient, and ceramist. The case must be carefully selected, and treatment planned. The use of mock-ups, followed by a wax model, aesthetic pre-evaluative temporaries, and silicone index, provides the best aesthetic, phonetic, and functional outcome and allows for better communication with the patient and laboratory. In this case report, use of indirect laminate veneers fulfills the esthetic and functional demands of the patient.

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