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Editorial

In today's technology-conscious world, Dental Science is progressing rapidly due to the society's urgent need for a dental practice that offers an astute and circumspect service as well as a painless and lifetime period of successful treatment. To achieve these goals of continuously improving the different procedures in dental practice, there is a compelling need for much research, the responsibility of which lies with the professionals in various disciplines that belong to this community.

A journal is an appropriate and effective mode for exchange of scientific ideas and innovations. The motive of this journal is to give the readers the best of the quality Original researches, Reviews, Case reports which would help the readers to keep the pace with the updates so as to augment the information and to stimulate interest, debate, discussion and interaction among dentists and specialists of all disciplines within the field of dentistry.

I am extremely grateful to the Authors for considering this Journal for their submissions. The editorial policy of Dental Bites is to disseminate among its readers factual information on research, clinical practice and cases of interests in Dentistry. The board is dynamic; it will offer a platform to the contributors to address the evolution and new areas of interest in the specialty.

Yours ,
Sd/-
Dr. Kunjamma Thomas
Chief Editor

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A NEW SIMPLE APPLIANCE NAMED AS "KMCT APPLIANCE" FOR CORRECTION OF CLASS II DIVISION 1 MALOCCLUSION IN CHILDREN

*Dr. E.Ramakrishnan, **Dr. Akhilesh.R.A, **Dr. Supreeda.S,
***Dr. Nisha Elizabeth John, ***Dr. Aswathi Joseph, ***Dr. Ameera Ahmed Ismail

Abstract

Class II division 1 malocclusions in children are treated best with myofunctional appliances. The complicated and bulky myofunctional appliances receive poor co-operation from children giving poor result. Here a simple single arch removable appliance named as KMCT appliance is being introduced. The design of the appliance, advantages of the appliance and our experience during the last 7 years are communicated here.

Keywords: Class II Div 1 malocclusion, Inclined plane appliance, Myofunctional appliance.

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Introduction

According to a European study by Brirgit Thilander et al, the prevalence of Class II div 1 malocclusion among children is 14.9%.[1] An Indian study at Nalgonda by Reddy E R et al showed 13.9% prevalence of Class II div 1 malocclusion among children.[2] Though different studies show different prevalence at various places, there is an average prevalence of around 15%(Fig 1). This is the most common skeletal malocclusion in children than Class II div 2 and Class III malocclusions.

The different treatment modalities for Class II div 1 malocclusion can be grouped under three headings:

1. Myofunctional appliances used in children
2. Camouflage treatment in young adults and adults, extracting two premolars in upper arch
3. Orthognathic surgery combined with fixed appliance therapy

Fig 1: Characteristics of Class II division 1 malocclusion

The myofunctional appliances are used in children and are very successful if

properly worn by the child. The myofunctional appliance therapy in young children of pre pubertal stage excludes the necessity of further treatment at later ages.

The various removable myofunctional appliances used to treat Class II div 1 malocclusion in children are (1) Twin block appliance, (2) Activator (3) Bionator (4) Frankels appliances (FR II), (5) pre orthodontic aligner, and (6) inclined plane appliances. Fixed myofunctional appliances are (1) Herbst appliances (2) Jasper Jumper (3) Forcs FRD, and (4) MARA (mandibular anterior repositioning appliance). Among all these fixed and removable appliances, twin block appliances gained popularity because of its success rate. All the above mentioned removable functional appliances have the disadvantage of poor patient co operation due to the bulkiness of the appliance, extending to both arches. Fixed functional appliances are more time consuming to fabricate and fix and requires imported components. Hence they become expensive appliances.

Inclined plane appliances are relatively simple involving only the upper arch and are well accepted by the children. Here a new modified inclined place appliance is presented. This appliance has been used successfully during the last 7 years in the Paediatric Dentistry Department of KMCT Dental College, Manaserry, Kozhikode, Kerala. Hence the appliance is given the name "KMCT appliance".

The KMCT Dental College is situated in a rural area of Kerala. The people belonging to the villages around the college are simple and of low and medium socio-economic status. The treatments suitable for them are simple inexpensive appliances which are efficient to give good results. The present appliance is designed to suit the majority of the patient population of this hospital.

Review of literature

On searching the literature we found two studies conducted on inclined plane appliances. Emami Meiboidi Shahin et al studied on 25 children in early mixed dentition period (Fig 2), and found that it is effective as an alternative to complicated functional appliances in the treatment of Class II div 1 malocclusion.[3] A modified anterior inclined plane incorporating a double cantilever spring was used by Roa S.A et al to treat a Class II div 2 patient[4](Fig 3). The inclined planes used by these two authors are similar in design.

KMCT appliance

The new inclined plane used by us is different from these inclined planes in that it does not extend laterally towards canine and premolars. It slopes towards canine and premolars also, so that there is least bite interference. It allows sliding of lower jaw forward. The photograph of new inclined plane is given in Fig 4.

Design and construction of the new inclined bite plane - KMCT appliance

The upper and lower Impression for study models and an upper impression for working model are made.

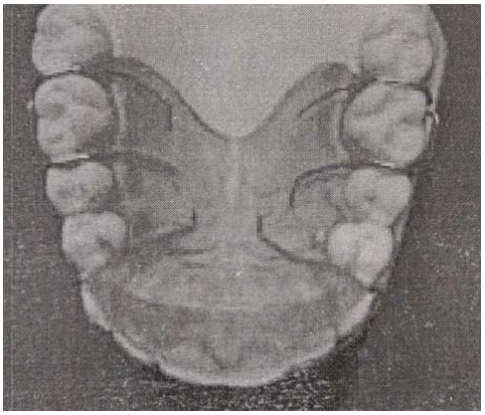

Fig 2:Inclined plane used by Emami Meiboidi Shahin et al[3]

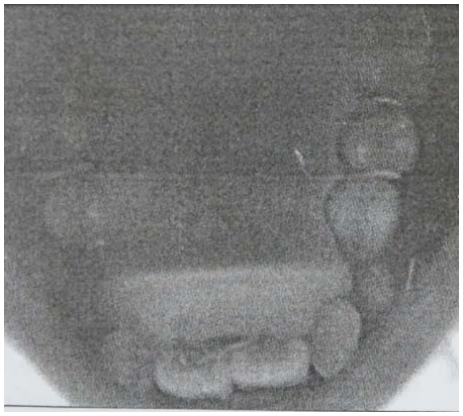

Fig 3: Inclined plane used by Roa S.A et al[4]

Examination of the study model show the extent of deep bite, over bite, over jet and the position of incisal tips on the palatal side. On a working model of the upper arch Adam's clasps are made on the 1st permanent molars and a long labial bow is also made. A Hawley's appliance is first made in self cure acrylic. A small amount of self cure clear acrylic powder is mixed with monomer in a dappen dish and allowed to reach dough stage. At that stage about 1cubic centimetre of the acrylic is taken and added to the palatal side of the appliance and shaped with fingers or a spatula to form an inclined plane and the lower cast is placed on the upper cast and checked if the incisal tip of the lower arch is touching the slope of the inclined plane and can slide forward.

Care is taken to see that the inclined plane slopes laterally also so that there is no bite interference for canines and premolars. Also see that the inclined plane does not touch the gum on lingual surface of the lower incisors. The appliance is immersed in water and is allowed to cure. After curing it is checked on the cast to see that the mandibular incisors could slide forward in to a class I position. There is minimal bite interference and minimal bite opening in the posterior area so that posterior teeth can rapidly erupt and settle in to new position. The child is instructed to wear the appliance 24 hrs except during eating and brushing.

Fig 4: KMCT appliance (modified inclined plane appliance)

Treatment cost

KMCT appliance is an improved and modified inclined plane appliance. It is an inexpensive appliance as compared to all other removable and fixed myofunctional appliances. This college being run by a charitable trust, Kunjitheruvai Memorial Charitable Trust (KMCT) charges only Rs.

500.00 for a removable corrective appliance. One appliance may be enough for completion of treatment in many cases.

Fig 5: Frontal view of a patient with Class II Division 1 malocclusion

Fig 6: Profile view of a patient with Class II Division 1 malocclusion

Sometimes a second appliance may be required if the 1st one becomes distorted or when there is interference due to erupting permanent teeth.

The treatment duration is usually 8 months to 12 months during which good results are obtained. Since it is a non extraction therapy and because of the simplicity and inexpensive nature of appliance it is well accepted by the children and the parents. This has been our experience during the past 7 years. The success of the treatment is well appreciated and satisfied by the parents on seeing the improved aesthetic appearance of the child.

Fig 7: Intraoral view before treatment

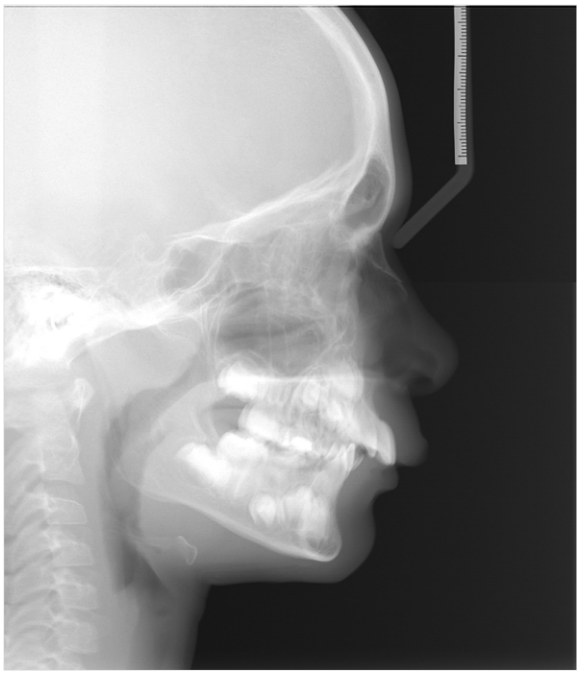

Fig 8: Lateral cephalogram of a Class II div 1 malocclusion before treatment

In a private clinic a dentist may have to charge more than this but it could be much lower than that of the other complicated removable or fixed functional appliances mentioned earlier(Figs. 5 to 10).

Discussion

It has been reported that the most common component in a Class II skeletal malocclusion is mandibular retrusion.[5] Therefore all the functional appliances attempt to reposition mandible into a Class I skeletal relationship by advancement of the mandible.

Fig 9: KMCT Appliance–in the patient's mouth

Fig 10: post treatment profile view of the same patient shown in figures 5, 6, 7 , 8 and 9

Many myofunctional appliances like Twin Block, FR II, Activator, Bionator, removable Jasper Jumper etc were effectively used in various studies. But they failed to become the choice of an Orthodontist or Pedodontist or a General Dentist in his regular dental practice because of the bulkiness of the appliance causing non co-operation from children. Even twin block appliance though found to be effective are not regularly used by the dentists due to the bulkiness of the appliance extending to both arches and the increased chair side time required for trimming and adjusting the appliance.

An ideal appliance should be comfortable for the patient, allow jaw movements, leave room for tongue and provide skeletal rather than dental effects.[6] In these contexts, a removable modified inclined plane appliance that is simple in design, contained in one arch, least bulky becomes practically acceptable for the child and dentist.

Class II div 1 malocclusion is characterised by mandibular dentition 'distal' to the maxillary dentition. The principle of functional therapy is to reposition a retrusive mandible to a forward position by constructing an appliance with a protrusive bite when the appliance is placed in the mouth. Dentofacial orthopaedics represents a positive approach to the treatment of craniofacial imbalance by addressing the underlying cause of malocclusion, in an effort to maximise the natural potential for corrective growth.[7]

Repositioning the mandible in a downward and forward position by the inclined plane appliance stimulates a proprioceptive response in the muscles of mastication. The purpose is to encourage adaptive skeletal growth by maintaining the mandible in a corrected forward position for a sufficient period of time to allow adaptive skeletal changes to occur in response to a functioning stimulus.[8]

The improved and modified inclined plane appliance is simple economical, acceptable by the child and effective in treating Class II div I malocclusion. It allows full time wear of appliance resulting in rapid correction of malocclusion. This inclined plane appliance will not increase vertical dimension considerably. So unlike TBA (twin block appliance), it can be used in children presenting mandibular retrognathia and increased vertical dimension, where a further increase in vertical dimension is unfavourable for the soft tissues.

Though the inclined plane appliance exerts a restrictive force on maxilla through the labial bow, it is generally recommended for a Class II malocclusion with retruded mandible and a normal maxilla. In our experience we have found that mandibular retrusion is the main feature of Class II div 1 malocclusions and maxillary protrusion was uncommon. When the child was asked to bring the mandible forward the facial profile on side view became straight showing that the problem was with the distal position of mandible and not the proclination of maxillary teeth. McNamara also states that mandibular skeletal retrusion is the most common single characteristic of class II malocclusions; whereas maxillary skeletal protrusion was not a common finding.[5] Bishara reported that maxilla is positioned normally in Class II malocclusions.[9] There are some reports which states that maxilla is even in a retrognathic position.

A Class II division 1 malocclusion is characterised by Class II occlusion of first permanent molars, Proclination of upper anteriors, Increased overjet(up to 10-15mms), Deep bite, Lower incisor tips touching the palate, Lower lip trap between upper and lower incisors, Proclinated upper anterior teeth showing out due to inadequate lip coverage and an appearance of maxillary teeth prognathism. The ANB angle is >4 degrees and it can be up to 8-9 degrees(Fig 1). Reduced vertical facial height is also a characteristic.

In the Inclined plane appliance used by Emami Meibodi Shahin, and that used by Roa.S A et al, the inclined plane is not large enough to guide mandible while closing. The overjet can be up to 10-15mms.The KMCT inclined plane is modified so that the mandibular incisors touches the inclined plane upon closing of the mandible and it guides the mandible to slide on the Inclined plane and reach the desired new anterior positioning of the mandible. In this Inclined plane appliance there is no occlusal interference in canine- premolar area and the bite opening is minimal. This is because the Inclined plane slopes laterally also (Fig 9).

KMCT appliance is an improved and modified inclined plane appliance. In our experience the patient acceptance, co operation and good results are better for this appliance than any other appliance. This has been our experience during the past 7 years. The success of the treatment is well appreciated and satisfied by the parents on seeing the improved aesthetic appearance of the child (Figures 5 to 10).

The correction to class I molar occlusion, the improved facial profile view and the corrected skeletal discrepancy are well appreciated by the doctors as well.

Conclusion

Poor co-operation from children in wearing bulky and complicated myofunctional appliances for correction of Class II division 1 malocclusion gave poor results. Here a new simple, improved inclined plane appliance is described .It has been found to be very effective during the last 7 years in the department of Pediatric dentistry in KMCT Dental college, Manassery ,Mukkam, Kerala. The appliance is named KMCT Appliance.

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ANGIOGRANULOMA –THE ORAL PREGNANCY TUMOUR: LITERATURE REVIEW

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Abstract

Gingival enlargement in pregnancy is called angiogranuloma or pregnancy tumour. It is a conditioned gingival enlargement. It occurs when the systemic condition distorts the usual gingival response. Presence of plaque is not the determining factor of the clinical feature. Pregnancy accentuates the gingival response toward the local irritants. This review provides a discussion regarding the causative factors, histopathology and management of pregnancy tumour.

Keywords: Pregnancy, conditioned enlargement, altered tissue metabolism, hormonal variation, sub gingival micro flora

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Introduction

Gingival enlargement or gingival overgrowth is the accepted current terminology for increase in size of gingival which is a common feature of gingival disease. The term pregnancy tumour(PT) was first coined by Blum in 1912.[1] The first report of PT in English literature was described by Hullihen in 1844, but the term "pyogenic granuloma" or "granuloma pyogenicum" was introduced by Hartzell in 1904.[2] In the past "hypertrophic gingivitis" or "gingival hyperplasia" were the terms used for describing this clinical condition. Other names of pregnancy tumour are pyogenic granuloma, exuberant granulation tissue, granuloma gravidarium, angiogranuloma, pregnancy epuli.[1] Pregnancy associated gingival enlargement is included under the category of conditioned enlargements. Conditioned enlargement occurs when the systemic condition of the patient exaggerates or distorts the usual gingival response to dental plaque.[3] Although there is considerable debate about the incidence and causation of gingival changes during pregnancy, it is generally accepted that increases in gingival inflammation typically begin in the second month and reach a maximal level during the eighth month of pregnancy.[4]

Classifications

1. In 1946, Ziskin and Ness compiled a clinical classification of pregnancy gingivitis as follows:

Class I - Characterized by bleeding gingiva with more or less, no other manifestations.

Class II - Characterized by changes in the interdental papilla-oedema and swelling with subsequent blunting of interdental papilla.

Class III - Characterized by involvement of the free gum margin, which take on the colour and general appearance of a raspberry.

Class IV - Generalized hypertrophic gingivitis of pregnancy

Class V - The pregnancy tumour

2. **Enlargement in Pregnancy**

The changes may be localized or generalized. Another classification is marginal enlargement and tumour like gingival enlargement. The enlargement is usually noted on the marginal, gingival and interdental papilla. [5]

Marginal Enlargement: The incidence has been reported 10% to 70%.The enlargement is generalized in nature and more prominent interproximally than on facial and lingual surfaces. The enlarged gingiva is bright red or magenta in colour, consistency is soft and friable with a smooth shiny surface and a tendency for spontaneous bleeding on slight provocation.

Tumour like Gingival Enlargement: This is a non neoplastic condition. The presence of bacterial plaque and the inflammatory response toward the bacterial plaque is the cause for the enlargement. The incidence rate is 1.8% to 5%.[6] The lesion appears as discrete, mushroom like, flattened spherical mass which protrudes form the gingival margin or from the interproximal space. It has either sessile or a pedunculated base. The colour usually appears as dusky red or magenta and numerous deep red pinpoint markings could be noticed. The consistency usually is semi firm. The condition is usually painless until it is accentuated by local factors or occlusal interference which may lead to painful ulcers.

Histopathology

It is a non-specific, vascularising and proliferating inflammation.[7] Connective tissue has newly formed and engorged capillaries lined by cubical epithelial cells. The stratified squamous epithelium is thickened, with prominent rete pegs and prominent intercellular bridges and leukocytic infiltration. It is histologically similar to a pyogenic granuloma but it is a distinct lesion on the basis of etiology, biologic behaviour, and treatment protocol.[8]

Management

The need for surgical intervention during pregnancy should be carefully examined and there is possibility of regression after childbirth, due to the normalization of hormonal levels.[9] Surgical excision and removal of the local irritants are the usual treatment indicated. In certain cases the excision might need to extend beyond the periosteum in order to prevent recurrence. Presently soft tissue LASER can be used for the excision of the gingival tumour because of the lower risk of bleeding when compared to scalpel method.

Surgical excision of the lesion after delivery seems the best treatment option. The majority of cases are symptomatic and

show bleeding; nodules (71.9%) with soft consistency (62.3%) and a red surface (73.2%). Simple excision is enough to prevent recurrence but the aetiology and pathogenesis must be known to understand its nature. The Nd:YAG LASER is used nowadays because of the lower risk of bleeding compared to other surgical techniques.[10]

Discussion

In general, accepted cause for pregnancy tumour is that the hormonal level that increases in gingival inflammation typically begins in the second month and reach a maximal level during the eighth month of pregnancy. This may lead to oedematous, erythematous and hyperplastic gingiva. Capillary dialation is said to be one cause for the increase in gingival inflammation.

The classic work of Kornman & Loesch in 1980 have reported that the subgingival flora changes to a more anaerobic flora as pregnancy progresses.[11] The increase in Prevotella intermedia in the subgingival microflora is one of the significant finding. O'Neil in 1979 suggested that the altered tissue response to plaque is due to depression of the maternal T lymphocyte.[5]

Matthiesen et al. reported systemic suppression of maternal immune systems, specifically an altered T cell response, and impaired lymphocyte proliferation.[12] An in vitro study conducted by Ehring et al suggested that the progesterone concentration found in placenta blocks the K channel and this in turn contributes to maternal immunosuppression.[13] It has been proposed that, in the absence of VEGF, Angiopoietin-2 (Ang-2) causes blood vessels to regress. The protein level of Ang-2 was highest in the pregnancy tumours, followed by those after parturition and normal gingiva. The amount of VEGF was high in the granulomas in pregnancy and almost undetectable after parturition.

Summary and Conclusion

Angiogranuloma is a type of conditioned gingival enlargement. The three types of conditioned gingival enlargement is hormonal, nutritional and allergic. The increase in Prevotella intermedia in the subgingival microflora is one of the significant finding. Hormonal variation is another important factor in the occurrence of pregnancy tumour.

The presence plaque deposits and the factors that favour in the occurrence and recurrence of the condition should be eliminated.

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VIRTUAL ARTICULATORS: A SMART TOOL FOR SMART WORKING

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Dr. Sheejith. M,* Dr.Ranjith. M

Abstract

The future of dental practice is closely linked to the utilization of computer-based technology, specifically virtual reality, which allows the dental surgeon to simulate true life situations in patients. The transition from numerous mechanical articulator designs to recently developed virtual articulators is a breakthrough in the development of the articulator design. It is used to simulate temporomandibular joint which helps in fabrication of accurate prosthesis in prosthodontics. This paper reviews the need of virtual articulators, its advantages, and the analysis of the dynamic contact of occlusal surface of the maxilla and mandible.

Keywords: Virtual articulators, CAD-CAM, mechanical articulators.
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Introduction

"An articulator is a mechanical instrument that represents the temporomandibular joints and jaws, to which maxillary and mandibular casts may be attached to simulate some or all mandibular movements".[1] Articulators are an inseparable tool in designing and fabrication of any prosthesis in dentistry. Since ages, they are being used in dentistry and dental technology to simulate the human temporomandibular joint, thereby helps in accurate diagnosis and treatment planning, and appropriate treatment of the patient.[2]

The history of articulators dates back to 18th century. First mechanical articulator "The plaster articulator" came into existence in the year 1756 by Philip Pfaff.[2] Numerous articulators are available today, some are very complex and some are very simple in their use and adjustments. The articulator to be used depends on dentist's preference. Carl O. Boucher stated, "It must be recognized that the person operating the instrument is more important than the instrument itself. If dentists understand articulators and their deficiencies, they can compensate for their inherent inadequacies".[3]

Need for a Virtual Reality (VR) Articulator

In daily practice, mechanical articulators are used to diagnose and simulate the functional effects of malocclusions and morphological alterations upon dental occlusion.[4] A mechanical device is limited in its ability to simulate the variability of biologic systems (i.e, the dynamic conditions of jaw movements and dependent aspects). For instance, mechanical articulators cannot simulate:

- The mobility of teeth when using plaster casts in it.
- The distortion and deformation of mandible during loading conditions (mandible bends in maximal opening position to the inner side, which entails problems when making impressions of teeth during wide opening).
- The complexity of movement patterns because the movements of the mechanical articulator follow border structures of the mechanical joint, which never represent the effects of resilience of the soft tissue or the time-dependent, muscle-guided movement pattern of chewing.[5,6]

Casts cannot represent the real dynamic conditions of the occlusion in the mouth. Many other problems regarding the technical procedures and dental materials decrease the accuracy of reproduction such as:

- The stability of the articulator itself.
- The precise orientation of the cast onto the articulator.
- The expansion and contraction of the plaster used for articulation.
- The deformation of the bite registration material (eg., wax, which is susceptible to heat).
- Repositioning the mandibular cast into maxillary cast using the bite impressions without leaving any space.[6,7]

Therefore the future of dental practice is closely linked to the utilization of computer-based technology, specifically virtual reality(VR), which allows the dental surgeon to simulate true life situations in patients.[4] The dilemmas associated with the use of semi-adjustable articulators can be resolved by replacing the mechanical articulator by its digital replication- the virtual articulator. In contrast to the conventional mechanical procedure, the VR tools enable three-dimensional navigation through the occlusion based on every point of view while the mandible moves along predefined pathways (as the mechanical articulator would do), or reproduce movement patterns of mastication that never can be simulated in mechanical systems. It essentially improves the designing of dental prosthesis by adding kinematic analysis to the design process. Virtual articulator can signify and quantify the effects of resilience of the soft tissue on the time-dependent basis during muscular movements of chewing. [6]

Virtual articulators are also called as "Software articulators". They are not concrete, but exist only as a computer program. They comprise of virtual condylar and incisal guide planes. Guide planes can be measured precisely using jaw motion analyser. Virtual articulators are able to design prostheses kinematically. They are capable of simulating human mandibular movements, by moving digitalized occlusal surfaces against each other and enabling correction of digitalized occlusal surfaces to produce smooth and collision free movements.[2]

Advantages

- Full analysis can be made of static and dynamic occlusion, of the inter-maxillary relationships, and of the joint conditions, due to dynamic visualization in three dimensions (3D) of the mandible, the maxilla, or both.
- The possibility of selecting section planes allowing detailed observation of regions of interest such as temporomandibular joint.
- Combined with CAD/CAM technology, this tool offers great potential in planning dental prostheses, since it affords greater precision and a lesser duration of treatment.[4]

Types of Virtual Articulators

a. Completely adjustable virtual articulator

b. Mathematically simulated virtual articulator

Completely adjustable virtual articulator

The virtual articulator of Kordass and Gartner from the Greifswald University in Germany was designed to record the exact movement paths of the mandible with an electronic jaw movement registration system called `Jaw Motion Analyser`(Fig 1). The ultrasonic measurement system, Jaw Motion Analyzer (Zebris, Germany) is used to record and implement the movement pattern of the mandible.

It is an ultrasonic motion capture device that is comprised of an ultrasound emitter array that is bonded to the labial surfaces of the mandibular teeth using a jig customized with cold cure acrylic, and a sensor array located on a head frame secured to the patient's head.[2,4]

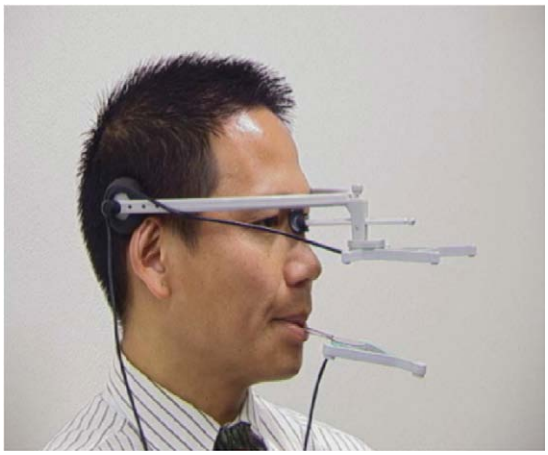

Fig1: Jaw motion Analyzer

Mathematically Simulated Virtual Articulator

Szentpetery's virtual dental articulator from the Martin-Luther University of Halle is based on a mathematical simulation of the articulator movements. It is a fully adjustable three dimensional virtual articulator capable of reproducing the movements of a mechanical articulator. In addition, mathematical simulation contributes to offer possibilities not offered by some mechanical dental articulators, such as curved Bennett movement or different movements in identical settings .This makes it more versatile than a mechanical dental articulator.[2,4]

Programming of Virtual Articulators to analyse occlusal collisions in dental prosthesis

The programming and adjustment methods of the virtual articulator were described by Kordass and Gartner in

1999.[5]First a digital image is obtained of the surfaces of each tooth, of the global dental arches, and of the bite registries using 3D scanners. The scanner projects a vertical laser beam onto the surface of the object. A digital camera equipped with a charge coupled device (CCD) registers the beam reflected from the object and transmits the digital signals to an electronic processing system. The processed image data are stored as digital matrix brightness values, ready for use by the scanner software and for on-screen visualization and computerized manipulation. There are two types of digitization.

a. Direct digitizing, in which tooth surfaces are scanned inside patients mouth.
b. Indirect digitizing, in which tooth surfaces are scanned in the cast obtained from pouring the impression of the patient.[8,9]

The digitized casts are transfered on to the virtual articulator using digital facebow, which was developed to locate the maxillary cast of the patient in a cranial coordinate system. The position of a pointer in 6 positions with reference to the head and transverse horizontal axis are scanned and the exact position of the maxillary cast is transferred on to the virtual articulator (Fig 2). Mandibular cast is positioned exactly to the maxillary cast with the use on the scanned centric occlusion record.[10,11]

Exact movement paths of the mandible was recorded with an electronic jaw movement registration system called `Jaw Motion Analyser`. This ultrasonic measurement system is used to record and implement the movement pattern of the mandible in the virtual articulator.[11,12]

The reference data sets coming from the 3D scanner, and jaw movement records, are matched and presented in the virtual articulator Dent-CAM. The Dent-CAM software consists of three main windows which show the same movement of the teeth from different aspects.

The rendering window shows both jaws during dynamic occlusion and can visualize unusual views throughout dynamic patterns of occlusion (ie, the view from the occlusal cups while watching the antagonistic teeth coming close to the intercuspidation position during chewing movements). It also allows the creation and export of animations.

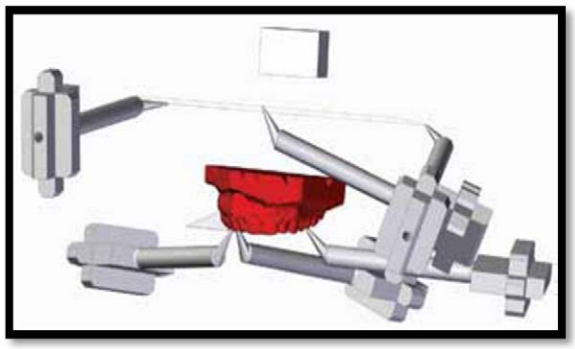

Fig 2: Location of maxillary cast on cranial coordinate system with all 6 pointers

The occlusion window shows the static and dynamic occlusal contacts sliding over the surfaces of the upper and lower jaw as a function of time. The speed of this movement can be controlled with sliders; a colored differentiation of the contact force is also implemented. In a smaller window, the movements of the temporomandibular joint

are represented in a sagittal and transversal view, which allows the analysis and diagnosis of interdependencies between tooth contacts and movements of the temporomandibular joint.

The slice window shows any frontal slice throughout the dental arch. This tool helps to analyze the degree of intercuspidation and the height and functional angles of the cusps. With this window, the analysis of guidance and balancing becomes easy.[4,6,11]

The system offers separate three-dimensional visualizations of the maxilla and mandible for a top view and an overview of both jaws. A three dimensional representation of condylar pathways also can be visualized. The jaw models can be manipulated using a section plane, which facilitates a detailed view of every region of interest.

The real geometry of the dental arch and its relation location are reconstructed in a CAD CAM system(Fig 3).

Then the dental prosthesis is modeled, the function simulation is performed in ordered to obtain the interfering collision points which could produce a disease in the TMJ. Excursive movements, such as protrusion and latero-trusion, are simulated using a CAD CAM system, analyzing possible occlusal collisions so that the design can be adequately modified. The data set of newly designed and improved occlusal surfaces can be transferred to a milling machine, producing real crowns and fixed restorations with that particular, optimized functional occlusion.[6,7,13]

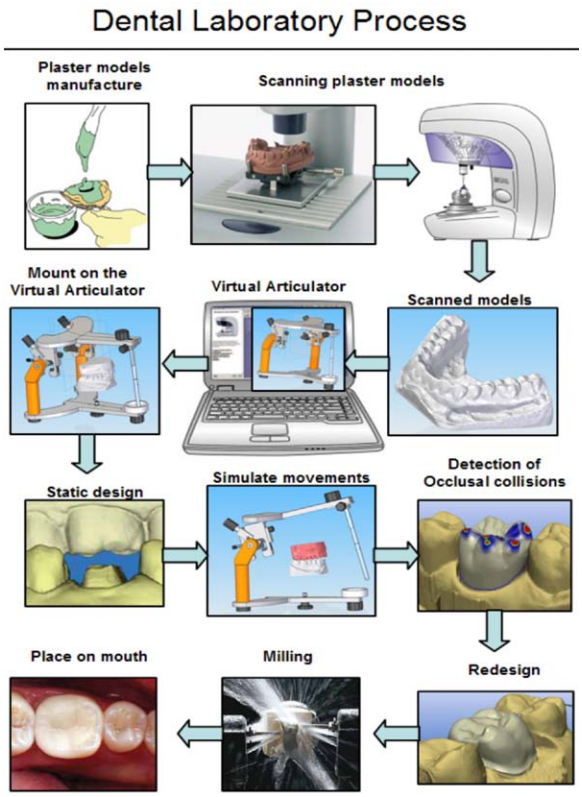

Fig 3: Fabrication of dental prosthesis using virtual articulator and CAD CAM

Conclusion

The VR articulator is a basic tool that deals primarily with the functional aspects of occlusion; however, it also can be regarded as a core tool in many diagnostic and therapeutic procedures and in the CAD/CAM manufacture of dental restorations. The concept of virtual articulator will change conventional ways of production and communication in dentistry and begin to replace the mechanical tools.

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EASY ACCESS DONOR SITE FOR STEM CELLS: ARE WE NEAR??

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Abstract

Regeneration of damaged tissues is the optimal outcome of treatment, and both tissue engineering and regenerative medicine are emerging as promising treatment options. Stem cells, specifically mesenchymal stem cells, are promising candidates for tissue regeneration. Adult mesenchymal stem cells recently have showcased broad differentiation potential covering virtually all mesenchymal-derived tissues. In this article special attention is placed on gingival tissue-derived mesenchymal stem cells as a feasible option for stem cell harvesting.

Keywords: stem cells, tissue engineering, regeneration, gingival mesenchymal cells

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Introduction

Wound healing, or regeneration of a specific tissue, requires a combination of events, such as appropriate sequencing of regulatory signaling pathways, presence of a number of progenitor cells responding to these signals, an appropriate extracellular matrix or carrier, and adequate blood supply.[1] Based on tissue-engineering concepts, the healing/regeneration process of a tissue may be manipulated at the level of regulation of molecules, extracellular matrix or scaffold, and cellular availability. This method has several advantages, such as high-quality regeneration of damaged tissues without formation of a fibrous scar, minimal donor-site morbidity compared with autografts, and low risk of autoimmune rejection and disease transmission.[2]

Following the identification of mesenchymal stem cells, a new era in the field of regenerative medicine began. The adult stem cells originally thought to be developmentally restricted to specific cell lineages related to the tissue from which they were isolated, was shown to have a broad differentiation potential covering virtually all mesenchymal-derived tissues. Tissue engineering using these mesenchymal stem cells became interesting therapeutic option. Stem cells can be isolated from tissues such as bone marrow, skeletal muscle, cartilage, dental organ, adipose tissue, synovium and cardiac tissue.[3]

The most extensively studied source of stem cells is the bone marrow, which contains hematopoietic stem cells and non hematopoietic cells, referred to as

mesenchymal stem cells.[4] First identified in 1966 within the stromal compartment of bone marrow,[5] mesenchymal stem cells include a unique population of multipotential cells that exhibit extensive proliferative ability and can differentiate along multiple tissue-specific lineages, such as osteoblasts, chondrocytes and adipocytes. Mesenchymal stem cells appear to escape immune recognition, and exert anti-inflammatory and immune-modulatory effects via the suppression of T-, B-, natural killer and antigen presenting cells, both in vitro and in vivo.[6]

At present, there is no definitive marker for identifying mesenchymal stem cells, suggesting that the cell populations derived by the current methods are, in fact, heterogeneous. However, to define mesenchymal stem cells phenotypically, minimal criteria have been proposed by the International Society for Cellular Therapy.[7]

First, they must be plastic-adherent when maintained in standard culture conditions; second, they must express the surface markers CD73, CD90 and CD105 and major histocompatibility complex class II surface molecules; and, third, they must retain the capacity to differentiate into osteoblasts, adipocytes and chondroblasts under standard in-vitro conditions. Another important characteristic of these cells is their fibroblast-like spindle shape in culture.

Autologous adult stem cells should ideally be easy to obtain, result in minimal patient discomfort and be available in substantial numbers to avoid extensive expansion culturing. Bone marrow has been the major source of mesenchymal stem cells for clinical applications. However, isolation of cells from bone marrow is an invasive procedure, which can be painful and may occasionally be associated with infectious complications. Moreover, the number of mesenchymal stem cells harvested from bone marrow can be low, which may necessitate the need for harvesting mesenchymal stem cells from other sources like the oral cavity. The mouth, and specifically the gingiva, constitutes one of the most accessible harvesting sites for stem cells and gives rise to little or no morbidity as a result of the rapid healing capacity of gingiva.

Mesenchymal stem cells from the oral cavity

Dental tissue-derived mesenchymal stem cell-like populations reside in specialized well-characterized tissues and may be used in regenerative medicine. The first type of dental stem cell was isolated from the human pulp tissue and termed ‘postnatal dental pulp stem cells’. Subsequently, four other types of dental-mesenchymal stem cell-like populations, from exfoliated deciduous teeth, periodontal ligament, apical papilla of developing teeth, and dental follicle precursor cells, were isolated and characterized.

Dental mesenchymal tissue is termed ‘ectomesenchyme’ as a result of its initial interaction with the neural crest, a feature that may differentiate ectomesenchymal-derived stem cells and bone marrow-derived stem cells.[8] The oral stem cells show characteristics similar to those described by for bone marrow mesenchymal stem cells

(i.e. they can, using specific differentiation media and conditions, differentiate to osteogenic, chondrogenic and adipogenic lineages); however, differences have been noted between the dental stem cell and bone marrow mesenchymal stem cell populations. Dental stem cells appear to be more committed to odontogenic development than to osteogenic development, and they also exhibit the potential to differentiate into neurogenic linages.[9]

In this article special attention is placed on gingival tissue-derived mesenchymal stem cells because this is the most accessible source for stem cells in the oral cavity.

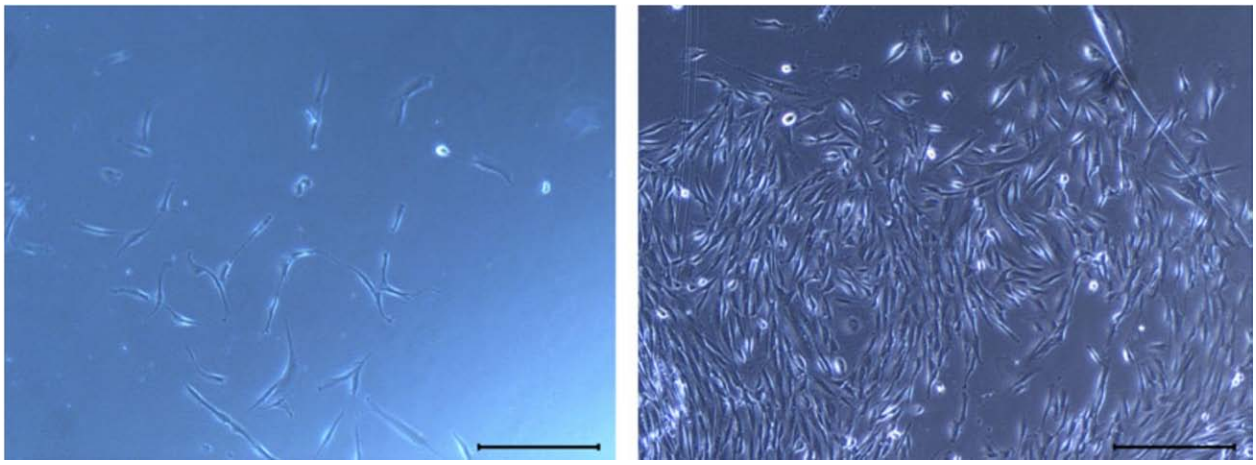
Stem cells from human gingival tissue

Mitrano T, Sanz et al in 2010[10] identified another source of mesenchymal stem cells in the oral cavity: from human gingival tissue. They took gingival connective tissue samples from healthy subjects; de-epithelialized, leaving only connective tissue and cultured for 3–4 weeks. Differentiation into osteogenic, chondrogenic and adipogenic lineages was induced and evaluated by histologic staining and immune-regulation assay.

Gingival tissue cells fulfilled the criteria proposed by the International Society for Cellular Therapy for mesenchymal stem cells.[7] In culture, stem cells from human gingival tissue had the ability to adhere to plastic and showed a fibroblast-like spindle shape (Fig 1). Cell characterization was consistently positive for the mesenchymal stem cell markers CD90, CD105, CD73, CD44 and CD13 and negative for the hematopoietic markers CD34, CD38, CD45 and CD54.They observed differentiation with positive staining for adipogenic, chondrogenic and osteogenic lineages; furthermore, gingival cells showed immune-modulatory capacity. As mesenchymal stem cells are nonimmunogenic and have immune-modulatory capability, transplantation of allogeneic mesenchymal stem cells to a host may not require immune suppression. Human mesenchymal stem cells impair the maturation and function of dendritic cells and inhibit, in vitro, the proliferation, differentiation and mobility of human T- and B-cells.[6] Sanz et al evaluated the inhibitory effect of stem cells from human gingival tissues on mitogen- stimulated peripheral blood mononuclear cells. Gingival tissue mesenchymal stem cells were co-cultivated, at different ratios, with peripheral blood mononuclear cells, and a dose-dependent immune suppressive capacity of gingival tissue mesenchymal stem cells was observed. The result was in accordance with those of Wada et al.[11] who also demonstrated the same effects.

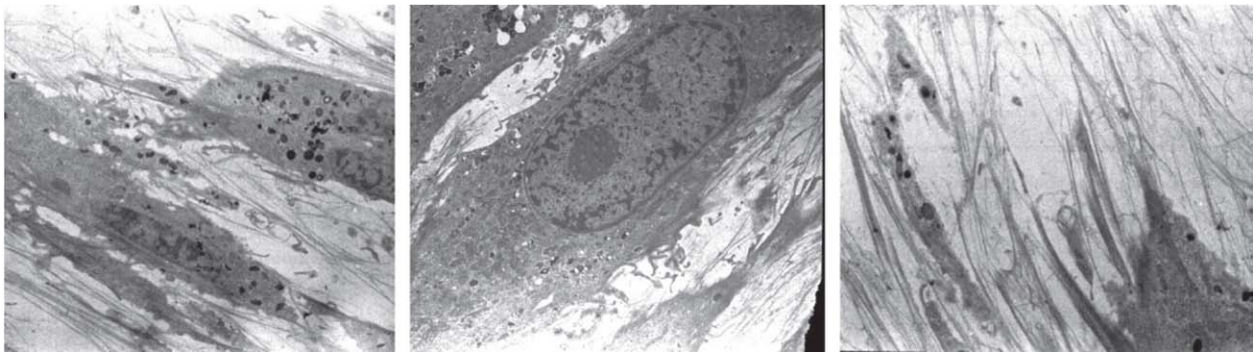
The morphological and ultrastructural characteristics of these mesenchymal stem cells under transmition electron microscopy were also studied. A fibroblast-like morphology was observed. Similar to the metabolism of a mature osteoblast the stem cells from human gingival tissues indicated the presence of two or three extended nucleoli, mitochondria with extended morphology, expression of vacuoles in the process of exocytosis, extracellular granular and nongranular matrix, collagen fibers and areas of early mineralization between the collagen fibers(Fig 2).The potential of these gingival stem cells to differentiate into osteoblast linages and to serve as bone producers, open up new clinical approaches in tissue engineering.[3]

Fig 1: Morphology of stem cells from human gingival tissue.[10]



Phase-contrast image demonstrating the morphology of gingival cells (A) at passage 0 on day 3 of culture (103 magnification; scale bar = 50 lm) and (B) on day 15 of culture (103 magnification; scale bar = 50 lm). The presence of a homogeneous fibroblast-like population was evident during the in-vitro expansion.

Fig 2: Transmission electron microscopy of human gingival stem cells [10]



Transmission electron microscopy of stem cells from human gingival tissue differentiated into osteoblasts. (A)Fibroblast-like shape and extended nucleus (3,0003 magnification). (B) Mitochondria with extended morphology and expression of vacuoles (3,0003 magnification). (C) Collagen fibers forming the extracellular matrix in vitro (3,0003magnification).

Conclusions

Regeneration of damaged organs or tissues is the optimal outcome of treatment, and both tissue engineering and regenerative medicine are emerging as promising treatment options. Stem cells, specifically mesenchymal stem cells, are promising candidates for tissue regeneration. Adult mesenchymal stem cells originally thought to be developmentally restricted to specific cell lineages related to the tissue from which they were isolated, was recently shown to have a broad differentiation potential covering virtually all mesenchymal-derived tissues.

However although tissue engineering comprises a highly attractive treatment prospect, cell-based therapy is still limited to clinical trials and is not performed in a routine clinical setting. The next steps is the need for the development of protocols to standardize the preparation of the biological

products and appropriate vehicles for cell transportation that are safe both for the cells themselves and for the patient receiving the cells. Only when these and other issues have been satisfactorily resolved can stem cell therapy become a true therapeutic alternative.

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IS PREGNANCY A CONTRAINDICATION FOR ORTHODONTIC TREATMENT???...

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Abstract

Nowadays there are many adult patients seeking orthodontic treatment because of increase in awareness. Among them, there are many pregnant females coming to Orthodontist for treatment or sometimes a lady during the treatment phase may become pregnant. "Can a pregnant women continue with orthodontic treatment or can she start with orthodontic treatment during pregnancy?" this is a difficult question to answer. This review article gives the information how to go about the treatment in pregnant women, the precautions to be taken, effect of drugs and hormonal changes on orthodontic treatment.

Key words: pregnancy, orthodontics, precautions, review

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Introduction

Pregnancy is one of the most wonderful phases in a woman's life. It is a common saying "when you look good, you feel good". It is important for the pregnant woman to not only look good, but also to feel good inside out as this will have a whole lot of impact on her well-being as well as that of her unborn child.[1-5]

It's a fact the people are naturally drawn toward pleasant faces. An enhanced appearance will also change the way you relate to others by increasing your self - confidence and helping you converse, smile and laugh with ease. If you're taking orthodontic treatment, and suddenly find out that you are pregnant, there is no need to be tensed. There is no reason why you need to postpone your orthodontic treatment till after your delivery.[2] Certain factors need to be kept in mind before going ahead with braces in pregnant women.[1]

Physiological changes associated with pregnancy

Pregnancy causes profound and remarkable changes in all organ systems. Dentist should be aware of the altered physiologic status of the pregnant patient to avoid inappropriate interpretation of normal changes as pathologic.[3]

With pregnancy, the most important change takes place in hematologic and cardiovascular systems as a result of altered hormonal activity. The increase in maternal

serum mineral corticoids induces sodium retention, which in turn leads to increased total body water content and an increase in plasma volume of 30% to 40%.

Another factor contributing to the expansion of intravascular volume is the increase in red blood cell volume of 15% to 30%. However, the increase in plasma volume exceeds the increase in red cell volume, resulting in a relative dilutional anemia. The relative increase of plasma volume over red blood cell mass shows up as "hemodilution" or "physiologic anemia of pregnancy" which reaches its maximum by 30 to 32 weeks of gestation.[3]

During pregnancy, all coagulation factors are increased, except factors XI and XIII, which are decreased. Thrombin-mediated fibrin generation increases during pregnancy, which combined with the increased amount of clotting factors and increased hematocrit, leads to the hypercoagulable state of pregnancy. All these factors, along with surgery, point to the clinically important predisposition of deep venous thrombosis (DVT) and pulmonary edema (PE) in pregnant women.[3]

In pregnant women, the heart compensates for the elevation in blood volume as well. The cardiac output increases 30% to 50%, secondary to a 20% to 50% increase in heart rate as well as a 20% to 50% increase in stroke volume. The majority of this increase occurs by the 10th week of gestation. There is a gradual, further increase up to 24 weeks and then the output plateaus. During the second and third trimesters, a decrease in blood pressure and cardiac output can occur while the patient is in a supine position. This has been attributed to the decreased venous return to the heart due to the compression of the inferior vena cava by the gravid uterus, which can result in a 14% reduction of cardiac output. The condition is known as supine hypotensive syndrome and is manifested by light-headedness, hypotension, tachycardia, and syncope. Once it occurs emergency care should be given.[3]

The respiratory system undergoes changes at all anatomic levels in pregnant women. The entire respiratory tract becomes edematous due to capillary engorgement. Mucosa in the upper airways may also become more edematous and friable. The functional residual capacity reduces by 20% because of the elevated diaphram by the gravid uterus. Oxygen reserve diminishes with the decrease in functional residual capacity and increase in oxygen consumption.[3]

Medical, dental and psycho-social history

Like any other form of dental care, a thorough and detailed medical history is critical. However, in case of pregnancy, it is important to get the opinion of the gynaecologist if any known complications are to be expected. A history of current medications is also valuable because various drugs have oral side-effects and may influence the course of the orthodontic therapy. Drugs such as non-steroidal anti-inflammatory drugs, hormone supplements and vitamin D metabolites could probably cause a reduction in tooth movement during orthodontic therapy. Any previous medical conditions such as diabetes mellitus or previous pregnancy complications are important to know in advance before starting orthodontic treatment.[1]

A complete dental history provides the orthodontist knowledge about the patient's attitude towards dental care and patient's priorities. It is important that the orthodontists must be more active and capable of diagnosing gingival and periodontal problems. If the patient already has signs such as gingival inflammation and poor oral hygiene, it may be wise to start orthodontic therapy after the pregnancy. Patient's perception of their own health is considered to be an important aspect of their psychosocial make up and potential compliance. It is important for the orthodontist to know if the patient is self-motivated and enthusiastic about receiving orthodontic treatment also taking into account the hormonal and physiological changes that will be anticipated during the course of pregnancy.[3-5]

Positioning of pregnant women in the dental chair

During the third trimester of pregnancy, when the woman is supine, the uterus may press on the inferior vena cava and impede venous return to the heart, which may lead to hypotensive syndrome (occurring at a rate of 15-20%) and loss of consciousness.

In order to prevent this from happening during dental treatment, when seated in the dentist's chair the pregnant woman's head should always be higher than her feet, and, if necessary, a small pillow (or a folded blanket) should be placed under her right hip ("left uterine displacement") so that the uterus is moved away from the inferior vena cava.

Hormonal changes that affect tooth movement

1. Estrogen

Estrogens are female sex hormones that occur naturally in three forms. The first and most prominent form of estrogen is estradiol, which is produced from menarche to menopause and is important in the regulation of the estrous cycle. The second form is estrone, produced after menopause, when the total amount of estrogens has decreased. The third form, estriole, is expressed primarily during pregnancy. Estrogen is considered to be the most important hormone affecting the bone metabolism in women. It inhibits the production of various cytokines which are involved in bone resorption by stimulating osteoclast formation and osteoclast bone resorption. It also inhibits osteoblasts' responsiveness to PTH. Estrogens do not have any anabolic effects on bone tissue; they directly stimulate the bone forming activity of osteoblasts.

Studies have shown that estrogens decrease the velocity of tooth movement.[6] Oral contraceptives, taken for long periods of time, can influence the rate of tooth movement. Androgens also inhibit bone resorption, modulate the growth of the muscular system, and may affect the length and results of the orthodontic treatment.[2]

2. Progesterone

Progesterone has been shown to increase gingival exudates, affect the gingival vascularity and integrity of the capillary endothelial cells. The presence of increased sex hormones during pregnancy

may cause epithelial separation and an increase in vascular permeability. Vascular and hormonal changes may increase the gingival crevicular fluid and aggravate response to plaque. He *et al.* studied the effect of progesterone on orthodontic tooth movement (OTM).[4] He found that progesterone influence the periodontal reconstruction on OTMs in pregnant rats and may be helpful in alveolar bone formation. Long-term progesterone administration could reduce the rate of tooth movement.[7]

Osteoclasts are primarily observed 2 days after force application. But there is lower number of osteoclasts in a pregnant woman 2 days after appliance insertion. This decrease in osteoclast number may be due to the gradual increase of estrogen and progesterone at early phases of pregnancy. It has been suggested that maximum osteoclasts recruitment happens 5-7 days after force application.

3. Relaxin

Relaxin has been known as a pregnancy hormone. It is released just before child birth to loosen the public symphysis, so that the relaxed suture will allow widening of the birth canal for parturition. Relaxin might accelerate the early stages of orthodontic tooth movements in rats.[8]

Effect of various drugs in pregnancy and tooth movement

During orthodontic treatment, drugs are prescribed to manage pain from force application to biological tissues, manage temporomandibular joint (TMJ) problems and tackle some infection throughout the course of treatment. Apart from these drugs, patients who consume vitamins, minerals, hormonal supplements, during pregnancy and other compounds for the prevention or treatment of various diseases can also be found in every orthodontic practice.[9] Some of these drugs may have profound effects on the short- and long-term outcomes of orthodontic practice. Hence, it is necessary to review the mechanism of action and effects of commonly used drugs on tissue remodelling and orthodontic tooth movement. [8]

1. Analgesic

Most commonly used medications in orthodontics are for control of pain following mechanical force application to tooth. Inhibition of the inflammatory reaction produced by prostaglandins (PGs) slows the tooth movement. Recent research demonstrated the molecular mechanisms behind the inhibition of tooth movement by NSAIDs. The levels of matrix metalloproteinases (MMP9 and MMP2) were found to be increased, along with elevated collagenase activity, followed by a reduction in procollagen synthesis which is essential for bone and periodontal remodeling.

2. Aspirin

Many pregnant women take this medicine as pain killer but some of pregnant ladies are prescribed this medicine as for blood thinner. Due to some reasons the blood of pregnant lady get thicker and there is clot formation in placenta due to this the foetus does not get good amount of blood supply so the growth of foetus is either

retarded or there are chances of foetal death. To reduce these chances gynaecologist prescribe a blood thinner. These drugs should be to taken orally or intravenously. Acetylsalicylic acid and the related compounds, and their action result from inhibition of COX activity, which converts unsaturated fatty acids in the cell membrane to PGs.

Clinical experience shows that orthodontic tooth movement is very slow in patients undergoing long-term acetylsalicylic therapy. Salicylate therapy decreases bone resorption by inhibition of PGs' synthesis and may affect differentiation of osteoclasts from their precursors. Therefore, it is recommended that patients undergoing orthodontic treatment should not be advised to take aspirin and related compounds for longer period during orthodontic treatment.[2]

3. Bisphosphonates

Bisphosphonates (BPNs) have strong chemical affinity to the solid-phase surface of calcium phosphate; this causes inhibition of hydroxyapatite aggregation, dissolution, and crystal formation. Bisphosphonates cause a rise in intracellular calcium levels in osteoclastic-like cell line, reduction of osteoclastic activity, prevention of osteoclastic development from hematopoietic precursors, and production of an osteoclast inhibitory factor. Studies have shown that BPNs can inhibit orthodontic tooth movement and delay the orthodontic treatment. Topical application of BPNs could be helpful in anchoring and retaining teeth under orthodontic treatment.[2]

4. Vitamin D

Vitamin D and its active metabolite, 1,25,2(OH)D3, together with parathyroid hormone (PTH) and calcitonin, regulate the amount of calcium and phosphorus levels. Vitamin D receptors have been demonstrated not only in osteoblasts but also in osteoclast precursors and in active osteoclasts. Stimulatory action of vitamin D on osteoblasts can help stabilize orthodontic tooth movement. In 1988, Collins and Sinclair demonstrated that intraligamentary injections of vitamin D metabolite, 1,25-dihydroxy cholecalciferol, caused increase in the number of osteoclasts and amount of tooth movement during canine retraction with light forces. [10]

Orthodontic consideration and management

There are some factors that could make orthodontic treatment uncomfortable. For instance, the first trimester of pregnancy can manifest itself in the form of morning sickness. Several women actually suffer through morning sickness throughout their pregnancy. Morning sickness can have you feeling fatigued and dehydrated. Throwing up everything to eat can actually lead to malnutrition, and in severe cases, a pregnant woman may need to be hospitalized. So care should be taken not give them appointments in the morning time. All these can be bad enough on their own, but when you combine them with the soreness and discomfort that comes with wearing braces, it can all be hard to take. The initial days of braces treatment can be discomforting and even painful. A pregnant woman may find that she can't eat

her food, because her teeth hurt too much, and she needs to eat to keep her energy up.

Anti- convulsants including valproate, carbamazepine, and phenytoin and methotrexate have been observed to induce oral clefts in humans. Allow women who have a high risk of producing offspring with oral clefts to be targeted with folic acid supplementation.

Light and continuous force should be used as we know that periodontium is susceptible to breakdown with heavy forces and it's advisable to limit the visits to shorter appointments to avoid the patient being in extreme supine position especially during the later stages of the pregnancy.[11]

Dental radiography for pregnant women

According to American Dental Association (ADA), every precaution should be taken to minimize radiation during pregnancy. However, if there is an acute dental infection, it must be addressed and radiographs can be taken. In addition, the radiation caused by oral radiography is minimal. It is advisable to coordinate the orthodontic treatment plan with the obstetric care provider to establish guidelines that will beneficial for maternal oral health and perinatal outcomes.

Orthodontic treatment could include the necessity to have one of the teeth extracted. Tooth extraction by itself may not be dangerous for a pregnant woman. However, one must avoid taking X-rays during the first trimester of pregnancy. In fact, it's better to avoid X-rays for the entire duration of pregnancy. If a lady patient is up for a radiograph and suspect she could possibly be pregnant, it's advisable to wait till you confirm this before you go ahead and get an X-ray done.

According to the American College of Radiology, no single diagnostic x-ray involves a radiation dose significant enough to pose a threat to the health and normal development of the foetus. More recent evidence suggests that ionising radiation at a dose of less than 5 rad does not increase the risk of malformation, growth retardation or miscarriage.

For this reason, dental radiographs are considered safe to be given at any time that it is deemed necessary during pregnancy, provided that the dentist follows all the proper radiologic practices, i.e., using a radiation protective apron with a thyroid collar, using high-speed films, following the proper procedures in order to take the radiograph, and following the ALARA (As Low As Reasonably Achievable) principle.[6]

Orthodontic treatment plan

It is of very importance to plan a very simple and realistic treatment plan in patients who are pregnant. A good communication between the orthodontist and the patient is a key for successful results. If the patient wants to undergo orthodontic therapy primarily for frontal aesthetics and is not willing to be compliant for a 2-year treatment plan and comprehensive therapy, this needs to be established at the beginning. In such patients, limited treatment should only be performed. As an alternative in some

patients, it may be advisable to wait until after the pregnancy to start orthodontic treatment.

Orthodontic consideration for gingival health during pregnancy

Gingivitis is caused by several factors that may be local or systemic factors. Among systemic factors, the role of hormonal changes during pregnancy is well-established. Although, the presence of fixed orthodontic appliances alone may not cause gingivitis, factors like pregnancy and poor oral hygiene combined together could precipitate acute gingival inflammation that may progress to a periodontal condition in a patient receiving orthodontic therapy. [12]

Orthodontic appliances could act as a potential plaque retentive source and aggravate inflammatory reactions that are seen during pregnancy. During pregnancy if there is pre-existing gingival inflammation, presence of orthodontic appliances could increase the demand of rigorous oral hygiene maintenance and in patients who lack that self-motivation; the periodontal condition may get aggravated when orthodontic appliances are present in the oral cavity.[2]

There is a lack of awareness regarding oral health-care issues among patients who are pregnant and choose to seek orthodontic treatment. Our emphasis is on patient education, oral hygiene maintenance and preventive and treatment strategies for the management of gingival health in orthodontic patients during pregnancy.[2]

Oral hygiene maintenance during orthodontic treatment

Before starting orthodontic treatment, any pre-existing periodontal condition must be checked. Because of pre-existing hormonal changes during pregnancy, the gingival tissues may be already inflamed in pregnancy women. Thus, a more rigorous oral hygiene routine will be required to maintain optimal oral health. Frequent dental prophylaxis will be helpful and meticulous home- care regimens will need to be employed to ensure success.

In addition to tooth brushing, a detailed instruction in the manipulation of dental floss will enable the patient to floss when the braces are in the mouth. Many interdental cleaning aids such as tooth picks or miniature bottle brushes can be attached to handles for the convenience of manipulation around teeth, Thus oral hygiene regimen maintained at home and coupled with professional dental cleaning will ensure successful oral health and keep orthodontic patients during pregnancy free of gingival and periodontal disease during active treatment.

Role of orthodontist

For successful completion of orthodontic treatment, a good communication must be established between the patient and the orthodontist from the beginning. Detailed history, oral examination and assessment of patient compliance and expectations will enable the orthodontist to develop practical goals for

successful treatment. It is important for orthodontists to be aware of the limitations that may be inherent in such cases. In addition to reinforcing oral hygiene, it is important that the patient be sent for professional cleaning at regular intervals. Good communication among health-care professionals will benefit the patient and improve their quality of- life. We should use steel ligature in place of elastic modules because elastic modules are less hygienic. However, there are no obvious contraindications to orthodontic therapy in a healthy pregnant patient.

However, it may be advisable to limit the visits to shorter appointments to avoid the patient being in extreme supine position especially during the later stages of pregnancy. Radiographic imaging such as a panoramic film and peri- apical films are routinely used to assess periodontal health and root inclinations. Every precaution should be taken to minimize radiation during pregnancy. However, if there is an acute dental infection, it must be addressed and radiographs can be taken. In addition, the radiation caused by oral radiography is minimal. It is advisable to coordinate the orthodontic treatment plan with the obstetric care provider to establish guidelines that will benefit maternal oral health and perinatal outcomes.

Role of patients

It is important for women to be aware of the importance of oral health-care especially during pregnancy. Simple and effective home care measures described earlier and professional dental care will enable women to prevent any gingival and/or periodontal issues during the course of their orthodontic treatment. It is important to emphasize that professional tooth cleaning alone is not sufficient for preventing gingival and periodontal issues and conscientious oral home care is also of paramount importance.

Patient education and awareness

It is important that medical professionals dealing with prenatal care be educated the importance of dental care to their patients. In addition, the dental health-care providers must be aware of the importance of dental care during pregnancy and effects of poor periodontal health on pregnancy and the baby. Various behavioral modification techniques could be employed. Constant motivation of the patient could help improve patient compliance during orthodontic treatment. It is important to emphasize that professional tooth cleaning alone is not sufficient for preventing gingival and periodontal issues and conscientious oral home care is also of paramount importance. Thus, a combination of professional tooth cleaning and educational reinforcement of oral hygiene will prove to be successful. Constant motivation of the patient could help improve patient compliance during orthodontic treatment. It is critical for the dental care provider to focus on changing the individual's perceived need towards oral health and or values associated. Especially during orthodontic treatment, which is over a period of a couple of years, constant reinforcement and periodic monitoring and

occasional discussions with the patient are extremely crucial.

Most importantly, there needs to be a psychological change and motivation in the patient that will make them conscious about their oral hygiene status.

Conclusion

It has been found that orthodontic treatment during pregnancy may aggravate gingivitis caused by local and systemic factors. Periodontitis during pregnancy may lead to complications and preterm low-birth-weight babies. Awareness among oral and prenatal healthcare professionals is critical for optimal patient care. For successful completion of orthodontic treatment, a good communication must be established between the patient and the orthodontist from the beginning. Detailed history, oral examination and assessment of patient compliance and expectations will enable the orthodontist to develop practical goals for successful treatment.

It is important for orthodontists to be aware of the limitations that may be inherent in such cases. In addition to reinforcing oral hygiene, it is important that the patient be sent for professional cleaning at regular intervals. Good communication among healthcare professionals will benefit the patient and improve their quality of life.

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C-SHAPED ROOT CANALS: A REVIEW

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****Dr. Elsy Bijoy, ****Dr. Ravi

Abstract

The aim is to review and discuss the etiology, incidence, anatomic features, classification, diagnosis and management of the C-shaped canal configuration. C-shaped root canals are frequently observed anatomic variations in mandibular second molars. Owing to the complex and variable presentation of C-shaped canals, the clinician often faces several challenges during diagnosis and treatment. Knowledge of the C-shaped canal configuration is essential to achieve success in endodontic therapy.

Keywords: C-shaped canals, root canal morphology, review

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Introduction

Successful root canal therapy requires a thorough knowledge of root and root canal morphology. One such variation of the root canal system is the C-shaped canal configuration. It is termed so because of the C-shaped cross-sectional anatomical configuration of the root and root canal .Most commonly C-shaped canals are found in mandibular second molars, the C-shaped canal configuration may also occur in mandibular premolars, maxillary molars and mandibular third molars. The aim of this article is to discuss the etiology, incidence, anatomic features, classification, and diagnosis of C-shaped canal configuration.

Etiology

C-shaped roots are due to taurodents; Manning[1] has reported that it also occurs as a result of age changes due to deposition of dentin on the walls of the canal. But this theory was rejected as C- shaped canals were found in under 40 years of age.[2]The most accepted reason for C-shaped canals is the failure of fusion of Hertwig's epithelial sheath. Failure of the Hertwig's epithelial sheath to fuse on the buccal side will result in the formation of a lingual groove, and failure to fuse on the lingual would result in a buccal groove. Hence, this fusion is not uniform and a thin interradicular ribbon connects the two roots together. Failure of the sheath to fuse on both the buccal and lingual sides will result in the formation of a conical or prism-shaped root[1]. Fusion is most likely to occur if the distance between the root canals is small. Earlier, the irregular fusion of the Hertwig's epithelial sheath was attributed to trauma, such as radiation or chemical interference, but following the documentation of racial predilection, it is more likely to be of genetic origin. The root canals in such teeth merge in a very wide, slot like, single, continuous root canal morphology, which can assume the shape of a letter C(Fig 1&2).

Incidence

Canal configuration has been shown to have a high prevalence in mandibular second molars with a percentage ranging between 2.7-45.5 percent. The C-shaped variation in canal anatomy has also been reported in maxillary first molars (0.12%), maxillary third molars (4.7%), mandibular third molars (3.5%-4%) and mandibular second premolars (1%).[3] Singla& Aggarwal[4] reported finding a C-shaped canal configuration in the palatal canal of a maxillary second molar. The possibility of finding C-shaped canal anatomy in maxillary lateral incisors with type III radicular groove has also been documented.[5] There is no correlation of C-shaped canal configuration with gender and also with age and tooth position. Bilateral occurrence of C-shaped canals has been reported in a percentage of 70%-81%.[6]

Features

Roots

A characteristic of roots having a C-shaped canal is conical or square configuration.[7,8] The root configuration of molars having this canal shape may be represented by fusion of either the facial or lingual aspect of the mesial and distal roots. The roots display an occluso-apical groove on the buccal or lingual surface, which represent the line of fusion between mesial and distal roots. The surface opposite to this radicular groove is convex[3].Peiris *et al.*,[9] referred'gutter-shaped' to the C-shaped roots of mandibular second molars.

Pulp chamber

The pulp chambers of teeth with C-shaped canals mostly have greater apico-occlusal width with a low bifurcation.[10]

Root canal system

The root canal system of C-shaped canals shows broad, fan-shaped communications from the coronal to the apical third of the canal. The canals change shape from the coronal aspect of the root. For example: A continuous C-shaped canal would change to a semicolon configuration in the mid root and then becomes continuous C-shape in the apical third of the root or vice versa.[3]

Diagnosis

Preoperative radiographic diagnosis

There are differences in opinions on the value of a preoperative radiograph in diagnosing a C-shaped case. According to Cooke & Cox[11] it is not possible to diagnose C-shaped canals on preoperative radiographs. Conversely, others investigators described four radiographic characteristics that can allow prediction of the existence of this anatomical condition: radicular fusion, radicular proximity, a large distal canal or a blurred image of a third canal in between.[2,12] Hence, a C-shaped root in a mandibular second molar may present radiographically as a single-fused root or as two distinct roots with a communication. When the communication or fin connecting the two roots is very thin, it is not visible on the radiograph and may thus give the appearance of two distinct roots.

Fig 1: Classification of C-shaped canals - Melton s classification (based on cross sectional shape)

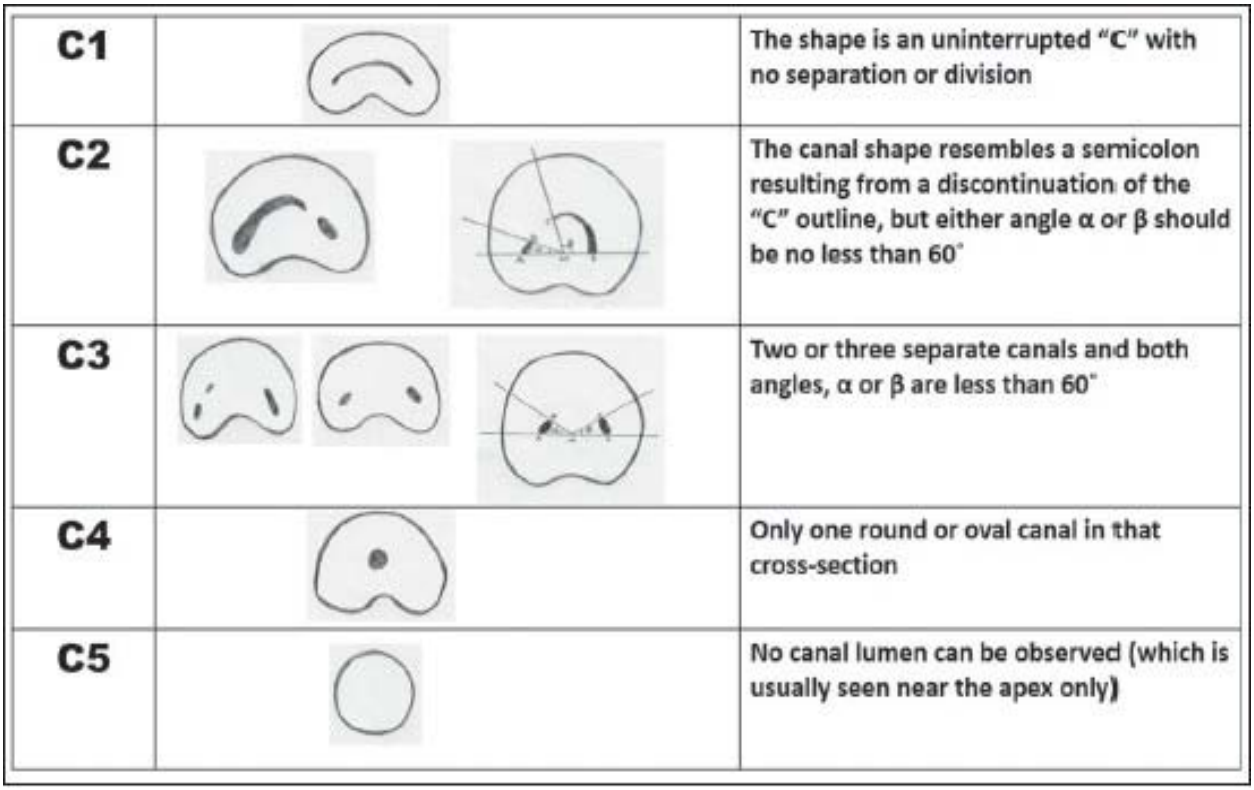
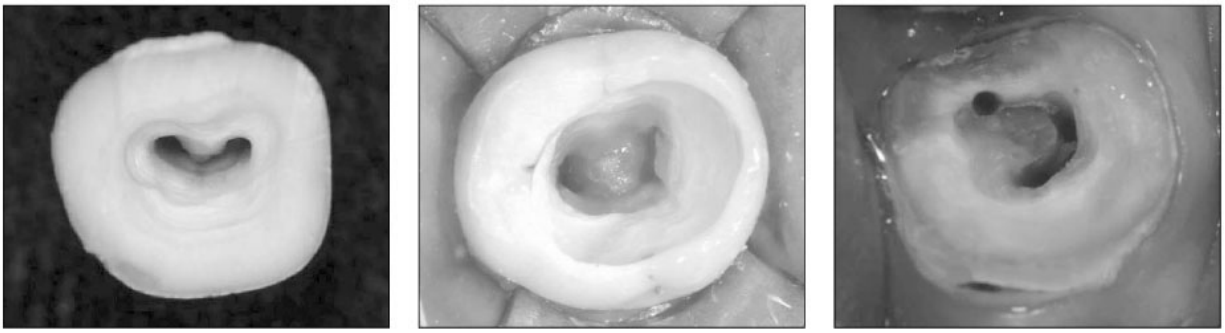


Fig 2: Types of C canals according to Melton et al



The radiograph may also reveal a large and deep pulp chamber, usually found in C-shaped molars.

Wang *et al.*,[13]reported a higher incidence in the recognition of C-shaped canals using a combination of radiography and clinical examination under the microscope (41.27%) than using the radiography (34.64%) or clinical examination (39.18%) alone.

Preoperative clinical diagnosis

The crown morphology of teeth with C-shaped anatomy does not present with any special features.

Clinical diagnosis

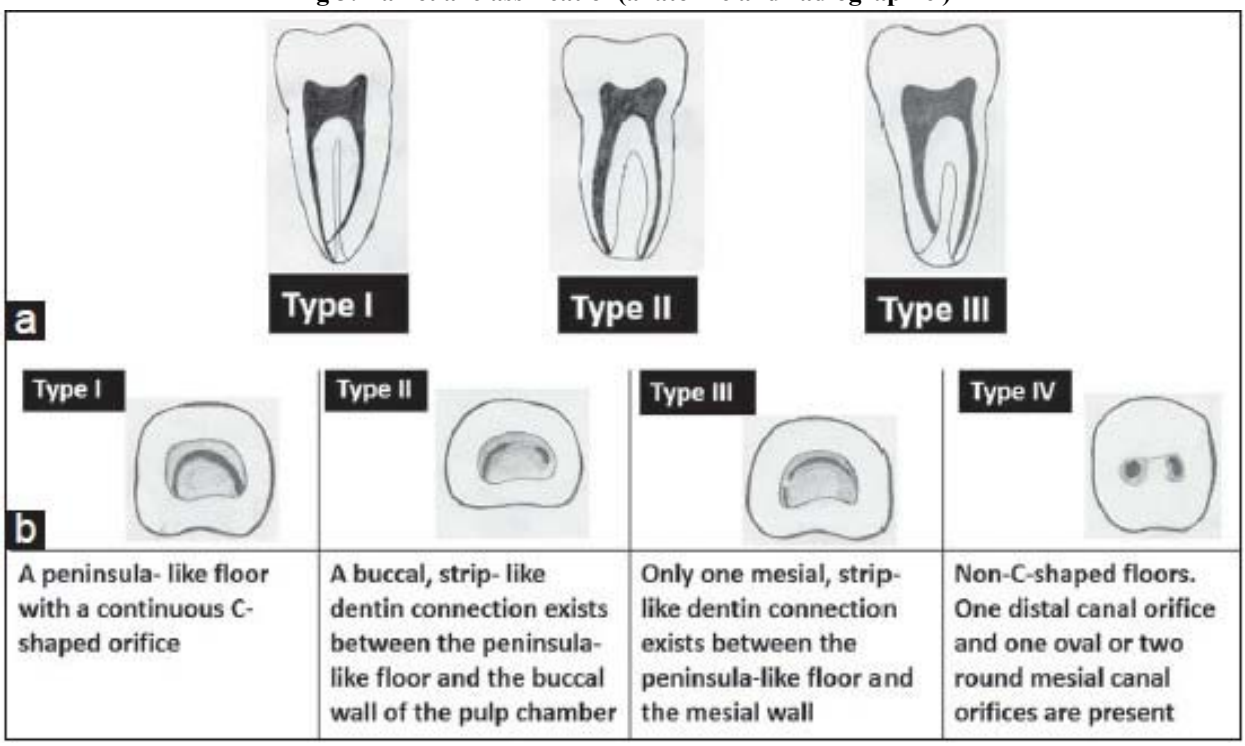
1. After access cavity preparation

Clinical diagnosis of C-shaped canals can be established only following access to the pulp chamber. The pulpal floor in C-shaped teeth can vary from peninsula like with a continuous C-shaped orifice to non C-shaped floors as per the classification given by Min *et al*.[14]

Fan *et al*[15], stated that for mandibular second molar to qualify as having a C-shaped canal system, it has to exhibit all the following three features:

a. Fused roots;
b. A longitudinal groove on lingual or buccal surface of the root;
c. At least one cross-section of the canal should belong to the C1, C2, or C3 configuration, as per Fan's anatomic classification (Fig 3).

Fig 3: Fan et al classification(anatomic and radiographic)



2. Working length determination

To diagnose a C-shaped canal working length is of great help than any other means. In a true C-shaped canal, (single canal running from the orifice to the apex) it is possible to pass an instrument from the mesial to the distal aspect without obstruction. In the semicolon type, (one distinct canal and a buccal or lingual C-shaped canal) whenever an instrument was inserted into any side of the C-shaped canal, it always ends in the distal foramen of the tooth and a file introduced in this canal could probe the whole extension of the C. When negotiating the C-shaped canal, instruments may be clinically centered[3].

Radiographically, the instruments may either converge at the apex or may appear to be exiting the furcation, thus adding to the confusion and troublesome task of determining whether a perforation has occurred.

Conclusion

It is important to have a knowledge of different possible alterations in the internal anatomy of teeth for successful therapy.the C-shaped canal system tends to vary considerably in there anatomical configuration and thus leads to difficulties in debridement, filling and restoration.

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ODONTOGENIC MYXOMA OF MAXILLA TREATED WITH RESECTION - A CASE REPORT

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****Dr. Alavi Shiyas, ****Dr. Jasly K , ****Dr. Jasmine John

Abstract

This paper is about a patient who reported to the Department of Oral and Maxillofacial Surgery, KMCT Dental College, Manassery, Kozhikode, Kerala. The case arouses particular interest due to the rapid growth and infiltrating nature of the lesion in maxillary posterior teeth area of an 18 year-old male patient, who denied any leading symptoms, with the lesion involving extensively. After through investigations the lesion was diagnosed as Odontogenic Myxoma.

Keywords: Odontogenic Myxoma, maxilla, excision.

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Introduction

Rudolph Virchow in 1863 first described myxofibroma.[1] In 1974 Thoma and Goldman were the first to describe odontogenic myxoma (OM) in jaws.[1]

The World health organization (WHO) has classified OM as benign tumor of ectomesenchymal origin with or without odontogenic epithelium.[1] The Odontogenic origin of OM may be judged based on the exclusive location in the tooth bearing areas of the jaws and the presence of an odontogenic epithelium.[2]

Most of the OMs reported were in young adults affected mostly in their second and third decade of life with marked female predilection.[3]

OM occurs both in bone and soft tissue.[4] Majority of these tumors occur in the mandible. Clinically, it is slow-growing, painless, locally aggressive and site-aggressive tumors.[5] Larger lesions may cause tooth displacement and cortical bone expansion.[6]

Radiologically, OM appear as multicystic lesion with well-defined or diffused margins with an appearance of either a “Honey combed”, “soap bubble” or “Tennis racket” shape. Unilocular appearance is seen in children and in anterior parts of the jaw.[7] Root resorption is rarely seen, and the tumor is often scalloped between the roots.

This case report is on a patient who reported to the Department of Oral and

Maxillofacial Surgery, KMCT Dental College, Manassery, Kozhikode, Kerala.

Case report

The case arouses particular interest due to the rapid growth and infiltrating nature of the lesion in maxillary posterior teeth area of an 18 year-old male patient, who denied any leading symptoms, with the lesion involving extensively. The patient's only complaint was a swelling in the right upper back teeth region since two months. (Fig 1)

Fig 1: Photograph of the patient

The swelling was small and gradually increased to the present size. The growth was continuous in nature without any periods of remissions or exacerbations. No other associated symptoms were present.

Extraorally, there was mild facial asymmetry on right side of face. On inspection, a localised swelling was present in middle third of the face which extended from ala of the nose to the tragus of ear. Upon extraoral palpation, it was firm and non tender and fixed to the underlying structures. Overlying skin was not erythematous or inflamed and there was no rise in temperature. No palpable cervical lymphadenopathy was present. The mouth opening was normal – three finger width.

Intraorally, there was a swelling of 4×3 cm over the right side of maxilla extending from maxillary right lateral incisor to maxillary right first molar. The lesion produced bilateral cortical expansion with no changes over the overlying mucosa. There was no abnormal mobility and drifting of associated teeth. The swelling was non tender on palpation (Fig 2). The adjacent mucosa appeared normal with no sinus opening. It was soft, fluctuant at the centre of the swelling while firm and bony hard to the sides.

Fig 2: Intraoral photograph

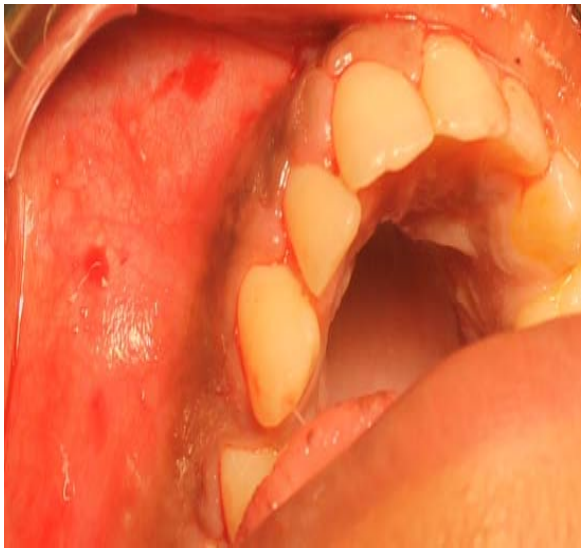
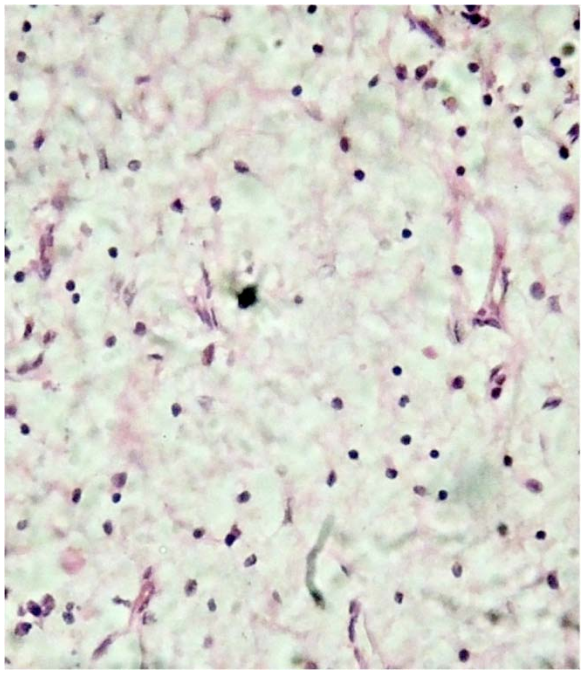


Fig 3: OPG

Fig 4: Histopathologic picture



The patient was a non smoker, non alcoholic and a non pan chewer. There was no relevant family, medical or dental history. He was moderately built and nourished, with normal gait and posture. All vital signs were within the normal limits. A provisional diagnosis of Ameloblastoma was given for the lesion. The differential diagnosis included odontogenic myxoma and odontogenic keratocyst. OPG and biopsy was advised.

In the OPG, the lesion appeared as a well defined radiolucent lesion of size approximately 4 × 5 cm extending from teeth 12 to 16,which was surrounded by a sclerotic border. Thin radio opaque bony septae was evident within the lesion. There was a displacement of 15,16. 16 was grossly decayed. No root resorption was evident (Fig 3).

Histopathologically, there was a myxomatous area with scanty collagen fibers and vascular spaces. Few large spindle and stellate shaped fibroblasts were noticed.

Diffuse mixed inflammatory cell infiltrate was also noted (Fig 4).

A final diagnosis of Odontogenic Myxoma was made after obtaining the OPG and histopathologic reports. The patient was posted for the surgical excision of the lesion after obtaining the results of the routine laboratory investigations.

Treatment

The Tumor was surgically resected along with teeth under general anesthesia and sent for excisional biopsy (Fig 5 to 8).

Fig 5 to 8: Surgical excision of the lesion

Gross examination of the excised specimen showed white gelatinous appearance of the tumour, firm in consistency. The excisional biopsy results once again confirmed the diagnosis of odontogenic myxoma.

Discussion

The Odontogenic myxoma is a benign neoplasm arising from odontogenic mesenchymal origin with growth characteristics and clinical, radiographic

presentation similar to those of the ameloblastoma. It shows infiltrative growth but does not metastasize. Gelatinous consistency may be responsible for its infiltrative nature. It presents as an asymptomatic jaw expansion without sensory nerve changes.[1-7]Age distribution is very broad, ranging from 5 to 65 years. It constitutes 3-6% of total odontogenic tumors. The occurence in maxilla is rare.

This case arouses particular interest due to the rapid growth and infiltrating nature of the lesion in maxillary posterior teeth area of an 18 year-old male patient, who denied any leading symptoms, with the lesion involving extensively. All these findings in the present case was in contrast to the usual presentation of an Odontogenic Myxoma.

Management of myxoma is similar to that of aggressive odontogenic tumours. Multilocular tumors exhibit a 25% recurrence rate and, therefore, must be treated more aggressively. In the case of a multilocular myxoma, resection of the tumor with a generous portion of surrounding bone is required. Because of the gelatinous nature of the tumor, it is crucial for the surgeon to remove the lesion intact so as to further reduce the risk of recurrence.

After treatment a minimum of five years of surveillance should be maintained irrespective of treatment modality applied to treat odontogenic myxoma.[8]

Conclusion

It is difficult to diagnose OM based on clinical and radiographic finding. Diagnosis can be made by biopsy. Differential diagnosis has great importance for all tumors involving the maxillo-facial region. Due to aggressive behavior of these tumors regular follow up over years is absolutely necessary after treatment in the cases of odontogenic myxomas.

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AWARDS AND ACHIEVEMENTS

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Final year Post Graduate Student, Department of Conservative Dentistry & Endodontics Secured 1st Prize in Paper Presentation during the 16th IACEDE & IES PG CONVENTION held on 4th-6th June, 2015 at I.T.S Centre for Dental Studies & Research Muradnagar, Ghaziabad.

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