

# JOURNAL OF MAXILLOFACIAL SCIENCE & RESEARCH



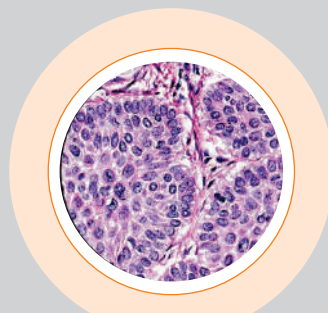
NAAC Accredited  
Dental College

**Official Publication of the PMS College of Dental Science & Research**

Jan - June 2022

Volume : 3 Issue : I

ISSN No. : 2348-9030



## ABOUT THE JOURNAL

Journal of MaxilloFacial Science and Research (JMFSR, ISSN 2348-9030) is the official publication of the PMS College of Dental Science and Research. The journal started with the aim of providing our students and faculty a platform to showcase their research projects and interesting clinical cases. We also accept articles from outside the institution on topics related to all the dental specialities and related sciences. Authors are encouraged to submit research papers, case reports (new / interesting / rare cases/ cases with clinical significance and interdisciplinary cases), and short communications. Special effort is made to ensure rapid publication. Articles written in English alone will be accepted provided they have not been and will not be published elsewhere. The editor and or its publisher cannot be held responsible for errors or for any consequences arising from the use of the information contained in this journal. The appearance of advertising or product information in the various sections in the journal does not constitute an endorsement or approval by the journal and or its publisher of the quality or value of the said product or of claims made for it by its manufacturer.



# JMFSR



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## A VISION FULFILLED

The grace of God Almighty is best reflected in parents with integrity and children who strive hard to realize their dreams. The late **Sri P. M. Shahul Hameed B.A (1920-1995)** gave his children the best gift in life, quality education, at a time when few realized the wonders that education could work in the lives of men and women. The PMS College of Dental Science and Research is a monument to the memory of that great soul. College was established in 2002 under the able guidance of **Dr. P.S.Thaha**, a visionary with over three decades of experience in dental education and patient care in India and abroad. This college is the first self-financing dental institution in Kerala State, the first to achieve the ISO 9001-2000 certification and NAAC accreditation among dental colleges in Kerala. In addition to undergraduate and postgraduate courses, college is currently conducting PhD programs in different specialities of dentistry recognized by Kerala University of Health Sciences and NITTE University. The college provides an excellent environment for students as well as faculty in developing knowledge, clinical skills and attaining academic excellence. PMS College is currently ranked among the best 40 dental institutions of the country as per the survey conducted by INDIA TODAY.



### DIGITAL DENTISTRY-CAN IT OUTPLACE MANUAL DENTISTRY?

Dentistry is a unique branch of medical science where the clinician needs to have sound knowledge regarding biological basis of various dental problems and at the same time should possess engineering, artistic and surgical skills to execute the appropriate treatment. The greater importance of artistry might have given the term dentistry. But along with aesthetics, functional aspects of every dental treatment are of paramount importance.

In the earlier years, dental treatment was solely depending on the manual skills of the operator or technician. Digital dentistry with the advent of intraoral scanners, 3 D printers, integrated computerized cone beam images have revolutionized day to day dental practice. The present-day dentist is confused whether to practice manual dentistry or go digital. While it holds many advantages when we go digital, it raises a very pertinent question-whether it's going to replace manual dentistry?

Modern techniques and tools can provide highest quality of dental care and a better experience for patients and dentists. The accurate scans by intraoral scanners provide reliable and faster results with more precision. With the advent of modern diagnostic imaging technology, we could spot dental issues even before they happen with reduced doses of radiation. Intraoral cameras are helpful for the doctor to explain the oral issues in a better way. Patients can easily understand and get motivated to initiate dental treatment as well as to maintain oral hygiene. Digital treatment planning can incorporate patient expectations to provide personalised dental treatment, thus minimizing patient dissatisfaction at the end of treatment.

But one thing we must keep in mind is that these jargons can only act as adjunct to ease your diagnosis, treatment planning or execution. Technology may become sometimes a barrier to communicate between dentists and patients if dental professionals treat patients as “cases” of oral diseases rather than as an individual.<sup>1</sup> Technological advances have created unemployment in many fields. Levy and Murnane in 2004 described the difficulties of replicating human perception in the chapter “Why People Still Matter”<sup>2</sup>. But the examples they quoted were refuted a decade down the line. A study by Oxford University in 2016 identified jobs of auxiliary dental personnels like dental technician, dental hygienists and dental assistants are at increased risk of being computerised, but dentists are at low susceptibility<sup>3</sup>.

The human touch required in interaction with the patients, the clinical acumen and experience required for proper diagnosis and the manual dexterity essential for execution of dental treatment are irreplaceable by any machine. At the same time technological advances easing these processes should be embraced for the ultimate benefit of the speciality.

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**Dr. Ambili R**  
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## BLOOD-FILLED BLISTER IN THE ORAL CAVITY: ANGINA BULLOSA HAEMORRHAGICA- A CASE REPORT

Manisha Shaji<sup>1\*</sup>, (Capt.) Vivek.V<sup>2</sup>, Sunila Thomas<sup>3</sup>

### ABSTRACT

A sudden and occasionally painful emergence of oral blood-filled vesicles and bullae that is not caused by a blood dyscrasia, vesiculobullous disorders, systemic diseases, or other known reasons is known as Angina Bullosa Haemorrhagica (ABH). After a short period of time, the haemorrhagic bullae spontaneously burst, causing rough, frequently painless, superficial erosions that spontaneously heal within a week without leaving scars. Dental or functional trauma appears to be the main inciting element in ABH, even though the

pathophysiology is yet unknown. The ABH lesions are frequently mistaken for those of other mucosal conditions. It's crucial to separate this benign disorder's presentation from that of other, more dangerous conditions with comparable presenting symptoms. To differentiate ABH from other blistering disorders of the oral mucosa and to discuss their therapy, this paper describes the clinical characteristics of instances of ABH.

**Keywords:** angina bullosa haemorrhagica, blood-filled bullae, pemphigus, blistering diseases

### INTRODUCTION

Angina bullosa Haemorrhagica (ABH), which Badham first used to describe oral blood-filled vesicles or bullae in 1967, is a condition for which there is no recognised blood dyscrasia, vesiculo-bullous disorder, systemic disease, or other cause.<sup>1</sup>

Localized oral purpura and stomatopompholyx haemorrhagica are two synonyms for this condition. They all heal spontaneously without scarring.

The aim of this article is to give a clearer knowledge about angina bullosa and how to differentiate it from other blistering diseases.

### CASE REPORT

A 61-year-old male patient reported to the department of Oral Medicine and Radiology, PMS Dental College of Science & Research with a chief complaint of growth that was noted on right buccal mucosa during trial insertion of complete denture. On taking the medical history, patient was found to have diabetes for past 15 years, and was under medication and under anti-platelet treatment (for the past 3 years.) On Local examination revealed a purple-coloured blister of size 6x3mm on posterior right buccal mucosa in relation to 47, 48 on occlusal line.

The blister was irregular in shape with ill-defined borders. No blanching was noted. On palpation it was non-tender with soft consistency, non-fluctuant, non-compressible in nature, however raised edges were observed. Provisional diagnosis was Angina Bullosa Haemorrhagica on right buccal mucosa in relation to 47, 48 regions. Patient had no history of any bleeding diathesis or mucosal blistering disorder. Differential diagnosis were made to exclude other mucosal or cutaneous diseases such as erythema multiforme, bullous lichen planus, pemphigus, pemphigoid, epidermolysis bullosa, arterio venous malformation or varices on right buccal mucosa. We finalized the blister as angina bullosa by compiling the evidence as the patient was having diabetes mellitus and was taking anti-platelet drugs for past 3 years. This could have caused ABH. Also colour of blister was characteristic of angina bullosa, and adding to it the patient gave a history of cheek bite on that area (Figure 1). No medication was advised as angina bullosa is self-healing, and patient was recommended for review after 7 days for further consultation. Review was done after 7 days and on examination a self-healed blister was noticed (Figure 2).

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Fig 1 Angina bullosa on right buccal mucosa



Fig 2 Self-healed blister

## DISCUSSION

Clinical signs of ABH include blood-filled blisters that typically appear on the soft palate. They often have a 2–3 cm diameter. They frequently spontaneously burst, leaving behind a ragged ulcer that heals without leaving scars. A recurrence could happen in about 30% of patients. Ulcers that hurt could be present.<sup>2</sup> Women experience it at a 52 percent rate while men at 48 percent. An underlying illness is typically not revealed by laboratory testing, including complete blood count and coagulation profile. Peak prevalence is in middle-aged and aged sufferers. Some report a burning sensation preceding the blister onset. The Nikolsky sign is often negative.

Its cause is yet unknown. ABH has been linked to a constitutional predisposition, such as inadequate mucosal vessel anchoring or loose cohesion between the epithelium and corium of the mucosa. Sub-epithelial haemorrhages could result from this. ABH is a benign condition, some authors report that lesions located in the posterior pharynx and in the epiglottis may cause a choking or gagging sensation and in rare cases could result in acute airway obstruction<sup>6</sup>. Grinspan et al, noted an association with diabetes mellitus, hyperglycaemia, and/or a family history of diabetes in 44.4% of the 54 cases they studied with ABH.<sup>3</sup> Etiologies mentioned in the literature are related to the minor trauma due to hot foods, restorative dentistry, periodontal therapy, dental injections of anaesthetics, chlorhexidine gluconate mouth rinse and steroid inhalers.<sup>7</sup> Haemorrhagic blisters can also appear in the setting of leukaemia, vasculitis and other haematological and haemostatic disorders.

The differential diagnosis is broad, including pemphigus, mucosal pemphigoid, cicatricial pemphigoid, epidermolysis bullosa acquisita, linear IgA dermatosis, bullous lichen planus, erythema multiforme, oral amyloidosis and fixed drug eruption. Haemorrhagic blisters can also appear in the setting of leukaemia, vasculitis and other haematological and haemostatic disorders.<sup>4</sup> Direct immunofluorescence is generally negative, however equivocal immunostaining for IgG and C3 has been formerly reported. Although the threat of asphyxia is probably remote, palatal, or pharyngeal blisters should be ruptured to be able to save higher airway obstruction. In uncommon occasions, the dimensions of the bulla and the unfastened blood within the larynx requires intubation of the trachea through both fiberoptic endoscopy or direct laryngoscopy or securing the airway through surgical tracheostomy.<sup>2</sup>

The management of a patient presenting with oral blood-filled bullae should start with a detailed medical history and a careful examination to differentiate ABH from other more serious diseases. The patient should be reassured of the benign nature of the blisters. Large palatal or pharyngeal blisters causing a choking sensation should be broken if still intact. Management of these lesions should include the use of anti-inflammatory or anti-bacterial rinses (0.2% chlor



hexidine gluconate) to relieve pain and to limit secondary infections of the ulcers.<sup>2</sup>

## CONCLUSION

The lack of information of angina bullosa haemorrhagica makes it very probable to be under-diagnosed and under-reported. The examination of the oral mucosa and the skin, collectively with the clinical records are the keys to diagnosis. In widespread practice, the dermatologist may be faced with a blood-crammed bullous lesion of the oral mucosa. Recognition of the lesion is significant to avoid misdiagnosis.

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## PYOGENIC GRANULOMA IN THE BUCCAL VESTIBULE: A CASE REPORT

Bharath Mohan<sup>1\*</sup>, (Capt.) Vivek.V<sup>2</sup>, Sunila Thomas<sup>3</sup>

### ABSTRACT

Pyogenic granuloma is a reactive and non-neoplastic soft tissue tumor which is thought to represent an exuberant tissue response to local irritation and trauma. Clinically these lesions usually present as single nodule or sessile papule with smooth or lobulated surface. These may vary in size from a few millimeters to several centimeters. Pyogenic granuloma of the oral cavity is known to involve the gingiva commonly (75% of all cases). Rarely it may be present extrajugally. Here, we report a case of extra

gingival pyogenic granuloma in the buccal vestibule which was clinically misdiagnosed as vestibular abscess.

**Keywords:** Pyogenic granuloma, gingiva, vestibule, clinical diagnosis

### INTRODUCTION

Pyogenic granuloma is a relatively common, soft tissue tumor of oral cavity that is believed to be reactive and non-neoplastic in nature.<sup>1,2</sup> The name pyogenic granuloma is a misnomer since the condition is not associated with pus and does not represent a granuloma histologically.<sup>3-5</sup> Some authors use the term lobular capillary haemangioma for this lesion.<sup>6,7</sup> The pyogenic granuloma is thought to represent an exuberant tissue response to local irritation or trauma.<sup>2,4,5,8</sup>

Clinically these lesions usually present as single nodule or sessile papule with smooth or lobulated surface.<sup>1-3,5-7</sup>

These may be seen in any size from a few millimetres to several centimetres.<sup>2,3,5-7,9</sup> As lesions mature, the vascularity decreases and the clinical appearance become more collagenous and pinkish.<sup>3</sup> The peak prevalence is in teenagers and young adults, with a female predilection of 2:1.<sup>1,3,5,10</sup> The increased incidence of these lesions during pregnancy may be related to the increasing levels of estrogen & progesterone.<sup>1-3</sup> Pyogenic granuloma of the oral cavity is known to

involve the gingiva commonly (75% of all cases). Uncommonly it can occur on the lips, tongue, buccal mucosa, vestibule, palate and so on.<sup>2,4,5</sup> The purpose of this case report is to present a case of extra gingival pyogenic granuloma in the buccal vestibule which was clinically misdiagnosed as vestibular abscess.

### CASE REPORT

A 22-year-old male patient reported to the Department of Oral Medicine & Radiology, PMS College of Dental Science & Research with a chief complaint of a soft tissue growth in relation to the lower left posterior teeth for one month. On local examination, two soft tissue sessile growths noticed on the left buccal vestibule emanating from the vestibule having an oval shape with reddish-pink colour, measuring approximately 2x2mm & 4x4mm with well-defined borders (Figure 1). Both the growths were seen in close approximation and occasional pus discharge was noticed. On palpation, the growths were having mild tenderness, soft in consistency, slightly compressible, non-pulsatile, non-fluctuant, non-translucent & non-reducible. Partially erupted 38 was

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noticed. IOPA of 36, 37 & 38 showed a radiolucency at the distal surface of the crown of 38 suggestive of a peri-coronal inflammation (Figure 2). Distal side of 37 showed a coronal radiolucency suggestive of proximal caries. On pulp vitality testing, 36,37,38 was vital & 37 showed an early response suggestive of pulpal hyperaemia in relation to 37. Provisional diagnosis was Vestibular abscess from impacted 38. Peripheral exophytic lesions like Pyogenic granuloma, Fibroepithelial polyp, Peripheral giant cell granuloma, Peripheral ossifying fibroma were considered in the differential diagnosis. Surgical extraction of 38 was done, and the growths were surgically excised and sent for histopathological examination. Satisfactory healing was noticed and the patient was put on follow-up. The histopathologic examination revealed granulation tissue with non-neoplastic proliferation of endothelial cells with blood cells formation and infiltration of acute and chronic inflammatory cells in a few collagenous matrix. Surface of the lesion was consistent with hyperplastic para keratinized stratified squamous epithelium and areas of atrophy, ulcer and fibrinoleukocytic membrane. These findings were consistent with a histopathological diagnosis of pyogenic granuloma.



Fig 1: Sessile soft tissue growths seen in the left buccal vestibule.

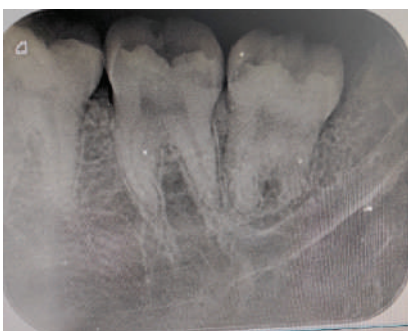


Fig 2: Partially erupted 38 with an ill-defined radiolucency at the distal surface of the crown suggestive of a Peri-coronal inflammation. Proximal caries of 37

## DISCUSSION

In the oral cavity pyogenic granulomas show a striking predilection for the gingiva, with interdental papillae being the most common site in 70% of the cases. They are more common in the maxillary anterior area than any other area in the mouth. Gingival irritation and inflammation that result from poor oral hygiene, dental plaque and calculus or over-hanging restorations may be precipitating factors in many cases.<sup>2,8</sup> Pyogenic granulomas of head and neck are uncommonly seen extragingivally and such locations may cause a diagnostic dilemma.<sup>2,4</sup> In the present case, the lesion was seen on the buccal vestibule, with no attachment to the adjacent attached gingiva.

Although pyogenic granuloma can be diagnosed clinically with considerable accuracy, radiographic and histopathological investigations, aid in confirming the diagnosis and treatment. Radiographs are advised to rule out bony destruction suggestive of malignancy or to identify a foreign body.

All clinically suspected pyogenic granulomas must be biopsied to rule out more serious conditions. The histopathological picture of the extra gingival pyogenic granuloma is quite similar to the ones occurring on the gingiva. Microscopically, it consists of many dilated blood vessels in a loose oedematous connective tissue stroma. There is typically a dense acute inflammatory infiltration but this may be scanty or absent.<sup>2,5,9</sup>

Treatment of pyogenic granuloma consists of conservative surgical excision which is usually curative. There is a relatively high rate of recurrence (about 15%) after simple excision.<sup>3</sup> Recurrences after surgery of extra gingival pyogenic granuloma is however uncommon.<sup>4</sup>

## CONCLUSION

Pyogenic granuloma is a common non-neoplastic inflammatory hyperplasia of the oral cavity, which usually depicts an overzealous connective tissue response to a known stimulus or injury. Pyogenic granuloma is known to show a striking predilection for the gingiva, occurrence in other sites like vestibule is extremely rare. The clinical diagnosis of such an uncommon occurrence can be challenging. This case report highlights the importance of clinical and

histopathological correlation for effectual diagnosis of oral exophytic lesions.

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## DIAGNOSTIC IMPORTANCE OF RADIOGRAPHS: A CASE REPORT OF DENTIGEROUS CYST

Asiya Vahab<sup>1\*</sup>, (Capt.) Vivek.V<sup>2</sup>, Sunila Thomas<sup>3</sup>.

### ABSTRACT

Dentigerous cyst is a developmental odontogenic cyst, which apparently develops by accumulation of fluid between reduced enamel epithelium and the impacted tooth. It may be derived from various sources. Odontogenic cysts are derived from the odontogenic epithelium which is derived from the basal epithelium of the stomodeum. Dentigerous cyst is defined as a cyst that originates by separation of the follicle from around the crown of an unerupted tooth. Because the histopathologic appearance of the lining epithelium is not specific, the diagnosis relies on the radiographic and surgical observation of the attachment of the cyst to the cemento-enamel junction. The dentigerous cyst is reported to be one of the most common lesions of the jaws. Clinically, dentigerous cysts are usually

asymptomatic, but have the potential to become extremely large and cause cortical expansion and erosion. The most commonly affected teeth are mandibular third molars, maxillary canines, and mandibular premolars. Rarely are odontome, deciduous teeth, and supernumerary teeth associated to a dentigerous cyst. The prevalence of mesiodens, a supernumerary tooth in the maxillary central incisor area, ranges from 0.15 to 1.9 percent. Approximately 5 to 6 percent of all dentigerous cysts are associated to supernumerary teeth.

**Keywords:** Dentigerous cyst, supernumerary tooth, odontogenic cyst.

### INTRODUCTION

The most common odontogenic cysts are radicular cysts, which are preceded in frequency by dentigerous cysts in the jaws.<sup>1</sup> Dentigerous cysts, also known as follicular cysts, develop when the follicle around the crown of an unerupted tooth separates, leading to fluid accumulation between the enamel surface of a formed tooth and the reduced enamel epithelium.<sup>2</sup> There is a male predominance and young men have found to have a higher occurrence.<sup>2</sup> We report a rare case of dentigerous cyst associated with an impacted anterior maxillary supernumerary tooth

### CASE REPORT

A 23-year-old male reported to the Department of Oral Medicine & Radiology, PMS College of Dental Science & Research with complaint of painless swelling in the middle third of the face for a duration of one year. Patient had no history of trauma or orthodontic

treatment. At the time of presentation, the patient had no systemic disease. On examination, extra orally, a swelling of size 4x2 cm size with diffuse borders was seen on the middle third of the face in the philtrum involving the upper lip. It mildly obliterated the nasolabial fold of the left side (Figure 1). Intra orally, an ovoid shape erythematous swelling was seen on the labial vestibule of 11,21,22. Extending 1.4 cm right and 2.5 cm left from the midline, and 2 mm apical to the attached gingiva of 11,21,22 and superiorly obliterating the labial vestibule. Its surface was smooth and edges were indistinct (Figure 2). On palpation, the swelling had smooth surface with ill-defined margin, soft and uniform consistency with mild tenderness & rise in temperature, it was compressible, non-pulsatile, non-fluctuant, non-translucent & non-reducible. Palatal region appeared as normal (Figure 3). The overlying palatal and labial mucosa were normal. Displacement, discoloration and grade I mobility noted on 21. Tender on percussion was positive on 21.

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Based on the clinical features, a provisional diagnosis of Periapical cyst on 21 was given. Nasolabial cyst, Traumatic bone cyst were considered as differential diagnosis. On checking vitality, 21 and 13 appeared nonvital. (Table I)

Tooth no	Score	Tooth no	Score
11	10	21	26
12	11	22	13
13	28	23	7

Table I. Pulp vitality test: 13 and 21 appears non vital



Fig 1:Extra oral image



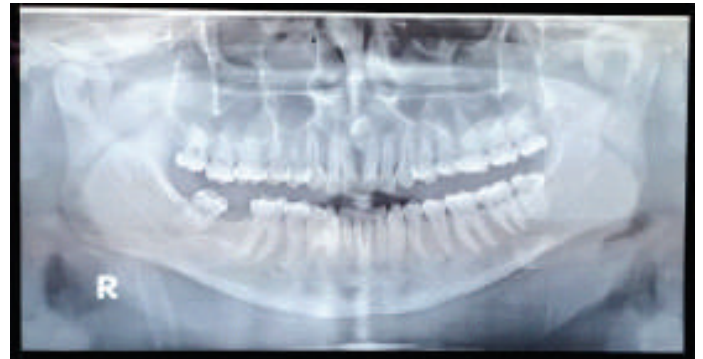
Fig 2:Intra oral:labial surface



Fig 3:Intra oral:palatal region

Panoramic radiograph shows a well-defined oval-shaped unilocular radiolucency with a well-defined corticated border in the apical region of 12,11,21,22 which was surrounding an impacted supernumerary tooth in between 11 and 21. (Figure 4)

Fig 4:Panoramic view of the lesion



On taking an occlusal radiograph of the maxilla, a well-defined with poorly defined corticated border, inverted pear shaped unilocular radiolucency seen on the maxilla, in the periapical region of 12,11,21,22 which was surrounding a supernumerary in between 11,12. Crown of the impacted tooth was placed towards the left side which caused widening of PDL space of 21 and the radiolucency was more towards the right side, suggestive of a dentigerous cyst. (Figure 5) Radio graphic differential diagnosis can be periapical cyst involving a supernumerary tooth, because occlusal shows radiolucency encircling supernumerary tooth.



Fig 5:Occlusal radiograph of the lesion

CBCT showed a well-defined solid expansile lesion of size 10.79mmx18.35mm involving impacted and inverted supernumerary between 11 and 21. It was well defined with poorly defined cortical margins. It also appeared to be unilocular without any scalloping. The lesion was arising from left cemento enamel junction of impacted supernumerary pushing the crown of impacted tooth to left side, crossing the midline and the lesion was enlarging to the right side suggestive of dentigerous cyst. (Figure 6) The lesion arising from cemento enamel junction of the supernumerary teeth is seen only in CBCT. Thus a final diagnosis of DENTIGEROUS CYST was given.



Fig 6 :Sagittal section of CBCT reveals the attachment at the CEJ

## DISCUSSION

Dental literature says that labial swelling can be because of infections, allergic diseases, cysts, tumors or any other mucosal or bony abnormalities.<sup>2</sup> Our case had malposed maxillary anterior teeth which turned out to be a significant finding as supernumerary teeth are commonly located in the anterior maxillary region and can often cause developmental and eruption disturbances of adjacent permanent teeth, leading to crowding, displacement, diastema and, in some cases, radicular resorption and dentigerous cyst formation.<sup>4</sup> Dentigerous cysts account for approximately 16.6% of all jaw cysts. About 95% of these cysts involve permanent dentition and only 5% are associated with supernumerary teeth. The exact etiology of supernumerary teeth is still unknown but it can be a result of local, independent, or conditioned hyperactivity of dental lamina. Mesiodens, first named by Bolk in 1917, is the most frequent type of supernumerary tooth and is situated in the maxillary anterior incisor region. It is a rare entity with a prevalence of 0.15–1.9% in the general population and a slight male predilection.<sup>4</sup>

Dentigerous cysts associated with mesiodens are easily diagnosed radiographically because of their radiopaque image. CT is necessary and valuable, not only to identify the pathology of the dentigerous cyst and the exact location of the impacted tooth but also to determine the full extent of the lesion as well as to identify erosion of cortical bone and invasion into adjacent soft tissues, thus contributing to proper treatment planning as well.

Radiographically, the dentigerous cyst may appear as well-defined unilocular or multilocular radiolucency enclosing the crown of an unerupted tooth. The radiolucency usually arises in the cemento enamel junction of the tooth. Differential diagnoses of such radiolucency include radicular cyst, odontogenic keratocyst, and odontogenic tumors such as ameloblastoma, Pindborg tumor, odontoma, and adenomatoid odontogenic tumour<sup>5</sup>

Nasolabial cyst and traumatic bone cyst were considered as clinical differential diagnosis. Nasolabial cyst also shares the same location similar to the current case. Traumatic bone cyst or simple bone cyst are mostly reported in males especially in the first 2 decades, and it is usually asymptomatic. In both cases, the associated tooth is vital. But in the current case, the associated 21 and 13 were non-vital.

In our case report, we gave more emphasis on the diagnostic importance of radiographs. Based on clinical features, a periapical cyst on 21 was the clinical diagnosis. On radiographic examination, a Panoramic radiograph shows unilocular radiolucency surrounding an impacted supernumerary tooth between 11 and 21. A median palatal cyst was considered as the radiographic differential diagnosis. It could be a dentigerous cyst or periapical cyst involving a supernumerary tooth because occlusal radiograph shows radiolucency encircling the supernumerary tooth. The final diagnosis of the dentigerous cyst was confirmed with CBCT. The lesion arising from the cemento enamel junction of the supernumerary teeth is seen only in CBCT.

## CONCLUSION

Dentigerous cyst are rarely seen on the anterior region of the maxilla. Radiographs are the best adjuvant tool for accurate diagnosis even in the rarest cases. Three-dimensional viewing of the structures

using this imaging method offers greater accuracy in planning surgical treatment, thus allowing more effective results to be achieved. CBCT is a very useful complementary tool for final diagnosis and surgical planning in cases of dentigerous cyst.

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## TREATMENT OF SKELETAL CLASS II MALOCCLUSION USING THE “FORSUS” APPLIANCE : A CASE REPORT

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### ABSTRACT

One of the most valuable tools introduced to correct skeletal Class II malocclusions at the deceleration stage of growth are fixed functional appliances which helps in achieving stable results. The most commonly used appliances are the Jasper jumper and the Herbst appliance. In this case report, a patient with a skeletal Class II malocclusion was treated using the Forsus appliance. The appliance was worn for 5 months after the initial alignment with fixed mechanotherapy. The mandible was brought forward to a Class I skeletal and dental relationship at the end of this treatment.

**Keywords:** Fixed functional appliance, Forsus, Class II malocclusion, Growth modulation.

### INTRODUCTION

Class II malocclusions constitute a significant incidence in our population. It compromises facial esthetics and smile and thereby quality of life. Since Class II correction is a common orthodontic case requirement, a plethora of appliances have been introduced in our field. Various forms of functional appliances are used to treat skeletal Class II malocclusion thereby achieving better esthetics and functional harmony.<sup>1</sup> Myofunctional appliances like Activator, Frankel's regulator and the Twin block can be used for Skeletal Class II correction during active growth phase.<sup>2</sup> It has been proven that skeletal correction can be achieved even during deceleration phase of growth by using certain fixed functional appliances.<sup>3</sup>

Fixed functional appliance is one that is fixed to upper & lower jaw, which cannot be removed by the patient. The Herbst appliance is the forerunner of all the fixed functional appliances. The Herbst appliance is an upper and lower fixed appliance linked by a telescopic mechanism. Bilateral telescope mechanism keeps the mandible in a forced anterior position during all

swallowing. The telescopes allow mandibular opening and closing movements and when constructed properly lateral jaw movements are also possible. Use of Herbst appliance gives remarkable results as compared to other methods of Class II correction. Many of the inter-arch appliances used to correct Class II malocclusions suffer from problem of breakage of the constituent parts. It is also expensive and difficult to make. Considering the disadvantages of Herbst appliance, in the present case of a Class II skeletal malocclusion Forsus appliance was used.

### CASE REPORT

A 13-year-old boy reported to Department of Orthodontics with the chief complaint of forwardly placed upper front teeth. Intra oral findings showed Class I molar relation on right and Class II molar relation on left side, Class I canine relation on right and half cusp Class II on left side with increased overjet and overbite.

Mild imbrications in the mandibular arch was noticed with proclined lower anteriors and a convex profile. Cephalometric analysis revealed skeletal class II malocclusion with retrognathic mandible and

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increased proclination of lower anteriors. Orthopantomogram (OPG) showed a full complement of dentition with erupting 3<sup>rd</sup> molar in all 4 quadrants. On radiographic examination of cervical vertebrae, 65% of adolescence growth was still expected according to Hassel & Farman (1995) system of skeletal maturation.<sup>4</sup>

Pre treatment cephalogram, extra oral & intra oral photographs are shown in figure 1,2,3.



Fig. 1 Pre-treatment cephalogram



Fig 2 Extraoral pre-treatment photographs  
a) Frontal view b) Frontal view with Smile  
C) Lateral view

## DIAGNOSIS

A 13-year-old post pubertal male with Angle's Class II Division I subdivision left malocclusion on a skeletal Class II base with retrognathic mandible, severely proclined upper and lower anteriors and increased overjet with complete deep bite, moderate convex profile, moderate posterior divergence and incompetent lips.



Fig.3 Intra-oral pre-treatment photographs.



Fig 4 Mid treatment intra oral photographs with forsus appliance

## TREATMENT PLAN

Considering patient's profile and pubertal status, the Forsus fixed functional appliance was the appliance of choice in the present case. MBT™ prescription with 0.022 slot was followed. For better anchorage control, transpalatal arch was used in the maxillary arch and the arch wire was cinched back in the mandibular arch.

Alignment was done using 0.014 and 0.016 NiTi wires in the upper and lower arches for initial 2 months. This was followed by 0.017 × 0.025 rectangular NiTi wires and then by 0.019 × 0.025 stainless steel wire in the upper and lower arches. Forsus fatigue resistant device was then installed and used actively for 5 months. The appliance was activated every 4 weeks. Midtreatment intra oral photographs with forsus fatigue resistant appliance are shown in figure 4.

The pre and post treatment cephalogram revealed increase in mandibular length, correction of overjet and improvement in soft tissue. Post treatment extra oral & intra oral photographs are shown in figure 5 & 6



Fig. 5 Extra-oral post-treatment photographs



Fig. 6 Intra-oral post-treatment

## RESULTS AND DISCUSSION

Class II malocclusion is one of the most difficult malocclusions to treat especially in the post pubertal stage of growth. Several removable or fixed functional appliances are used for treatment of growing Class II div I malocclusion with mandibular retrognathia in order to stimulate mandibular growth. Along with some dentoalveolar and soft tissue effects, functional appliances can produce skeletal effects and can modify the direction of growth.

We have a handful of functional appliances, each shows variation in results depending upon the type of appliance used, patient compliance, duration of active treatment and patient's maturation level. Fixed functional appliances are used in cases where pubertal growth spurt is crossed. One such appliance is Forsus which shows acceptable results.

Table 1 : Skeletal changes.

	Pre-treatment	Post-treatment
SNA	80 °	80 °
SNB	70°	76 °
ANB	10 °	4 °
WITS	9mm	4mm
Go-Gn to SN	29 °	25 °
Jarabak's ratio	67.8%	70%
FMA	27 °	20 °
Sum of 3angles	393 °	388 °
Maxillary length	90mm	91mm
Mandibular length	60mm	65mm
Ramus length	40mm	48mm

Table 2: Dentoalveolar changes.

	Pre-treatment	Post-treatment
<b>MAXILLARY INCISORS</b>		
UI-NA angle	36 °	24 °
UI-NA linear	6mm	4mm
UI-SN angle	123 °	114 °
<b>MANDIBULAR INCISORS</b>		
IMPA angle	112 °	109 °
LI-NB angle	36 °	36 °
LI-NB linear	10mm	7mm

The results after Forsus Fatigue resistant device in the present case is shown in table I. The post-treatment values showed favorable skeletal changes. Here SNA angle remained the same, SNB angle was increased from 70° to 76°, 6 ° reduction in ANB angle and Wit's reduction of 5mm (Table 1). At the end of the treatment mandibular body length and ramus length was increased (Table 2).

The dentoalveolar changes showed maxillary incisors are retracted significantly by 2mm linear and 12° angular and mandibular incisors are retracted significantly by 3mm linear and no change in angular values for mandibular incisors (Table 2). There is also soft tissue improvement towards an orthognathic profile (Table 3).

Table 3: Soft tissue changes

	Pre-treatment	Post-treatment
<b>MAXILLARY INCISORS</b>		
UI-NA angle	36 °	24 °
UI-NA linear	6mm	4mm
UI-SN angle	123 °	114 °
<b>MANDIBULAR INCISORS</b>		
IMPA angle	112 °	109 °
LI-NB angle	36 °	36 °
LI-NB linear	10mm	7mm

## CONCLUSION

The Forsus appliance brings the mandible forward by effectively remodelling the TMJ, therefore more stability can be attained. Active treatment with comprehensive Class II correction in growing patients induced mainly dentoalveolar changes, with significant mesial movement of the mandibular dentition. Major advantage of using forsus appliance is that treatment time is not prolonged. Forsus is an effective mechanism for Class II correction, especially in young adult patients with retrognathic mandible. However, patient compliance is major setback although comparatively tolerated as it is a better alternative to conventional anterior repositioning appliances

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## MINIMALLY INVASIVE TUNNEL TECHNIQUE FOR ROOT COVERAGE: A CASE SERIES

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### ABSTRACT

Gingival recession is defined as the apical migration of the gingival margin from the cemento-enamel junction. Gingival recession, although not associated with increased tooth loss, is considered an aesthetic issue in many patients, and often lead to dentin hypersensitivity and carious/non-carious cervical lesions of the exposed root surface. There are various treatment modalities for its management, but recently, minimally

invasive surgical techniques have gained much importance because of lower patient morbidity and better results when compared to conventional techniques. This article presents a case series treated with a minimally invasive surgical approach for root coverage.

**Keywords** : Gingiva, Recession, Minimally invasive, Tunnelling, Esthetics

### INTRODUCTION

Gingival recession is a common condition for which patients seek treatment due to sensitivity and compromised esthetics. The prevalence of  $\geq 1$  mm recession in adults of 30 years or older in the USA was 58%, according to National Health and Nutrition Examination Survey (NHANES III).<sup>1</sup> Recession defects can be managed by non-surgical and surgical approaches. Even though various methods for root coverage has been developed such as pedicle flaps with or without grafts, free gingival grafts, and guided tissue regeneration, the gold standard technique for a predictable outcome is sub epithelial connective tissue graft with coronally advanced flap.<sup>2</sup> But it requires a second surgical site for graft harvesting and there is difficulty in procuring adequate amount of graft tissue for managing multiple sites of recession.

Recently several innovations in root coverage procedures have been proposed for better esthetic outcome to reduce the chairside time and to improve the patient comfort. Minimally invasive and microsurgical approaches are two important revolutions that happened in this regard. Minimally invasive surgical procedures for root coverage can be performed using tunnelling technique. The concept was introduced by Raetzke in 1985 by creating partial

thickness pouches under the flap allowing the insertion of Connective Tissue Graft (CTG) or a similar substitute. The pouches ensure close adaptation of the grafted tissue without detachment of interdental papilla or placement of any vertical incisions.<sup>3</sup> In addition, the technique has gained popularity due to better esthetic results, undisturbed blood supply and nutrition to the graft resulting in faster healing and lesser postoperative difficulties.<sup>4</sup>

Quest for better periodontal regeneration has led to development of scaffold-based Extra Cellular Matrix (ECM) technologies as alternatives to autogenous soft tissue and is still continuing. The trending representative soft tissue graft substitutes include Acellular Dermal Matrix (ADM), human amniotic membrane, collagen matrix derived from different sources etc. Platelet rich fibrin is a recent innovation into dentistry and can be considered as a replacement to CTG because it can improve the healing process and promote angiogenesis by virtue of its potential to release several growth factors from the immune cells contained within the fibrin scaffold.<sup>5,6</sup>

The present case series describes management of multiple gingival recession in 2 patients using modified surgical techniques based on patient related factors and availability of biomaterials.

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## CASE REPORT

A 50-year-old male patient reported to the Department of Periodontology, PMS College of Dental Science and Research with chief complaint of sensitivity in relation to upper right back tooth region for 6 months. The patient was under medication for hypothyroidism (Thyronorm 50 mg) for 2 years. Clinical parameters assessed were keratinised tissue width, recession depth and width as well as pocket depth. On examination Type 2 gingival recession (RT2) was noticed in the maxillary right posteriors along with cervical abrasion that were restored using GIC.<sup>8</sup> In addition sufficient vestibular depth, no aberrant frenal pulls and thick gingival phenotype were present. A minimally invasive tunnel technique with Platelet Rich Fibrin (PRF) for root coverage was planned.

## Surgical site preparation

### Incision

The surgical protocol employed was modified Pin hole Technique (PST).<sup>9</sup> Following administration of local anesthesia, i.e., local infiltration of 2% lidocaine with a concentration of 1:80000 epinephrine, a horizontal incision of 2mm was given apical to mucogingival junction in relation to second premolar using #15C scalpel blade (Figure 1b). Through that access, sub

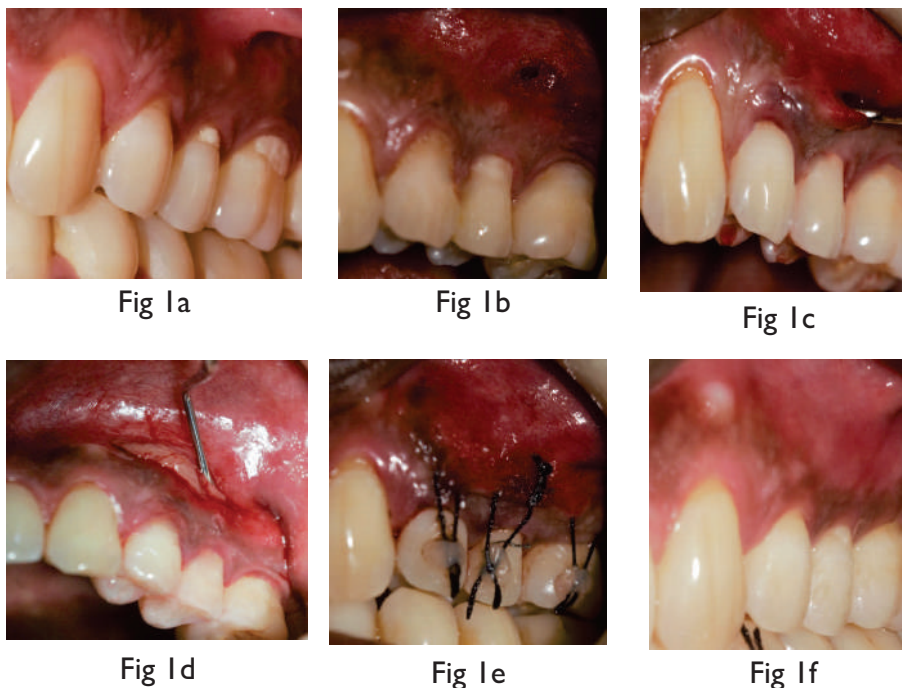


Figure 1: (a) Preoperative view, (b) Pin hole incision placed, (c) gingival tissue advanced coronally, (d) insertion of PRF, (e) sutures placed, (f) post operative view

## Procedure

### Presurgical protocol

The treatment protocol was explained to the patient and an informed consent was obtained. Routine periodontal therapy, including scaling and root debridement was done along with contouring of GIC restoration in the cervical abrasion on teeth planned for root coverage procedure. Oral hygiene instructions were given. Patient was recalled after 4 weeks for the surgical procedure. Preoperative view is given in Figure 1a.

periosteal tunnel was created using Periosteal Elevator [Hirschfeld - 6 (P20)] which was extended coronally and laterally without disrupting the stability of interdental papilla and until the gingival margin could passively reach the cemento enamel junction (CEJ) (Figure 1c).

### L-Platelet Rich Fibrin (PRF) preparation

With the help of a sterile syringe, 10 ml of blood was drawn from the patient's antecubital vein and collected

in a sterile glass test tube. The tube was carefully transferred to a centrifugation machine and immediately centrifuged at 3,000 revolutions per minute for 12 minutes at room temperature.<sup>6</sup> After 12 minutes, three fractions were obtained from centrifuged blood: acellular plasma on the surface, a Platelet Rich Fibrin (PRF) clot formed in the middle part of the tube, and red blood cells at the bottom. Using a sterile tweezer, the PRF clot was removed carefully from the tube. A sterilized scissor was used to gently detach the Red Blood Cell (RBC) layer from the PRF clot.

PRF clot was then introduced through the tunnel until there was sufficient fullness in the papillary tissues for self-holding the mucogingival tissue complex. (Figure 1 d).

### Suturing

Tension free flap was advanced 1mm coronal to CEJ. The Horizontal incision was sutured using a simple interrupted suture with 3-0 black silk. To retain the coronally positioned gingival margin at CEJ, the horizontal mattress sutures were temporarily anchored using composite resin onto the buccal surface of teeth (Figure 1 e). Surgical site was covered using periodontal dressing (COE PAK™, GC AMERICA INC). Post operatively Charter's brushing technique was demonstrated, and use of soft brush was instructed for oral hygiene maintenance.

### Results

Wound healing was satisfactory when patient was reviewed after 10 days, and sutures were removed. On clinical examination scalloped marginal gingiva coronal to the level of CEJ was appreciated along with complete root coverage in the operated site (Figure 1 f).

### Case-2

A 43yr old systemically healthy female patient reported to the Department of Periodontology, PMS College of Dental Science and Research with chief complaint of receded gums in relation to the upper front teeth. The Patient had no medical contraindications for periodontal surgery. Clinical parameters assessed were keratinised tissue width, recession depth, width, and pocket depth. On examination gingival recession Type 2 (RT2) was noticed in the maxillary anteriors (Figure 2 a).<sup>7</sup> In addition sufficient vestibular depth, no aberrant frenal pulls and thick gingival phenotype were present. A minimally invasive tunnel technique with platelet rich fibrin was planned for root coverage.

### Procedure

Presurgical protocol was similar to the previous case.



Figure 2: (a) Preoperative view, (b) VISTA incision placed, (c) gingival tissue advanced coronally (d) insertion of PRF, (e) sutures placed, (f) post operative view

## Surgical site preparation

### Incision

The surgical protocol employed was similar to Vestibular Incision Subperiosteal Tunnel Access (VISTA) technique with slight modifications.<sup>9</sup> Following administration of local anesthesia, i.e., local infiltration of 2% lidocaine with a concentration of 1:80000 epinephrine, a midline vertical incision was given through the maxillary labial frenum using #15C scalpel blade (Figure 2 b). Through that access, subperiosteal tunnel was created using Periosteal Elevator Hirschfeld-6 (P20) which was extended coronally and laterally without disrupting the stability of interdental papilla and until the gingival margin could passively reach coronal to CEJ (Figure 2 c).

### Suturing

Tension free flap was advanced 1mm coronal to CEJ. Flap stabilisation was done using horizontal mattress suture using 5-0 Mer silk and stabilized on to the palatal aspect apical to cingulum. PRF membrane was inserted on both sides through the midline incision (Figure 2 d).

Midline incision line was sutured using simple interrupted suture (Figure 2 e). Surgical site was covered using periodontal dressing (COE PAK™, GC AMERICA INC). Post operatively Charter's brushing technique was demonstrated and use of soft brush was instructed for oral hygiene maintenance.

### Results

Postsurgical healing was uneventful on review after 10 days (Figure 2 f). But sutures in relation to I2 and I3 were dislodged. It was noticed that complete root coverage was achieved in relation to I1, I2, I2, I2, I3 and partial root coverage in relation to I2 and I3. In addition, the amount of keratinized tissue was increased.

## DISCUSSION

Root coverage procedures are employed for improving gingival health as well as esthetics. In literature there exists, numerous surgical techniques for root coverage with different levels of success, evaluated by the proportion of complete root coverage or mean root coverage. This includes free

gingival grafts, laterally repositioned flap, Coronally Advanced Flap (CAF) and its modifications. CAF is considered the choice of flap design, especially when combined with a connective tissue graft and/or enamel matrix derivatives (EMD).<sup>8</sup> But due to the growing esthetic concern among patients, conservative surgical procedures like those which can preserve the papillary integrity have been proposed for indicated cases of root coverage and regenerative therapy.<sup>10</sup> One such approach is the split thickness envelope flap with a CTG insertion modified by Allen et al in which papillary undermining was proposed for advancing the mucogingival complex more coronally and was later on coined as the tunnel approach.<sup>3, 11</sup>

As evidenced in a recent systematic review by Tavelli et al, various technique modifications in tunnel flap preparation by microsurgical approach is emerging.<sup>12</sup> This paved way to newer incision design, suturing technique to improve surgical access, increased flap mobilization for coronal positioning, better maintenance of graft coverage during healing. In this case series minimally, invasive surgical approaches were applied. We have combined the conventional tunnelling technique with different access incisions and modified suturing technique in the treatment of multiple sites of gingival recession.

In the landmark study published by Chao, the mean root coverage obtained was 69.4% with PST.<sup>9</sup> In the present case series, 100% complete root coverage was obtained in the first case when modified tunnelling approach was used integrating pin hole access incision with PRF secured with coronally anchored sutures. Similar to our results Agarwal et al reported a mean root coverage of 87% in treated sites when minimal sulcular access incision and conservative tunnel was combined with T-PRF membrane.<sup>13</sup>

A recent 12-month study by Chatterjee et al, has shown 96% root coverage when VISTA technique was combined with PRF.<sup>14</sup> Similarly, Reddy et al documented 100% root coverage in Millers class I recession by combining PRF with VISTA technique.<sup>15</sup> However in our second case we employed similar technique but could not achieve complete root coverage in some sites which might be due to loss of suture during the healing period.



In the two cases presented in this series, remote access was made using pin hole and VISTA incision to facilitate tunnelling. By these different entry approaches, it was possible to access the underlying attached gingival complex without any incidence of lacerating the soft tissues which is quite common when tunnelling is made from the gingival sulcus owing to its very narrow entrance.

The soft tissue augmentation and uneventful healing postoperatively could be attributed to the PRF membranes along with minimum manipulation of tissue inserted within the tunnelled pouches through the access incisions made in either case. Coronally advanced mucogingival complex stabilized using palatally placed composite anchored suture used in the second case is another novelty introduced here. But care should be taken to avoid premature loss of suture.

Hence, within the limitations of this study, it could be inferred that minimally invasive access tunnelling is an effective root coverage surgical treatment with added advantages like better esthetic outcome and postoperative healing. But both the cases documented in this report are done in the maxillary arch. The application of these techniques in managing gingival recession in mandibular teeth needs to be demonstrated. Similarly, effectiveness and superiority of tunnelling techniques over other conventional methods also need evidence. Hence, more comparative studies and randomized controlled trials are needed in this regard.

## CONCLUSION

Gingival recession is a common condition encountered in clinical practice. Despite having various surgical and non-surgical methods of managing it, the rising aesthetic concern among patients has led to emergence of novel methods which are minimally invasive. Evolution of numerous modifications in incision design, suturing technique, graft substitutes etc is happening which may pave way for a better predictable root coverage in future.

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## NEUTRAL ZONE TECHNIQUE FOR REHABILITATION OF HIGHLY RESORBED RIDGE – A CASE REPORT

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### ABSTRACT

Long-term denture wearers commonly experience decreased stability of their mandibular complete dentures due to severe resorption of the lower edentulous ridge and altered muscular control. In order to overcome these challenges, the neutral zone plays an important role. With this technique, a denture is constructed that is in harmony with the surrounding oral structures and is shaped by muscle function. Despite being conventional, the technique is valuable. The purpose of this report is to describe a

conventional neutral zone technique that uses improvised procedures to reduce chairside visits for patients with an atrophic mandibular ridge.

**Keywords** : resorbed ridges, denture stability, neutral zone concept, long term denture wearer

### INTRODUCTION

Oral functions are very complex and highly individual, specially the synergistic actions of the tongue, lips, cheeks, and floor of the mouth.<sup>1</sup> A severely resorbed ridge, particularly in the mandible, makes complete denture retention and stability unfavorable. However, in the case of a severely resorbed ridge, an implant overdenture can provide a more stable outcome than traditional complete dentures. Overdenture may not be the best option for a patient who is medically compromised or has financial difficulties.

The Neutral zone philosophy is based on the concept that for each individual patient there exists a specific area within the denture where the function of the musculature will not unseat the denture, and at the same time where the forces generated by the tongue are neutralized by the forces generated by the lips and cheeks.<sup>1</sup> It was first described by Wilfred Fish who reported the influence of the polished surfaces on retention and stability of complete dentures in 1931. He stated that the polishing surface contour should conform to the shape of the tongue, lips, and cheeks. These tissues, in function or at rest, would exert an elastic pressure on the dentures, and retain them in place rather than dislodge them.<sup>2</sup>

Fahmi<sup>3</sup> investigated neutral zone in relation to the crest of the residual ridge in the anterior, premolar and molar regions. He found that the position of the neutral zone in relation to the alveolar ridge was found to be highly affected by the period of edentulousness. The longer the period of edentulousness, the more buccally or labially located was the neutral zone.

### CASE REPORT

A 52-year-old male reported to the department of Prosthodontics with the chief complaint of difficulty in chewing food because of his loose denture. The patient was edentulous for the past ten years and was wearing complete denture prosthesis since then. Because of financial constraints and his medical history of diabetes, he did not agree to implant overdenture therapy. An edentulism classification system based on diagnostic findings has been developed by the American College of Prosthodontists<sup>4</sup>. Clinical evaluation revealed resorbed maxillary ridge with flabby tissues in the canine to canine region, and flat (atrophic) mandibular ridge Atwood Order V and an increased inter-arch space. Intraorally, the upper arch form was ovoid with adequate height. A panoramic radiograph showed the lower arch with severe ridge

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resorption. From the radiographic finding, the least vertical height of mandibular bone was found to be approximately 10 to 15 mm, defined as Type III. A clinical examination showed that only the posterior lingual vestibule remained. Thus, the muscle attachment classification was found to be Type D.



Figure 1: Extraoral and intraoral pictures of patient-mandibular arch shows severe atrophy

**Clinical procedure:**

**Step 1: primary impression**

Primary impressions of the upper jaw and lower jaw was recorded in irreversible hydrocolloid (Alginate) impression material using metal stock tray and the model was poured in Type-III Gypsum Product (Dental stone).

**Step 2: secondary impression**

Maxillary custom tray was fabricated using a full spacer design. The use of wax spacer is more reliable because of the accuracy with which we can achieve variable thickness of impression material thereby achieving variable compression of tissue at different areas. Border molding was done using thermoplastic impression compound sticks and wash impression was made with polyvinyl siloxane elastomeric impression

material. For resorbed mandibular ridges, there are several impression techniques like Conventional technique, Functional impression technique, Elastomeric technique, Admix technique, Cocktail technique, All green technique, Flange technique and Modified Functional Impression Technique.

The mandibular final impression was made using custom tray and admix technique (Mc Cord and Tyson). This reduces the potential discomfort arising from atrophic mucosa. Impression compound and green stick compound were mixed in the ratio of 3: 7 parts by weight & placed in a bowl of water (60 degrees Celsius) and kneaded to a homogenous mass. Wax spacer was removed; this homogenous mass was placed and patient was made to do functional movements. The rationale behind this technique is viscous admix of impression compound and green stick compound removes the soft tissue folds and smoothens them over the mandibular bone.

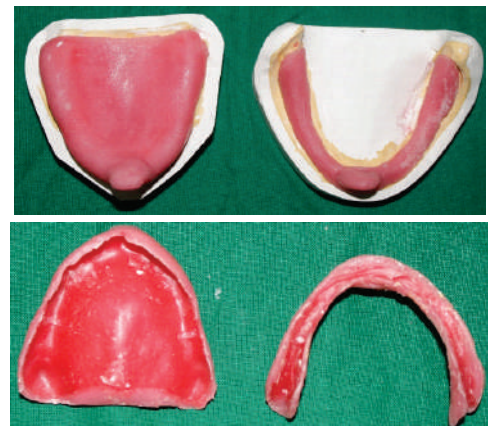


Figure 2: primary cast and custom tray with spacer of maxillary and mandibular arches.

**ADVANTAGES:**

- 1. Functional position of muscle are recorded in single step.
- 2. Less care side time and economical.

**DISADVANTAGES:**

- 1. Overextension of impression
- Impressions were poured using type III gypsum product (dental stone).

### Step 3: Assessing the base plates and recording the occlusion

Temporary denture bases were constructed using autopolymerising acrylic resin on master cast. Wax occlusal rims were fabricated and jaw relation was made using tentative method & articulated. After establishing tentative vertical dimension and centric relation record, new denture bases were fabricated with acrylic stops in molar region that engaged the orthodontic stainless-steel wire for retention of the molding material while recording neutral zone. Vertical stops were established at the level of vertical dimension using low fusing green stick compound and autopolymerising resin.

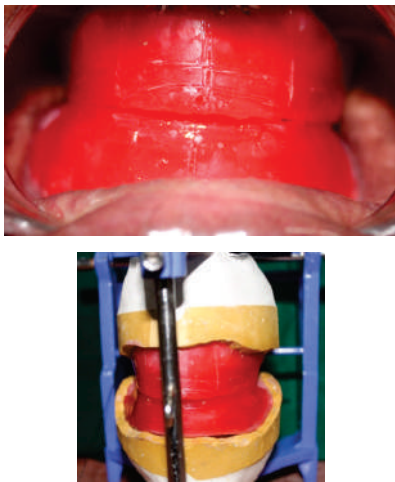


Figure 4 :Tentative jaw relation and articulation

### Step 4: The neutral zone impression

Maxillary record base was placed in the patient's mouth. Universal tray adhesive was applied over temporary denture base. After that Addition silicone (Poly-vinyl Siloxane) putty impression material was adapted over the modified denture base at established vertical dimension & molded according to the muscle action in neutral zone by asking the patient to do actions like swallowing & saying words like "oo", "eee". The internal (Tongue musculature) and external muscle groups (Buccinator & Orbicularis group of muscles) had been brought into action, moving them through their respective action paths. In doing so, reciprocating pressures have been exerted upon the silicone impression material, which had gradually molded into a state of neutral balance and become centrally inert in relation to all of the complex forces acting upon it.



Figure 5: Temporary denture base with posterior acrylic stop and engaging retentive wire, neutral zone impression and duplication of neutral zone impression with wax

The neutral zone impression so obtained was placed on master model, and was covered with putty index around the impression on both the labial and lingual sides. The addition silicone impression material was then removed from the base plate, the neutral zone space was preserved using plaster index and molten modelling wax was flowed into the space created between the index that took the shape of the molded occlusal rim in neutral zone.

The neutral zone impression so obtained was placed on master model, and was covered with putty index around the impression on both the labial and lingual sides. The addition silicone impression material was then removed from the base plate, the neutral zone space was preserved using plaster index and molten modelling wax was flowed into the space created between the index that took the shape of the molded occlusal rim in neutral zone.

### Step 5:Teeth arrangement and trial insertion

First the mandibular teeth were arranged in the neutral zone area. This was confirmed by replacing the putty index. The maxillary teeth were arranged according to the mandibular teeth. Teeth arrangement was done in Class I arch relation. Once the waxed-up dentures were ready, they were checked in the patient's mouth for esthetics, phonetics and occlusion.



Figure 6: Trial insertion

### Step 6: Final insertion

After completion of try-in, denture fabrication was done in heat cure acrylic resin. Finished and polished complete denture was inserted in patient's mouth after doing minor occlusal correction. Post denture instructions was given to the patient and was recalled after 24 hours for checkup. Regular follow-up was done in 3 months interval up to 1 year.



Figure 7: Final insertion

**Follow up:** The patient was followed for several months and was highly satisfied with the dentures.

### Discussion:

Neutral zone procedure is most effective for a highly atrophic ridge & aids in retention and stability and uses muscle function to produce the impression. It defines polished surfaces and tooth position and also requires an extra clinical stage. This technique produces a mandibular denture that is in muscle balance and in harmony with the surrounding structures. Fish and other researchers emphasized on the zone of equilibrium in which the outward forces exerted by tongue counterbalance the inward forces of lips and cheeks in complete denture construction. Fish pointed that out of the three surfaces of the denture, the polished surface is bounded by the tongue and the cheeks. These are involved in normal physiologic movements such as speech, mastication, swallowing, smiling, and laughing.<sup>5-7</sup>

Various materials and methods have been recommended by different authors for recording neutral zone. The impression materials that are used in the neutral zone impression technique are modeling plastic impression compound<sup>8-11</sup>, softwax<sup>12</sup>, silicone, polyvinyl siloxane, tissue conditioner<sup>5</sup> and polyether. Geriatric patients need not have sufficient muscle tone to push away impression material, which has high viscosity so the lower the viscosity the better the fine detail reproduction. Following are advantages and disadvantages of some commonly used impression techniques for highly resorbed residual ridges:

IMPRESSION TECHNIQUE	PROS	CONS
Conventional Technique (Boucher)	<ol style="list-style-type: none"> <li>1. Easy handling</li> <li>2. No dimensional change</li> <li>3. Reproduction of fine details</li> </ol>	<ol style="list-style-type: none"> <li>1. Short manipulation time</li> <li>2. Hardens quickly before the functional movements can be recorded.</li> </ol>
Functional Impression Technique (Winkler)	<ol style="list-style-type: none"> <li>1. Overall denture has better surface contact</li> <li>2. Improved retention</li> <li>3. Interference due to tray handling is eliminated</li> <li>4. Less chances of over and under extension as the movements are performed by the patient</li> </ol>	<ol style="list-style-type: none"> <li>1. Restriction of tongue movement therefore inaccurate recording of lingual border.</li> <li>2. Completely dependent on patient.</li> </ol>
Admix technique (Mc Cord and Tyson)	<ol style="list-style-type: none"> <li>1. Functional position of muscle are recorded in single step.</li> <li>2. Less care side time and economical</li> </ol>	<ol style="list-style-type: none"> <li>1. Overextension of impression</li> </ol>

## Conclusion:

Muscular control will be the main stabilizing and retentive factor during function, which is why the neutral zone is intended to construct dentures in muscle balance. The technique is relatively simple. Adding an extra clinical step will help to improve denture stability and will provide patients with dentures that are more functional.

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## AN EXTENSIVE BONY SWELLING IN THE ANTERIOR MANDIBLE

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### ABSTRACT

Odontoameloblastoma (OA) is a rare tumor with both epithelial and mesenchymal components. Most of the tumors are associated with unerupted teeth and are commonly seen in young males with a slight predilection for the mandible. The etiology of this tumor is still unclear. Unlike odontoma, its clinical features and growth characteristics are similar to ameloblastoma such as the potential to produce bone expansion, root resorption and recurrence.

### INTRODUCTION

Odontoameloblastoma (OA) is a rare odontogenic tumor and it is a combination of ameloblastoma and odontoma-like structures. In 1970 Thoma introduced the term odontogenic ameloblastoma and in 1971 this term was included under World Health Organization (WHO) histological classification of odontogenic tumors.<sup>1</sup> The latest WHO 2017 classification does not group it as a separate entity, attributable to insufficient evidence regarding its histogenesis. WHO defined this tumor as “A neoplasm that includes odontogenic ectomesenchyme in addition to odontogenic epithelium that resembles solid multicystic ameloblastoma (SMA) in both structure and behavior”. Earlier it was known by different names such as calcified mixed odontogenic tumor, adamant-odontome, soft and calcified odontome and ameloblastic odontoma.<sup>2</sup> It has some clinical features similar to odontoma, like young age onset, male predilection and associated with unerupted tooth in the posterior mandible. Nevertheless, unlike odontoma some of its growth characteristics are similar to ameloblastoma, such as the potential to produce bone expansion, root resorption, and recurrence. Hence it should be treated as conventional ameloblastoma with wide surgical excision for preventing recurrence.

Hence it should be treated as conventional ameloblastoma with wide surgical excision for preventing recurrence. Here we report a case of a 36 year old male who presented with an extensive swelling in the anterior mandible that showed histopathological features of both ameloblastoma and odontoma.

**Keywords** : Mixed tumor, Odontoameloblastoma, Odontogenic tumor

### CASE REPORT

A male patient aged 36 years reported to a private dental clinic with a chief complaint of swelling in the lower jaw for the past few months. Radiographic examination revealed multilocular radiolucent lesion associated with multiple miniature tooth-like structures. Based on the clinical and radiographic examination, the provisional diagnosis was complex odontoma and differential diagnosis was odontoameloblastoma and ameloblastic fibro-odontoma. The patient was referred to our institution. On extra oral examination slight facial asymmetry was noted on the left side of the face. Intra oral soft tissue examination revealed a diffuse swelling of about 6 cm in size extending from 35 to 42 (Figure 1).



Fig 1: Clinical photograph showing bony hard, non-fluctuant, non-tender swelling of about 6 cm with buccal and lingual cortical plate expansion.

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The swelling was extending both labially and lingually showing obliteration of labial vestibule and floor of the mouth. On palpation the swelling was bony hard, non-fluctuant, non-tender of about 6 cm in size with buccal and lingual cortical plate expansion. CBCT showed a single well defined multilocular radiolucent lesion involving the anterior mandible extending from 43 to mesial aspect of 37 with multiple miniature tooth-like structure and associated with impacted 33 (Figure 2).

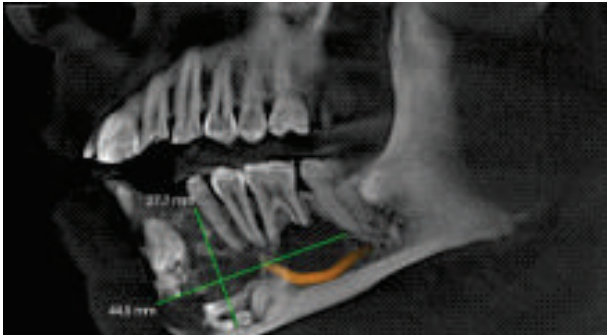


Fig 2: CBCT showing single well defined multilocular radiolucent lesion involving the anterior mandible extending from 43 to mesial aspect of 37 with multiple miniature tooth-like structure and associated with impacted 33

The buccal and lingual cortical plates were expanded and thinned out. Surgical removal of the lesion was done under LA and the excised mass was sent for histopathological examination (Figure3).

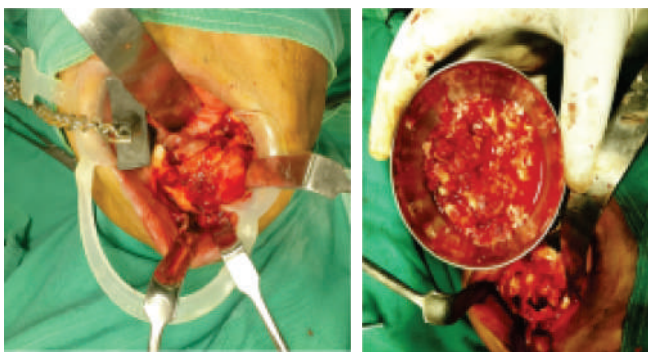


Fig 3: Intra operative Photograph of the lesion.

On grossing we received 2 bottles of formalin fixed specimen. Bottle 1 had 6 teeth, 24 supernumerary teeth and 14 bits of soft tissue with average size of about 0.5 x 0.4 x 0.2 cm. In Bottle 2, three bits of cystic soft tissue of average size 0.3 x 0.8 x 0.4 cm were present (Figure 4).



Fig 4: Grossing image showing mixture of hard and soft tissues. Hard tissue comprised of 6 teeth and 24 supernumerary teeth.

Histopathology of the excised specimen showed numerous cords, strands and islands of odontogenic epithelium within the connective tissue (Figure5).

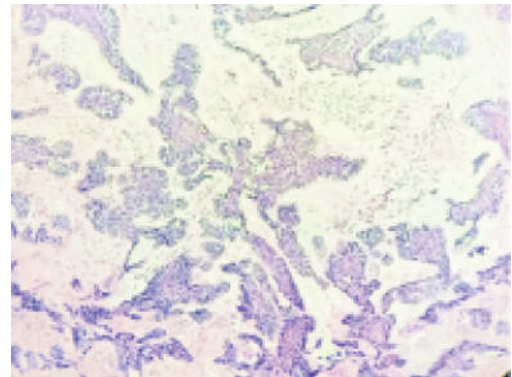


Fig 5: Photomicrograph shows numerous cords, strands and islands of odontogenic epithelium within the connective tissue.( H & E 10 X)

Multiple follicles of ameloblastomatous epithelium showing peripheral tall columnar cells exhibiting nuclear palisading, reverse polarisation and central stellate reticulum like cells were noted (Figure 6).

Area of hyalinization was present around various islands and strands of odontogenic epithelium. Squamous metaplasia was seen in some follicles. Focal collections of multinucleated giant cells were seen within the connective tissue. In some areas, the epithelium appeared as a cystic lining having a thickness of 2-3 cell layers with budding and proliferation into the connective tissue as mural islands. The connective tissue was compressed and fibrous having areas of hard tissue formation (Figure 7).

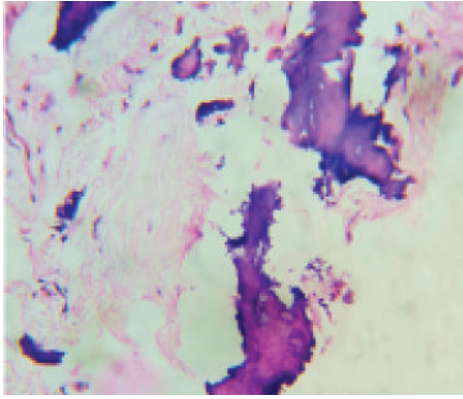


Fig 7: The connective tissue shows areas of hard tissue formation. (H & E 10 X)

Ground section and decalcified sections of miniature tooth like structures showed the regularly arranged dental hard tissue (Figure 8 & 9).



Fig 8: Ground section shows the regularly arranged dental hard tissue.

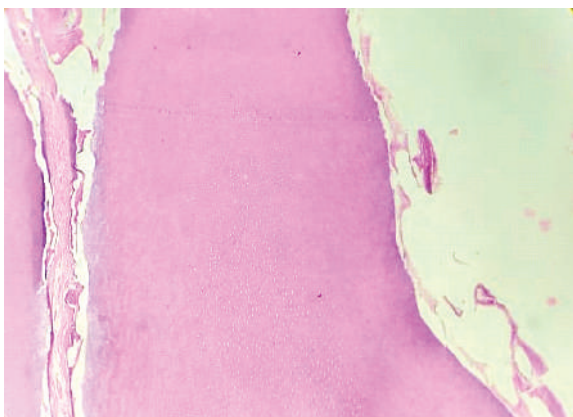


Fig 9: Decalcified section shows dentin with dentinal tubules. (H & E 10 X)

Based on the histopathological examination odontoameloblastoma was given as final diagnosis.

## DISCUSSION

Odontoameloblastoma is a rare mixed odontogenic tumor with both epithelial and mesenchymal components. The epithelial proliferation produces follicular or plexiform pattern similar to ameloblastoma and the epithelium induced mesenchymal part produces dental hard tissue.<sup>3</sup> Earlier this tumor was known by different names which include odontoblastoma (Thoma, 1970), adamant-odontoma (Shafer et al., 1983), calcified mixed odontogenic tumor (Hoffman, 1985), soft and calcified odontoma (Worley and McKee, 1972) and ameloblastic odontoma (Hooker, 1967).<sup>4</sup> In 1971 WHO deleted the term “ameloblastic odontoma” from its “histologic typing of odontogenic tumors, jaw cysts and allied lesions” and subdivided into ameloblastic fibro-odontoma (AFO) and odontoameloblastoma.<sup>2</sup> The latest WHO 2017 classification does not group it as a separate entity, attributable to insufficient evidence regarding its histogenesis. Till now less than fifty cases have been reported as odontoameloblastoma in the English literature, from which only 14 cases fulfil the histological criteria of the WHO classification.<sup>1</sup>

The pathogenesis of this tumor is still unclear. One theory proposes that the proliferation of epithelium could induce the underlying mesenchymal tissue to form mineralized dental tissue. Another probability is that ameloblastoma and odontoma can develop separately and then collide.<sup>4</sup>

The majority of the tumors are associated with unerupted tooth and commonly seen in young males with slight predilection for mandible with an incidence of 0.5%. Clinically, odontoameloblastoma is a slow growing painless mass and its growth characteristics are similar to conventional ameloblastoma with extensive bony expansion and root resorption. These tumors are locally aggressive, infiltrative neoplasms but do not metastasize.<sup>5</sup> In the present case there was swelling in the lower anterior region with no symptoms.

Radiographically, this tumor shows a well-defined unilocular or multilocular radiolucency with varying amounts of radio-opaque material. The radio-opaque material is either compound odontoma or complex odontoma. Usually, it displaces the adjacent unerupted tooth.

Microscopic picture of this tumor shows numerous cords, strands and islands of odontogenic epithelium within the connective tissue similar to ameloblastoma. This ameloblastic component is intermixed with dental hard tissue. Histologically, it is difficult to differentiate between ameloblastoma associated odontoma, ameloblastic fibro-odontoma (AFO) and ameloblastic fibro-dentinoma (AFD).<sup>6</sup> AFD shows cords or nests of odontogenic epithelium and primitive ectomesenchyme with exclusive dentin matrix or dentinoid material or osteodentin arranged haphazardly but in AFO the primitive ectomesenchyme shows both enamel and dentin matrix or dentinoid material.<sup>7</sup> The AFO & AFD are now considered as part of the spectrum of developing odontoma and has limited growth potential whereas the odontoameloblastoma is locally aggressive with infiltrative growth.

This tumor should be aggressively treated like a conventional ameloblastoma with wide surgical excision and close follow-up for at least 5 years due to its tendency for infiltrating between bony trabeculae, which results in high rate of recurrence after inadequate removal.<sup>8</sup>

## CONCLUSION

Odontoameloblastoma is a rare odontogenic tumor with both epithelial and mesenchymal components. Pathogenesis of this tumor is still unclear because very few cases are reported till now. Clinically it has more resemblance with conventional ameloblastoma and may frequently be associated with an unerupted tooth. Owing to its locally aggressive and infiltrative behaviour it should be treated like conventional ameloblastoma with wide surgical excision.

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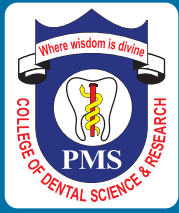
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