

A NOTE FROM THE CHAIRMAN



Dear All,

Season greetings from the office of Sri Rajiv Gandhi Group of institutions which is ever evolving from the dedicated support of all its members. With years of experience in teaching and running this institution, I strongly believe in Socrates saying that 'Education is the kindling of a flame and not the filling of a vessel.' In that connection, I am proud that Dental Era is contributing to the speciality of dentistry for continuously acquiring new and better knowledge having direct practical implications.

Bless you all with long life with continuous learning!

Dr. P. SADASIVAN

Chairman

Rajiv Gandhi Group of Institutions

MISSION STATEMENT

"Dental Era - A Journal of Dentistry" is to provide a means for the interchange of ideas amongst the academicians and advance the evidence base of Clinical Dentistry.

This shall be achieved by critical review process and guided by eminent authorities in all disciplines.

"Dental Era - A Journal of Dentistry" will continue to communicate the highest standard for dental care of patients.

EDITOR'S DESK



Greetings everyone!

Comprehensive approach to any discipline should include advances in diagnostics, treatment strategies, and alternative approaches. Keeping this in mind we are ready for our yet another issue of Dental era - A Journal of Dentistry!

There are case reports stressing aetiology and treatments of various diseases like squamous cell carcinoma, occlusal disharmony and crown lengthening. We are also reporting an unusual case of bicroot canines.

Molecular biology for diagnosis and targeted therapies is being extensively researched. There are a lot of dental applications of the same. We bring you the latest on diagnostics in the field of molecular biology in dentistry.

Endoscopy in craniofacial trauma, Optical coherence Tomography and digital models –virtual reality take us to the hi-tech world of dental diagnostics. These fields are yet to become a reality for majority of Indian population, but it is slowly picking up.

Implants are all time favourite, so we give short implant review this time. Reviews on Lingual orthodontics and three dimensional root canal treatments are some of the latest modalities trying to overcome the limitations of their standard versions.

Examinations and summer are approaching fast and we need to keep our cool for both!!

Have a cool reading!

Dr. VAIBHAVI JOSHIPURA
Editor-in-Chief

ASSISTANT EDITOR'S DESK



Dear friends and colleagues,

After successfully bringing out our first issue, we are pleased to present Dental Era April – June 2015 issue.

I am happy to report that progress has been made in establishing a flow of unsolicited articles for our journal. As promised to publish more of case reports, we have 4 case reports and 8 reviews, which are of high standards. Case reports on Oral squamous carcinoma, surgical crown lengthening, infra-occlusion of primary molar and primary maxillary bilateral bicrootated canine are very interesting and certainly will help the readers.

The review articles on dental implant, use of endoscopy, optical coherence tomography and three dimensional root canal treatment under SAF are really informative

Lingual orthodontic and digital models will help orthodontist refresh their memory.

Cell free nucleic acid, as a molecular diagnostic tool for cancer is really promising.

Finally, I would like to thank all the authors for submitting excellent articles.

I also thank our readers for encouraging us to bring good articles. To continue the good work, we require constant feedback from our readers. So, please, do not hesitate to contact me with your comments, complaints and suggestions. They will surely help me in improving this journal.

I am happy to have been involved in laying the groundwork and I can't wait to see what's coming next. I am absolutely certain that the best is yet to come.

Let me now conclude with a warm thank you to our editorial board and review team for their wonderful job.

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LETTER TO THE EDITOR

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In particular, contributors should avoid making statements on economic benefits and costs unless their manuscript includes economic data and analyses. Avoid claiming priority and alluding to work that has not been completed. State new hypothesis when warranted, but clearly label them as such. Recommendations, when appropriate, may be included.

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CONSTANT TRAUMA A THREAT TO LIFE: A CASE REPORT OF ORAL SQUAMOUS CELL CARCINOMA

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ABSTRACT

Oral squamous carcinoma is a life threatening malignancy predominantly of the Indian subcontinent. Various etiological factors have been proposed that may give rise to oral squamous cell carcinoma, constant trauma is one of them to which the lateral border of tongue is very much susceptible. The present case reveals an ulcer on the lateral aspect of the tongue that was clinically diagnosed to be a traumatic ulcer but later histopathological evaluation proved it to be a well differentiated squamous cell carcinoma

KEY WORDS

Traumatic ulcer, lateral border of the tongue, oral squamous cell carcinoma

INTRODUCTION

Squamous cell carcinoma is the most prevalent malignant neoplasm of the oral cavity. In developing countries, carcinoma of oral cavity in males is the sixth most common cancer. In females, it is the tenth most common site of cancer¹. The risk factors for OSCC are tobacco, betel quid, alcohol and recently human papilloma virus infection. The important factors related to carcinoma with a poor prognosis include large size of the tumor at the time of diagnosis, the presence of metastases in regional lymph nodes and a deep invasive front of the tumor. Continuous irritation or trauma can be one of the important etiological factors in causing the same and the following case report highlights the same.

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CASE REPORT

Squamous cell carcinoma is the most prevalent malignant neoplasm of the oral cavity. In developing countries, carcinoma of oral cavity in males is the sixth most common cancer. In females, it is the tenth most common site of cancer¹. The risk factors for OSCC are tobacco, betel quid, alcohol and recently human papilloma virus infection. The important factors related to carcinoma with a poor prognosis include large size of the tumor at the time of diagnosis, the presence of metastases in regional lymph nodes and a deep invasive front of the tumor. Continuous irritation or trauma can be one of the important etiological factors in causing the same and the following case report highlights the same.



Fig1: Showing ulceration of right lateral border of the tongue

Treatment

Enameloplasty was done in relation to 46. An excision of the complete lesion was carried out (Fig 2) and sent to Department of Oral Pathology for Histopathological evaluation.



with placement of suture

Histopathology

Macroscopy:An incisional biopsy specimen measuring 1X1.8 cm, brownish in color, soft in consistency and with irregular surface was sent in 10% formalin. The bit was taken for processing.

Microscopy:Microscopic examination of H&E stained section showed overlying hyperplastic stratified squamous epithelium. The underlying connective tissue stroma shows sheets of dysplastic epithelial cells separated by thin connective tissue septa. Keratin whorl formation seen in few areas (Fig 3,4).

Individual cells show altered nuclear-cytoplasmic ratio, cellular and nuclear pleomorphism, hyperchromatic nuclei in few areas and vesiculated nuclei with prominent nucleoli in few areas, individual cell keratinization, abnormal mitotic figures. Clear cell change seen in few cells (Fig 5).

Dense chronic inflammatory infiltrate predominantly lymphocytes and plasma cells seen. Few blood vessels lined by endothelial cells and extravasated RBCs seen. Deeper areas show muscle invasion (Fig 1).

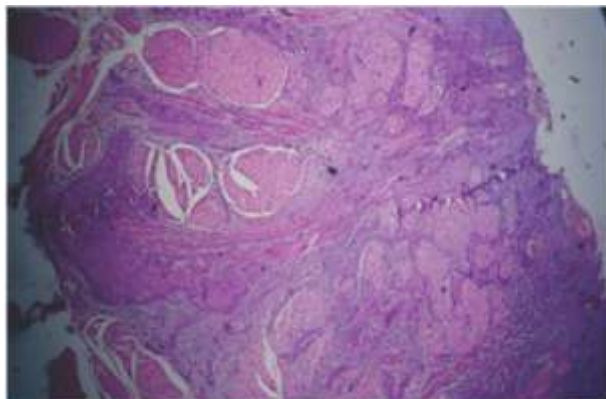


Fig 3: Under 4X epithelium seen invading the

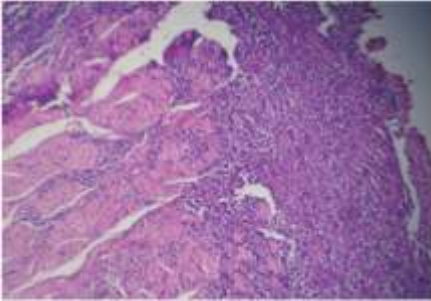


Fig 4: Under 10X epithelium seen invading the connective tissue

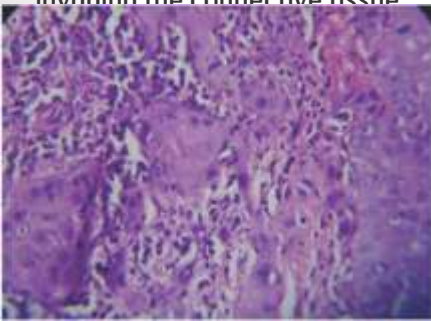


Fig 5: Under 40X the epithelial cells show prominent dysplastic features like hyperchromatism, prominent nucleoli, high-up mitosis and invasion of epithelial cells into connective tissue

Final Diagnosis

Based on the histopathological features a final diagnosis of well differentiated squamous cell carcinoma of right lateral border of the tongue was given.

DISCUSSION

More than 90% of all oral cancers are squamous cell carcinoma (SCC) ². This neoplasm is generally more frequent in male than in female ³. Except for carcinoma of the lip vermilion, the most common sites of oral SCC are the

tongue and floor of mouth, followed at a lower frequency by the soft palate, gingiva and buccalmucosa ⁴. The etiology of SCC remains unknown, but predisposing factors such as smoking associated with heavy alcohol use are well known ². Other habits have also been associated with SCC, such as chewing betel leaves and inverted smoking, practices commonly observed in India ⁵. OSCC can arise from a previously existing potentially malignant disorder such as oral leukoplakia, erythroplakia, submucous fibrosis and lichenoid dysplastic lesions, or can arise de novo ⁶. The lateral tongue and floor of mouth combine to form a high risk region. There are two main reasons for the high risk region: first, carcinogens mix with saliva, pool in the bottom of the mouth and; secondly, less protection against carcinogens as these regions of oral cavity are covered by a thin, non-keratinized mucosa ⁷. The link between inflammation and cancer was noticed about 150 years ago by Virchow. A retrospective case record review was conducted of all patients who were seen at the Dept. of Oral Diagnosis, University Hospital San Paolo of Milan from January 2007 to June 2013. A total of 14 individuals were seen looking for OSCC and mucosal trauma; the mean age in the cohort was 54.7 years, with 5 individuals younger than 50 years; 6 were men and 8 were women. Only 5 patients were current smokers. The association of chronic oral mucosal trauma with local inflammation induced by fractured and/or malposed teeth or prosthetic crowns was easy to detect both through medical history and clinically.

The carcinogenic role of chronic trauma caused by fractured crowns or dental malocclusion is still controversial. In this report the authors describe a series of OSCC cases in which there was an association between younger age and local chronic trauma in non-smokers and with no alcohol consumption reported; in this cohort the mucosal trauma could represent a major risk factor for OSCC ⁸. According to Pindborg, OSCCs are classified into histopathologic grades as well differentiated (grade 1), moderately differentiated (grade 2) and poorly differentiated (grade 3). Well and moderately differentiated tumors can be grouped together as low grade and poorly differentiated and undifferentiated tumors as high grade ⁹. The treatment of OSCC generally requires a multidisciplinary approach. Surgery is the preferred first line treatment of small, accessible OSCCs. However, advanced-stage OSCC is usually treated by a combined treatment program of surgery, chemotherapy, and radiotherapy ¹⁰.

The tongue is the most common intraoral site for cancer in most countries; however its global epidemiology shows significant geographic variation. Tongue cancer remains a serious health

problem in many countries including India (male incidence rates up to 6.5 per 100,000 per annum) and parts of Europe (male incidence rates in France up to 8.0 per 100,000 per annum). It is noted that as with other forms of oral cancer the majority of population-based data for tongue cancer comes from the Western world with a paucity of reliable data from the so-called developing countries. The tongue remains the most common intraoral site for oral cancer worldwide and in a number of countries it is a serious public health problem with significant morbidity and mortality. While the incidence of tongue cancer appears to be stable or falling in some regions of the world, in other areas it is rising, particularly among younger people.¹¹

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INFRA-OCCLUSION OF PRIMARY MOLARS: A REVIEW AND A CASE REPORT

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ABSTRACT

An infra-occluded tooth is a tooth that has failed to erupt to be in line with adjacent teeth in the vertical plane of occlusion. It is important to diagnose infra-erupted teeth and treat them in a timely fashion as they have the potential to cause malocclusion. They not only interfere with the normal exfoliation and subsequent replacement of the permanent successor, but also lead to tilting of adjacent teeth and extrusion of opposing tooth. Here we report a case of an infra-occluded primary mandibular molar and also review its management.

KEY WORDS

Infra-occlusion, submerged, primary teeth.

INTRODUCTION

Dental infra-occlusion is defined as teeth below the occlusal plane¹. An infra-erupted tooth occurs when a tooth has stopped its relative occlusal movement into the dental arch. Its marginal ridges are below the marginal ridge of the adjacent teeth and it remains below the plane of occlusion^{2,3}. The infra-erupted tooth has often been referred to as 'submerged' tooth in the literature; however, this term is not precise as it implies that the tooth has moved gingivally, which does not occur. Infra-occlusion occurs due to the failure of eruption of the tooth. Adjacent teeth continue to erupt within the surrounding and growing alveolar bone resulting in infra-occlusion of the affected tooth. The term 'infra-occlusion' is therefore preferred rather than 'submerged'⁴. The term 'infra-occlusion' describes the clinical picture without labeling the aetiology.

Infra-eruption of teeth has been attributed to a variety of factors such as ankylosis, absence of permanent successor, disturbances in

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local metabolism, gaps in the periodontal membrane, trauma causing damage to Hertwig's epithelial root sheath, infection, chemical or thermal irritation, failure in bone growth and abnormal tongue pressure⁴. Dental ankylosis is thought to be the major etiological mechanism of infra-eruption⁵⁻¹⁰. A genetic aetiology has also been suggested since infra-eruption of teeth has been observed in siblings⁸.

The prevalence of primary molar infra-occlusion varies among different populations, ranging from 1.3% to 38.5%^{2,11}. The incidence varies based on patient's age. It most frequently develops in the middle mixed dentition between the ages of eight to nine years¹² but can be seen as early as three years^{8,11}. Infra-eruption of primary dentition is ten times more common than permanent dentition, and the commonly affected tooth is the mandibular second primary molar followed by the mandibular first primary molar¹³. This process prevents their normal exfoliation.

CASE REPORT

A four year old boy reported to the Department of Pedodontics & Preventive Dentistry, Sri Rajiv Gandhi College of Dental Sciences, Bengaluru, with a complaint of missing lower left posterior tooth. Clinical examination revealed a severely infra-occluded lower left second primary molar (Fig 1) with an occlusal carious lesion. Also, the maxillary left second deciduous molar was supra-erupted. An intraoral periapical radiograph was advised (Fig 2), and it demonstrated an infra-occluded /ankylosed mandibular left primary second molar in the bone with underlying second premolar. The

treatment of the decayed infra-occluded mandibular left primary second molar involved restoration with glass ionomer cement and periodic check-up. Extraction of the infra-occluded primary molar and space maintenance till the eruption of the mandibular second premolar was planned at a later date following the eruption of the mandibular first permanent molar.



Fig 1: Intraoral view of the infra-occluded mandibular left primary second molar.



Fig 2: Intraoral periapical radiograph of infra-occluded mandibular left primary second molar.

DISCUSSION

The presence of ankylosed primary molar teeth may complicate eruption and development of the succedaneous teeth. Typically, exfoliation of affected teeth is delayed¹⁴ with subsequent complications such as: deflected eruption paths for adjacent or opposing teeth¹⁵, impaction of premolars^{15,16}, localized or generalized loss of needed arch length¹⁴, tipping of adjacent teeth over the ankylosed primary molar or supra-eruption of opposing teeth,^{14,16-17} increase in caries and periodontal disease

susceptibility¹⁸. In order to prevent these complications, it is important to identify and diagnose an infra-erupted tooth early. Clinical examination reveals a primary tooth that is below the level of the occlusal plane. Infra-occlusion is classified in many ways. According to Kjær I et al¹⁹ infra-occlusion is classified into



Group I

Mild degree of infra-position: The level of occlusion of the primary molar is equal to or less than half crown height of the actual primary molar when the occlusal level was compared with the occlusal surface of one or two fully erupted neighbouring teeth.

Group II

The level of occlusion of the primary molar is half to full crown height below the level of the occlusal surface of one or two fully erupted neighbouring teeth.

Group III

Severe degree of arrest. The level of occlusion of the second primary molar is equal to or more than full crown height below the level of the occlusal surface of one or two fully erupted neighbouring teeth.

Group IV

Extreme degree of arrested eruption. The second primary molar is found deeply subgingivally retained to such an extent that the occlusal surfaces of the fully erupted neighbouring teeth are located at a distance equal to or

more than one and a half crown height of the primary molar compared with the level of the neighbouring teeth.

Tapping on the tooth reveals an abnormal percussive 'cracked tea-cup' sound and is indicative of ankylosis^{13,20}. Evaluation with a periapical radiograph is indicated and can illustrate the lack of a well-defined periodontal ligament and lamina dura space and fusion of the root with bone²¹. However, fusion can often occur in an isolated area, often at the furcation, therefore this method of detection can be unreliable¹³.

The various treatment procedures that have been proposed depending on the age of the patient, the amount of drifting of adjacent teeth, and the condition of the permanent successor are:

- (i) monitoring the ankylosed tooth²²
- (ii) early extraction and space maintenance²³
- (iii) restoration of occlusal height²⁴
- (iv) luxation¹⁸

A conservative treatment approach for ankylosed primary teeth is the continuous supervision of tooth eruption evidenced with periodic radiographic observation for normal root resorption^{25,26}. The tooth should be monitored until the time that it interferes with the eruption of the succedaneous tooth, tipping of adjacent teeth or supra-eruption of opposing tooth occurs.

Alternate treatment option is a composite buildup or placement of a stainless steel crown on the infra-occluded tooth to prevent tipping of adjacent teeth and to restore the occlusion to the correct height, thereby preventing the tooth of the opposing arch from supra-eruption.

Early extraction and space maintenance is recommended if tipping of adjacent teeth and space loss is noticed until the permanent successor has erupted²⁷. If there is no permanent successor, most authors recommend early extraction followed by orthodontic treatment to close the space and prevent the formation of a bony defect²⁸. Extraction of an ankylosed tooth must be managed with great care to prevent the formation of a bony defect and damage to the mental nerve.

Luxation is a treatment option for ankylosed teeth, permitting the teeth to continue its eruption. The theory behind luxation of affected primary molars is that the bony union between the alveolus and the

ankylosed teeth can be broken¹⁸. Biederman as well as Skolnick have reported the efficacy of a luxation technique in breaking bony ankylosis^{29,30}. If this technique is not immediately successful, then it can be repeated in six months³¹. However this technique has shown limited success²⁴.

CONCLUSION

Although the majority of ankylosed teeth with permanent successors shed normally, early and proper intervention to prevent occlusal discrepancies is advisable. Early diagnosis and treatment of an infra-erupted tooth can potentially prevent the need for extensive surgery and morbidity³².

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PRIMARY MAXILLARY BILATERAL BIROOTED CANINES: A CASE REPORT

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ABSTRACT

Primary teeth have fewer abnormalities of size and morphology when compared to permanent teeth. Primary canines with two roots are an extremely rare dental anomaly. This report presents a case of birooted primary maxillary canines, revealed during routine radiographic examination. The occurrence of birooted primary canines appears to be higher in the maxilla than the mandible. The present report discusses the possible etiology of birooted canines; its implications on the developing dentition and treatment options.

KEY WORDS

Dental anomaly, Primary canine, Birooted canine

INTRODUCTION

The primary maxillary canine normally has a single conical root¹. Birooted primary canines are considered very rare and have only been diagnosed following radiographic examination²⁻⁶. The dental literature contains fewer primary radicular anomalies compared to permanent radicular anomalies⁷. It has been reported that the three rooted mandibular molar frequency was occasional in the primary dentition and common in the permanent dentition⁷. The incidence of two or three root canals in mandibular anterior teeth has also been documented. The incidence is reported to be as low as 1% and as high as 43%. The frequency of mandibular canines with two canals, have been reported to be between 19.3% and 31.2%.⁸

Although the etiology of this anomaly is unknown, an ingrowth of Hertwig's epithelial root sheath has been suggested as a possible cause⁹. The purpose of the present case report is to signify the importance of radiographs taken from different angles in better

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understanding of morphological aberrations of the maxillary primary canines

CASE REPORT

A 4 year old boy was brought to the Department of Pedodontics and Preventive Dentistry, Sri Rajiv Gandhi College of Dental Sciences, Bengaluru with a chief complaint of pain in relation to upper left posterior region since 2 weeks. There was no relevant medical history or any history of congenital diseases. Intra oral examination revealed a fully erupted primary dentition with multiple carious lesions in several primary teeth. Clinical examination did not show any abnormality in size and shape of any teeth present.

Radiographic examination indicated that the left maxillary primary molars require pulpectomy and restorations were necessary for many other teeth. Radiographic examination also revealed bilateral double rooted maxillary canines with bifurcation in the cervical third of the roots with divergence mesiodistally (Figure 1,2). Mandibular primary canines were single rooted.

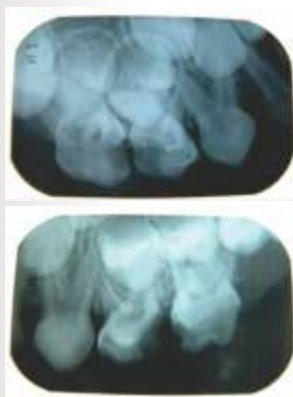


Fig 1,2: Right and left maxillary radiographs showing birooted canines

DISCUSSION

The prevalence of birooted primary canines appears to be higher in the maxilla than the mandible, and birooted primary canines often occur bilaterally¹⁰. The etiology of teeth with supernumerary roots is poorly understood. Several authors have postulated theories for the occurrence of this phenomenon. It has been demonstrated that bifurcation of roots may be related to an ingrowth of Hertwig's epithelial root sheath. Other researchers have suggested that fusion or gemination may be related to the clinical presentation of supernumerary roots¹⁰. The enamel organ plays an important role in root development by forming Hertwig's epithelial root sheath, which moulds the shape of root and initiates dentin formation.

These findings suggest that, in this case a defect in the dental lamina during the early stages of root formation could be an etiological factor. Such abnormalities may be genetically determined, or associated with environmentally induced cellular changes¹⁰. The most commonly existing morphology for primary canine is that of a long, slender tapering root more than twice of the crown length. Crown of primary birooted canine has similar dimensions. Roots are two in number, one mesial and one distal with their orientation/alignment being similar to that of primary mandibular molars.

For normal exfoliation to occur, the permanent successor must resorb the roots evenly. The angulation of the erupting permanent canine may lead to delay in normal exfoliation of the primary canine and labial eruption of the permanent canine. During exodontic procedures, the clinician should make sure that the crown of the permanent tooth is not trapped in the interradicular area of the primary tooth as this could cause accidental removal of the developing permanent tooth. These teeth may have to be sectioned during extraction.¹¹ The clinician also should inspect extracted anomalous primary teeth to ensure that all roots have been retrieved. Since it is not known whether these abnormal root configurations affect the normal exfoliation of the primary teeth, it is unclear whether these anomalous teeth present orthodontic problems⁷. Observation of primary birooted canines during growth and development will help avoid problems during successive stages of development and eruption.^{11,12}

CONCLUSION

Birooted primary canine is an extremely rare condition. This anomaly cannot be seen during routine intraoral examination. It

can be often detected during routine radiographic examination. This anomaly should be kept in mind and radiographs should be taken before the extraction of a primary canine.

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SURGICAL CROWN LENGTHENING FOR MANAGEMENT OF COMPLICATED FRACTURES OF MAXILLARY ANTERIOR TEETH – A CASE REPORT

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ABSTRACT

When fracture of a tooth occurs, the line of fracture can extend in a variety of directions and the direction of the line of fracture often dictates the treatment plan. In cases where fracture lines extend apical to the gingival margin, exposure of fractured margins becomes necessary and management of such fractures of tooth often requires an interdisciplinary approach involving endodontic, periodontal and restorative procedures or cumulative of all. This article describes a case in which severely traumatized maxillary anterior teeth were managed by a combined approach involving surgical exposure and crownlengthening, endodontic and restorative procedures.

KEYWORDS

Surgical crown lengthening, Biological width, Biological Zone.

INTRODUCTION

Dental injuries are a common occurrence in patients who have suffered trauma to the middle-third of the face. These injuries to the teeth can range from minor craze lines in enamel to avulsion of the tooth. The most commonly affected teeth are usually the maxillary incisors¹.

When fracture of a tooth occurs, the fracture line may extend in a variety of directions, and the direction of the fracture line often dictates the treatment plan. A crown fracture with a subgingivally located fracture line poses a significant challenge to the dentist. This is because a subgingival fracture presents problems in completing endodontic and restorative procedures.

Moreover, as preparation of adequate margins for a crown

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becomes difficult in cases of a subgingival fracture, such a fracture may contribute to future periodontal breakdown if the margins of the restorations are placed apical to the gingival margin. Hence, in cases where fracture lines extend apical to the gingival margin, exposure of fractured margins becomes necessary and management of such tooth fractures often requires an inter-disciplinary approach involving endodontic, periodontic and restorative procedures^{1,2}.

Exposure of tooth margins can be achieved by various techniques. These include surgical crownlengthening, orthodontic extrusion and surgical repositioning. Crownlengthening is a periodontal respective procedure that removes supporting periodontal structures to expose sound tooth structure coronal to the alveolar crest level. Traditionally, endodontic, crownlengthening and restorative procedures are performed in a staged manner, with the crown lengthening procedures usually performed after completion of endodontic treatment and prior to finalization of tooth preparation. However, insituations where the fracture lines are entirely subgingival, the execution of the endodontic treatment may be difficult unless the tooth margins are exposed by surgical procedures.

Crown lengthening procedures are performed in cases of subgingival tooth fractures to expose the tooth margins and, also, in situations in which a tooth has a short clinical crown considered in adequate for the retention of cast restorations. This report describes a case in which

surgical exposure and crownlengthening were performed after endodontic treatment for management of fractured maxillary anterior teeth with restorations^{3,4,5}.

CASE REPORT

A healthy 20-year old male patient was referred to the Department of Periodontics from the Department of Conservative dentistry & Endodontics of the Sri Rajiv Gandhi Dental College & Hospital, Bangalore, India, with the complaint of fractured maxillary anterior teeth.

The injury had occurred as a result of an alleged assault fourteen days prior. Clinical examination revealed complicated crown fractures of the maxillary right lateral and central incisors, and maxillary left lateral incisor, central incisor with complete loss of coronal tooth structure (Fig No-1).



Fig No 1: Pre-operative buccal and palatal views

The fracture lines were located entirely supragingivally. Radiographic examination revealed the extent of the fracture lines and they are above the level of the alveolar crest (Fig No-2). The patient was informed about the prognosis (what was the prognosis?) of the teeth and the available treatment options.

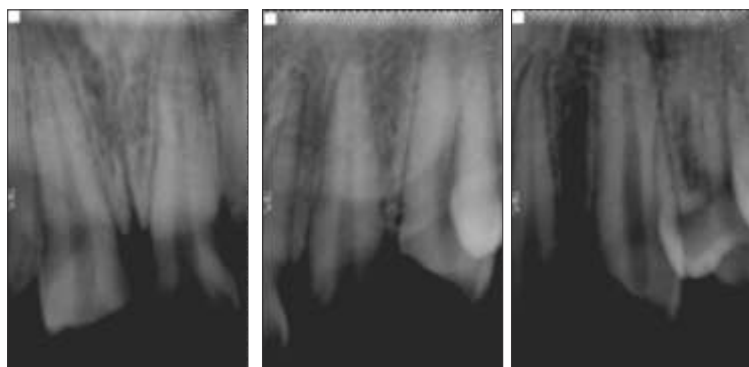


Fig No 2: Pre-Operative Radiographs

After having been given the options of either an interdisciplinary

approach to retain the teeth or extraction of fractured teeth followed by prosthetic replacement with removable implant supported prostheses, the patient opted for the former. Hence, after consultation with the Department of Conservative Dentistry and Endodontics, a treatment plan was formulated. This included endodontic treatment procedures followed by surgical crown lengthening for attaining sufficient clinical crown for future restorative purposes, after adequate healing is achieved, the restorative procedures are done. Proper written consent was obtained prior to initiating the treatment procedures. Endodontic treatment was performed on the teeth, and the Root canals were obturated with gutta-percha by the sectional technique.

Crown lengthening was performed under local anesthesia after completion of full mouth oral prophylaxis. Undisplaced flap technique was followed buccally and lingually with respect to on the palatal aspect, an internal bevel incision was given to resect the gingival tissue to obtain adequate exposure clinical tooth structure (Fig No-3, a, b). Osteotomy and osteoplasty were not performed as we have achieved exposure of sufficient tooth structure after soft tissue excision coronal to the alveolar crest to facilitate placement of the restoration without violating the zone of supra-crestal gingival tissues (Biological width). Sutures were placed to attain primary closure (Fig No-3, c). Periodontal dressing has been given.



Fig No 3: a, Buccal view of incisions for undisplaced flap; b, Palatal view of incisions for undisplaced flap; c, suturing after displacing apically; d, 1 week post-operative; e, f, 1 month post-operative

The surgical site was covered with a periodontal dressing, and the patient was prescribed post-operative systemic antibiotics (amoxicillin 500mg three times a day for 7 days), analgesics (combination of aceclofenac 100mg and paracetamol 500mg twice daily for 5 days) and 0.2% chlorhexidine gluconate oral rinse for two weeks. The patient was also advised to avoid brushing at the



Fig No 4a,b: Buccal and palatal views after crown placement

Satisfactory healing was achieved (Fig No-3, d, e, and f). Teeth were restored with porcelain fused metal crowns (Fig No-4) four months after surgery. Favorable tissue response was observed and there was no mobility or pocket formation in relation to the restored teeth. The patient was satisfied with the results of the treatment.

DISCUSSION

Traumatic injuries with loss of tooth structure in the incisor region are common, especially among children and young individuals. In certain situations, the fracture line may extend apical to the gingival margin or crest of the alveolar bone. In these instances, in order to facilitate proper restoration of the teeth, surgical intervention in the form of a crown-lengthening procedure is required. Other treatment options for exposure of the fracture lines include orthodontic extrusion and surgical repositioning.⁶

Anterior teeth with coronal fractures can be managed with-out surgical invasion if the biologic width of the tooth is not violated by the apical extent of the fracture, provided the residual root structure possesses an adequate ferrule. In such clinical situations, orthodontic extrusion can be employed to expose the fractured margins."

Orthodontic or surgical extrusion can be performed in cases of isolated tooth fractures. When multiple adjacent teeth are involved, clinical crown lengthening procedures need to be performed to expose sufficient tooth structure for restorative purposes. In the case presented here, the patient was given an alternative option of extraction and prosthetic replacement of the teeth.

As the patient opted not to undergo extraction, a treatment plan was formulated involving endodontic procedure, exposure of tooth structure, followed by restorative procedures. As multiple teeth were involved in the

esthetic zone, a decision was made to perform crown lengthening to achieve the desired exposure of tooth structure.^{7,8}

Crown lengthening is a periodontal resective procedure aimed at removing supporting periodontal structures to gain sound tooth structure coronal to the alveolar crest. Crown-lengthening procedures are performed in cases of insufficient remaining clinical crown which is result of sub gingival or subcrestal root fracture; perforations of the root at the coronal third; caries with sub gingival extension; excessive wear of the dentition; or presence of previous sub gingival margins of restoration.⁹

Clinical crown lengthening is indicated in these situations to gain additional tooth structure to meet the mechanical need of the restorative procedures." Besides these functional and biological reasons, crown-lengthening procedures can be performed for esthetic reasons in cases where there are short clinical crowns, excessive wear, uneven gingival contour or an excessive gingival display.^{9,10,11}

Although crown-lengthening procedures are usually performed after completion of endodontic treatment, as in the case here, where the fracture lines are entirely subgingival, surgical exposure and crown lengthening can be performed as the initial procedure to facilitate both endodontic and restorative procedures.¹²

Periodontal health is of paramount importance for all teeth, both sound and restored. Crown-lengthening procedures are based on biologic principles that can be determinants for a successful treatment. These procedures enable the clinician to develop an adequate ferrule for crown retention without extending the crown margins deep in to the periodontal tissues, an area referred to as the biologic width, the portion of the root surface occupied by the junctional epithelium and gingival connective tissue.¹³

Gargiulo et al,¹⁴ in their study of human cadavers, reported that the connective tissue attachment occupies 1.07 mm of space coronal to the crest of the alveolar bone and that the junctional epithelium occupies another 0.97 mm of space coronal to the connective tissue attachment. Vacek et al.¹⁵ reported the dimension of epithelial attachment to be 1.14 mm and that of the connective tissue attachment to be 0.77 mm.

Although crown lengthening is a useful technique in managing

teeth with short clinical crowns, decisions regarding use of this approach should be made judiciously. Due to the invasive and irreversible nature of the procedure, this approach should be used with caution. Crown-lengthening procedures are contraindicated in teeth with deep carious lesions or fractures that result in non-restorable situations, in teeth with unfavorable crown-to root ratio because of short roots or reduced bone support and in posterior teeth where exposure of the furcation region may occur as a result of the procedure. Since crown lengthening is a surgical procedure, other factors to be considered include the potential for damage to surrounding anatomic structures, as well as the systemic health of the patient.^{11,12,13}

CONCLUSION

Proper management of fractured teeth with extensive loss of coronal tooth structure often requires an interdisciplinary approach. The location of the fracture line, as well as the periodontal status of the involved teeth play important roles in proper treatment decisions. In cases of multiple tooth fractures occurring apical to the gingival margin, crown-lengthening procedures are a valuable treatment approach for exposure of the fracture lines.

In an interdisciplinary approach, although the various treatment procedures are generally performed in a staged manner, which usually involves endodontic therapy followed by crown lengthening and finally restorative therapy, the sequence of treatment may be altered in

accordance with the clinical situation. As in the case presented here, when surgical exposure and crown lengthening are performed as initial procedures, they will enable the clinician to perform endodontic and restorative procedures properly and contribute to the long-term retention of such teeth.

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