Natural tooth as an interim prosthesis

Neha S. Dhariwal, Niraj S. Gokhale, Punit Patel, Shivayogi M. Hugar
Department of Pedodontics and Preventive Dentistry, KLE University’s VK Institute of Dental Sciences, Belagavi, Karnataka, India

Address for correspondence:
Dr. Shivayogi M. Hugar, Department of Pedodontics and Preventive Dentistry, KLE University’s VK Institute of Dental Sciences, Belagavi - 590 010, Karnataka, India. E-mail: dr.hugarsm@gmail.com

Abstract
A traumatic injury to primary maxillary anterior tooth is one of the common causes for problems with the succedaneous tooth leading to it noneruption. A missing anterior tooth can be psychologically and socially damaging to the patient. Despite a wide range of treatment options available, sometimes, it is inevitable to save the natural tooth. This paper describes the immediate replacement of a right central incisor using a fiber-composite resin splint with the natural tooth crown as a pontic following surgical extraction of the dilacerated impacted permanent maxillary central incisor. The abutment teeth can be conserved with minimal or no preparation, thus keeping the technique reversible and can be completed at chair side thereby avoiding laboratory costs. It can be used as an interim measure until a definitive prosthesis can be fabricated as the growth is still incomplete.

Key words: Biologic restoration, dilaceration, fiber-composite, replantation

INTRODUCTION
Injury in primary dentition causes a lasting damage to the permanent teeth. There is an incidence of 23-69% of developmental disorders to the succedaneous teeth following any injury to the primary teeth.[1,2] The damage that occurs can range from a coronal changes in color and shape to gross deformity or malformation of the radicular portion.[3] Dilaceration of the root is one of the most common sequelae, wherein the tooth fails to erupt as the root and crown develop at an angle. Lateral or vestibular bending is observed.[4]

The most common time of injury is 3-4 years when the crown portion of the permanent tooth is mineralized, and root formation is in its initial stages thus, causing these problems in root formation.[1] Radiographic diagnosis immediately after injury does not provide any evidence of development of root, dilacerations, or change in angulation.[1,3] A close monitoring of the tooth development and the progress in its eruption needs to be assessed.[1] If there is stagnation in the tooth development or any periapical changes, then surgical intervention is advised. In such cases, if the tooth is displaced, then surgical repositioning or tooth transportation or a combination of surgical intervention followed by orthodontic correction is attempted if possible.[3] Majority of the times, various epidemiological surveys have stated that patient is taken to a dentist only due to a missing tooth or not at all. In most of the situations, the root is malformed or the root formed is ceased prematurely. The preferred therapy is to surgically extract the permanent dilacerated tooth followed by a space maintainer so that a more definitive treatment can be provided when the patient’s growth is complete. Alternative to this is orthodontic intervention either to close the space or maintain the space for further prosthetic rehabilitation depending on the case providing the best possible treatment available.[6,7]

Use of removable functional space maintainer as an interim restoration that needs periodic adjustment according to the progressive jaw growth over the period of time is unsatisfactory for logopedic and psychological reasons.[1] For this reason, in the present case report, the impacted permanent maxillary right central incisor was surgically extracted and the natural crown of the tooth was used as a semi-permanent prosthetic restoration.

CASE REPORT
An 11-year-old Asian male reported to the Department of Pedodontics and Preventive Dentistry with a chief complaint of missing upper anterior teeth for 5 years [Figure 1]. Detailed history revealed that there was a history of trauma due to fall while playing when the boy was...
6 years old as a result of which, he lost his upper primary right central incisor. After which the boy was taken to the local doctor and on examination was informed that the permanent tooth would erupt subsequently. Other history was noncontributory.

Extraoral examination did not reveal any abnormality. Intraoral examination was done wherein soft tissue examination showed normal gingival appearance and contours. Hard tissue examination: Teeth present [Figure 2].

16 55 54 53 12 21 22 63 64 65 26
46 85 44 43 42 41 31 32 33 34 75 36
64, 65 were grossly decayed and occlusal caries with 54, 55, 75, and 85.

On palpation, a prominence was felt in the maxillary labial vestibule near the frenal attachment with a palatal bulge on the right side.

Following the clinical examination, an intraoral periapical (IOPA) radiograph was prescribed of the missing central incisor region. It showed the presence of a dilaceration of the right maxillary central incisor with no root visible and IOPA was taken to localize the tooth [Figure 3]. The IOPA radiograph taken could not conclusively localize the root of the tooth hence, a maxillary occlusal and orthopantomograph [Figure 4] was further advised to confirm the findings of the IOPA. It was found that the tooth was dilacerated with crown inverted directed in the apical direction.

An orthodontic opinion was taken, and the treatment plan was decided based on the diagnosis made of an impacted dilacerated right maxillary central incisor secondary to trauma. Surgical extraction was planned followed by biologic restoration using the same tooth. Surgical extraction was planned as the tooth could not be aligned back into the arch due to the dilaceration and correcting the inversion.

**Technique**

*Initial treatment*

Oral prophylaxis was done followed by restoration of 54, 55, 75, and 85 and pit and fissure sealant with 16, 26, 36, and 46 was done and extraction with 64, 65 under 2% local anesthesia with 1:80,000 adrenaline.

*Surgical extraction of 11 [Figures 5-7]*

After taking informed consent from the parents, surgical extraction was planned with 11 followed by the use of the crown as an interim prosthesis. After the surgical extraction, postoperative instructions were given. The patient was recalled after a week for follow-up.
The crown portion of the tooth was stored in saline. The pulp tissue was removed, and pulp chamber was cleaned with sodium hypochlorite and saline. The tooth was dried and etched, bonded and filled with composite, and access cavity was sealed.

After 1 week, the sutures were removed, still some amount of soft tissue healing was remaining; hence, the prosthetic restoration was deferred for another week, and the patient was advised gum massaging and oral hygiene instructions were reinforced. On the subsequent appointment, biologic restoration was planned.

**Customization of the natural tooth (Figure 8)**
The extracted tooth was rinsed with normal saline and trimmed to in the horizontal plane maintaining the contours of the tooth up to the cementoenamel junction to match the adjacent teeth contacts and contours.

The natural tooth was etched, bonded, and interlig fiber splint were measured and fixed to the tooth on the lingual surface in the middle third of the tooth with flowable light-cure composite. The tooth along with the fiber splint was checked in the patient’s mouth [Figure 8].

The splint was fixed with flowable light-cure composite on the adjacent teeth (12,21,22) on the lingual side in the middle third after etching and bonding. Finishing and polishing were done. Postoperative occlusion and esthetics were checked [Figures 9 and 10]. Excess material was trimmed. Postoperative oral hygiene instructions were reinforced and the patient was advised soft diet and strict instructions to avoid biting anything hard from the front teeth were given. The regular follow-up of the patient is been done to monitor the patient, and the oral hygiene maintenance is reinforced.

**DISCUSSION**

Although the impacted maxillary incisor occurs less frequently, it brings concerns to parents in the early mixed dentition because of noneruption of the tooth. Several reports have successfully treated impacted maxillary anterior teeth by proper crown exposure surgery and orthodontic traction. However, impaction with a severely dilacerated root is seldom reported, especially the maxillary incisor. It is probably because of the high clinical difficulty of bringing the dilacerated tooth into position; most patients probably would choose extraction with the replacement of prosthesis instead. As in the present case,
the different angulations of radiographs were used to assess the alignment of tooth which failed to determine the exact positioning of the root with respect to the crown and also the downward crown angulation with labiolingual reversal of the crown clearly indicating extraction as the treatment of choice followed by prosthetic rehabilitation.

The restoration of a smile is one of the most appreciating and gratifying services a dentist can render. The expression “biological restoration” was coined by Santos and Bianchi in 1991.\[8\] Using the natural tooth as a pontic offers the benefits of being the right size, shape, and color. Moreover, the positive psychological value to the patient in using his or her natural tooth is an added benefit. When the crown of the tooth is in good condition, it can be temporarily bonded easily to the adjacent teeth with light-cured restorative material.

At present, there is no standard treatment procedure for the replacement of permanent anterior teeth that are lost because of trauma, especially in cases that occur before cessation of growth. While removable appliances or prostheses seem to be one suitable treatment option, patient compliance is generally a major problem, besides compromised esthetics because of canine clasps that are commonly used to provide stability and to enhance retention.\[9,10\] Moreover, partial removable dentures are frequently subjected to fracture. In this regard, fixed acid-etch bridging may offer several advantages over removable appliances including enhanced esthetics, ease of use, and avoidance of becoming accustomed to a removable prosthesis.\[11\] This approach would also permit utilization of a patient's natural crown as a pontic for an immediate bridge, with little or no need to perform complicated laboratory procedures. Besides the use of resin composite to splint the pontic to neighboring sound teeth, the possibility of utilizing fiber-reinforced bridges has recently become possible. However, because both adhesive techniques effectively splint the abutment teeth together, there is a strong risk of restricting the growth of maxilla locally, especially during the critical period of increase in the inter-canine arch dimension. Furthermore, such bridges are more difficult to clean, and access to the healing sockets, if required, is poor. Altogether, these considerations substantiated a fixed, appliance-type interim approach.

The treatment modality followed in this case has been reported in literature but is very sparse. In a study, this method was used for the management of one of the two replanted teeth that showed failure, using the natural crown as pontic in a fixed semi-permanent bridge until a more definitive prosthesis could be fabricated. No long-term follow-up results for this study have been reported.\[11\]

Another study where alternative treatment option for the premature loss of a traumatized maxillary central incisor because of extensive root resorption and mobility, a fixed appliance-type provisional prosthesis was fabricated using the patient's natural clinical crown from the extracted tooth.\[10\] The outcomes of the present study provided similar results which are durable, esthetic, and convenient. In our study, efforts to save the tooth orthodontically/surgically were explored, but because of the position and angulation of the root, the tooth could not be saved. Hence, the advantage of retaining the patient's natural crown was made use of so that the patient can better tolerate the effect of tooth loss and also the natural tooth provides the optimal pontic in terms of shape, color, size, and alignment.\[10,11\]

Management of the consequences of trauma can be as challenging as the treatment of the traumatic injury itself. The fixed appliance presented in this case offers a simple and effective treatment option using its own natural coronal portion. It can be considered a hygienic, noninvasive, and long-term provisional treatment without bearing any risk of restricting growth, while providing superior esthetics and function. However, this procedure is highly operator-dependent and demands appropriate case selection and precise technique.
CONCLUSIONS

This case is a unique one as the traumatized tooth showed abnormal root angulation and this treatment modality helped the patient to retain the natural shape, color, size, and alignment of the tooth, hence minimizing the psychological trauma. This case presents a novel treatment modality which the dentist should consider when esthetics is of prime concern in an adolescent patient where more definitive treatment is not indicated due to the transient occlusion.

Declaration of patient consent
The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

Financial support and sponsorship
Nil.

Conflicts of interest
There are no conflicts of interest.

REFERENCES

1. Filippi A, Pohl Y, Tekin U. Transplantation of displaced and dilacerated anterior teeth. Endod Dent Traumatol 1998;14:93-8.
2. Andreasen JO, Sundström B, Ravn JJ. The effect of traumatic injuries to primary teeth on their permanent successors. I. A clinical and histologic study of 117 injured permanent teeth. Scand J Dent Res 1971;79:219-83.
3. Andreasen JO. Injuries to developing teeth. In: Andreasen JO, Andreason FM, editors. Textbook and Color Atlas of Traumatic Injuries to the Teeth. 3rd ed. Copenhagen: Munksgaard; 1994. p. 457-94.
4. Zilberman Y, Fuks A, Ben Bassat Y, Brin I, Lustmann J. Effect of trauma to primary incisors on root development of their permanent successors. Pediatr Dent 1986;8:289-93.
5. Lin YT. Treatment of an impacted dilacerated maxillary central incisor. Am J Orthod Dentofacial Orthop 1999;115:406-9.
6. Davies PH, Lewis DH. Dilaceration — A surgical/orthodontic solution. Br Dent J 1984;156:16-8.
7. Mattison GD, Bernstein ML, Fischer JW. Lateral root dilaceration: A multi-disciplinary approach to treatment. Endod Dent Traumatol 1987;3:135-40.
8. Santos J, Bianchi J. Restoration of severely damaged teeth with resin bonding systems: case reports. Quintessence Int 1991; 22: 611-15.
9. Parolia A, Shenoy KM, Thomas MS, Mohan M. Use of a natural tooth crown as a pontic following cervical root fracture: A case report. Aust Endod J 2010;36:35-8.
10. Ulusoy AT, Cehreli ZC. Provisional use of a natural tooth crown following failure of replantation: A case report. Dent Traumatol 2008;24:96-9.
11. Nuvvula S, Mohapatra A, M Kiranmayi, K Rekhalakshmi. Anterior fixed interim prosthesis with natural tooth crown as pontic subsequent to replantation failure. J Conserv Dent 2011;14:432-5.

This is an open access article distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 3.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as the author is credited and the new creations are licensed under the identical terms.

For reprints contact: reprints@medknow.com