An interim, fixed prosthesis using natural tooth crown as a pontic

Sir

Viability of periodontium is a crucial factor in determining the success of replantation of an avulsed tooth. In children, a tooth replanted with a necrotic periodontium is likely to get ankylosed and undergo root resorption. We present a case where the avulsed tooth could not be replanted in a 9 year old because of a 3 day extra-oral dry time period but was instead, utilized as a pontic and incorporated in a space maintainer. This appliance not only prevented intra-arch changes but also provided for speech and esthetics, all of which are essential in a growing child.

Direct trauma is when the tooth itself is struck against a surface or when an object strikes tooth following falls, automobile accidents, sports-related injuries, or child abuse. The dental injury may vary from enamel chipping to complete avulsion.

A major determinant of successful replantation of an avulsed tooth is the status of periodontium and pulp. An extra-oral dry time (> 1 hour) of an immature tooth is unfavorable for replantation. For a growing child where appearance and personality are of prime importance, a fixed esthetic space maintainer was designed using the natural crown as a pontic.

A 9-year-old male child had been referred from the General Hospital after sustaining trauma to the face following a fall from a swing face forward. The facial wound had been sutured and tetanus toxoid administered. The medical history was not contributory.

The general physical examination did not show any other external injury. The intra-oral inspection showed a missing maxillary right deciduous lateral incisor and a permanent right maxillary central incisor. The gingiva overlying the missing teeth and the mucosa of the lower lip opposing the missing teeth were also torn [Figure 1]. History revealed that the right deciduous lateral incisor had exfoliated a month back. All the other teeth were normal. Radiograph confirmed the avulsion of right permanent maxillary central incisor [Figure 2].

The avulsed tooth was found near the swing at the site of the mishap but unfortunately, deposited 3 days later. Since the avulsed tooth had remained dry extra-orally for 72 h after the injury, a decision was taken against replantation. The tooth was cleared of all dust and debris. The necrotic periodontal tissue attached to the root was chemically removed with sodium hypochlorite and finally, rinsed with sterile saline. The pulp was extirpated from the avulsed tooth [Figure 3] and the crown decoronated. The root canal access cavity was sealed with composite. The crown was transferred to sterile saline at room temperature. Stainless steel orthodontic molar bands were adapted on the first permanent maxillary molars.

Figure 1: An intra-oral view of the patient showing the missing permanent maxillary right central incisor and deciduous right lateral incisor and associated soft-tissue injury

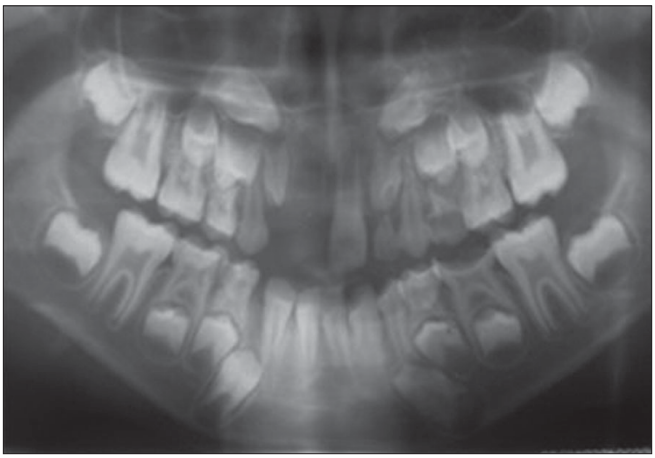

Figure 2: An OPG confirming the avulsion of permanent maxillary right central incisor

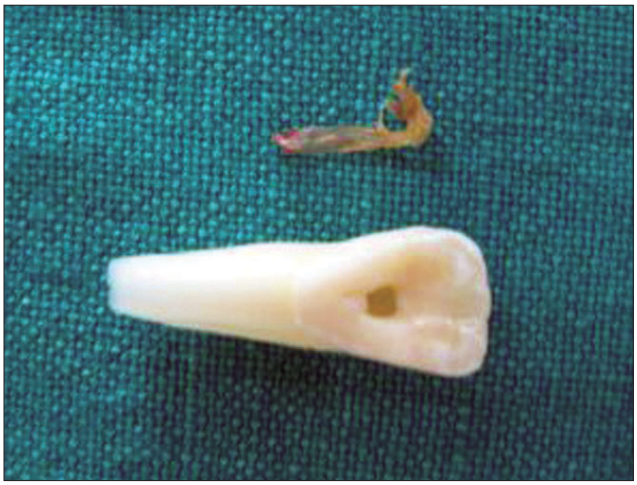

Figure 3: The avulsed immature tooth with the extirpated pulp

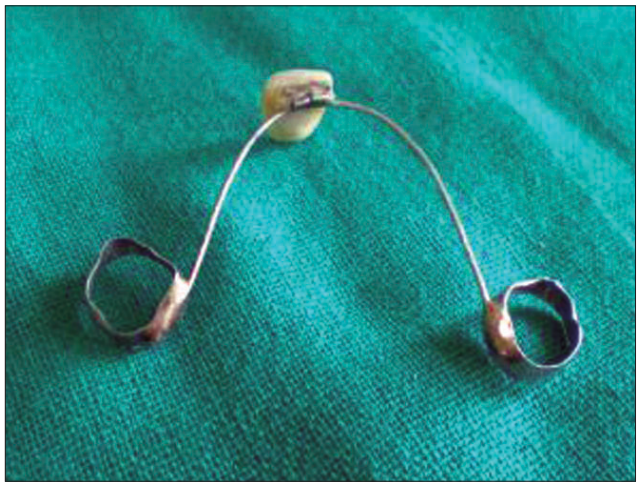

Figure 4: Palatal arch with the natural tooth pontic attached

Figure 5: The space maintainer with the natural tooth pontic cemented in maxillary arch

Figure 6: The appliance 1 year post-op: esthetically and psychologically beneficial

A palatal arch was fabricated using a 0.9 mm round stainless steel wire. Two orthodontic brackets were soldered on the palatal wire at the site of the avulsed incisor. The palatal aspect of the natural, avulsed tooth crown was dried, acid-etched with 37% orthophosphoric acid for 20 s and rinsed with water for 15 s. It was air-dried and a light-curing adhesive agent was applied and subsequently, light-cured. The brackets were attached to the palatal portion of the avulsed, natural tooth crown with a light-cure composite resin and photo-polymerized for 40 s at several points [Figure 4]. The palatal arch assembly was cemented in the maxillary arch using a glass-ionomer luting agent [Figure 5].

The composite flash was removed and occlusion checked. The patient was recalled after a week and thereafter is on a biannual follow-up. It was decided not to maintain space for the maxillary right lateral incisor as the permanent tooth was nearing eruption. The patient has been comfortable with the appliance nearly 1 year after treatment [Figure 6].

Loss of a permanent anterior tooth is traumatic. It compromises mastication, affects speech and esthetics,[1] impairs personality, and encourages tongue thrusting.

An avulsed tooth is completely displaced from the alveolus with total disruption of the pulpal blood supply. Boys show a higher prevalence of avulsion injuries as compared to girls in the ratio of 3:1, probably because of more outdoor sports-related trauma.

The prevalence of dento-alveolar injuries among children with permanent dentition is 5-20% out of which the avulsed teeth represent 1-16%.[2] Maxillary incisor is the most commonly avulsed tooth.[3] Predisposing factors for trauma-related tooth avulsion include protruding maxillary incisors and incompetent lips.[4] In our index case, the direct trauma sustained during a fall from a swing could have forcefully closed the lower jaw with the upper, thus causing avulsion more so due to the unfavorable edge-to-edge malocclusion. It is in the age group of 8-12 years where avulsion is most likely to occur.[2,4,5] The loosely structured periodontal ligament around the erupting permanent teeth could be an additional causative factor for avulsion.[6]

The immediate treatment of an avulsed incisor is replantation so as to preserve the pulp and periodontium. Replantation, up to 60 min of extra-oral dry times, of avulsed immature teeth has been reported where only 15% showed evidence of periodontal healing.[7] But with extra-oral dry times of greater than 1 hour, it is unwise to replant the immature tooth because of an increased incidence of replacement resorption.[8]

The immediate treatment that can be provided to the patient for trauma related tooth avulsion is in the form of a space maintainer. Failure to do so can lead to drifting of the adjacent teeth, midline deviation, and space loss apart from over-eruption of the antagonistic teeth. Mastication,

speech, and esthetics also get compromised. The space loss following tooth avulsion can be bridged by a removable partial denture; resin bridges[9,10] and recently fiber-reinforced bridges[11,12] have also proven to be successful. Removable partial dentures have the disadvantage of being more dependent on patient compliance and can get lost or broken. Fiber-reinforced bridges are hygienic, esthetic, and do not require the fabrication of a cast model but they do tend to rigidly splint the adjacent teeth thereby, restricting the growth of intercanine arch width.[1] In our index case, it was decided to incorporate the natural tooth as a pontic in a fixed space maintainer, the palatal arch. The pontic provided psychological benefit and a perfect esthetic match. The palatal arch had the advantage of not restricting the growth of the maxilla during the critical inter canine arch width increase.[10]

This appliance thus, provided an interim, fixed appliance which would function till the growth of maxilla is complete. A fixed bridge or an implant could be designed later on. This paper thus highlights an esthetic, fixed and a provisional solution to an avulsed tooth in children where replantation is undesirable.

References

1. Ulusoy AT, Cehreli ZC. Provisional use of a natural tooth crown following failure of replantation: A case report. Dent Traumatol 2008;24:96-9.
2. Fountain SB, Camp JH. Traumatic injuries. In: Cohen S, Burns AC, editors. Pathways of the pulp. 6th ed. St. Louis: Mosby; 1994.
3. Camp JH. Replantation of teeth following trauma. In: McDonald RE, Avery DR, Dean JA, editors. Current therapy in dentistry. Vol 7. St. Louis; Mosby; 1980.
4. Ram D, Cohenca N. Therapeutic protocols for avulsed permanent teeth: Review and clinical update. Pediatr Dent 2004;26:251-5.
5. Andreasen JO, Malmgren B, Bakland LK. Tooth avulsion in children: To replant or not. Endodontic Topics 2006;14:28-34.
6. Andreasen JO. Effect of extra-alveolar period and storage media upon periodontal and pulpal healing after replantation of mature permanent incisors in monkeys. Int J Oral Surg 1981;1:43-53.
7. Andreasen JO, Borum MK, Jacobsen HL, Andreasen FM. Replantation of 400 avulsed permanent incisors 4. Factors related to periodontal ligament healing. Endod Dent Traumatol 1995;11: 76-89.
8. Flores MT, Andreasen JO, Bakland LK, Feiglin B, Gutmann JL, Oikarinen K, *et al.* Guidelines for the evaluation and management of traumatic dental injuries. Dent Traumatol 2001;17:193-8.
9. Daly CG, Wilkinson EJ. Use of patient's natural crown as the pontic in a composite resin-retained temporary bridge. Aust Dent J 1983;28:301-3.
10. Ashley M, Holden V. An immediate adhesive bridge using the natural tooth. Br Dent J 1998;184:18-20.
11. Chafaie A, Portier R. Anterior fiber-reinforced composite resin bridge: A case report. Pediatr Dent 2004;26:530-4.
12. Chauhan M. Natural tooth pontic FPD using resin composite-reinforced glass fibres. Quint Int 2004;35:549-53.

Urvashi Sharma, Arun Kumar Garg[1], Krishan Gauba
Departments of Pedodontics,
[1]Orthodontics, Dr. HSJ Institute of Dental Sciences and Hospital,
Panjab University, Sector 25, Chandigarh - 160 014, India

Correspondence to: Dr. Urvashi Sharma,
House Number 433, Sector 37-A, Chandigarh - 160 036, India.
E-mail: navneet207@rediffmail.com

DOI: 10.4103/0976-237X.68587