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Provisional use of a natural tooth crown following failure of replantation: a case report

CASE REPORT

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Abstract – Despite a wide range of treatment options available, traumatized teeth may be inevitably lost on certain occasions. This case report presents an 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 by using the patient's natural clinical crown from the extracted tooth. This measure proved to be a very adequate, esthetic treatment solution before a permanent restorative plan could be developed in the future.

The loss of a solitary permanent maxillary anterior tooth in a child or young adolescent is usually because of either direct trauma or its sequelae. Despite a wide range of treatment options that can be provided to conserve the tooth after the traumatic episode, there are occasions where loss of the traumatized tooth is inevitable. With special regard to avulsion injuries, replantation of teeth has a doubtful long-term prognosis because of the resorption, and more than half of the teeth are eventually lost because of ankylosis or inflammatory resorption (1, 2).

Following traumatic loss of the anterior tooth, it is important that an immediate replacement is provided in order to avoid esthetic, masticatory and phonetic difficulties, and to maintain the edentulous space. Conventionally, the solution to this clinical problem has been the provision of a single tooth, removable temporary acrylic prosthesis, or resin-bonded bridges; each having their specific advantages and disadvantages in terms of usage, esthetics and, compatibility with the growing maxilla (3–5). The present paper reports utilization of the clinical crown of a failed replanted tooth as part of a fixed temporary appliance.

Case report

A 11.5-year-old boy, with a chief complaint of excessive mobility of the right central incisor was referred to the pediatric dentistry clinic. His medical history was non-contributory. He had experienced a bicycle accident that resulted in the avulsion of his right central incisor 2 years ago. The parents failed to recall when and how the avulsed tooth was transferred to the local dentist's office. However, they remembered being informed by the dentist that he performed root canal therapy before replanting the avulsed tooth and that he fixed the tooth with a splint that had to remain in place for at least 5 years. The parents, who lived abroad as workers, refrained from referring their son to a specialist, as their health insurance did not cover a dental plan. However, as the replanted tooth gradually started showing signs of excessive mobility, they decided on admitting to our clinic during a summer vacation.

Clinical findings associated with the right central incisor confirmed the patient's chief complaint. The tooth was extremely mobile in both lateral and vertical directions, the marginal gingiva was inflamed, and the incisal edge was at least 4 mm below the occlusal plane (Fig. 1). The tooth had been adhesively splinted to three neighboring teeth with a semi-rigid material of plastic origin. The only remnant of the original splint was detected between the central incisors, with its mesial end having already been disconnected from the right central incisor (Fig. 1). A periapical radiograph of the tooth revealed severe root resorption that almost extended to the cervical level of the crown in the mesial aspect (Fig. 2). The apical third of the root had also resorbed completely, exposing a poorly condensed portion of the gutta-percha filling that, presumably, had been sheared off from the master filling because of repeated episodes of force generated by the mobile tooth.

Both clinical and radiographic findings stipulated extraction of the traumatized incisor followed by fabrication of a temporary denture for the rehabilitation of function and esthetics. Because both the patient and his parents were highly concerned with esthetics, the possibility of using the clinical crown as part of a fixed appliance-type denture was proposed. Upon approval of the patient and the parents, the tooth and the gutta percha were removed under local anesthesia (Fig. 3). In the same appointment, the crown was removed from the resorbed root, the coronal dentin was reduced to approximately 1 mm from the dentino-enamel junction (Fig. 4) and crown was transferred into sterile saline solution. The patient was scheduled for impressions 2 weeks later. Meanwhile, the tooth was

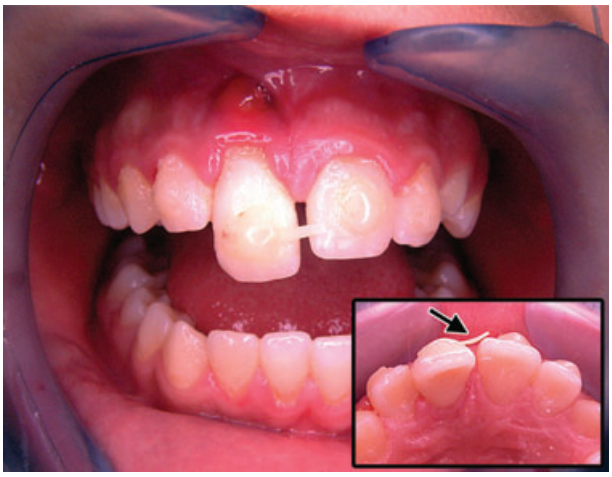

Fig. 1. View of the traumatized incisor at first visit. Inner picture: palatal view of the tooth, depicting the sheared trauma splint. Note resin composite bulks on the labial aspect of incisors.

Fig. 2. Periapical radiograph of the traumatized incisor. Severe root resorption and disintegrity of the gutta percha filling is evident.

kept in saline at +4°C until one day before laboratory procedures.

In the second appointment, stainless-steel molar bands (Dentaurum, Ispringen, Germany) were adjusted and placed on both maxillary first molars, followed by impressions of the maxillary arch with a stock tray and irreversible hydrocolloid impression material (Kromopan; Lascod, Italy). The molar bands were then appropriately secured into the maxillary impression and a working cast was obtained by using improved dental stone. A 0.9 mm round orthodontic wire (Dentaurum, Germany) was bent to follow the palatal aspects of all maxillary teeth, with a round loop bent over the extraction site for acrylic retention. The distal ends of

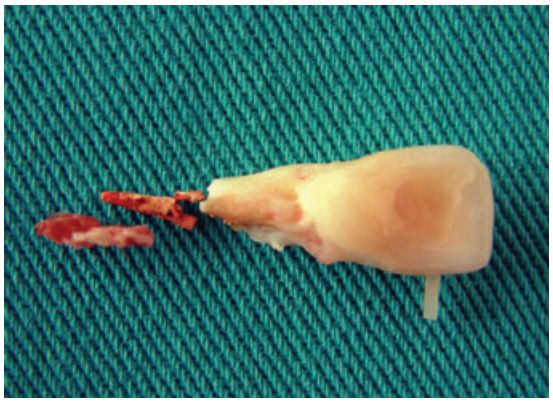

Fig. 3. View of the incisor and gutta filling after extraction. Note the extent of root resorption.

Fig. 4. Outline of the tooth crown after reduction of coronal dentin.

the wire were soldered to the palatal side of the molar bands. Simultaneously, one operator total-etched the cervical margins and the entire inner surface of the tooth crown with 37% phosphoric acid, followed by rinsing for 15 s. An acetone-based single-bottle adhesive (Prime & Bond NT; Dentsply, Konstanz, Germany) was applied to the etched surfaces in accordance with the manufacturer's recommendations. Thereafter, a microfilled hybrid resin composite material (Spectrum TPH, Shade B1; Dentsply) was placed into the crown in increments and light cured for 40 s each. A thin, final increment was placed over the entire cervical margin and photopolymerized. This increment served as an outer layer of resin that could co-polymerize with the pink denture resin. An autopolymerizing resin (Meliodent; Bayer, Germany) was used to bond the crown over the loop. Following pressurized polymerization, the appliance was removed from the cast and finished (Fig. 5). Following satisfactory try-in and occlusal adjustments, the appliance was cemented in place with glass ionomer cement at the same appointment (Figs 6 and 7). Both the patient and the parents were given hygiene instructions. First recall appointment was made 1 week later. The use of the appliance apparently caused no discomfort and the

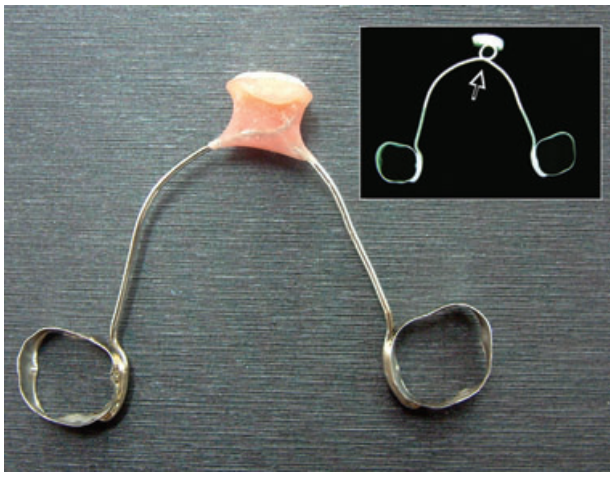

Fig. 5. View of the appliance before cementation. Inner picture: radiograph of the appliance, revealing the position of the loop (arrow) within the acrylic resin.

Fig. 6. Intraoral view of the appliance after cementation. Note excellent color match and form. The denture acrylic was extended in the mesial and directions to disguise the diastema.

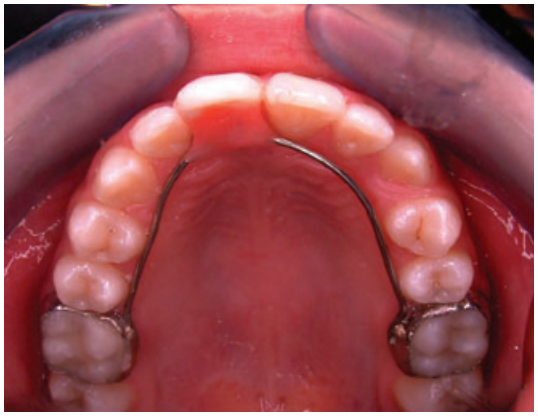

Fig. 7. Palatal view of the appliance.

patient was highly motivated by the esthetic result as well as improved ease of biting.

Discussion

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. 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 (6–8). This approach would also permit utilization of a patient's natural crown as a pontic (9) 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 (6–10) has recently become possible. However, because both adhesive techniques effectively splint the abutment teeth together (4), there is a strong risk of restricting the growth of maxilla locally; especially during the critical period of increase in the intercanine 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 in the present case.

One major advantage of retaining the patient's natural crown is that, the patient can better tolerate the effect of tooth loss (4). Moreover, it provides the optimal pontic in terms of shape, color, size and alignment. In the present case, the coronal dentin was reduced in order to place a bulk of light-shaded resin composite that would provide a better color match for the crown, which originally was slightly discolored because of trauma. Because the margins of the resin composite were extended beyond the cervical contours of the tooth, co-polymerization of composite resin and the methacrylate denture resin was easily achieved in a substantially large area without the need for any further mechanical retention. Together with the denture resin, the pontic design enabled access for hygiene through use of a superfloss. Furthermore, with the fulcrum axis being located in the posterior, the micro-resilience of the pontic allowed for stimulation of the underlying tissues, avoiding excessive postextraction ridge resorption.

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 for the replacement of a failed replanted tooth, using its own natural coronal portion. It can be considered a hygienic, non-invasive, and long-term provisional treatment without bearing any risk of restricting growth, while providing superior esthetics and function.

References

1. Andreasen JO, Borum M, Jacobsen HL, Andreasen FM. Replantation of 400 traumatically avulsed permanent incisors. I. Diagnosis of healing complications. Endod Dent Traumatol 1995;11:51–8.
2. Andreasen JO. Replantation of avulsed teeth. In: Andreasen JO, Andreasen FM, editors. Textbook and color atlas of traumatic dental injuries to the teeth, 3rd edn. Copenhagen: Munksgaard; 1993. p. 57–97.
3. Daly CG. Use of patient's natural crown as the pontic in a composite resin-retained temporary bridge. Aust Dent J 1983;28:301–3.
4. Ashley M, Holden V. An immediate adhesive bridge using the natural tooth. Br Dent J 1998;184:18–20.
5. Safirstein JJ, Owens BM, Swords RL. The resin retained natural tooth pontic: a transitional esthetic solution. J Tenn Dent Assoc 2001;8:31–3.
6. Chafaie A, Portier R. Anterior fiber-reinforced composite bridge. Pediatr Dent 2004;26:530–4.
7. Fahl N Jr. Restoration of the maxillary arch utilizing a composite resin buildup and a fiber framework. Pract Periodontics Aesthet Dent 1998;10:363–7.
8. Smidt A. Esthetic provisional replacement of a single anterior tooth during the implant healing phase: a clinical report. J Prosthet Dent 2002;6:598–602.
9. Belli S, Ozer F. A simple method for single anterior tooth replacement. J Adhes Dent 2000;2:67–70.
10. van Wijlen P. A modified technique for direct, fibre reinforced, resin-bonded bridges: clinical case reports. J Can Dent Assoc 2000;66:367–71.