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Avulsion of permanent lower central incisors: esthetic-functional solution

SHORT COMMUNICATION

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Abstract – This short communication reports a clinical case of a 11-year-old girl, who underwent an avulsion of the lower left lateral incisor and who sought delayed treatment. The treatment was a combined technique with polyethylene fibers and composite resins to create a fixed partial denture, which is a low-cost solution and presents a good esthetic-functional result. The technique is described and the success of its use in appropriately recommended cases is confirmed.

Short communication

This short communication reports a case of avulsion of the lower left lateral incisor (tooth 31) in a 11-year-old girl for whom replantation was not recommended. The esthetic solution proposed was the confection of an adhesive-fixed denture reinforced with polyethylene fibers, using the avulsed tooth itself.

Case report

A 11-year-old child who had a fall 15 days before presented to the dentist's office. During the event, the child lost a lower tooth, which was later found. Upon clinical and radiographic examinations, avulsion of the lower left lateral incisor (tooth 31) and the beginning of alveolar healing were confirmed (Fig. 1).

As replantation was not recommended due to the delay in treatment and the advanced process of alveolar healing, a traditional esthetic solution was planned that included an adhesive metaloceramic or metaloplastic denture. However, because the procedure incurred high costs for the family and the placement of a single tooth implant was not recommended considering the patient's age, the alternative was an adhesive denture reinforced with polyethylene fiber. To obtain a natural and satisfactory esthetic result, the crown of the avulsed lower left lateral incisor was used as the pontic.

In the next phase, the tooth was cleaned and placed in a 2% chlorexidine solution for 48 h. The lower arc was molded with alginate and the study model was confected in common plaster. The correct height to cut the root was then calculated (Fig. 2). The pulpar chamber was emptied, submitted to dental conditioning with a 10% polyacrylic acid for 10 s and filled with glass–ionomer cement (Chelon-Fill; 3M ESPE, Seefeld, Germany). The tooth was then positioned to check the mesio-distal prosthetic space and determine the length of the fiber-reinforced strip. Surface treatment was performed with acid for 30 s at a point on the vestibular face of the crown and the adhesive was applied for the confection of a guide with photopolymerizable composite resin to adapt to teeth 31, 32 and 41 (Fig. 3). This guide maintains the tooth in the desired position, even during the polymerization of the resin in final adhesion.

In the following session, prophylaxis of the teeth, confection of the slots (1 mm deep in enamel in elements 41, 31 and 32) and acid etching (phosphoric acid at 37.5% for 30 s) in the slots of these teeth (Fig. 4) were performed. The application of the adhesive (Prime Bond 2.1; Dentisply, Petrópolis, Brazil), insertion of the composite resin (color A2) and the fiber-reinforced strip were then performed. The tooth, guide and non-polymerized glass fiber were placed in position shortly after the application of the adhesive and resin in the lingual slots of teeth 32 and 41. The glass fiber was accommodated and light was applied for 40 s on each of the two teeth involved. Finally, anterior guide was removed (Fig. 5).

Finishing and final polishing were performed in the final session using diamond rotary cutting instruments and silicone points. The esthetic and functional result

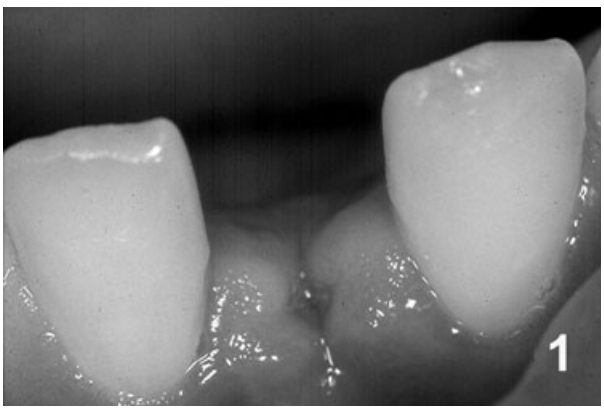

Fig. 1. Frontal view of the anterior mandibular segment with the absence of the lower left lateral incisor demonstrating the stage of tissue healing process.

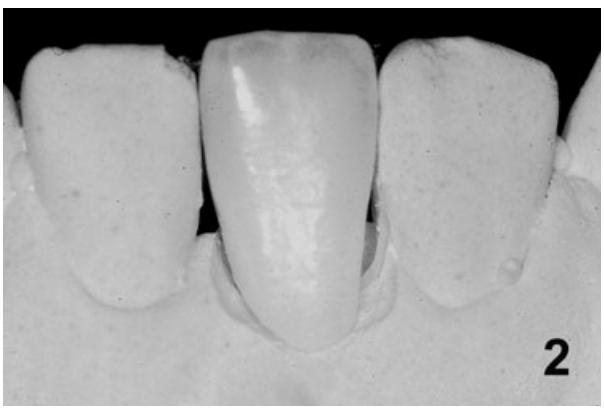

Fig. 2. View of the plaster model of the lower anterior segment, showing the incisal height obtained through root incision of the lower left lateral incisor.

Fig. 3. View of the mandibular anterior segment, demonstrating the resin guide with crown of the lower left lateral incisor in place. Detailed are the confectioned slots of teeth 41, 31 and 32.

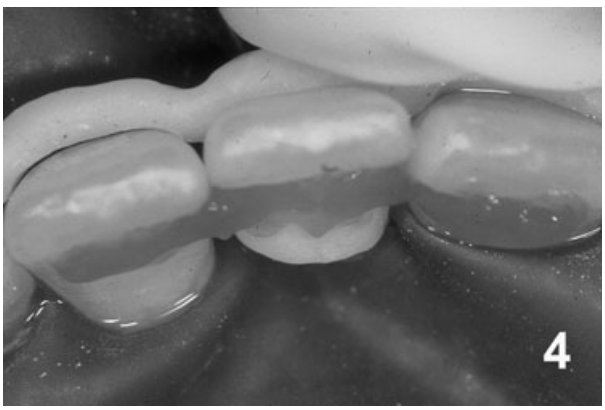

Fig. 4. Incisal view of the mandibular anterior segment, with the joint guide and the lower lateral incisor in place, demonstrating acid etching of teeth 41 and 32 and of the clinical crown of tooth 31.

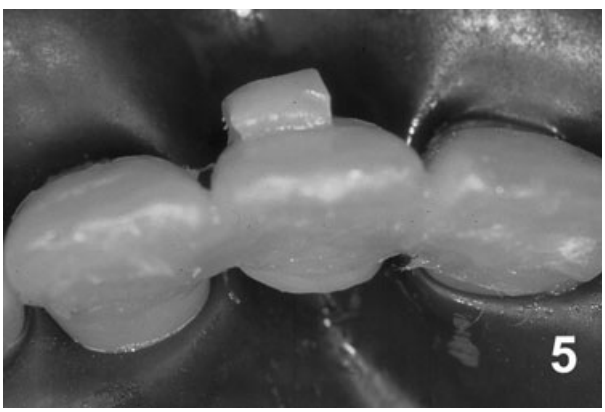

Fig. 5. Incisal view of the mandibular anterior segment, showing the final fixation with resin and polyethylene fiber of the clinical crown of avulsed tooth 31. Resin guide is already split.

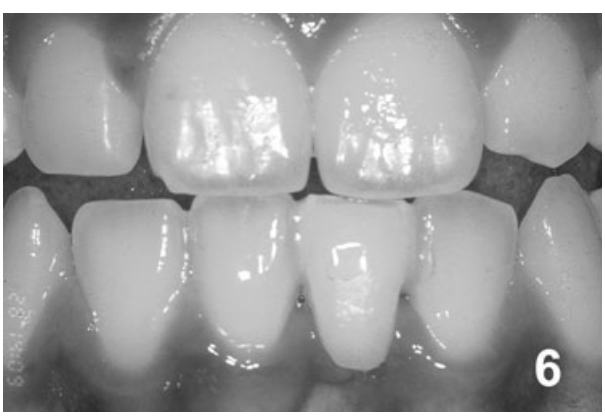

Fig. 6. Frontal view of the anterior arc in protrusion, showing the esthetic result of the adhesive denture of tooth 31 and the anterior guide, after a 3-year follow up.

was deemed satisfactory from the points of view of both the professional and the patient during the 3-year follow-up period (Fig. 6). The patient was given orientation regarding the correct hygiene for the denture, especially the technique of passing dental floss between the interproximals. Clinical follow up for this type of case is most important and should be performed periodically.

Discussion

The replantation of avulsed permanent teeth is supposed to be the most frequently performed treatment (1, 2). However, there are cases in which replantation is not recommended. In a study carried out in Brazil, the prevalence of tooth avulsion in individuals seeking hospital care was 11.6%. Approximately half of such patients (48.2%) did not have their teeth replanted. The main reason for this was the excessive length of time the avulsed tooth remained outside the alveolar bone. In this situation, dental replantation is not possible and other solutions are necessary to minimize esthetic, functional and emotional harm (1, 3, 4). In the present case, the alveolar healing process was advanced, thereby rendering dental replantation unfeasible. Aimed at minimizing the possible impact of this traumatic injury on the child's quality of life, the esthetic and functional re-establishment has become the main objective of the treatment. The solution proposed had to be adapted to the esthetic needs and socio-economic possibilities of the child's family (1, 5–7).

An adhesive denture may be used for esthetic and functional re-establishment in cases of dental avulsion, as it has the advantage of complying with the objectives of the restorative procedure in a shorter time period and at a reduced cost. These advantages make the use of this procedure feasible in the lower income population (1–3, 8, 9).

However, the literature demonstrates that the physical properties of the composites used in the confection of the adhesive denture limit its durability. Such a disadvantage can be minimized by adding polyethylene fibers to the denture, which reinforce its structure and improve its mechanical properties of distortion and traction, in addition to its flexural resistance and elasticity. Furthermore, this type of fiber is easy to manipulate and cost effective (5, 10, 11).

Adhesive dentures have proven to be effective, esthetic and functional, as suggested by Andreasen and Andreasen (1), in the re-establishment of form and function in cases of avulsed teeth. Nonetheless, its durability is still questioned. Still, one should take into consideration that it is a simple and cost-effective technique, generating greater access to treatment for populations with a socio-economic status similar to that in Brazil. In this manner, the solution encountered was deemed satisfactory by patients and dentists alike and restored the esthetics in the young girl entering puberty, a time when natural bodily changes lead to emotional disturbances and can cause adolescents to dislike their image (12, 13).

The autogenous adhesive-fixed partial denture with the application of polyethylene fibers proved to be an esthetic and functional solution in cases of avulsion of permanent lower central incisors. This is a simple, cost-effective technique that represents greater access to treatment for populations with socio-economic conditions similar to that found in Brazil.

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References

1. Andreasen JO, Andreasen FM. Avulsions. In: Andreasen JO, Andreasen FM, editors. Textbook and color atlas of traumatic injuries to the teeth, 3rd edn. Munksgaard: Mosby, MO, 1994. p. 383–420.
2. Ram D, Cohenca N. Therapeutic protocols for avulsed permanent teeth: review and Clinical Update. Pediatr Dent 2004;26:251–5.
3. Nguyen PMT, Kenny DJ, Barret EJ. Socio-economic burden of permanent incisor replantation on children and parents. Dent Traumatol 2004;20:123–33.
4. Cortes MIS, Marcenes W, Sheiham A. Impact of traumatic injuries to the permanent teeth on the oral health-related quality of life in 12–14-year-old children. Community Dent Oral Epidemiol 2002;30:193–8.
5. Flores MT, Andreasen JO, Bakland LK. Guidelines for the evaluation and management of traumatic dental injuries. Dent Traumatol 2001;17:193–6.
6. Schjøtt M, Andreasen JO. Emdogain® does not prevent progressive root resorption after replantation of avulsed teeth: a clinical study. Dent Traumatol 2005;21:46–50.
7. Kenny DJ, Barrett EJ, Casas MJ. Avulsions and intrusions: the controversial displacement injuries. J Can Dent Assoc 2003;69:308–13.
8. Eskitaşcıoğlu G, Eskitaşcıoğlu A, Belli S. Use of polyethylene ribbon to create a provisional fixed partial denture after immediate implant placement: a clinical report. J Prosthet Dent 2004;91:11–4.
9. Robertson A, Robertson S, Noren JG. A retrospective evaluation of traumatised permanent teeth. Int J Paediatr Dent 1997;7:217–26.
10. Hughes TE, Strassler HE. Minimizing excessive composite resin when fabricating fiber-reinforced splints. J Am Dent Assoc 2000;131:977–9.
11. Hamza TA, Rosenstiel SF, Elhosary MM, Ibraheem RM. The effect of fiber reinforcement on the fracture toughness and flexural strength of provisional restorative resins. J Prosthet Dent 2004;91:258–64.
12. Baldwin DWC. Appearance and aesthetics in oral health. Community Dent Oral Epidemiol 1980;8:244–56.
13. Shaw WC. The influence of children's dentofacial appearance on their social attractiveness as judged by peers and lay adults. Am J Orthod 1981;79:399–415.