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Replantation of an Immature Permanent Maxillary Central Incisor after Traumatic Avulsion: A 26-Month Follow-Up Case Report

Aymen Ben Hadj Khalifa[1-3*], Dorsaf Jarrar[1, 3], Chiraz Baccouche[1, 2], Hichem Ghedira[1, 3]

[1]Biological and Clinical Dento-Facial Approach Laboratory (ABCDF) LR12ES10, Faculty of Dental Medicine, University of Monastir, Monastir, Tunisia
[2]Department of Dental Anatomy, Faculty of Dental Medicine, University of Monastir, Monastir, Tunisia
[3]Department of Pediatric Dentistry, Faculty of Dental Medicine, University of Monastir, Monastir, Tunisia

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***Corresponding author:** Aymen Ben Hadj Khalifa

Abstract **Case Report**

Replantation of the avulsed tooth is the ideal treatment that can restore esthetic appearance and occlusal function shortly after the injury. It often presents a challenge to the clinician. This case report presents the management of an avulsed maxillary permanent left central incisor in an 8-year-old girl. It was kept dry for 40 minutes from the moment of trauma until its replantation. Missing several appointments, the patient was diagnosed with dental ankylosis. After six months of replantation, the root canal was then cleaned and filled with calcium hydroxide. Twenty months after replantation, clinically, the tooth showed 5 millimeters of withdrawal and a severe mobility. The radiographic examination revealed both inflammatory resorption and replacement resorption. Decoronation was applied and the extracted crown was used for temporary prosthesis. Six months later, clinical and radiographic control showed satisfactory healing. This treatment technique has proven to be an advantage for the patient in this growing period by maintaining the esthetics, the height of alveolar bone and by making the provision of an esthetically acceptable permanent restoration at a later age if prognosis becomes poor.

Keywords: Tooth Replantation, Tooth Ankylosis, Tooth Resorption, Appointments and Schedules.

INTRODUCTION

BACKGROUND

Replantation is the treatment of choice of avulsed permanent teeth [1]; however, this option cannot be always carried out immediately. Therefore, the tooth should be kept in an appropriate storage medium until replantation. As already recommended *by the International Association of Dental Traumatology (*IADT) [3], a recent systematic review has shown that the tooth should be replanted as quickly as possible to improve prognosis [4]. This prognosis is particularly dependent on root development, extra-alveolar dry time, the mode of transportation of avulsed tooth, and the presence of viable periodontal cells on the root surface before replantation [5]. In the long term, the replanted teeth may have the chance to survive or may even be lost or extracted after an inflammatory or replacement resorption [1, 2]. However, not only uncertainty exist on which interventions will maximize the survival and repair of the replanted tooth [4], but another factor should also be considered for the prognosis as the missed appointments. This case report describes a case of replantation of an immature avulsed maxillary permanent central incisor followed during 26 months with several missed appointments leading to a decoronation.

CASE DESCRIPTION

An 8-year-old girl victim of trauma consulted for emergency our department of pediatric dentistry. When she was leaving school, the girl stumbled and fell; she hit her face against the ground. The accident caused the avulsion of her permanent left maxillary central incisor (Fig-1A). She had no sign of loss of consciousness or nasal bleeding. The time between the accident and the onset of treatment was approximately 40 minutes, during which the tooth was covered with tissue and kept dry. When recovered, the avulsed tooth was examined to check the absence of fractures or damages, then gently cleaned of debris without scraping the desmodontium, rinsed and placed into normal saline solution. The avulsed tooth was immature with a wide-open apex. The patient had no medical or surgical history and the anti-tetanus vaccination was up to date. Extra oral examination showed no lacerations or contusions of the face. Intra oral examination revealed

avulsion of the maxillary left central incisor with a gingiva wound. Radiological examination showed an empty socket with no bone or root fractures (Fig-1B). The available treatment options were explained to the parents and replantation was decided together underling that the treatment could be long and that success depends largely on their collaboration.

Local anesthesia was performed and the socket was gently cleaned to remove any blood clot or debris then it was irrigated with a saline solution and before starting replantation, the gingiva wound was sutured. After gently replanting the avulsed tooth into its socket using finger pressure, a retro alveolar radiograph to verify positioning was made and showed a good position. A semi-rigid wire (0.6mm) was used for splinting. The teeth were prepared by etching and bonding, and then the wire was attached with composite resin to the middle third of the labial surface of avulsed tooth and some teeth on either side (Fig-1C). Finally, a postoperative retro-alveolar radiograph was performed to check the tooth position (Fig-1D).

Antibiotics (2 grams of amoxicillin daily for 7 days) and analgesics (1 gram of paracetamol per day for 5 days) were prescribed. The patient was recommended to have a soft diet and a good oral hygiene (chlorhexidine-based mouthwashes).

Two weeks later, the clinical and radiological examination did not show evident complications. The split was gently removed (Fig-2A) after radiographic control (Fig-2B).

At a two months of appointment follow-up, the clinical (Fig-2C) and radiographic (Fig-2D) examinations were still within normal limits. Therefore, an appointment of control was given after 2 weeks, but the follow-up appointments to monitor the tooth vitality and the possibility of revascularization were not respected.

Six months later, the patient come back to the clinic with an infraclusion of the replanted tooth and a higher gingival margin (Fig-2E). A typical metallic sound upon percussion and a lack of the tooth mobility were noticed on the replanted tooth suggesting dental ankylosis. The vitality test was negative. Radiographically, a discontinuity of the periodontal ligament at the apical part of the mesial side of the root was evidenced (Arrow in Fig-2F). All these data allowed to the diagnosis of an ankylosis in the replanted tooth. An endodontic treatment with a root canal filling using calcium hydroxide to delay the root resorption was planned. A checkup appointment was scheduled after 3 weeks. Yet, the patient consulted 5 months later (Fig-3A), corresponding to 11 months after replantation. The radiological examination showed no changes in the amount of root resorption (Fig-3B). The root canal was disinfected with sodium hypochlorite and was filled with calcium hydroxide.

The patient did not consult again for 9 months, corresponding to 20 months after replantation. The clinical examination revealed then a significant infraocclusion of about 5 millimeters of the tooth 21, with a mobility degree 2. The gingiva showed a depressible aspect in palpation and a productive fistula (Arrow in Fig-3C). The radiographic examination revealed a replacement root resorption in the apical third of the root (Arrowhead in Fig-3D) and an external inflammatory resorption in the cervical part of the root (Arrow in Fig-3D).

Decoronation was performed (Fig-4A). The extracted crown (Fig-4B) was cleaned thoroughly and embedded into a temporary prosthesis (Fig-4C) acting as a space maintainer for esthetic reasons (Fig-4D).

Six months after decoronation, a radiographic checkup showed replacement of the major part of the root with bone with no complications (Fig-5). The patient seemed to be highly satisfied with the aesthetic and functional outcome of the prosthesis and she reported no discomfort with its use. She was warned of the need for regular control until definitive prosthetic treatment.

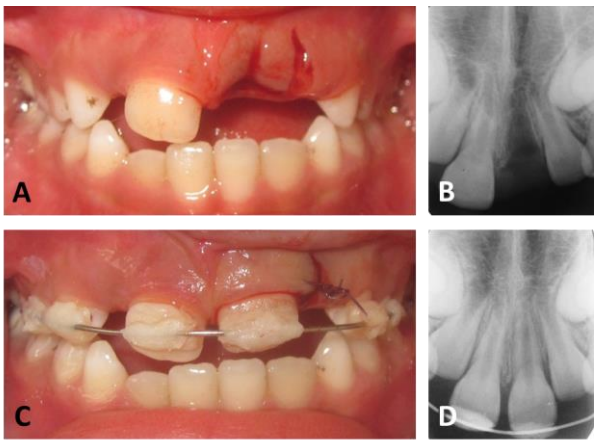

Fig-1: Emergency treatment of the avulsed tooth: replantation at the first consultation; A) Absence of the 21 with wound of the gingiva. B) Preoperative alveolar retro-radiographic: the socket was empty with no bone lesions. C) Replantation, splinting and suturing of the gingiva. D) Postoperative alveolar retro-radiographic: Successful replantation of the tooth fixed with a soft splint

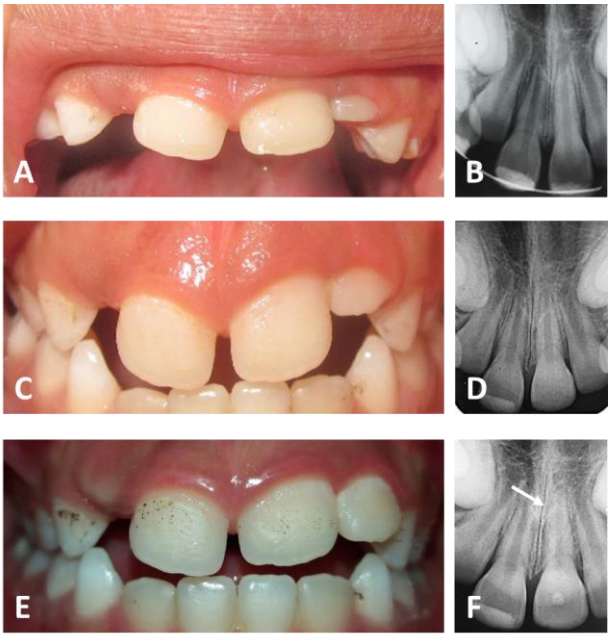

Fig-2: Clinical and radiographic examination: up to six months after replantation; A) Clinical examination: 15 days post-replantation, after removing the splint. B) Radiographic examination: 15 days post-replantation, just before removing the splint. C) Clinical examination: 2 months post-replantation. D) Radiographic examination: 2 months post-replantation. E) Clinical examination: 6 months post-replantation. F) Radiographic examination: 6 months post-replantation

Fig-3: Clinical and radiographic examination: up to 20 months after replantation; A) Clinical examination: 11 months post-replantation, the patient presented with a shift degree of eruption between the two central incisors. B) Radiographic examination: 11 months post-replantation, the root canal was obturated with calcium hydroxide. C) Clinical examination: 20 months post-replantation showing the shift between the two central incisors and a productive fistula between teeth 21 and 22. D) Radiographic examination: 20 months post-replantation, showing both a replacement (arrowhead) and an inflammatory root resorption of the tooth root (arrow)

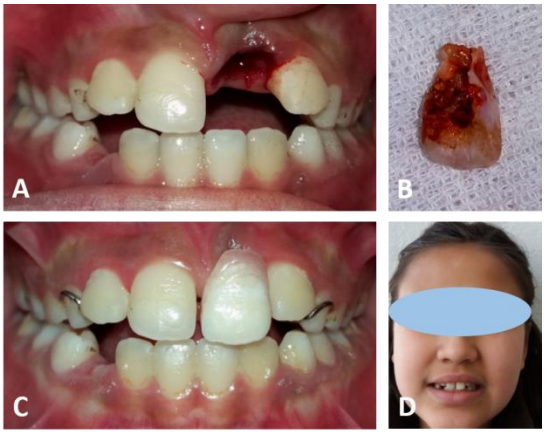

Fig-4: Decoronation: 20 months after replantation; A) Postoperative decoronated tooth. B) Crown fragment after decoronation. C) Temporary removable restorative prosthesis with the extracted crown. D) View dental prosthesis in place

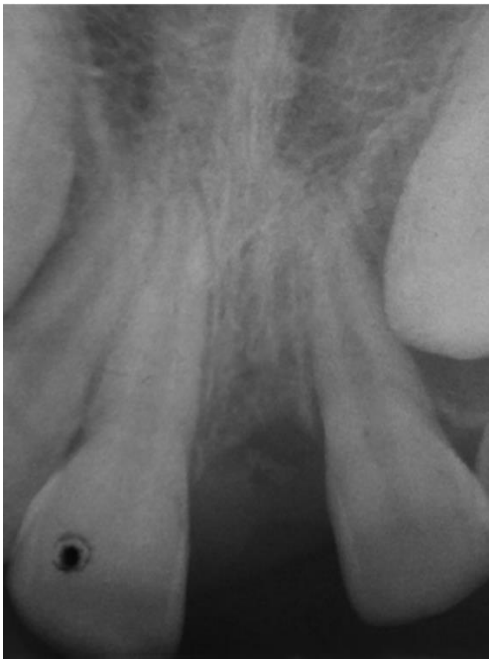

Fig-5: Radiographic examination: 6 months post decoronation and 20 months after replantation

DISCUSSION

Replantation time, storage conditions and the stage of root development are the decisive factors for pulpal and periodontal healing, and consequently for the long-term survival of tooth replantation [6-8]. Kinirons *et al*., indicated that the risk of resorption increases dramatically after 5 min of dryness, with the probability of resorption increasing by 29% for every additional 10 min of dryness [7]. According to Petrovic *et al.*, [6] after an avulsion injury, immature permanent teeth with open apices show lower survival potential in comparison to teeth with closed apices, because it requires a prolonged treatment. In the present case report, the time between the trauma occurrence and the emergency care was 40 minutes with a dry storage of the immature tooth. Moreover, replantation was performed without the use of tetracycline or sodium fluoride for the root surface treatment, as they were not

available at that time [9]. These conditions are reported in the guidelines of the International Association of Dental Traumatology [3] as the major contributors to unfavorable outcomes.

Again, according to the guidelines given by IADT, if the extra-alveolar dry time exceeds 60 minutes before replantation, extra oral root canal treatment should be carried out before replantation [3]. However, for teeth with open apexes that are rapidly replanted, pulp revascularization is possible [1, 3]. That was our initial therapeutic choice and close follow-up appointments were planned as recommended in the literature to assess the pulp vitality [10]. What is important here is to take into consideration the risk of root resorption following infection that could compromise the revascularization, because when a tooth is traumatized the pulp can lose its blood supply. A recent meta-analysis recommended extirpating pulp within 10-14 days following avulsion to avoid inflammatory resorption [11]. Moreover, when radiographic signs appear, resorption can effectively be stopped by endodontic therapy consisting in root canal filling with calcium hydroxide [2]. Unfortunately, this was not done in this case due to a missed appointment thus limiting the chances for the treatment to succeed.

On another side, ankylosis is a common complication that could be observed after avulsed tooth replantation [12], corresponding histologically to a process replacing dental tissues with bone [13] under a complex regulation [14]. Once ankylosis is diagnosed, a strict follow up is indicated. Some studies [15] suggest that in young children, the combined effect of a high rate of bone remodeling due to their growth, together with a lack of root mass in the immature tooth lead to a worse prognosis of the replantation enhancing the risk of replacement resorption. Thus, the loss of the tooth occurs in few years [12].

In this case, in addition to the aforementioned factors decreasing the chance of pulpal and periodontal healing, the patient's noncompliance with the clinical follow-ups made the situation more complicated. The delay of pulp extirpation to the six months after avulsion, and the non-renewal of calcium hydroxide allowed the development of the replacement resorption after the necrosis of the tooth. Petrovic [6] indicates that early root canal treatment is beneficial for patients who are not committed to the follow-up schedule. Obviously, the success of treatment needs the patient collaboration.

To treat dental ankylosis, decoronation could be proposed as an effective alternative to extraction [16]. It is a simple, safe and clearly less traumatic technique to avoid bone loss, aesthetic disturbances and excessively invasive treatments [17]. It has to be performed within 2 years of the diagnosis or before the growth spurt in order to preserve the alveolar bone and to prevent infraocclusion. Decoronation procedure is a reliable technique in terms of preservation of the width and height of the alveolar process for years [16-19]. During decoronation, the root canal should be completely cleaned and thoroughly rinsed with saline solution [16]. The indication of decoronation is dictated by the vertical difference between the ankylosed and adjacent teeth, child's age, gender and the growth pattern [15]. Malmgren concluded that the highest risk of having a severe infraocclusion is when ankylosis is diagnosed before the growth spurt [15]. The author also concluded that decoronation should be performed earlier in girls than in boys [20]. In our case, the patient was diagnosed with ankylosis before her growth spurt but in addition to the aforementioned factors, cervical resorption accelerated the decoronation procedure.

The predictable success of decoronation helps supporting the suggestion of replantation of avulsed teeth in children, even when the extra alveolar conditions indicate that healing might be compromised by ankylosis [21]. Tooth replantation helps restoring the patient's aesthetic and functional needs and provides psychological comfort for both the injured child and his parents. Otherwise, permanent prosthetic solutions at this time are not suitable considering the growth and development period in pediatric patient [22]. The resorbing root could serve as a matrix for alveolar bone formation which be preserved allowing to save time until definitive treatment. Bone and soft tissue are either managed for future implant insertion or fixed prosthesis [23]. Considering all these factors, replantation was performed in our case.

Diagnoses and treatment decisions evolved with this case as the patient missed her appointments, but replantation remained the best initial choice to preserve both the aesthetic appearance and function for several months.

CONCLUSION

Replantation ensures adequate space maintenance, function, esthetic and prevents psychological trauma in the child, which may be associated especially with a missing anterior tooth. It can be concluded that, by appropriate pretreatment of the avulsed tooth, the objectives of replantation can be achieved even if replantation is performed under adverse conditions.

The most common complication after replantation is ankylosis. One of the possible options of treatment, decoronation. A treatment seems to guarantee the most favorable conditions for future implantological treatment.

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REFERENCES

1. Andersson L, Andreasen JO, Day P, Heithersay G, Trope M, DiAngelis AJ, Kenny DJ, Sigurdsson A, Bourguignon C, Flores MT, Hicks ML. Guidelines for the Management of Traumatic Dental Injuries: 2. Avulsion of Permanent Teeth. Pediatric dentistry. 2015 Oct 1;37(6), 369-376.
2. Krug R, Kremeier K, Krastl G. Long-term retention of avulsed maxillary permanent incisors replanted after prolonged non-physiological storage. Dental Traumatology. 2019 Apr;35(2):147-152.
3. Andersson L, Andreasen JO, Day P, Heithersay G, Trope M, DiAngelis AJ, Kenny DJ, Sigurdsson A, Bourguignon C, Flores MT, Hicks ML. International Association of Dental Traumatology guidelines for the management of traumatic dental injuries: 2. Avulsion of permanent teeth. Dental Traumatology. 2012 Apr;28(2):88-96.
4. Day PF, Duggal M, Nazzal H. Interventions for treating traumatised permanent front teeth: avulsed (knocked out) and replanted. Cochrane Database of Systematic Reviews. 2019; (2).
5. Hasanuddin S, Reddy JS. Sequelae of delayed replantation of maxillary permanent incisors after avulsion: A case series with 24-month follow-up and clinical review. Journal of Indian Society of Pedodontics and Preventive Dentistry. 2018 Oct 1;36(4):410-416.
6. Petrovic B, Marković D, Peric T, Blagojevic D. Factors related to treatment and outcomes of avulsed teeth. Dental Traumatology. 2010 Feb;26(1):52-59.
7. Kinirons MJ, Gregg TA, Welbury RR, Cole BO. Dental trauma: Variations in the presenting and treatment features in reimplanted permanent incisors in children and their effect on the prevalence of root resorption. British dental journal. 2000 Sep;189(5):263-266.
8. Bendoraitiene E, Zemgulyte S, Borisovaite M. Reasonable outcome of avulsed permanent upper incisor after seven years follow-up period: a case report. Journal of oral & maxillofacial research. 2017 Oct;8(4):e6.
9. Andreasen FM, Andreasen JO. Luxation injuries of permanent teeth: general findings. IN: Andreasen JO, Andreasen FM, Andersson L, editors. Textbook and Color Atlas of Traumatic Injuries to the Teeth. 4th edition. Munksgaard, Copenhagen. 2007; 372-382.
10. Moule AJ, Moule CA. The endodontic management of traumatized permanent anterior teeth: a review. Australian dental journal. 2007 Mar;52:S122-37.
11. Hinckfuss SE, Messer LB. An evidence-based assessment of the clinical guidelines for replanted avulsed teeth. Part I: timing of pulp extirpation. Dental Traumatology. 2009 Feb;25(1):32-42.
12. Campbell KM, Casas MJ, Kenny DJ. Ankylosis of traumatized permanent incisors: pathogenesis and current approaches to diagnosis and management. Journal of the Canadian Dental Association. 2005 Nov 1;71(10):763-768.
13. Roy V, Jamazi I, Jemmali B, Ghoul-Mazgar S. Disruptions of the pulp-dentin complex in an investigated case of pink secondary retained molar. Odontology. 2010 Jul 1;98(2):177-180.
14. Ghoul-Mazgar S. RANK, RANKL and OPG expressions in a permanent molar with a replacement resorption. Odontology. 2013 Jul 1;101(2):239-243.
15. Malmgren1 B, Malmgren2 O. Rate of infraposition of reimplanted ankylosed incisors related to age and growth in children and adolescents. Dental Traumatology. 2002 Feb;18(1):28-36.
16. Malmgren B. Decoronation: how, why, and when. J Calif Dent Assoc. 2000 Nov;28(11):846-854.
17. Calasans-Maia JA, Neto AS, Batista MM, Alves AT, Granjeiro JM, Calasans-Maia MD. Management of ankylosed young permanent incisors after trauma and prior to implant rehabilitation. Oral Surgery. 2014 Feb;7(1):45-51.
18. Malmgren B. Ridge preservation/decoronation. Journal Endod, 2013; 39:S67–S72.
19. Mohadeb JV, Somar M, He H. Effectiveness of decoronation technique in the treatment of ankylosis: A systematic review. Dental Traumatology. 2016 Aug;32(4):255-63.
20. Malmgren B, Tsilingaridis G, Malmgren O. Long-term follow up of 103 ankylosed permanent incisors surgically treated with decoronation–a retrospective cohort study. Dental Traumatology. 2015 Jun;31(3):184-189.
21. Malmgren B, Malmgren O, Andreasen JO. Alveolar bone development after decoronation of ankylosed teeth. Endodontic topics. 2006 Jul;14(1):35-40.
22. Korkut E, Terlemez A, Çelebi H, Şener Y. Multidisciplinary treatment of avulsed teeth case report and 6 years follow-up. Journal of Pediatric Dentistry. 2016 May 1;4(2):42-46.
23. Andreasen JO, Malmgren B, Bakland LK. Tooth avulsion in children: to replant or not. Endodontic Topics. 2006 Jul;14(1):28-34.