Case Report

Replantation of avulsed permanent tooth with incomplete rhizogenesis

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ABSTRACT

Dental avulsion is one of the most frequent injuries in permanent teeth and higher complexity in terms of treatment and prognosis. The International Association of Dental Traumatology divides this trauma into several categories and guides the conduct according to each category. The aim of the present study is to report a case of dental reimplantation of the upper central incisor in a patient with incomplete rhizogenesis. An 8-year-old male patient sought care after undergoing avulsion of upper left central incisor and left superior deciduous lateral incisor teeth and subluxation of the upper right central incisor tooth. The upper left central incisor tooth was maintained in dry medium and reimplanted in <60 min after avulsion. The flexible restraint from the upper right canine deciduous to upper left canine deciduous remained for approximately 21 days. The clinical-radiographic follow-up was periodic and after 34 months posttrauma was observed crown integrity, root growth continuity, calcification of the canal of upper left central incisor, absence of radiographic image compatible with periapical lesion, and negative response to the pulp vitality test in the upper left central incisor tooth. We conclude from the exposed clinical case that, even with predictable sequelae, such as calcification of the root canal space and dental reimplantation is the procedure of choice in cases of dental avulsion.

Keywords: Dental reimplantation, dental trauma, tooth avulsion

INTRODUCTION

Dentoalveolar trauma, unfortunately, is a frequent occurrence and has a great clinical repercussion.[1] The dental avulsions are the total displacement of the tooth out of the alveolus, generating rupture of the vascular bundle and the compromise of the supporting tissues.[2,3] It is the most complex injury in terms of clinical approach within dentistry, since the difficulty in prognosis is due to the stage of root maturation, reimplantation time, storage medium, retention time, and associated lesions.[3,4]

Epidemiologically, dental avulsion is a trauma that affects more children and adolescents of the male sex[5,6] being its occurrence usually associated with traffic accidents, sports practice, aggressions, and falls.[1,5,6] The teeth affected with the highest incidence in this type of trauma are the upper central incisors, followed by the upper lateral incisors.[6]

The protocol for the treatment of a dental avulsion is divided according to the root maturity and the conditions of the cells of the periodontal ligament.[4] It is most advisable to implant the permanent tooth at the site of the accident; however, it is known that it is impossible to perform this type of procedure immediately. In this way, it is important that the dental element is stored in an appropriate medium and taken to the patient as soon as possible to ready care.[4,7]

The indicated procedure according to the International Association of Dental Traumatology (IADT) protocol for

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avulsion and reimplantation situations in the immediate care is the cleaning of the tooth, topical application of antibiotics, local anesthesia, irrigation and examination of the alveolus, removal of the clot, and reimplantation of the avulsionated tooth.[4] After reimplantation, gingival lacerations are sutured, verification of the dental position and application of a flexible contend for 14 days. At the end of this process, the administration of antibiotics and verification of the tetanus vaccine.[4]

The aim of this study is to describe the clinical management of dental reimplantation in a patient who suffered avulsion of the upper central incisor presenting incomplete rhizogenesis and discuss the outcome of dental reimplantation.

CASE REPORT

An 8-year-old male patient sought care in the Faculty of Dentistry when the emergency room (ER) referred him, after avulsion of the upper left central incisor (21) and left superior deciduous lateral incisor (62) and subluxation of the permanent right upper central incisor (11). The clinical history described during the anamnesis reported the occurrence of trauma from a skateboarding crash.

He reported that the upper right central incisor tooth was stored in a dry environment on the way to the ER, and thus, on arriving at the ER, the tooth was reimplanted 45 min after the avulsion. The present oral lacerations were sutured and a semirigid containment with canine-to-canine nylon wire was performed after the reimplantation of the upper right central incisor tooth. Antibiotic therapy (amoxicillin 500,000 ui) was then instituted for 7 days and paste feed.

During the clinical reassessment examination, the semirigid restraint was removed only during the consultation, for a better evaluation of the present situation. The patient presented disharmony in the smile line, and periapical radiographic examination revealed an incomplete rhizogenesis in elements upper right central incisor and upper left central incisor [Figure 1a and b].

After prophylaxis and removal of stitches, the scheduled clinical procedure was the installation of a new semirigid containment of canine to canine with nylon thread, for 21 days. Clinical and radiographic follow-up at 8 months showed the eruption of the left superior lateral incisor tooth, lack of resorption and periapical lesion, besides apparent root development [Figure 2a and b]. The pulp and percussion sensitivity examination did not indicate any outstanding abnormalities.

Figure 1: (a) Frontal close-view of the traumatized central incisor. (b) Radiographic appearance after removal of the restraint

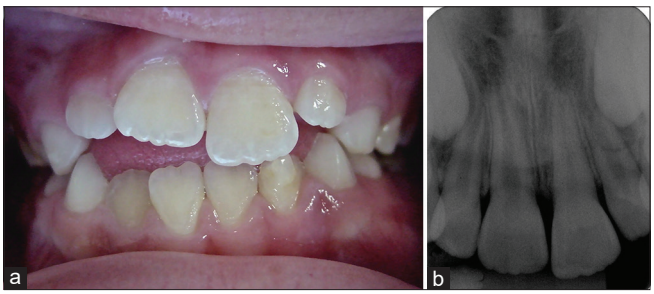

Figure 2: (a) Clinical appearance at 8 months. (b) Eight-month radiographic appearance

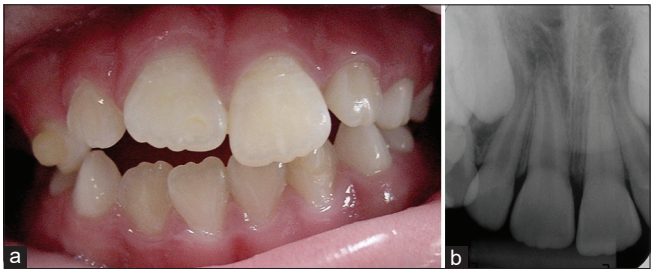

Figure 3: (a) Clinical appearance at 12 months. (b) Twelve-month radiographic appearance

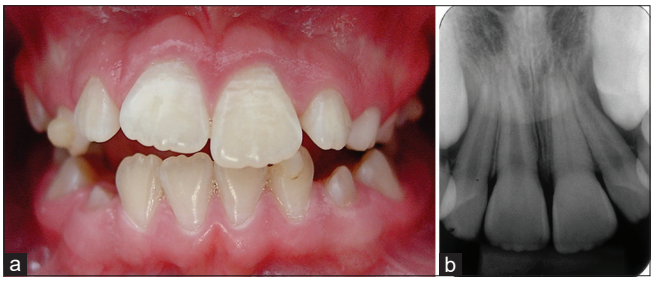

Figure 4: (a) Clinical appearance at 24 months. (b) Twenty-four months radiographic appearance

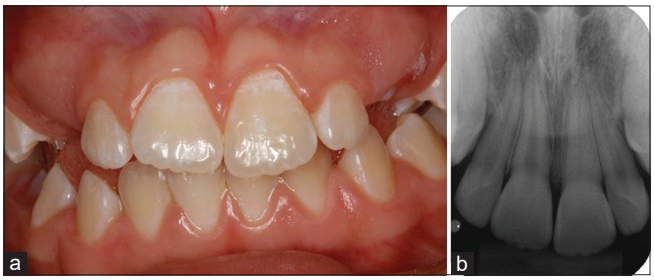

Figure 5: (a) Clinical follow-up at 34 months. (b) Radiographic appearance at 34 months

The clinical-radiographic evaluation was performed at 12 and 24 months during the period of proservation [Figures 3a, b and 4a, b]. A discrete calcification of the root canal space in the left central incisor (21) was radiographically observed at 12 months of follow-up and at 24 months, the pulp sensitivity tests already showed no pulp response in the same tooth.

Clinical and radiographic examination at 34 months showed satisfactory repair and the absence of any symptomatology, as well as evidence of bone integrity [Figures 5a and b]. The dental crown had no degree or evidence of darkening, and there were no radiographic signs consistent with periapical lesion or resorption present.

DISCUSSION

Trauma to anterior teeth is a common lesion of the dentoalveolar system, in which proper first aid is of paramount importance. As the region of incisors is an aesthetically important area, when children and adolescents suffer from this type of injury, the challenge is to preserve the tooth and minimize subsequent damage.[8] The great difficulty in cases of avulsion, when related to the age of the adolescent patient, is in the lack of alternative rehabilitation, since the patient is in the stage of craniofacial development, being not suitable for the installation of a prosthesis or implant.[8] Thus, the importance of dental reimplantation as a method of rehabilitation of the young patient is highlighted.[1]

Traumatic lesions in young permanent teeth affect approximately 30% of children,[9] and avulsion of permanent teeth is observed in 0.5%–16% of all these lesions.[10] The highest incidence of anterior dental trauma occurs between seven and 12 years of age, with dental avulsion being considered the most severe and the prognosis dependent on actions taken at the accident site and immediately after avulsion.[11]

Dental reimplantation should be performed as soon as possible, with the time of a tooth being avulsed outside the alveolus inversely proportional to the possibility of success in this type of treatment. In addition, other factors are of relevance for treatment such as the extra-alveolar time, type of storage of the avulsed tooth, use or not of restraints, the use or not of antibiotic therapy, alveolar cavity treatment, and the need or not of endodontic treatment. However, there are also practical reasons for immediate care of previous dental trauma, to avoid subsequent interventions.

Determining the prognosis of avulsion is very peculiar since it is established from a combination of factors.[3-5] However, it is the understanding that to obtain the best possible prognosis of an avulsed tooth, it should be re-implanted as soon as possible. Nevertheless, there are a number of possible sequelae that may occur along the follow-up of the dental reimplantation, such as ankylosis, root resorption by replacement, and pulpal necrosis, which may lead to darkening of the dental crown and development of the periapical lesion.[12] In the case described, radiographic findings consistent with pulpal calcification were evidenced at 12 months after replantation and what is expected is a possible chromatic alteration of the reimplanted tooth.[13] The color change of the dental crown after dentoalveolar trauma is a relatively common sequel in traumatized teeth, being more evident in cases of diffuse calcification of the pulp space.

The calcification of the pulp canal space or pulp obliterations is one of the most predictable sequelae in reimplanted teeth, being radiographically evidenced during the prenervation consultations until 1 year after the reimplantation, where the gradual loss of the pulp lumen is observed.[14] Pulp viability was observed in teeth with avulsed open apices and reimplanted in the order of 32.9%. In addition, it was verified that the obliteration of the pulp cavity was the most evident sequel in 96% of cases already at 10 months postreimplantation.[14]

The extra-oral time and storage medium of the avulsed dental element are also closely related to the survival prognosis of the avulsed teeth.[4,14] In the case described, it is possible to observe that the tooth storage medium was not adequate since it was taken to the ready service on a paper napkin. In this way, the cells of the periodontal ligament were preserved due to the short time of the tooth outside the alveolus-45 min.[4] According to the protocol described by the IADT, after dental avulsion, if immediate reimplantation is not possible, the tooth must be stored in a suitable medium until the time of reimplantation.[4] Among the possible means of storage, milk is the most indicated, since besides the easy access, it also has the unique combination of nutrients able to keep cells of the periodontal ligament viable.[14]

Davidovich described a case of immediate reimplantation similar to the one described in the article, which resulted in revascularization of the pulp space, progression in root development, and posterior canal calcification.[15] In a comparative analysis, the outcome of the cases was very similar due to the fidelity to the protocol described by the IADT, being a tooth with incomplete rhizogenesis and with extra alveolar time <60 min, allowing immediate reimplantation.[15] What differs from one case to the other is in the smallest alveolar overtime described in the Davidovich

report, which totaled 10 min, showing no change in relation to the outcome of the case described here.

It is known that dental avulsion is an injury of high complexity and with several factors of intercurrence in the outcome of the treatment, being of great importance the time of the tooth outside the socket, the storage medium, the fast and qualified service, and the good adhesion of the patient to the proposed treatment.[4] Thus, although the tooth was stored in dry medium, the factor determining the positive outcome of the case was the minimum time of the dental element outside the alveolus, occurring in <60 min, thus maintaining the viability of the periodontal ligament cells.[4]

The present clinical case describes a successful clinical and radiographic aspect well within the established follow-up period. Radiographically, we observed continuity of root growth on upper left central incisor tooth, calcification of root canal, absence of image compatible with root resorption or periapical lesion. Clinically, it is possible to observe the integrity of the dental crown without chromatic alteration of the tooth, even if subtle or discreet, when compared with the other teeth, besides a better harmony in the dental positioning.

CONCLUSION

We can suppose that the minimum time of the tooth outside the alveolus was the determinant factor for the viability of the cells of the periodontal ligament, allowing pulp revascularization after reimplantation. In addition, the calcification of the pulp tissue proved to be a positive result in the adversities involved in the case, thus indicative of clinical success.

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.

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Conflicts of interest

There are no conflicts of interest.

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