"Holding the horses": Pulpal healing after replantation of an immature permanent central incisor following avulsion: A 3 years follow-up case study

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ABSTRACT

Avulsion is one of the most complex kinds of trauma that was believed to result in pulp necrosis and therefore require endodontic treatment. This case demonstrates that in avulsion of immature permanent incisors we should consider the revascularization before starting endodontic treatment. Avulsion of an immature permanent central incisor in a 6 and a ½-year-old girl is presented. The girl was brought immediately to a dental office, and the immature tooth was replanted shortly after the avulsion. During 3 years follow-up, continuation of root development, pulp revascularization and bone-like tissue growth into the pulp chamber were observed. The tooth is vital and asymptomatic with no signs of ankylosis.

Key words: Avulsion, Dental Trauma, Revascularization

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INTRODUCTION

Avulsion refers to the complete displacement of a tooth out of its socket.[1] In the permanent dentition, the most common tooth to be avulsed is the maxillary central incisor, especially between the ages of 7 and 10, before root development has completed.[2] Pulpal revascularization in an immature tooth is a possible outcome that can consequently delay or even prevent root canal treatment.[2] Replantation is usually recommended, but the success rate is fairly low and heavily depends on the extra-oral time and on the storage medium of the tooth postavulsion.[1,3] If the tooth has already been replanted, cleaning the area with chlorohexidine rinse is recommended, followed by immobilization with a flexible splint for 7-14 days.[1,3] Soft diet for 2 weeks and uncompromising oral hygiene are instructed to the patient.[3]

The following case report describes a 3 years follow-up of an avulsed maxillary central incisor with an open apex, which has been accidentally lost in the suction system, and shortly after has been found, cleaned, and replanted.

CASE REPORT

A healthy 6 and a ½-year-old girl pulled a rope with her teeth while playing, and her right maxillary central incisor had been extruded out of the socket. She was taken immediately to a local private practice nearby. The right maxillary central incisor was extruded almost completely out of the socket. During cleaning and stabilization, the right central incisor was accidently sucked into the suction system by the dental assistant and soon after found, cleaned and inserted back into the socket. A semi-rigid splint was placed from the first primary molar to the left central incisor. Radiographically, both central incisors had half-completed roots with wide open apices [Figure 1]. A course of antibiotics along with oral hygiene and diet instructions were administered. Then, the dentist referred the girl to the Department of Pediatric Dentistry at the

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Hebrew University-Hadassah School of Dental Medicine in Jerusalem. At the first visit in our department, 3 days after the trauma, the splint was intact, and the oral hygiene was satisfactory. At the next visit, 10 days later, no changes were noted. Six weeks after the trauma, the tooth was stable, and electric pulp testing (EPT) was negative, but in a radiographic examination, minimal continued root development in both central incisors could be observed. The splint was then removed. Two-and-a-half months after the trauma, positive response to the EPT was recorded, and continued development of the roots was disclosed in the radiograph. At the 6 months recall the tooth was vital, but the radiographic examination showed a delay in its development with a wider pulp, thinner root walls and bone-like tissue that invaded the pulp [Figure 2]. At 1-year follow-up, no clinical difference could be seen between the central incisors, but the radiograph revealed arrested root development of the traumatized tooth with bone invasion into the root canal. The root walls were thin and the pulp, as well as the apex, appeared wide [Figure 3]. At the 18, 24 and 36 months follow-up the right central incisor showed radiographically arrested root development [Figure 4]. The periodontal ligament (PDL) seemed intact, clinically the tooth was testing vital and did not show any discoloration or signs of ankylosis [Figure 5].

Figure 1: Day of avulsion: Both central incisors had half completed roots with thin walls surrounding the canal and wide open apices. Note that the avulsed 11 is slightly extruded

DISCUSSION

When provided with correct conditions, many tissues are capable of self-regeneration. For example, bone has the capacity to regenerate and repair. Bone loss from endodontic infection, periodontal disease or trauma can be restored over time.[4] The dental pulp is one of the most innervated and vascular tissues in the body and has the potential for neural and vascular

Figure 2: Six months postavulsion: Tooth 21 continues developing, dentinal walls become thicker and apex becomes more constricted. The avulsed tooth, 11, delays in development: although dentinal walls become thicker root does not develop considerably and the apex is still widely open, with bone-like tissue that seems to invade the pulp chamber

Figure 3: Twelve months postavulsion: Root of 11 has not continued developing. Partial obliteration along the root canal space and normal periodontal ligament are noted

Figure 4: Three years postavulsion: Arrested development of 11 and calcifications at the apex are noticed. Periodontal ligament appears normal

Figure 5: Three years postavulsion: No discoloration is seen

regeneration.[5] This report confirms the regenerative potential of an avulsed maxillary central incisor with an immature apex. Without endodontic intervention, the tooth has continued developing almost completely without any signs of inflammation. After 3 years of follow-up, all the parameters are within normal limits and the tooth remains vital, with no signs of ankylosis, although its root is slightly shorter than the adjacent central incisor.

Revascularization is a possible outcome that should be considered when avulsion of an immature permanent tooth occurs. The advantage of revascularization and prevention of root canal treatment is continued development and completion of a root with thicker dentinal walls.[6] The shorter the time the avulsed tooth is out of the socket, the higher the chance that revascularization will be successful.[1] This is because the extra-oral time determines the vitality of the PDL, and its survival will prevent replacement resorption. The major factor that facilitates revascularization is the absence of infection, which usually occurs as the result of pulp necrosis.[6] Therefore, in addition to strict oral hygiene measures, as recommended in the present case, a periodic follow-up is necessary to assess loss of vitality or any pathological signs that will require an endodontic intervention as early as possible.[7] This case demonstrates that even with avulsion, which is one of the most complex types of dental trauma, there is a chance of healing and continued tooth development. Hence, revascularization should be considered before starting endodontic treatment that inevitably compromises the longevity of the tooth and will require future treatments.

WHY THIS PAPER IS IMPORTANT TO PEDIATRIC DENTISTS?

1. Pediatric dentists should consider the revascularization as the first treatment option in avulsed incisor with an open apex.
2. Meticulous hygiene must be reached from day one since it is crucial for success of revascularization.
3. Close monitoring is fundamental in order to prevent complications and detect any need for intervention.

REFERENCES

1. Andreasen JO, Anderasen FM. Textbook and Color Atlas of Traumatic Injuries to the Teeth. 4th ed., Ch. 17. Oxford: Blackwell; 2007. p. 444-81.
2. Andreasen JO, Borum MK, Andreasen FM. Replantation of 400 avulsed permanent incisors. 3. Factors related to root growth. Endod Dent Traumatol 1995;11:69-75.
3. American Association of Endodontics. Treatment of the Avulsed Permanent Tooth: Recommended Guidelines of the American Association of Endodontists 2004. Chicago: AAE Publication; 1995.
4. Heling I, Slutzky-Goldberg I, Lustmann J, Ehrlich Y, Becker A. Bone-like tissue growth in the root canal of immature permanent teeth after traumatic injuries. Endod Dent Traumatol 2000;16:298-303.
5. Johnson WT, Goodrich JL, James GA. Replantation of avulsed teeth with immature root development. Oral Surg Oral Med Oral Pathol 1985;60:420-7.
6. Kling M, Cvek M, Mejare I. Rate and predictability of pulp revascularization in therapeutically reimplanted permanent incisors. Endod Dent Traumatol 1986;2:83-9.
7. Ram D, Cohenca N. Therapeutic protocols for avulsed permanent teeth: Review and clinical update. Pediatr Dent 2004;26:251-5.

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