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Delayed expression of dental trauma-induced external root resorption

**KEYWORDS**

External root resorption;
Avulsion;
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Calcium hydroxide;
Apexification

Traumatic tooth injuries include crown-fractures with or without pulp exposure, where associated luxation injuries are accompanied by a greater frequency of pulp necrosis.¹ Following the International Association of Dental Traumatology (IADT) guidelines as the treatment protocol is considered the best clinical practice. Internal or external root resorption of tooth is one of the side effects of a traumatic tooth injury. Root resorption may or may not occur for a period time after an injury. Contemporary root resorption changes are due to the following: 1) loss or alteration of the protective layer and 2) inflammation of the unprotected root surface.² Tetracycline has been shown to have anti-resorptive and anti-microbial properties and to have a direct inhibitory effect on osteoclasts and collagenase. Root canal disinfection removes the stimulus leading to peri-radicular inflammation and stops resorption. The length of time for root resorption to occur remains unclear at the present time. The present case showed the occurrence of external root resorption 29 months after a tooth injury.

A 10-year-old girl presented for treatment of an upper right central incisor (#11) avulsion (Fig. 1A). Her tooth was traumatized approximately 30 min prior during a sports activity at school. The oral examination showed a #11

avulsion and a minor gingival laceration wound. The upper right lateral incisor, left central incisor, and left lateral incisor were examined, but no severe mobility was found. The #11 radiograph showed incomplete root apex formation and no obvious root fracture. Following the IADT guidelines, the patient was placed under a local anesthesia; #11 and its socket were cleaned with normal saline, and #11 was placed gently back into its alveolar socket. Splinting was done with 0.022 × 0.025 inches of twist wire from maxillary right canine to the left canine, which was left for two weeks, and the patient was prescribed with antibiotics (Fig. 1B). Root canal treatment #11 was initiated 7 days after replantation with calcium hydroxide used as an intra-canal medicament for apexification. The #11 follow-up radiographs showed nothing specific after four months (Fig. 1C). Six months later, the patient began orthodontic treatment for the purpose of alignment (Fig. 1D). Unfortunately, 29 months after the initial trauma, #11 developed a gingival fistula, and the radiograph showed external resorption at the middle root (Fig. 1E). Orthodontic treatment was immediately stopped. Systemic antibiotics were given for two weeks until the fistula disappeared (Fig. 1F). The tooth #11 was stabilized and maintained in the mouth up to the present time.

Calcium hydroxide has been shown to arrest and repair external inflammatory root resorptive defects, to eliminate the endodontopathic microorganisms from the root canal, and to induce hard-tissue barrier formation at the apex of non-vital immature teeth.³ The traditional application of calcium hydroxide to induce apexification is gradually being replaced by mineral trioxide aggregate (MTA) as a one-step technique.⁴ The present avulsion tooth case showed that root resorption can occur after a long period of time. Thus, additional dental work should be undertaken with caution in clinical settings.

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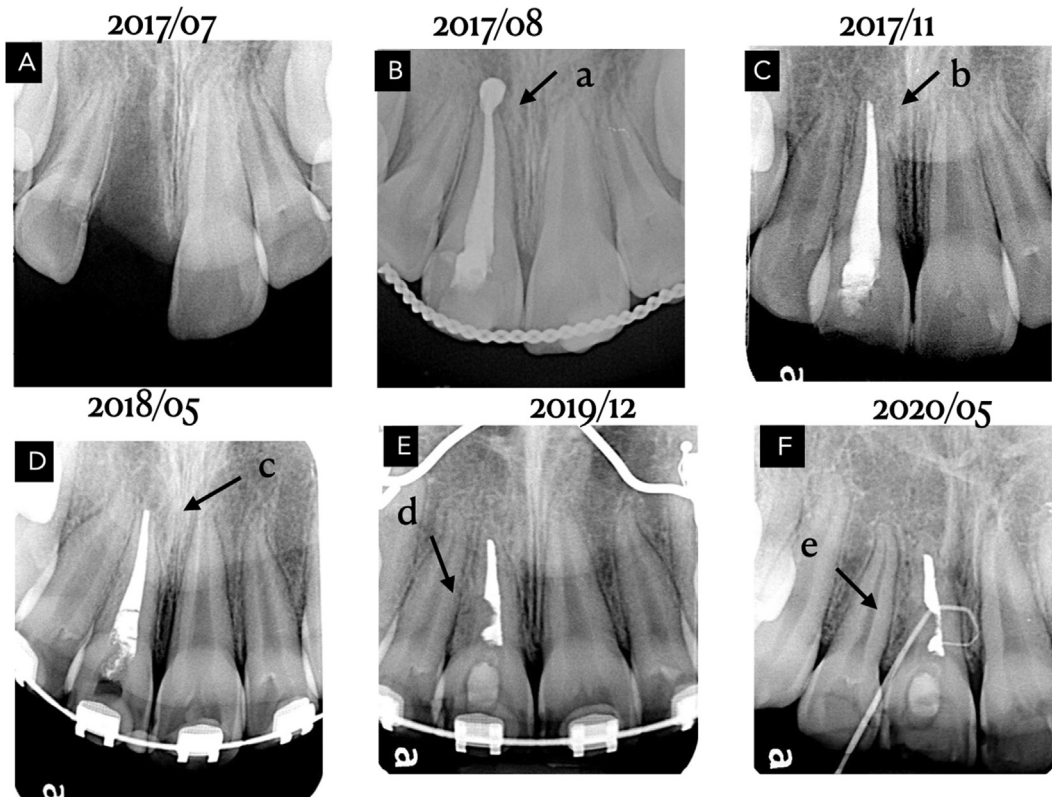


Figure 1 Periapical radiographs of the upper right central incisor. (A) The dental trauma injury was on the upper right central incisor (#11) with avulsion. (B) The canal was filled with Ca(OH)_2 cement for the purpose of apexification. (C) At the three-month follow-up, #11 exhibited an intact root surface, and the extruded Ca(OH)_2 material had undergone resorption. (D) The patient underwent orthodontic treatment. (E) After 19 months of orthodontic treatment, the tooth #11 middle root area exhibited external root resorption, and orthodontic treatment was stopped immediately. (F) The fistula originated from the resorption area.

Declaration of Competing Interest

The authors declare that there are no conflicts of interest regarding the publication of this paper.

References

- Robertson A, Andreasen FM, Andreasen JO, Noren JG. Longterm prognosis of crown-fractured permanent incisors. The effect of stage of root development and associated luxation injuries. *Int J Paediatr Dent* 2000;103:191–9.
- Andersson L, Friskopp J, Blomlof L. Fiberglass splinting of traumatized teeth. *J Dent Child* 1983;3:21–4.
- Lin JC, Lu JX, Zeng Q, Zhao W, Li WQ, Ling JQ. Comparison of mineral trioxide aggregate and calcium hydroxide for apexification of immature permanent teeth: a systematic review and meta-analysis. *J Formos Med Assoc* 2016;115:523–30.
- El-Meligy OA, Avery DR. Comparison of apexification with mineral trioxide aggregate and calcium hydroxide. *Pediatr Dent* 2006;28:248–53.

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