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Splint Treatment of Teeth with External Resorption After Dental Trauma: A Case Report

Kübra Mumcu[1*], M. Sinan Dogan[1]

1. Harran University, Faculty of Dentistry, Department of Pediatric Dentistry, Sanliurfa / TURKEY.

***Corresponding author:** Mumcu K, MSc., Department of Pediatric Dentistry, Faculty of Dentistry, Harran University Sanliurfa, Turkey.
E-mail : dt.kubramumcu@harran.edu.tr

Abstract

Dental trauma is one of the important health problems in childhood. Dental injuries that affect children's maxillofacial development should be treated in the best and most accurate way. It may be necessary to splint the adjacent teeth in order to prevent increased mobility in the affected teeth after dental trauma. In this case report, external resorption with mobility is observed in an immature permanent tooth that had an average of 1 year dental trauma. Therefore, apexification treatment was started with a 4-week splint application. As a result of this 4-week splint, stabilization of the tooth was achieved. In addition, in this case, it is desired to restore the patient's function and aesthetics.

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Introduction

About 25% of school-age children experience dental trauma in various forms. It is observed that dental injuries are very common especially in primary school-age children. (1) A serious complication of these traumas is pulp necrosis, the prevalence of which varies according to the type of trauma, especially in 1-6% of crown fractures with luxation, and in nearly all intrusions. Immature permanent teeth stop root formation when faced with such an trauma. It is also difficult to treat with conventional root canal treatment due to the canal width and wide open apex.(2) Apexification allows for the formation of a rigid (osteoid or cementoid) tissue barrier through the open apical foramen prior to placement of a root canal filling.(3) The purpose of apexification is to obtain an apical barrier to prevent the passage of toxins and bacteria from the root canal into the periapical tissues.(4)

Trauma to the anterior teeth is common in childhood. Depending on the severity and direction of the injury, dental injuries can result in tooth fracture, concussion, luxation, or avulsion.[1] Depending on the type of injury, this may lead to necrosis of the pulp tissue. Endodontic treatment of immature permanent necrotic teeth can be performed with apexification when pulp regeneration, repair, and preservation are not possible. In addition, tooth roots may undergo changes in root resorption or formation due to external infection (inflammatory) during treatment.(5)

External root resorptions can be localized in any part of the root depending on the area where it is exposed to pressure, inflammation or trauma. They can be classified as cervical apical or lateral external root resorption according to their localization. It is apical external root resorption defined as shortening or blunting of the root tip. Lateral external root resorption occurs between the enamel-cementum and dentin-cementum junction of the root. On the root surface, there are radiolucency shaped

mouse bites in the adjacent bone. Lesions not originating from the pulp in the cervical region of the tooth are also called cervical external root resorption. Radiographically, cervical external root resorptions are observed as radiolucency without smooth borders in the cervical region.(6) In external resorption, it is very important to control the pulp microorganisms that initiate the resorption. This type of root resorption can be predicted and stopped by bacterial stimulation removed from the dentinal tubules. Calcium hydroxide (CH), applied between 6 months and 2 years, is the preferred intracanal drug for the treatment of external pulp infection. CH has strong antibacterial effect, low solubility as well as a long lasting effect in the root canal. This, in turn, removes the stimulation factor (microorganisms that initiate resorption) from the main channel by affecting it. CH increases the pH of dentin (8.0-10.0), thereby inhibiting the activity of osteoclastic acid hydrolases and activating alkaline phosphatases in periodontal tissues.(7)

Ensuring the stabilization of the tooth exposed to dental trauma is an extremely important factor for the healing of the tooth and the periodontal tissues that support the tooth. Treatment of acute damage to the periodontal tissue after trauma can be achieved by reducing the mobility of the tooth. In luxations caused by periodontal tissue damage in the traumatized tooth, the luxated teeth should be stabilized by splinting to healthy teeth. With the splint made, the forces created by the chewing and oral muscles will be distributed over the intact tooth and luxe tooth. Thus, the force on the luxated tooth will be reduced.(8)

In this case, it was aimed to increase the stabilization of the tooth with increased mobility after the trauma by splinting. In addition, it was aimed to achieve success by performing calcium hydroxide apexification to stop the external resorption seen in the tooth roots with crown fracture.

Case Report

It was learned that a 9-year-old male patient who applied to the pediatric dentistry clinic of Harran University fell at home about 1 year ago and had a fracture in his left central incisor. In the intra-oral examination, crown fracture, mobility and percussion, and pain on palpation were observed in tooth 21. In the radiographic examination, it was determined that root development was not completed and there was a radiolucent area around the root and external resorption. It was learned that the patient did not have any systemic health problems. (Figure 1-2)

Figure 1. Radiographic image taken before treatment.

Figure 2. Radiographic image taken before treatment (image of external resorption).

Informed consent was obtained from the parents and treatment was started. To stabilize the mobility in tooth 21, a semi-rijid splint was performed on teeth 12-11-21-22 with the help of flowable composite (Filtek Ultimate Flowable, 3M, ESPE, Seefeld, Germany).(Figure 3) Ca(OH)2 on tooth 21 It was decided to treat with apexification. In the first session, the access cavity was opened and pulpal extirpation was performed. Tooth 21 was irrigated with 2 ml of 2.5% sodium hypochlorite. Afterwards, the canals were dried with sterile paper cones and filled with calcium hydroxide temporary canal sealer (Kalsin, Turkey), and access cavities were closed with temporary filling material (Cavit, ESPE, Seefeld, Germany). (Figure 4-5-6)

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Figure 3. Intraoral view of splint treatment.

Figure 4. Intraoral occlusal view of splint treatment.

In the session 4 weeks later, it was observed that there was no mobility, percussion, and pain on palpation in tooth 21, and the splint was removed. (Figure 7-8) To continue the apexification treatment, after re-irrigating the canal with 2.5% sodium hypochlorite, the root canal was dried with sterile paper cones and filled with calcium hydroxide temporary canal sealer (Kalsin, Turkey) and temporary filling with glass ionomer cement. done. (Kavitan Plus, Pentron, Czech Republic). The patient was given periodic 3-month appointments, and root development and apex formation were followed up with intracanal $Ca(OH)_2$ regeneration.

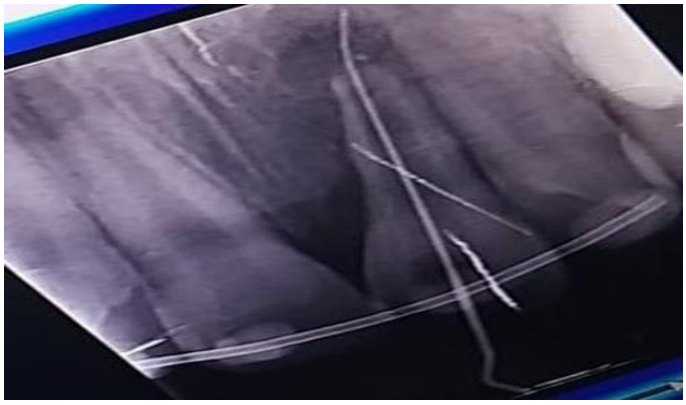

Figure 5. Radiographic image of working length determination.

Figure 6. Radiographic image of calcium hydroxide placed in the canal.

Figure 7. Intraoral view after splint removal.

Figure 8. Radiographic image after root filling.

Discussion

In dentistry, traumatized teeth are splinted to adjacent teeth to prevent increased mobility due to acute periodontal lesions. With splinting, the distribution of forces acting on the teeth can be modified.(9) In our case, we provided the stabilization of the mobile tooth with a 4-week splint application. Lateral forces are converted into vertical forces that provide faster healing and are less detrimental to tooth support tissues by restoring bone integrity and remodeling periodontal ligament fibers.[9] There are two important factors for a successful treatment: mild force on the tissues to be healed and controlled movement of the teeth of approximately 50 microns in the traumatized socket.(10)

Common complications of dentoalveolar trauma include pulp necrosis, root resorption, periapical pathology and pulp canal obliteration.(11) Root resorption is a complication of most concern after luxation and avulsion injuries. As a result of injury and post-injury inflammatory response, the root surface and especially the cement protective layer are damaged. In such cases, the forms of healing depend on the size-surface area of the root injury and the severity of the inflammatory stimulus. improvements; If the root surface to be healed is small and the inflammatory stimulus is temporary, the root heals with new cementum and periodontal ligament, and this is called positive healing. If root damage is extensive, bone will adhere directly to the root surface, resulting in ankylosis and bone replacement. In addition to root surface damage, if there is infection in the root canal space, inflammatory resorption will occur from this constant stimulus. This is also progressive inflammatory resorption that can cause tooth loss in a very short time.(12) In our case, the healing of the root surface is expected with the formation of cementum and periodontal ligament.

It is very important to know the complications that may occur after such dental injuries and to follow these cases carefully. Especially when resorption complications are understood, treatment should be started quickly and effectively. [12] In such patients, the aim of treatment should be to provide function, phonation and aesthetics.

References

1.Keels MA; Section on Oral Health, American Academy of Pediatrics. Management of dental trauma in a primary care setting. Pediatrics. 2014;133(2):e466-76.
2. Bonte E, Beslot A, Boukpessi T, Lasfargues JJ. MTA versus Ca(OH)2 in apexification of non-vital immature permanent teeth: a randomized clinical trial comparison. Clin Oral Investig. 2015;19(6):1381-8.
3. Farhad A, Mohammadi Z. Calcium hydroxide: a review. Int Dent J. 2005 Oct;55(5):293-301.
4. Gawthaman M, Vinodh S, Mathian VM, Vijayaraghavan R, Karunakaran R. Apexification with calcium hydroxide and mineral trioxide aggregate: Report of two cases. J Pharm Bioallied Sci. 2013;5(2):131-4.
5. Silveira CM, Sebrão CC, Vilanova LS, Sánchez-Ayala A. Apexification of an Immature Permanent Incisor with the Use of Calcium Hydroxide: 16-Year Follow-Up of a Case. Case Rep. Dent. 2015; 2015:984590.
6. Ulusoy ÖİA. Eksternal Kök Rezorpsiyonları ve Güncel Tedavi Yaklaşımları. ADO Klinik Bilimler Dergisi. 2010; 4(3): 632-637.
7. Fuss Z, Tsesis I, Lin S. Root resorption – diagnosis, classification and treatment choise based on stimulation factors. Dent Traumatol. 2003 ;19(4):175-82.
8. Doğan MS, et al.Dental travmada kullanılan farklı splint tiplerinin periotest yöntemi ile değerlendirilmesi. Harran Üniversitesi Tıp Fakültesi Dergisi .2019; 16(1):117-122.
9. Martı Akgün Ö. Dental travma tedavisinde kullanılan splint çeşitleri. Gulhane Medical Journal.2011;53(2): 143-148.
10.Mazzoleni S, Meschia G, Cortesi R, Bressan E, Tomasi C, Ferro R, Stellini E. In vitro comparison of the flexibility of different splint systems used in dental traumatology.Dent Traumatol. 2010 ;26(1):30-6.
11. Cohenca N, Simon JH, Mathur A, Malfaz JM. Clinical indications for digital imaging in dento-alveolar trauma. Part 2: root resorption. Dent Traumatol. 2007 ;23(2):105-13.
12. Majorana A, Bardellini E, Conti G, Keller E, Pasini S. Root resorption in dental trauma: 45 cases followed for 5 years. Dent Traumatol. 2003;19(5):262-5.