

Simultaneous Treatment of Two Traumatized Maxillary Incisors with Successful Retention of an Apical Segment

Juan Castro Lopez¹, Sergio Humberto Flores Covarrubias^{2*}, Jose Luis Esquivel Villegas¹, Edward Abrams³ and Oscar R Bolanos⁴

¹Endodontist Universidad Autónoma de Chihuahua, Mexico

²Professor and Director Postgraduate Endodontics, Universidad Autónoma de Ciudad Juárez, Mexico

³Assistant Professor, Kornberg School of Dentistry, Temple University, Philadelphia, PA, USA

⁴Clinical Professor, Kornberg School of Dentistry, Temple University, Philadelphia, PA, USA

***Corresponding Author:** Sergio Humberto Flores Covarrubias, Professor and Director Postgraduate Endodontics, Universidad Autónoma de Ciudad Juárez, Mexico.

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Abstract

Two traumatized maxillary incisors were successfully treated. One tooth presented with a horizontal root fracture at the level of the apical third and the second tooth presented with an open apex and an acute apical abscess. Patient was last seen for a 3 year evaluation and presented no ill symptoms or abnormalities. A radiograph taken at that visit showed exceptional healing.

Keywords: Horizontal Fracture; Necrotic Pulp; Apical Segment; Open Apex; MTA Plug

Introduction

A complete root fracture affects cementum, dentin and the pulp canal. These lesions are rare and represent between 0.5% and 7% of the total traumatic injuries in permanent teeth [1]. Horizontal fractures occur more frequently in the maxillary anterior teeth and in teeth with complete root formation, and may present with mobility, extrusion or displacement of the coronal segment depending on the severity of the trauma. The definitive diagnosis is determined with radiographs taken with different vertical angulations [2]. Prognosis depends on different conditions such as the patient's age, the degree of mobility of the coronal segment, level of the fracture, stage of root formation and the presence of infection [3]. When a prolonged amount of time passes between the time of the trauma and dental consultation, pulp necrosis of the coronal segment occurs in most cases and the apical segment usually remains vital [4]. The treatment of choice in cases where the coronal segment becomes necrotic is root canal therapy.

This case report describes the treatment and follow-up of tooth # 9 with a horizontal root fracture and the successful retention of the apical segment, and treatment of tooth # 10 presenting with an open apex.

Case Report

First Visit April 2013

A 12-year-old male patient presented to the office to receive emergency dental care. The patient described a history of dental trauma that occurred 3 years ago.

Clinical examination showed inflammation of the upper lip on the left side.

The intraoral examination presented a localized swelling in the bottom of the vestibule, slight mobility of the central incisor (# 9) and fracture of the incisal edge in the lateral incisor (# 10) restored with a composite resin.

The radiographic examination showed a horizontal root fracture at the level of the apical third in tooth # 9 with a separation of approximately 5mm between the apical and coronal segments.

The presence of an extensive area of radiolucency involving teeth # 9 and # 10 was observed. In addition, tooth # 10 presented with an open apex (Figure 1A). The diagnosis obtained was a horizontal root fracture and pulp necrosis in tooth # 9, and an acute apical abscess and an open apex in tooth # 10.

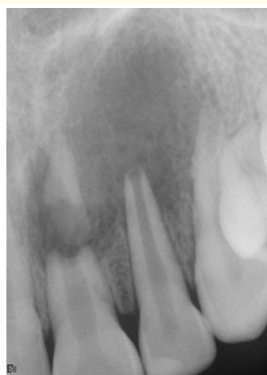


Figure 1A: Initial radiograph.



Figure 1B: Working lengths.

Clinical procedure

After local anesthesia and rubber dam isolation, coronal access was obtained in both incisors with retention of the rubber dam with cyanoacrylate cement. Determination of the working lengths was obtained, 17 mm for tooth # 9 and 21 mm for tooth # 10 (Figure 1B).

Biomechanical instrumentation was accomplished manually with K type files (Kerr®) up to size 80 in tooth # 9 and size 55 in tooth # 10, using 2.5% sodium hypochlorite (NaOCl) as an irrigant throughout the instrumentation process .

The canals were medicated with calcium hydroxide (Viarden®) mixed with saline solution, and temporarily sealed with Provisit®.

Second visit May 2013

Upon removing the temporary restorations, tooth # 10 presented drainage of an exudate.

After irrigating with sodium hypochlorite to remove the calcium hydroxide in both teeth, the canals were instrumented to size 100 in tooth # 9 and size 70 in tooth # 10. The whole instrumentation process was done utilizing irrigation with 2.5% sodium hypochlorite.

A mixture of calcium hydroxide was placed in both canals. The access openings were closed with Provisit®. Subsequently, two changes of calcium hydroxide were made with 30 day intervals in June and July.

Third visit August 2013

The entire root canal of tooth # 9 was obturated with white MTA Angelus® (Figure 2). A new mixture of calcium hydroxide was placed in tooth # 10 given the persistence of exudate. It is important to mention the reduction in size of the periapical lesion after 3 months of starting treatment. In addition, some apical closure was observed in tooth # 10.



Figure 2: MTA tooth # 9.

Fourth visit September 2013

A new calcium hydroxide medication was placed in tooth # 10 due to the persistence of exudate.

Fifth visit October 2013

New medication of calcium hydroxide was placed due to persistence of exudate.

Sixth visit December 2013

New medication of calcium hydroxide was placed due to persistence of exudate.

Seventh visit February 2014

A satisfactory periapical bone repair was observed, and the canal was dry. An apical plug of white MTA Angelus® was placed in tooth # 10 with a damp paper point tip in the rest of the canal to help with the setting. A temporary filling of Provisit® was used to seal the access (Figure 3A and 3B).



Figure 3A: *Placing apical.*

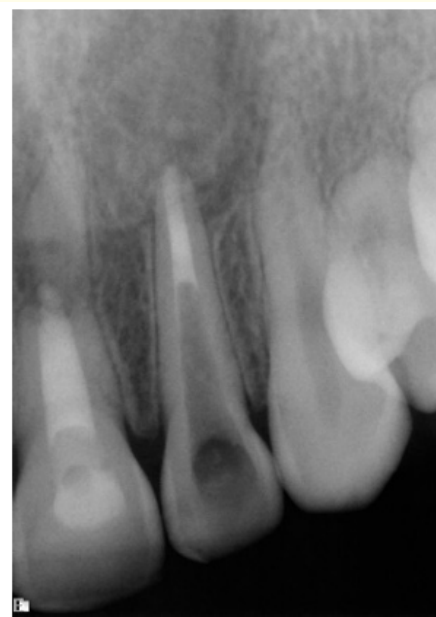


Figure 3B: *Apical plug tooth # 10.*

Eight visit March 2014

The canal was sealed with gutta-percha and Sealapex® sealer cement using lateral and vertical condensation technique, tooth # 10 (Figure 4A and 4B).



Figure 4A: Obturation and view.

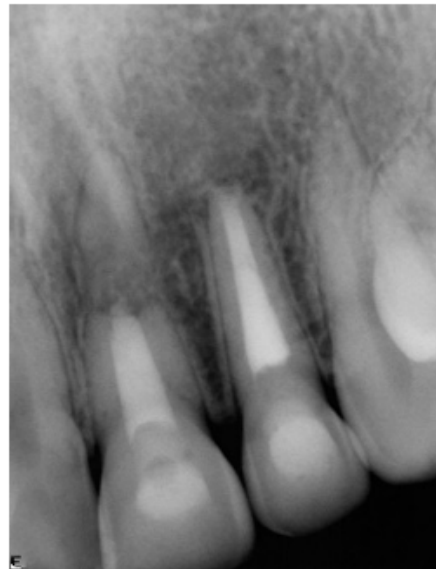


Figure 4B: Final radiograph.



Figure 4C: 3 year recall of apical segment.

Ninth visit April 2016

Recall radiograph at 3 years. Both teeth were asymptomatic and showed disappearance of the area of radiolucency. The successful retention of the apical root segment was evident (Figure 4C).

Angelus® Londrina, PR, Brazil. Viarden® calcium hydroxide powder, Mexico. Provisit® Zinc Sulfate, Mexico. Sealapex® Kerr, U.S.A.

Discussion

The level of the root fracture is an important factor that affects the prognosis and long term survival of the tooth. One study found that the percentage of survival in horizontal root fractures was 89% of the apical third, 78% of the middle third, 67% between the middle and cervical third, and 33% of the cervical third [5]. Andreasen., *et al.* described the healing of horizontal fractures in 4 categories: a) Healing by interposition of hard tissue. b) Healing by interposition of connective tissue. c) Healing by interposition of bone and connective tissue. d) No healing due to interposition of granulation tissue [6]. The healing that occurred in this case was by hard tissue formation. Generally, immediate Endodontic treatment in cases of horizontal root fracture is not recommended. This is done only when a state of pulp necrosis is confirmed [7]. In our case, the fracture was located in the apical third and the Endodontic treatment was performed only in the coronal segment. Intracanal medication of Calcium hydroxide was applied due to its antibacterial properties [8]. MTA was used as a filling material in the entire canal of tooth # 9 for its excellent sealing properties and to help stimulate the formation of hard tissue [9]. An apexification procedure was performed in the lateral incisor # 10 by placing an apical plug of MTA and thus providing a good seal of the canal terminus [10].

Conclusion

Horizontal root fractures with necrosis of the coronal segment can be treated with an intra- canal medication of calcium hydroxide to control the infection. Obturation of the canal with mineral trioxide aggregate is then recommended. A successful outcome with survival of the apical segment and hard tissue deposition in between both segments was obtained in this case.

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