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Case Report

Use of MTA and intracanal post reinforcement in a horizontally fractured tooth: a case report

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Abstract – Root fracture is one of the consequences of dental traumatisms. The possibility of saving the fractured tooth depends on the level of the fracture and also on pulp vitality. This case report describes the use of MTA in association to an intracanal post to reinforce a maxillary central incisor with horizontal root fracture in its cervical third.

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Horizontal root fractures are unfortunate accidents that most of the times affect maxillary central incisors mainly in the middle third of the root nevertheless apical and coronal third fractures are also sometimes reported (1).

The success of the treatment of a root fracture depends, among other factors, on maintenance of pulpal vitality and level of fracture. The success rate varies but has been reported to be approximately 74% (2). However, cervical root fractures are usually of doubtful prognosis.

If the pulp is no longer vital, the use of an intracanal calcium hydroxide dressing may provide a hard tissue barrier at the apical end of the coronal part of the fracture. Nevertheless, this procedure demands time and often there is a need for periodic changes of the material.

Mineral trioxide aggregate (MTA) was introduced in 1993 for application in periapical surgery (3) and treatment of root perforation (4). From then on, based on the material's physical (5) and biological properties (6) it has been suggested for use in a variety of other clinical situations (7–9).

The purpose of this report is to present the use of MTA plus an intracanal post to reinforce a maxillary central incisor with a cervical horizontal root fracture.

Case report

A 12-year-old male was referred to the Department of Endodontics of Bauru Dental School, University of São Paulo, in July 2003, with an access cavity in the maxillary right central incisor; the canal had been instrumented and filled with a calcium hydroxide-like paste.

The patient came in with a composite resin-stainless steel (0.7 mm) splint on the anterior teeth because of the moderate mobility. Routine extra and intraoral examinations indicated signs of normality; there were no lesions, edema, or abnormalities (Fig. 1). Radiographs showed incomplete apex formation and a horizontal root fracture in the coronal third of the tooth but no periapical pathology associated (Fig. 2). The patient complained of increased sensitivity in the area. Indeed, the affected

Fig. 1. Clinical aspect at the first visit. Patient arrived with a splint.

Fig. 2. Horizontal root fracture detected during initial radiographic exam.

tooth was tender to percussion and palpation on the buccal gingiva at the mid-root level. The space between the fractured segments appeared minimal and a widened but intact PDL was visible surrounding the fracture. There was no significant bone loss in the anterior region. Patient's oral hygiene was excellent.

After local anesthesia and with a rubber dam in place, the tooth was reinstrumented and redressed with a calcium hydroxide-polyethyleneglycol-iodoform paste. The splint was kept in place. The patient was advised to avoid mastigation in the area.

Two months later, the intracanal dressing was removed and an apical plug with ProRoot MTA

Fig. 3. Apical plug with ProRoot MTA.

(Dentsply-Maillefer, Ballaigues, Switzerland) was made (Fig. 3). The material was mixed in a 3:1 proportion and taken to the apical region with lentullo drills and accommodated in place with fine condensers.

An intracanal post was selected according to the diameter of the canal, which was then totally filled with MTA and the post immediately put in place with no pressure (Fig. 4). The access cavity was then restored with composite resin.

Follow-up appointments were realized after 2–4, 6, and 10 months. No sinus tract, edema or sensitivity

Fig. 4. The root canal was totally filled with MTA and an intracanal post was fixed immediately.

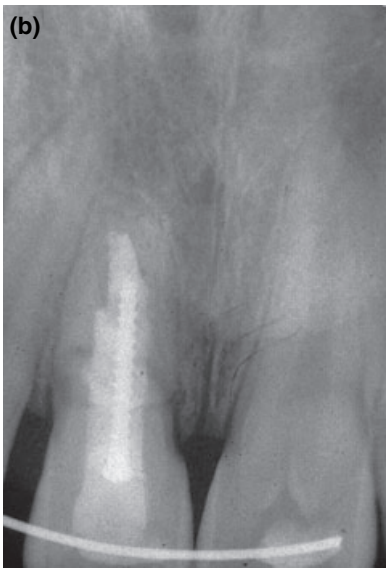

Fig. 5. Clinical (a) and radiographic (b) control at 18-month follow-up.

were observed or related by the patient at any time interval. The patient was comfortable and no periapical pathology had developed. Radiographs showed signs of normality and closing of the apex.

The immobilization was initially maintained for 3 months. We then decided to keep the splint for a longer period of time, once mobility had not resolved yet. At 18 months, apparent clinical and radiographic signs of success could be observed (Fig. 5). This case illustrates the potential for repair of a horizontal root fracture after calcium-hydroxide therapy, sealing with MTA and post reinforcement.

Discussion

The angulation of the X-ray in the radiographic detection of a horizontal root fracture is critical. If you suspect of a horizontal root fracture, it is advisable to take multiple radiographs.

Success after root fracture depends on the degree of pulp injury and can be divided in two categories: repair by a hard-tissue bridge and repair by the ingrowth of connective tissue and hard tissue between the fractured pieces. If the dental pulp is necrotic, repair does not occur without root-canal treatment (10). A factor with significant influence in the healing process in cases of horizontal fractures is the presence or absence of communication of the fracture line with the oral environment because of contamination from bacteria present in the sulcus (10).

The treatment of choice for fractured, non-vital teeth consists in using calcium hydroxide dressings for certain periods of time followed by gutta-percha filling (11). Inspite of the good results with calcium hydroxide, the technique is very time consuming and does not always imply success of the case. In this particular case, the patient presented an open apex and horizontal fracture in the coronal third of the root of the right central maxillary incisor. The fracture had no communication with the oral environment but possible contamination from the sulcus was a major concern, and so calcium hydroxide was used for 2 months.

We then chose to use MTA in order to fill the fragile fractured root with a material of fast setting time and excellent biological and physical properties (3–9). The apical plug of MTA was placed in a way that the apex would be completely sealed. Hachmeister et al. (9) related that a 5 mm apical plug is adequate enough to avoid leakage of apical fluids into the canal space. They proved that an apical plug placed via canal is as good as if it were placed via periapical surgery, as in a retrograde filling.

The remaining portion of the canal was completely filled with MTA in order to set an intracanal post and reinforce the root. The post was selected to fit in the root with enough space to be completely surrounded by MTA.

In addition, another reason for filling the canal with MTA was the proximity of the fracture to the gingival sulcus, where we could take advantage of the excellent property of the material to set even in humid conditions. No other material has this ability and yet seals the cavity adequately to avoid bacterial contamination.

Many techniques have been proposed for the treatment of horizontal root fractures of necrotic teeth. This case was handled as if the tooth were necrotic once access opening had been done some time before the patient arrived to us, and the previous state of the pulp was not known. Clinical and radiographical follow-ups have demonstrated the viability of these procedures in cases of horizontal root fractures in which the prognosis for calcium hydroxide therapy is dubious.

The purpose of the present report was so forth to provide an alternative treatment for

teeth with horizontal root fractures, where after dressing the root canal with calcium hydroxide, MTA was used to fill and secure an intracanal post aiming tooth stability and preventing microleakage.

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