Conservative Management of Maxillary Lateral Incisor Tooth with a Fractured Root : An Innovative Approach.

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Abstract

Radicular fractures in permanent teeth are uncommon injuries resulting from dental traumas, constituting only 0.5-7% of cases. Traumatic dental injuries occur more frequently in young patients. They vary in severity from enamel fractures to avulsions. Fractures occur often in the middle-third of the root and rarely at the apical-third. The present paper reports a case of horizontal radicular fracture located in middle-third of an upper left-lateral incisor.

Key words: *Root fracture, Healing, Traumatic injuries*

Introduction

Root fracture implies fracture of the cementum, dentin and pulp. When the root fractures horizontally, the coronal segment is displaced to varying degrees, but generally the apical segment is not displaced. The extent of coronal segment displacement usually indicates the location of the fracture which can vary from apical fracture (simulating concussion injury), to severe (simulating extrusive luxation: cervical fracture). Radiographic examination for root fractures is extremely important, as it is usually oblique (facial to palatal). A single periapical radiograph may easily miss its presence. It is therefore imperative to record at least three angled radiographs at 450, 900 and 1100, so that at least in one angulation, the x-ray beam will pass directly through the fracture line, thereby make it visible on the radiograph. Horizontal root fractures frequently occur at the anterior maxillary region and may occasionally heal without endodontic treatment. The diagnosis of horizontal root fractures is made by clinical and radiographic examinations.

Case report

A 21 year old male patient was referred to department of Conservative Dentistry and Endodontics with periodic pain and tenderness of tooth #10. Original root canal treatment was performed three years back. The radiograph showed that the root was obturated only to the fractured site (Fig 1) and had bothered him on and off over the years. Clinical examination revealed that it was mildly tender to percussion. Radiographically, a horizontal root fracture was present in the middle third of the upper left lateral incisor together with a periapical radiolucency surrounding the fractured apical part. There were no significant pocket depths and no evidence of sinus tracts. The adjacent teeth were non tender and responded normally to cold.

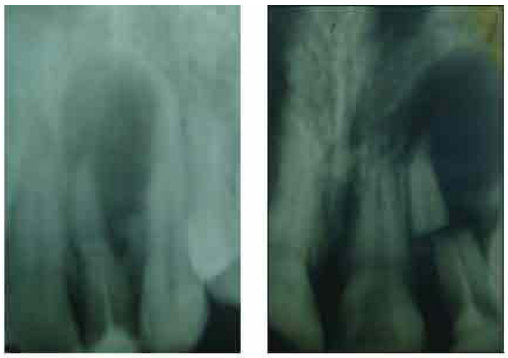

Figure 1: Pre-operative radiograph with different angulations

After explaining the treatment plan to the patient, access was made possible by removal of porcelain fused to metal crown. Then the gutta-percha was removed completely using H File (Dentsply) and xylene. After determination of working length by using a radiograph, the canal was prepared with a combination of rotary and hand instruments. Sodium hypochlorite (3%) and Chorhexidine (2%) were used as irrigants throughout the procedure.

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Chorhexidine (2%) was used as the final irrigant for 1 minute. Lastly calcium hydroxide ($Ca(OH)_2$) was injected into the canal, and a radiograph was taken to confirm the same. Cavit (3MESPE) was used to temporarily close the access opening. Patient was recalled for surgery after seven days.

Surgical procedure:

1. After preparation of the patient for surgery, a submarginal or Ochsenbein-Luebke flap incision was made using Bard Parker (BP) Blade No. 15.
2. A full thickness rectangular flap was raised using periosteal elevators, tissue reflection was started from the vertical releasing incision, at the junction of the submucosa and the attached gingiva (Fig 2).

Figure 2: Removal of apical root fragment with surgical procedure

3. After tissue retraction, the fractured apical part of the root was removed (Fig 3), and periapical curettage was done using elevators and curettes with the concave surface facing the internal wall of the osseous crypt.

Figure 3: Fractured root piece

4. Ultrasonic tips with diamond coating and irrigation port (DENTSPLY Tulsa Dental) were used for root end preparation, and root canal was obturated with gutta percha by lateral condensation technique, following which root end filling was carried out with MTA (ProRoot MTA; DENTSPLY, Tulsa Dental).
5. A radiograph was obtained with the flap held loosely in place to detect any foreign objects in the crypt or adhering to the flap to assess the quality of obturation and root end restoration (Fig 4).

Figure 4: Radiograph immediately after periapical surgery

6. The corners were first identified and sutured in place with a single interrupted suture using 5-0 black silk.
7. The patient was recalled after one week for suture removal. The healing of the lesion was satisfactory. After one month, new porcelain fused to metal crown was placed (Fig 5).

Figure 5: After placement of crown

8. After three, six and twelve months of review (Fig 6 & Fig. 7), the patient remained asymptomatic. The clinical and radiographic appearances were within normal limits. A periodontal examination revealed no probing depths or mobility exceeding normal limits.

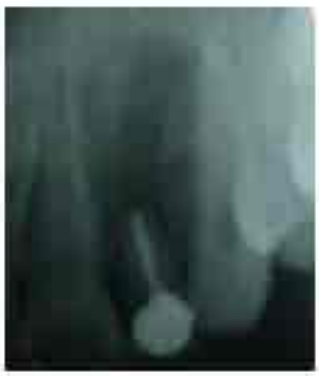

Figure 6: Radiograph after 6 months

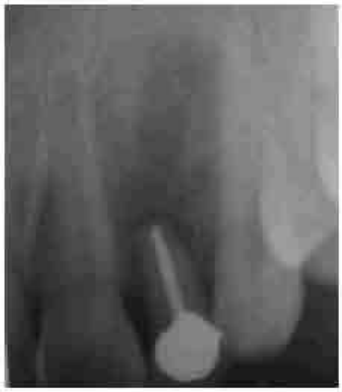

Figure 7: Radiograph after 12 months

Discussion and Conclusion:

The prognosis of root fractures depends on the extent of the fracture line, the pulp tissue condition, occlusion, dislocation of fragments and the general health of the patient. Andreasen and Hjørting-Hansen described four types of responses to root fractures [1]:

1. Healing with calcified tissue: Radiographically, the fracture line is discernible, but the fragments are in close contact.
2. Healing with interproximal connective tissue: Radiographically, the fragments appear separated by a narrow radiolucent line, and the fractured edges appear rounded.
3. Healing with interproximal bone and connective tissue: Radiographically, the fragments are separated by a distinct bony ridge.
4. Interproximal inflammatory tissue without healing: Radiographically, a widening of the fracture line and/or a developing radiolucency corresponding to the fracture line becomes apparent.

The first three types of healing patterns are considered successful. The teeth are usually asymptomatic and respond positively to sensitivity testing. The fourth type of root fracture response is typical when the coronal segment loses its vitality. The infective products in the coronal pulp cause an inflammatory response and typical radiolucencies at the fracture line.

The International Association of Dental Traumatology has recently developed a consensus statement on diagnosis and treatment of dental traumas [2]. According to these guidelines, a correct care plan requires to be performed by clinical and radiographic examinations, followed by sensibility tests and patient care instructions.

If the fracture line is in communication with the oral cavity, immobilization is difficult and microbial contamination of the pulp with subsequent pulpal necrosis is almost inevitable. Dental pulp necrosis is present in 20 to 44% of root fracture cases, whereas in luxated teeth without fracture, necrosis occurs in at least 43.5% [3]. Successful management of root fractures often involves a multidisciplinary combination of endodontic, orthodontic, periodontic and prosthetic therapy.

Treatment options with root fractures typically include reduction of the fracture and stabilization by rigid fixation for a variable length of time. According to Andreasen, splinting may be applied for a week to stabilize root fracture with rigid fixation. Reversal of vitality of root-fractured teeth varies from a few months to 2 years [4]. In cases of horizontal root fractures, successful results have been reported ranging from 54% to 77% [2].

In a recent study Andreasen investigated the healing of 400 root fractures, and he concluded that not only the type of splints applied had no association with the outcome of healing process, but also that the location of the root fracture did not affect pulp survival [5].

Root canal therapy is indicated if the patient complains of pain or discomfort and/or when vitality control reveals non-vital pulp tissue. The extent and completion of repair depends on an intact periodontal ligament, from which originate the hard tissue forming cells. Healing of root fractures without treatment has also been reported in many studies [6].

It is therefore concluded that the primary purpose of treatment of fractured elements is to keep a steady tooth and to preserve its vitality. It is important to remember that maintaining a natural tooth during growth can be an excellent intermediate solution before implant rehabilitation.

References:

1. Andreasen JO, Hjørting-Hansen E: Intra-alveolar root fractures: radiographic and histologic study of 50 cases. J Oral Surg 1967; 25:414-426.
2. Flores MT, Andersson L, Andreasen JO, Bakland LK, Malmgren B, Barnett F, et al.: International Association of Dental Traumatology. Guidelines for the management of traumatic dental injuries. I. Fractures and luxations of permanent teeth. Dent Traumatol 2007, 23:66-71.
3. Kocak S, Cinar S, Kocak MM, Kayaoglu G: Intraradicular splinting with endodontic instrument of horizontal root fracture-case report. Dent

Traumatol 2008; 24:578-580.

4. Öztan MD, Sonat B: Repair of untreated horizontal root fractures: two case reports. Dent Traumatol 2001; 17:240-243.
5. Özbek M, Serper , Çalt S: Repair of untreated horizontal root fracture: a case report. Dent Traumatol 2003; 19:296-297.
6. Berna Artvinli L, Dural S: Spontaneously healed root fracture: report of a case. Dent Traumatol 2003; 19:64-66.