

Conservative Treatment of A Horizontal Root Fracture in A Maxillary Central Incisor with the Help of Intraradicular Splinting – A Case Report

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Abstract: Root fractures due to traumatic injuries can be a very challenging situation for a clinician especially when it is encountered in the cervical third. Treatment alternatives for cervical root fractures are limited and mostly involves removal of the coronal fragment. The current case report describes a conservative approach to managing a cervical root fracture with intraradicular splinting in a maxillary central incisor using a fiber post.

Keywords: Traumatic injuries, fiber posts, cervical root fracture, splinting.

I. Introduction

Traumatic injuries involving the orofacial region are quite commonly encountered especially among the young adult age group. The presentation of trauma can be varied ranging from infraction of enamel to complete avulsion of the tooth. Root fractures can be defined as a fracture involving the cementum, dentin and pulp^[1]. The incidence of root fractures is 0.5 to 7% of the injuries of the permanent dentition and commonly occurs among the age group of 11 to 20 years^[2-4].

Root fracture leads to the damage to pulp, dentin, cementum and the periodontal ligament (PDL). The PDL injury may range from no injury to stretching and rupture^[5]. Clinical management of a root fracture depends on position of the fracture line, length of the remaining root segment and the presence or absence of a coronal segment. Chances of healing with calcified tissue is poorest in cervical-third fractures due to a short mobile coronal fragment and possibility of bacterial contamination from the gingival crevice^[1,6].

Several treatment modalities for managing root fractures have been suggested. These include disinfection and obturation of the coronal segment only, surgical removal of the apical segment, removal of the coronal segment and orthodontic or surgical extrusion of the apical segment and stabilization of the coronal segment with endodontic implants^[7]. Intraradicular splinting has been suggested as a conservative approach to unite the fractured fragments, when the fracture is below the alveolar crest^[4,8,9]. However, spontaneous healing of root fractures without treatment has been documented^[10,11].

The following case report is an example of conservative management of a horizontally fractured maxillary central incisor with the help of intraradicular splinting.

II. Case Report

A 28 year old female patient visited the Department of Conservative Dentistry and Endodontics with the chief complaint of pain in relation to the upper front teeth since 1 week. The patient gave a history of trauma to that region 2 months back but had no complaints until before a week. The pain was dull in nature and occurred only upon biting with the involved teeth.

Clinical examination revealed Ellis Class II fracture in relation to tooth no. 12 and 21. Teeth 11 and 12 were tender on percussion. Vitality testing was done using heat and cold tests which showed that there was no response in 11 and 12 where as 21 showed a normal response. Intraoral periapical radiograph (fig 1.) showed a diffuse radiolucency and widening of the periodontal ligament in relation to the apical third of 11 and 12. Treatment plan was formulated to carry out endodontic therapy in 11 and 12 followed by composite build up in 12 and 21.



Fig 1: preoperative radiograph.

Access cavity preparation was done under local anesthesia in 11 and 12 and the patient was recalled for further treatment. The patient reported to the department after 3 days with a complaint of pain and mobility of the treated front teeth. The patient confirmed another injury to the same teeth the previous day.

Clinical examination revealed slight swelling and inflammation of the marginal gingival in relation to 11 (fig 2). There was presence of acute pain on palpation and grade 3 mobility in 11. Working length radiograph (fig 3) revealed a horizontal root fracture in 11 just apical to the level of alveolar crest.



Fig 2: clinical presentation of fractured 11 shows inflammation and swelling of marginal gingival.



Fig 3: working length radiograph shows fracture line in 11.

Immobilisation was done of the fractured fragment with the help of splinting using a wire and flowable composite resin (Ivoclar Vivadent, Bendererstrasse Liechtenstein) splint (fig 4). Thorough cleaning and shaping of the root canals was carried out. A calcium hydroxide dressing was placed for 2 weeks. After careful removal of the dressing, obturation of both 11 and 12 was done after 2 weeks (fig 5).



Fig 4: splinting done using wire and composite resin splint.



Fig 5: post obturation radiograph of 11 and 12.

Post space preparation was carried out upto no. 3 peeso reamers (fig 6). Placement of glass fiber post (Reforpost, Angelus, Brazil) was done. Cementation of the post was done using a dual cured resin cement (Rebilda DC, Voco, Germany) (fig 7). The patient was recalled after 1 week for removal of splint.



Fig 6: post space preparation in 11.



Fig 7: cementation of fiber post within the root canal of 11.

After 1 week, the patient was asymptomatic and the marginal gingival showed normal healing. The splint was removed and composite build up was done in 12 and 21 (fig 8). There was no mobility nor pain on palpation and percussion in relation to 11.



Fig 8: removal of splint and restoration with composite resin.

III. Discussion

Horizontal root fractures are the commonest type of root fractures and occur mainly in the maxillary anterior region, in fully erupted teeth with completed root formation. A frontal impact is mostly responsible for such injury^[1,2,4]. They occur most often in the middle-third and have equal incidence in the apical and coronal thirds^[8,12].

They can be classified on the basis of: 1) Location of the fracture line (cervical, middle and apical); 2) Extent of fracture (partial and total); 3) Number of fracture lines (simple, multiple and comminuted); 4) Position of coronal fragment (displaced and not displaced).

Root fractures with minor insults and/or damage to pulp such as hair line fractures, either leads to concussion injury or renders the pulp nonvital. In such cases, vitality tests should be carried out on a regular basis and the tooth should be kept under constant observation since there are chances of re-establishment of pulp vitality via revascularization. In cases of complete horizontal fractures, the principles of treatment remain the same as for all other fractures, ie reduction of displaced fragment followed by immobilization^[1]. Many times, an interdisciplinary/ multidisciplinary approach is necessary for the re-establishment of function and esthetics in a fractured tooth^[13]. Treatment plan is determined by the extent of subgingival fracture, remaining coronal tooth structure, location of fracture line, pulp vitality and length and morphology of the roots^[13].

Several treatment alternatives exist when the treatment requires removal of the coronal fragment. If the length of the apical fragment is sufficient, it can be restored by post and core. For that, the fragment can be extruded through crown lengthening or orthodontic or surgical repositioning. The disadvantages of such a treatment is that it may be difficult, time consuming, and the result may not be aesthetically acceptable^[14].

Hence, the coronal fragment should be retained as far as possible. Endodontic therapy of the coronal or both segments should be carried out. In the current case report, the fractured fragments could be repositioned enough to complete the endodontic therapy in both the fragments. Splinting was done to prevent loss or displacement of the coronal fragment during the interappointment period.

By insertion of the fiber post into the canal, approximation of the fracture fragments could be achieved more properly. Several studies have shown that proper repositioning of the coronal fragment leads to better healing of the horizontal root fractures. Fractured roots that revealed less space between the fragments radiographically, after repositioning, healed more frequently with hard tissue repair than those with more space between the fragments^[5,15].

IV. Conclusion

In the above presented case, treatment of horizontal root fracture was carried out conservatively with intraradicular splinting using a glass fiber post. It can be concluded that intraradicular splinting can be a suitable alternative technique for managing horizontally fractured teeth with a mobile coronal segment.

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