

## Management of a Horizontal Root Fracture in Maxillary Central Incisor by Intraradicular splinting, A Conservative Approach- Case Report

Dr. Dhruvin Desai<sup>1\*</sup>, Dr. Kamal Bagda<sup>2</sup>, Dr. Kailash Attur<sup>3</sup>, Dr. Radhika Kubavat<sup>4</sup>, Dr. Shruti Patel<sup>5</sup>

<sup>1</sup>Post graduate student, <sup>2</sup>Professor and HOD, <sup>3</sup>Professor, <sup>4</sup>Post graduate student, <sup>5</sup>Post graduate student, Dept of Conservative dentistry and Endodontics, Narsinhbhai Patel Dental College and Hospital, Visnagar, Gujarat India

\*Corresponding author: Dr. Dhruvin Desai

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### Abstract

### Case Report

Radicular fractures in permanent teeth are uncommon injuries that involve cementum, dentin and pulp and account for only 0.5–7% of dental traumas. These fractures commonly result from a horizontal impact and are transverse to oblique in direction. Their incidence is more in the middle third of the root than at the apical and cervical thirds. This paper describes a case of horizontal root fracture at the middle third of maxillary left central incisor. The fractured root fragments of the upper left central incisor were united with the help of a glass fiber post after receiving an endodontic treatment.

**Key words-** Horizontal root fracture, Intraradicular splinting, Fiber post, healing of fracture site.

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## INTRODUCTION

Mid-root fractures occur most frequently in the upper anterior teeth due to their position in the arch. These fractures are generally transverse to oblique and may be single or multiple, complete or incomplete. The initial treatment consists of the repositioning of displaced coronal segments, followed by the stabilizing of the tooth to allow healing of the periodontal ligament supporting the coronal segment to occur [1]. The amount of dislocation and the degree of mobility of the coronal segment affect the prognosis. Achieving stable fracture reduction is inversely proportional to the severity of dislocation, mobility, and pulpal injury [2].

Root fracture healing is categorized into the following four types: (I) interposition of calcified tissue (callus formation); (II) interposition of connective tissue, which is characterized by peripheral rounding of the fracture's ends; (III) interposition of bone and connective tissue, which is radiologically characterized by the clear separation[6].

However, intraradicular splinting has been suggested as a conservative approach to unite the fractured fragment when the fracture is below the alveolar crest [3-5].

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

## CASE REPORT

A 19-year-old female patient reported to the department of conservative dentistry and endodontics following trauma to the upper front teeth due to a road accident around 20 days back. She complained of fractured maxillary incisors and presented a desire to get them restored in order to have an aesthetic smile.

A radiograph of the maxillary anterior region (fig 2) illustrated horizontal root fracture at the middle third of the upper left central incisor with slight mobility of the coronal fragment was evident.



Fig-1: Pre-operative clinical photograph

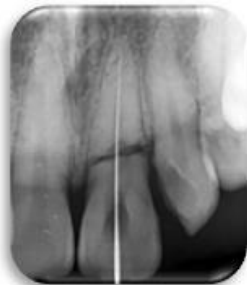


Fig-2: Pre-operative radiograph

After explaining the treatment plan to the patient and obtaining his consent, immobilisation of the fractured fragment was done with the help of splinting using Ribbond fiber splint and flowable composite resin (Ivoclar Vivadent)(fig 3). Endodontic treatment with the upper left central incisor was initiated. The working length was correctly determined and canals were cleaned, shaped using K files in a step-back manner to an apical file size #60(fig 4).



**Fig-3: Splinting done Ribbond fiber splint and flowable composite with K file within canal**



**Fig-4: Working length radiograph**

The canal was shaped to obtain a uniform taper from apex towards coronal. An interappointment calcium hydroxide dressing was given and the patient was recalled after 7 days. (fig 5) On the second visit root canal was obturated with gutta percha cone and AH plus sealer (fig 6).



**Fig-5: Calcium hydroxide dressing**



**Fig-6: Post obturation radiograph**

Post space preparation was carried out upto no.3 peeso reamers. Next, glass fiber posts were used to retain the fractured root fragments (fig 7). Root canals were etched with 37% phosphoric acid gel and dried with paper points. The fiber post was cemented with dual cure resin cement (Rebilda DC, Voco, Germany). These fiber posts served as intraradicular splinting, stabilizing the fractured fragments in position (fig 8).



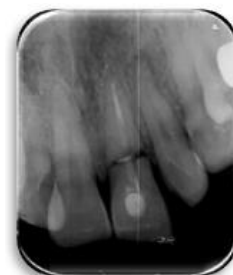
**Fig-7: Post space preparation radiograph**



**Fig-8: Post-operative radiograph of intraradicular splinting with fiber post**



**Fig-9: Post-operative clinical photo after removal of splinting**



**Fig -10: Follow up after 6 months**

After 4 weeks, the splint was removed. There was no mobility present. Patient was kept on follow up.

## 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 blow is mostly responsible for such injury [1, 3]. They occur most frequently in the middle-third and have equal incidence in the apical and coronal thirds [4, 7].

They are classified on the basis of: 1) Location of 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 non vital. 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, i.e., reduction of displaced fragment followed by immobilization [1, 13]. Many a times, an interdisciplinary/multidisciplinary approach is necessary for the re-establishment of function and esthetics in a fractured tooth [8]. 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 [8].

Several treatment options 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 has to be extruded through crown lengthening or orthodontic or surgical repositioning. However, it has disadvantages like difficulty, time consuming and the results may not be aesthetically acceptable [9, 15].

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, 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. 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 [10, 11].

Cvek *et al.* had concluded that the pattern and frequency of healing remains the same, regardless of the location of the root fracture in relation to the gingival crevice, although the frequencies may vary to some extent. Long-term prognosis of permanent

anterior teeth with root fractures is related to the amount of dislocation, stage of root development, and probably whether treatment was done (Jacobsen and Zachrisson) [12].

## CONCLUSION

In the above case, conservative treatment alternative was planned for the treatment of horizontal root fracture with the help of intraradicular splinting using a glass fiber post. Hence, it can be concluded that intraradicular splinting can be a suitable alternative technique for managing horizontally fractured teeth with mobile coronal segment.

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