**ABSTRACT:** Root fractures are encountered by every dentist in day to day practice. Horizontal root fractures are a type of traumatic dental injury that involves cementum, dentin, and pulp. Several options are available for the management of root fractures. But the difference lies in diagnosis & treatment planning which makes it a failure or a success. Goal of endodontic and restorative dentistry is to retain the natural tooth. This case report describes a technique for the management of horizontal mid-root fracture in an endodontically treated tooth using a titanium post to stabilize the fractured segments.

**KEYWORDS:** Horizontal Root Fracture, Obturation, Titanium Post.

**INTRODUCTION**

Trauma to the tooth is defined as injury to the tooth varying from a simple enamel infarction to complete exarticulation of tooth. Amongst these incidence of horizontal root fracture ranges from 0.5% to 7% in permanent teeth and from 2-4% in primary teeth\(^1\), which involves dentin, cementum and pulp.

Horizontal root fractures are most common and mainly occur in region of maxilla following physical trauma directly or indirectly involved, they are mainly observed in age group of 11-22 yrs.\(^2\)

The diagnosis of root fractures is determined by clinical and radiographic examination.\(^3\) It has long been accepted that the treatment for horizontal root fractured teeth involves repositioning and rigid splinting.\(^4\) Repositioning is thought to aid in pulp revascularization in the coronal aspect of the pulp; however, the effect of splinting in healing has been poorly explained experimentally.\(^5\) Other factors such as the space between the root fragments and the vitality of the periodontal ligament and pulp can also affect the treatment of a fracture, as well as the type of healing.\(^6\) The common types of healing include: healing with interposition of hard tissue, healing with interposition of bone and soft tissue between the fragments, healing with interposition of soft tissue, or no healing.\(^7\) Additional dental treatment of root fractures may also include endodontic therapy and restorative treatment if necessary.\(^8\)

Overall the treatment of horizontal root fractures is a very complicated process. The goal is to preserve tooth structure and to maintain pulp vitality if possible.\(^9\) However, because the treatment modality depends on many factors, there are often differences in opinion regarding necessary treatment of root-fractured teeth.

Horizontal root fractures can be classified\(^1\) as shown in Table 1.

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<td><strong>CLASSIFICATION OF HORIZONTAL FRACTURES</strong></td>
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| 1. Number of fracture lines | • Simple  
• Multiple |
| 2. Location of fracture lines | • Cervical  
• Middle  
• Apical |
| 3. Position of coronal segment | • Not displaced  
• Displaced |
| 4. Extend of fracture lines | • Partial  
• Total |
| 5. Position of fracture line | • ZONE 1: incisal edge to alveolar bone crest  
• ZONE 2: alveolar bone crest to 4-5mm below alveolar bone crest  
• ZONE 3: 4-5mm below alveolar bone crest till the root apex |

This case report describes the successful management of horizontal mid-root fracture in maxillary central incisor using titanium post to stabilize the root.

**CASE REPORT**

A 16 years old male patient reported to the Post Graduate Department of Conservative Dentistry and Endodontics, Institute of dental Sciences, Bareilly, UP with a chief complaint of mobility of upper right front teeth since few days.

History of present illness revealed that patient had an
injury while playing sport resulting in removal of prosthesis in relation to previously endodontically treated 11 and 21, due to trauma. There was no history of pain and swelling or any kind of discharge (Fig. 1a). On clinical examination grade-I mobility was observed in 11 with no extrusion or displacement. The surrounding periodontium appeared normal with no inflammation. The pocket depth was within the normal limits.

Past dental history revealed that patient had undergone an endodontic treatment for 11 and 21 six months back followed by placement of PFM crown. Past medical history, family history and habit history were non contributory.

Radiographic examination revealed horizontal fracture line in zone 2 in tooth 11, classified as simple undisplaced total fracture in middle third of the root (Fig 1b.). The previous obturation done in tooth 11 and 21 was not appropriate as it showed lack of lateral condensation.

The treatment was planned with sequential removal of gutta-percha from both the tooth using Gates Glidden Drill (Tulsa Dental Specialties, Dentsply) No. 2 and 3 and hedstrom files (Dentsply, Maillefer, Switzerland) under copious irrigation. Re-obturation was done in both the tooth, using sectional technique in tooth 11 and with lateral condensation in tooth 21 using gutta-percha and AH Plus sealer (Dentsply DeTrey GmbH, Germany). In tooth 11, 4-5 mm of the apical end of the root was obturated with gutta percha as this is the minimum required the thickness of any material to obtain a hermetic seal(Fig 2).

Now a post space was prepared using Peeso Reamer (Tulsa Dental Specialties, Dentsply) No 2 and 3 in tooth 11. The root canal was irrigated with 0.5% NaOCl and dried using paper points. Luting was done with Luxacore Z (Coltene Whaledent) and finally parallel, threaded, pre fabricated titanium post (Fig 3a, b) was placed into canal.

DISCUSSION

An inter-disciplinary or multi-disciplinary approach is essential for functional and aesthetic rehabilitation of tooth. The primary attempt to any traumatic injury should focus on preservation of tooth and not extraction.

Keeping in mind the chief complaint and history of patient we attempted to rejoin the fragments using parallel, threaded, pre fabricated titanium post. They have high flexural strength (1280 Mpa) comparable to stainless steel but are less rigid. Parallel post offer higher retention and are less likely to cause root fracture.

Andreasen et al observed 30% of cases with root fracture healed by hard tissue fusion of fragments, 43% by inter position of connective tissue, 5% by inter position of connective tissue and bone and 22 % showed signs of inflammation and pulpal necrosis. The factors that influence healing and prognosis are: Position and mobility of coronal segment after trauma; Status of the pulp; Position of the fracture line; Treatment time; Communication with the oral environment; Age and Gender.

CONCLUSION

Earlier studies have shown poor prognosis of horizontal root fracture but with the advent of new material coming up, the clinician must judge every situation on its individual merits and select a procedure that fulfills the needs of case while maximising stability and minimizing mobility.

REFERENCES

LIST OF PHOTOGRAPHS

Fig. 1(a) Pre-operative photograph of the patient showing the loss of prosthesis in tooth 11 and 21. (b) Pre-operative radiograph showing poor obturation in tooth 11 and 21. Horizontal fracture can be seen in tooth 11 (Arrow).

Fig. 2. An Intra-operative radiograph showing the obturation done in tooth 11 and 21 after removal of previous obturation material. Obturation in tooth 11 was accomplished with sectional method to retain 5-6 mm of obturation material apically.

Fig. 3(a) A Titanium Post is selected for tooth 11. (b) Post-operative radiograph showing the placement of titanium post inside the root canal of tooth 11 to stabilize the fractured segments. After the placement of titanium post in tooth 11, porcelain fused to metal (PFM) crown was given in tooth 11 and 21 (Fig. 4).

Fig. 4 Post-operative photograph taken after the placement of PFM crowns in tooth 11 and 21.