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ABSTRACT

Introduction: One of the main causes of permanent teeth loss is attributed to dental trauma; however root fractures are relatively uncommon in these situations. This case report presents the endodontic management of a horizontally fractured maxillary right lateral incisor using extracoronar splint for initial stabilization and then an intraradicular splinting technique for permanent stabilization. **Case Report:** Patient complained of pain and mobility of the upper right front teeth since 5 hours. After clinical and radiographic examination, a diagnosis of a horizontal fracture of maxillary right lateral incisor at the level of cervical line (Ellis class III) was made. The fracture segments were stabilized using extracoronar fiber splint and final intraradicular stabilization involved placing a fiber post in the canal and luting with resin cement. **Discussion:** This case demonstrates that both extracoronar and intraradicular splinting techniques together can be used to manage horizontally fractured teeth. The recent advances in the resin-based restorative materials with tooth colored fiber post are of choice because of several advantages such as esthetics, bonding to tooth structure, and low modulus elasticity similar to that of dentin.

KEYWORDS: Fiber splint, extracoronar splinting, Fiber post, intraradicular splinting, mid-root fracture, resin cement.

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INTRODUCTION:

One of the main causes of anterior permanent tooth loss is dental trauma. Upper central incisors are vulnerable to this type of injury, being affected in 80% of dental trauma, followed by upper lateral incisors and lower incisors¹. Incidence of horizontal root fractures ranges from 0.5% to 7% in permanent teeth and from 2% to 4% in primary teeth for all traumatic dental injuries². A single tooth fracture occurs in most cases and multiple teeth fracture is a rare finding^{3,4}.

The success of the treatment of a root fracture depends on many factors like pulpal status and level of fracture. Complication in the healing of the root fracture is because of damage to the dental tissues including pulp, dentin, periodontal ligament, cementum and sometimes the alveolar bone.

This case report presents the endodontic management of a horizontally fractured right lateral incisor at the cervical third of the root, using extracoronar splint for initial stabilization and then an intraradicular splinting technique for permanent stabilization of the fracture fragments of the tooth.

CASE REPORT

A 25 year old male patient reported to the Department of Conservative Dentistry and Endodontics with chief complaint of pain and mobility of the upper right front teeth since 5 hours. History revealed trauma because of the blow of a mechanical tool. Pain aggravated on consuming food and also on consumption of hot or cold beverages. Patient gave non contributory medical history.

On intraoral examination, soft tissue examination revealed bleeding gingiva with respect to maxillary right lateral incisor (**Fig 1**). Upper lip was found to be inflamed and lacerated due to trauma on right side. Hard tissue examination revealed grade I mobility in relation to maxillary right lateral incisor. The tooth was tender on horizontal and vertical percussion.

Intraoral periapical radiograph of maxillary right lateral incisor revealed a radiolucent horizontal line near the cervical third of the root of the right lateral incisor (**Fig 2**). Based on the clinical and radiographic findings, a diagnosis of horizontal

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fracture of the root at the level of cervical line (Ellis class III) was made. As the fracture line was subgingival, though the fractured fragment was mobile; it was held in position by the soft tissues.

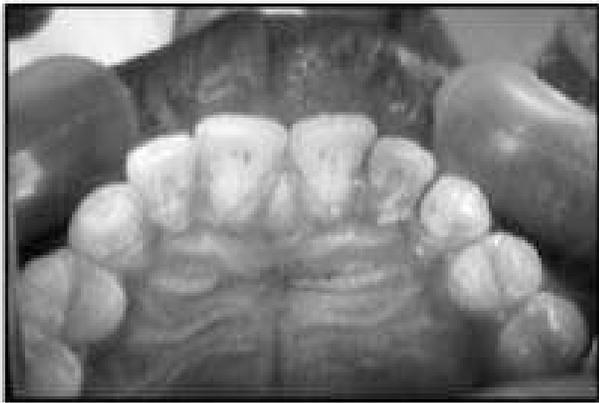
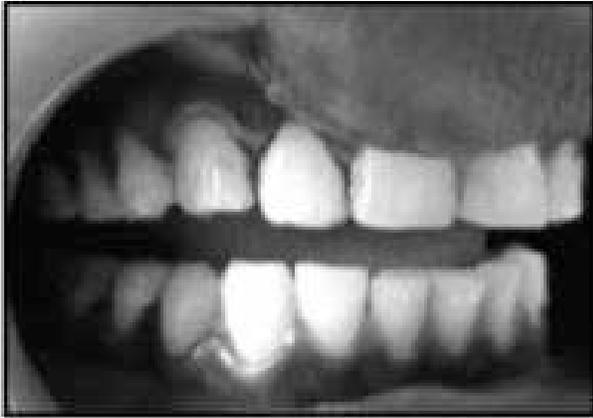


Fig 1: Preoperative clinical photographs (labial and palatal aspect) of maxillary right lateral incisor.



Fig 2: Preoperative radiograph of maxillary right lateral incisor.

PROCEDURE

As the trauma was recent, single sitting root canal treatment was planned for the patient. Local anaesthesia (Lignocaine) was administered and access opening was made. Holding the tooth in position by light digital pressure radiographic working length determination was done using number 15 K file (**Fig 3**).



Fig 3. Working length determination radiograph.

File was kept in position to approximate the fracture segments (**Fig 4**), right central incisor, right lateral incisor and right canine were splinted using extracoronol fiber splint (Angelus), bonded on the middle third of the labial surface of the three teeth using flowable light cure composite (3M ESPE) (**Fig 5**). After splinting, cleaning and shaping was done using Hand Protaper file system to a master apical size of F2. Obturation was done using F2 cone and AH Plus sealer (Dentsply) (**Fig 6**). The access cavity was sealed with temporary restorative material (Orafil, Prevest).

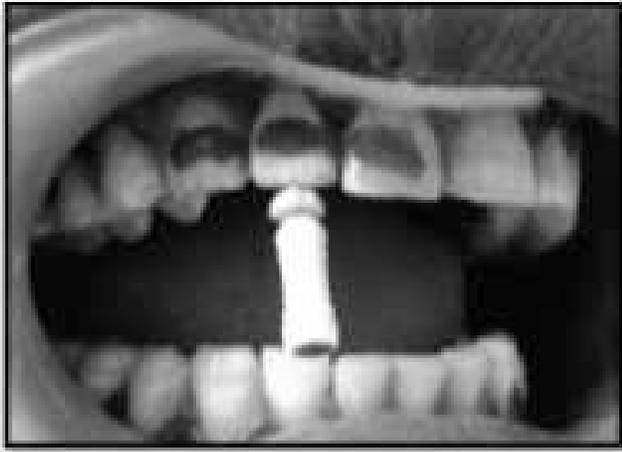


Fig 4. Fracture segments stabilized using #15 K file for extracoronar splinting.



Fig 5. Extracoronar splinting using fiber splint.



Fig 6. Post obturation radiograph.

Patient was then recalled after 3 days for endodontic post placement. Gutta percha filling was removed with peeso reamer by retaining 9 mm of gutta-percha apically. Minimum postspace preparation was done to minimize trauma to the periodontium during the procedure and a radiograph was taken for confirmation (**Fig 7**). Then a fiber post (Parapost system, Coltene) was tried in the tooth and another radiograph was taken, thus confirming the post in prepared canal (**Fig 8**).



Fig 7. Post space preparation radiograph.



Fig 8. Fiber Post try-in radiograph.

The post was cemented into the canal using self adhesive resin cement (Rely X U 200, 3M ESPE). Excess cement was removed from the access cavity and the cement was cured for 40s. A radiograph was taken to confirm the post placement (**Fig 9**). The access cavity was restored with composite resin.



Fig 9. Post operative radiograph.

Discussion

Preservation of the natural dentition and rehabilitation of oral cavity to a normal functional

state is the primary goal in dentistry. Direct trauma caused by automobile accident, sporting activity, violence, or malocclusion on the jaw or on individual tooth may result in tooth fractures. Initial treatment of horizontal root fracture⁵. involves repositioning the fractured tooth segments and then stabilizing the tooth to allow healing of the periodontal ligament.⁶

The treatment of transverse root fracture may be accomplished by means of extracoronol splinting, endodontic treatment of the coronal root fragment, intraradicular splinting of the two fragments using fiber post or extraction of the apical fragment depending upon the site of fracture.

Various extracoronol splinting techniques available for splinting of fracture fragments are orthodontic band-arch wire splint, cap splint, proximal bonding with composite, bonded orthodontic wire, bonding with fiber splint⁴. According to a study conducted by Andreason et al, extracoronol fiber splint was found to be optimal splint as compared with other splinting techniques. This splint was found to be slightly flexible (semirigid immobilization) and application implies minimal damage to the injured tooth⁴. Hence in the present case, for initial stabilization of the fracture fragments, fiber splint

was advocated.

A progressive improvement in the field of adhesive dentistry allows clinician to reattach a broken tooth structure mechanically, chemically and esthetically. In the present case, a fiber post was used along with the resin cement as an intraradicular splint to reattach the coronal fragment. Several advantages of fiber post for reattachment are conservation of tooth structure, esthetics, bonding to the tooth structure, cost effective, functional rehabilitation⁷. Luting agents such as zinc phosphate, zinc polycarboxylate, glass ionomer, and filled and unfilled resin cements have been investigated extensively. However the use of various types of fiber-reinforced post and resin cements is becoming popular⁸.

CONCLUSION

Reattachment of tooth fragment is a variable technique that restores function and esthetics with a very conservative approach. Adhesive techniques, sometimes in conjunction with intra-canal retention, like a post, can be used to reattach fractured segments and an esthetic result can be obtained, preserving the natural tooth with minimum procedure and cost to the patient.

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