

Combined Technique Fibre-Reinforced Composite Post and Original Fragment in Restoration of Traumatized Mandibular Lateral Incisor: A Case Report

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ABSTRACT

Background: Anterior teeth trauma is the most common among facial trauma and commonly seen emergency in dental practice. Since it is in the aesthetic zone patients are affected psychologically. Immediate treatment with the conservative and aesthetic approach is considered the best choice of treatment. Some studies state that reattachment of the fragment with fibre-reinforced composite post and dual-core resin is the most conservative and acceptable treatment option. This case report presents comprehensive management of crown fracture involving the pulp in the mandibular lateral incisor with reattachment of the fractured tooth segment with dual-cure adhesive resin and a glass-reinforced composite fibre post.

Keywords: Crown fracture, anterior tooth trauma, fibre-reinforced post.

INTRODUCTION

Traumatic injuries to the oral cavity is the most common and frequent type of emergencies seen in dental practice, mainly in Children and young adults.^{1,2,3} Trauma to the teeth may occur due to strong and sudden force to the dentition either by falling or during fighting or sudden hit and sports activities and road traffic accidents.⁴⁻⁷ These injuries require emergency dental care. The dental trauma may affect the social and psychological status of the patient and also cause pain and discomfort also produce serious concern for aesthetics, speech, biting and also stress due to the cost of treatment.^{8,9} Among all the dental trauma, the most affected were anterior dentition and frequently affected teeth were maxillary central incisor while the least affected was canine.^{5,10} The trauma to the teeth may result in fracturing of teeth,

displacement, subluxation or avulsion of teeth.^{11,12} Coronal fractures of permanent incisors represent 18-22% of all trauma to dental hard tissues, 28-44% being simple (enamel & dentin) and 11-15%, complex (enamel & dentin & pulp). Of this 96% involve maxillary central incisors.^{13,14} Fracture of anterior teeth requires immediate concern due to physiological and psychologic impairment because of aesthetics.¹⁵

Management of complicated crown fractures depends on the nature of the fracture like associated root fracture, Pulp involvement, damage to the periodontal apparatus, biologic width violation, and also on presence or absence of fragments of the fractured tooth (better prognosis if approximation between the fragment and traumatized tooth), occlusion type and early

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intervention for better prognosis.¹⁶⁻¹⁸ Children with a fractured crown may hesitate to smile and also has negative social interactions and hence management of the traumatized teeth should be done as early as possible.¹⁹⁻²⁰ The early methods of management of anterior tooth were done with a jacket crown, orthodontic bands, and pin retained resin, porcelain bonded crown and composite resin with acid etch adhesive techniques, stainless steel crowns, basket crowns, partial and full coverage crowns, laminate veneers which are expensive, time-consuming and not conservative^{15,21,22} But nowadays minimally invasive technique like reattachment of teeth with the tooth fragments gave acceptable effect with the advancement in the restoration materials. This treatment alternative was first reported by Chosack and Eildeman in 1964 who used cast post intracranial retention to reattach the tooth fragment.²³ In 1988, Tennery also Starkey in 1979 and Simonsen in 1982 has also used the similar technique.²⁴⁻²⁶

Reattachment of tooth fragment can be done when the fracture margin is present coronal to the gingival level as it provides more access for instrumentation and better visualisation²⁷. A full-thickness envelope flap may provide better accessibility in case of fracture extending subgingivally but present supra alveolar.^{15,21} But immediate reattachment of the tooth fragment is necessary as it may result in dehydration and change in tooth colour²⁸ The fractured tooth fragment bonding with the teeth can be called as autogenous biologic restoration^{22,29}

Earlier for reattachment of tooth fragments bevel designs, chamfers, dentinal and enamel grooves and resin composite materials were used.^{30,31} And in complicated coronal fracture where root canal treatment is done, the root canal space can be used as inner reinforcement avoiding the further preparation of the fractured tooth.¹⁷ This paper reports a case of complicated coronal tooth fracture of mandibular lateral incisor which was reported to the clinic after a day of trauma and the management was done by Combined technique with fibre-reinforced composite post and original fragment.

CASE REPORT

A 27 year old male patient reported to the clinic with a complaint of fractured teeth and sharp

continuous pain in the lower front teeth region. History revealed that the patient had trauma before one day and no relevant systemic history. Clinical examination showed a coronal fracture of mandibular left lateral incisor with the fracture margin located 3mm supragingival. And the patient had no evidence of lacerations or swelling extra orally. The intraoral examination also showed no evidence of soft tissue lacerations and inflammation and tooth was intact in the alveolar socket. An intraoral radiograph showed no evidence of root fracture or other pathological findings in relation to both the affected tooth and adjacent teeth. The tooth responded to vitality test. The patient had brought the tooth fragment, which was not stored in any storage media. The patient was explained with the treatment options, and the patient wanted to retain that natural tooth fragment. The fractured segment was approximated with the tooth and checked for any discrepancies, and the fit between the fragment and tooth was satisfactory. The tooth fragment was placed in the saline during the entire period to ensure rehydration and prevent discolouration.



Fig 1: Pre operative picture showing Ellis Class III fracture of Left Mandibular lateral incisor.



Fig 2: Pre Operative radiograph Straight On



Fig-3: Pre operative radiograph Mesial angulation.



Fig 4: Buccal canal-20mm.



Fig 5: Lingual canal- 18mm.

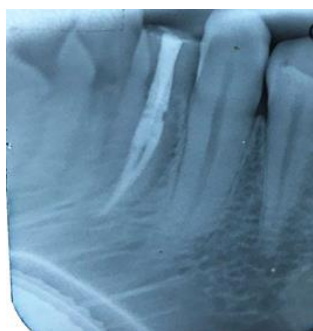


Fig 6: Obturation with Gutta Percha.



Fig 7: Post space made in Buccal canal.

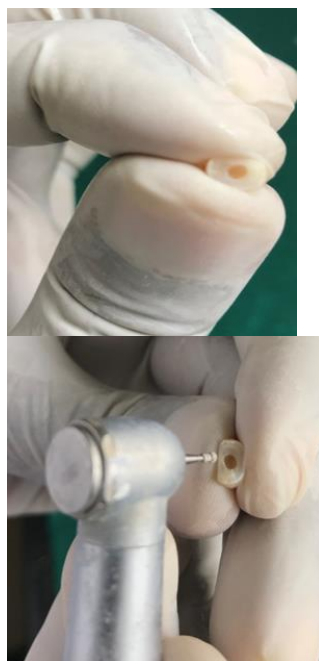


Fig 8 & 9: Preparation of Post space in the Fractured tooth fragment.

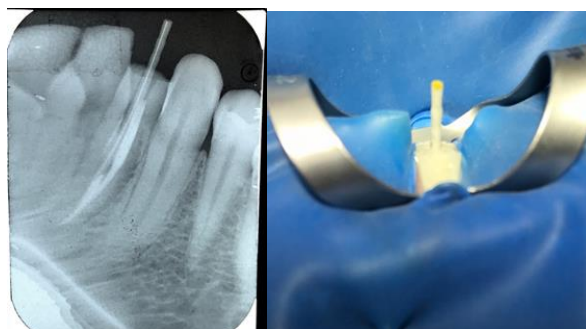


Fig 10 & 11: Placement of fiber-reinforced composite resin post.



Fig 12: Post-op Radiograph showing effective reattachment of tooth fragment with the fractured teeth.



Fig 13 & 14: Post Operative Intraoral Picture revealing good esthetics and function.

On the same day, local anaesthesia was administered, and a rubber dam was placed, and access opening of mandibular left lateral incisor was done and was medicated with calcium hydroxide. During the access opening, it was found that the tooth had two canals: Buccal and Lingual canal. The patient was asked to report after three days. During the second visit, the teeth were asymptomatic, and the canal was obturated with gutta-percha coated with sealants. Post space was created in the buccal canal by removing the gutta-percha leaving 4mm apically to ensure the seal. And tooth fragment place in the saline was also prepared to match the post.

The root canal and the coronal fragment was etched with 37% phosphoric acid for 15seconds and rinsed and air-dried. In this case, glass fibre reinforced post was used coated with dual-cure luting composite and placed in the prepared canal. Dual cure luting composite was also placed in the fragment space and was then approximated with the post and light-cured for the 40s from both labial and lingual side. Finally finishing and polishing was done. The occlusion was checked, and there was no problem in function and esthetics.

DISCUSSION

It was important to restore the traumatized teeth as it had psychological and emotional impact on the patient. Isolation with rubber dam is essential if the target is to maximize the longevity of the adhesive materials. However the successful reattachment also depends on time elapsed after trauma and the hydration of the fragment. According to Prabhakar AR et al 32 and Is Khinda V et al 33, the tooth fragment carried in a storage media like saline, milk, coconut water, HBSS, egg white or water had more successful rate as they maintained the fragment strength, vitality and prevented discolouration. According to a study by Farik B 34 et al, Crown fragments dried for more than 1 h had lower bond strength when bonded to the remaining tooth structure compared to the strength of bonded fragments that were not dried. Rewetting of dried fragments could be done by immersing the fragments in water for 24 h. Perdigão J 35 explains that Dentin's dehydration may cause a collapse of collagen fibres and obstruction of adequate penetration of resin monomers leading to poor adhesion between dentin and composite material. Since the patient reported a day after trauma, the fragment was placed in saline for 24hours in order to achieve hydration and improve its strength and fracture resistance.

The original fragment reattachment techniques used in this case using glass fibre reinforced composite post as they are most reliable and offer good esthetics. Pulpless teeth posed concerns in aesthetics, and also advancement in the composite materials led to the use of glass fibre composite post, which is composite interlaced with glass filaments. They had a modulus of elasticity similar to dentin, and also light can be transmitted through this translucent glass fibre post which had superior esthetics. 36 According to Antonio Signore et al., The survival rate of glass fibre posts with dual-core composite resin core material in endodontically treated teeth was 98.48%, and hence dual-core resin was used for luting. 37

Based on the study results of Bosso K et al, Fiber reinforced post had better stress distribution, fracture resistance and longer survival rate.38 The fracture resistance was due to combination of elastic and adhesive characteristics which enables the tooth and post to move and flex as single unit. It

is also reported by Tosun G 39 that the use of a fibre post with fractured teeth, minimizes the stress on the reattached tooth fragment as it interlocks the two fragments.⁴⁰ Reattachment of tooth fragments with fibre reinforced composite post are the more preferred way of treatment now as they are superior to another conventional method in many aspects. They are:

1. Minimal loss of tooth structure with maintenance of anatomic form and contour, surface texture, Translucency, better occlusion,
2. Inexpensive and time saving procedure,
3. Wear resistance as natural tooth fragment is retained,
4. Better Esthetics and Quick rehabilitation,
5. Positive social, emotional and psychological comfort to the patient. 21, 41,42

CONCLUSION

The combined use of a fiber-reinforced composite resin post and the original crown fragment is a simple and efficient procedure for the treatment of traumatized anterior teeth that appears to offer pleasing esthetic and functional results that is less invasive than conventional prosthodontic treatment.

CONFLICTS OF INTEREST

The authors declare they have no potential conflict of interests regarding this article.

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