



## Esthetic rehabilitation of fractured anterior teeth with fiber post and all ceramic zirconia restoration

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### Abstract

The anterior teeth are relatively vulnerable to trauma. It can cause tooth fracture resulting pain, swelling etc. Sometimes fracture involves pulp and can disturb esthetics. Endodontic therapy and post insertion into the canal space are required for the restoration of severely damaged teeth with significant loss of coronal structure so that the foundation restoration can be strengthened to support the crown. In this case report, it is described with prefabricated fiber post and core system. A 22-year-old male with fracture of upper front teeth was treated with endodontic treatment followed by fiber post and all-ceramic restoration.

**Keywords:** trauma, post & core, endodontic treatment

### Introduction

Traumatic injuries primarily affect the anterior teeth, notably the maxillary incisors (because of their position in the mouth), where crown fractures are the most frequent after effects, but less frequently affects the mandibular central incisors. Before the age of 18, it is anticipated that a quarter of the population will experience at least one oral traumatic injury related to coronal fractures of the anterior teeth. The most prevalent causes of these injuries include falls, high-impact activities, and bike accidents <sup>[1]</sup>.

Dental injuries typically only involve one tooth, although some trauma types, such as car accidents and sports injuries, can result in numerous tooth injuries <sup>[2]</sup>. In such injuries sometimes pulp become exposed (ellis class 3 fracture) and then endodontic treatment should be carried out firstly. When the coronal tooth structure has been completely destroyed, a post and core restoration is needed as the base for a crown. Mesio-occluso-distal preparation reduces tooth stiffness by 60%, while endodontic therapies typically reduce it by 5-45% <sup>[3]</sup>.

Brittleness of the dentin of teeth during endodontic treatment is attributed to water loss and loss of collagen cross-linking. Regardless of how attentive the post is, a restoration lacking resistant shape is unlikely to be a long-term success <sup>[4]</sup>.

The field of endodontically treated tooth restoration has undergone a revolution because to fibre posts. In order to balance the benefits of metallic cast posts with higher aesthetic and mechanical features as well as radiographically detectable quality, technological innovation provided ample possibility <sup>[5]</sup>. Crowns made of zirconia are becoming increasingly common, and they do offer some advantages. One of the most authentic advantages of zirconia is its strength and durability. Zirconia is the choice of many dentists for its biocompatibility, which means it's less likely to provoke the body into producing a reaction or immunological response like inflammation.

### Case report

A 22 yrs male who had a bike accident fracturing his multiple teeth reported to the hospital for his treatment. Upper anterior teeth showed fracture upon investigation. Due to accidents, some teeth suffered significant damage, making coronal tooth structure unsuitable for restoration. Upper anterior teeth 11 and 12 showed ellis class 3 fracture. They were very tender and patient was unable to bite. More than 50% of the coronal structure was damaged and pulp was exposed. Following an examination, the patient's legal guardian and the treatment alternatives were discussed.

After clinical and radiographic evaluation treatment plan was confirmed. As the pulp was exposed the primary treatment plan was endodontic treatment. Access opening was done under local anaesthesia. Working length determination was done by radiograph and confirmed with electronic apex locator. Copious irrigation with 5% sodium hypochlorite was performed for the biomechanical preparation that is cleaning & shaping of the root canal. Patient was medicated with proper antibiotics and analgesics for healing. In next appointment throughout instrumentation, the root canal was extensively irrigated with sodium hypochlorite and normal saline. Using an absorbent point, the canal was dried. Obturation was done with gutta percha and AH Plus sealer using single cone technique.

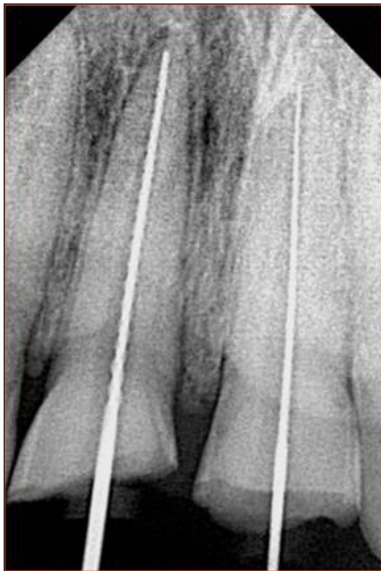
Patient was recalled after a week. Prefabricated fiber post was luted in the canal using dual-cure resin cement (Calibra, Dentsply) after the post area was prepared with Peeso Reamer. Core build-up was done by composite resin. Crown cutting was done and alginate impression was taken and shade selection done using Vita shade guide. When the all ceramic zirconia crown was fabricated it was luted by luting cement.



**Fig 1:** Preoperative photograph



**Fig 2:** Preoperative



**Fig 3:** Working length



**Fig 4:** Obturation



**Fig 5:** Fiber Post placed



**Fig 6:** Fiber post



**Fig 7:** Post operative photograph

## Discussion

After all cavities and leftover restorative materials have been removed, the choice of whether to utilise a post to restore an endodontically treated tooth should be dependent on the amount of tooth structure still present. A routine restoration without a post would be recommended if the coronal structures of a tooth are primarily intact, the primary preparation is the access opening for endodontic treatment, and the tooth has favourable occlusion (for example, an anterior tooth that has been traumatised but not fractured becomes nonvital). It may be necessary to employ a post to give the coronal restoration supplementary retention when considerable sections of the crown are missing due to cavities, fracture, or the existence of an existing restoration that repairs several tooth surfaces.

For repairing teeth that have had endodontic treatment, fiber-reinforced composite posts should be used to support the roots and retain the core [6]. Fiber posts are recommended in situations where a metal post would compromise the aesthetic outcome, in patients who are at risk due to a history of orofacial trauma and the placement of a metal post would put an endodontically treated tooth at risk of root fracture, in teeth that still have enough coronal structure to allow for the development of a 1.5-mm to 2-mm ferrule in the crown preparation, and in teeth that have lamination.

There is proof that fibre posts restore endodontically treated teeth successfully in the clinical setting. While reconstructing premolars that had undergone endodontic treatment, Mannocci and colleagues [7] contrasted amalgam restorations with fibre posts and composite resin cores.

In addition to strengthening the tooth, luting the fibre posts with resin cement aids in improving the bond strengths of the broken teeth segments. Also, it reduces the inclusion of air spaces, which are convenient and predictable [8]. Dual curing systems are the best option because they would enable polymerization even in those areas that would otherwise have remained uncured due to light's inability to penetrate deeper areas, where lightcured luting resin cement may result in incomplete polymerization in apical areas [9]. Although eugenol-based sealers may prevent the setting of resin cements, resin-based sealers are used to obturate the teeth intended for restoration with glass fibre posts.

Several fiber-based restorative materials have been described recently for repairing teeth that have undergone endodontic treatment. Woven fibre ribbons, originally used for periodontal splinting and direct-placement FPDs utilising an adhesive/composite-resin approach, were one of the first fiber-based materials utilised to reconstruct endodontically treated teeth [10].

## Conclusion

The treatment of endodontically weaker teeth and those that have been involved in trauma can be made simpler and more effective than with other systems by using fiber-reinforced composite posts. The physician must decide which clinical situations call for the use of a fibre post, select cementation methods and materials that are suitable with those chosen, and ensure that the tooth's crown preparation has an appropriate ferrule. The dentist can give their patients successful restorations that are aesthetic, long-lasting, and successful by comprehending the concepts for clinical success using fibre posts that are discussed in this article.

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