

# Rehabilitation of Fractured Tooth by a Custom-Made Fiber Reinforced Composite Post: A Case Report

Dr. Priyanka Sharma<sup>1</sup>, Dr. Omveer Singh<sup>2</sup>, Dr. Lokesh Sharma<sup>3</sup>, Dr. Devina Pradhan<sup>4</sup>, Dr. Rahul Srivastava<sup>5</sup>, Dr Amit Kumar<sup>6</sup>

<sup>1</sup>Senior Lecturer, Department of Pedodontics & Preventive Dentistry-Maharaja Gangasingh Dental College & Hospital, Shri ganga nagar, Rajasthan

<sup>2</sup>Senior Lecturer, Department of Public Health Dentistry-Career Dental College, Lucknow

<sup>3</sup>Lecturer, Department of Public Health Dentistry-Sardar Patel Post Graduate Institute of Dental & Medical Sciences, Lucknow

<sup>4</sup>Senior Lecturer, Department of Public Health Dentistry-Rama Dental College Hospital & Research Centre, Kanpur

<sup>5</sup>Reader, Department of Oral Medicine & Radiology-Rama Dental College Hospital & Research Centre, Kanpur

<sup>6</sup>Oral Pathologist & Consultant Dental Surgeon, Department of Oral Pathology, Varanasi

## Abstract

Management of traumatic injuries to the teeth is a challenge to the practicing dentist. It has no prescriptive method for occurring, possesses no significant predictable pattern of intensity or extensiveness and occurring at times when dentists are least prepared for it. Ninety-two percent of traumatic injuries results in fracture of maxillary permanent central incisors because its protrusive and anterior positioning. The young permanent maxillary central incisor root canal chamber is large and tapered. This case report describes the management of Ellis Class III fractured tooth in a young permanent maxillary central incisor by an innovative clinical procedure.

**Keywords:** tooth fracture, composite resin, and dental pulp cavity.

## Introduction

Various international studies it has been reported that males experiences more dental trauma as compared to females (Stock well, 1988; Kania et al., 1996). The prevalence of traumatic dental injuries varies from 13.8-15.1% (Gupta et al., 2002; Ravishankar et al., 2010). The most common cause for traumatic dental injury is falls and collision (Ravishankar et al.; Milliken et al., 2006; Marcenes & Murray, 2001; Nicolau et al., 2001). The maxillary central incisors are the most common teeth affected during trauma (Bastone et al., 2000). Some articles have reported that 25% of patient population under 18 years old, sustained dental injuries in the form of crown fractures in maxillary incisors (Andresen & Ravn, 1972; Petti & Tarsitani, 1996). Subsequently, anterior crown fractures lead to discomfort and serious psychological, aesthetic, functional and phonetic problems that can affect social relationship (Traebert et al., 2003; Marcenes et al., 1999). This article highlights the management of Ellis Class III fracture in young permanent maxillary central incisors with custom made FRC post.

## Case Report

A15-year-old boy reported to the Department of Pedodontics and Preventive Dentistry with fracture of

upper left central incisor (Fig. 1). He had history of trauma due to accident 4 years back. On examination 21 had Ellis Class III fracture and were non-mobile. Intra oral per apical radiograph reveled fracture line involving enamel, dentine and approximating pulp (Fig. 2). When patient reported, on examination there was color change but tooth was having no pain. Thermal test and Electric pulp test revealed abnormal response.

## Methodology

Access cavity was prepared with endo access bur size 3 and working length was determined using apex locator and confirmed by IOPAR (Fig.3). The canal was constantly irrigated with chlorhexidine irrigating solution, saline and 17% EDTA solution. Complete BMP was done with advance sequencing till #70 K file with regular recapitulation and irrigation. The canal was dried using paper points and calcium hydroxide was placed for 1 month, by placing temporary cavity restoration (Fig.4).

After one month temporary access cavity restoration was removed. The canal was sectional obturated with Gutta-percha coated with sealer (Fig.5). The department had Tenax Fibre Trans Esthetical tapered post of size 1.1 mm. This size fiber post was loosely bound to the tapered anatomy of

root canal of the incisor. The entire post was then etched with 37% phosphoric acid for 30 seconds and washed dried with three-way syringe. Bonding agent was applied with micro tip brush and cured for 40 seconds on each side. The composite was adapted on to the post and just like during custom made post the entire unit was taken and inserted into the root canal. Then it was retrieved immediately and cured for 40 seconds all around. The post dimensions were adjusted by yellow ring finishing bur (Fig.6). The canal was acid etched using micro brush. Bonding agent was applied and excess was removed using paper point. The custom made FRC post was Islamized using silanating agent. Then it was luted into the canal using resin-based sealer. The coronal restoration with composite was done and tooth preparation was done (Fig. 7, 8). After tooth preparation the impression of teeth with rubber-based impression material taken. The temporary crown was placed using Zinc Oxide Eugenol sealer. And patient was recalled after a week for luting of Porcelain fused metal crown (Fig. 9).

## Discussion

The traumatic dental injury increases bacterial potential to invade sectioned dentinal tubules and therefore produce acute inflammation and pulp (Díaz, 2008). Young permanent tooth has a rich vascular supply and therefore has high potential of healing. Pulp vitality testing should be carried out on traumatized teeth over an extended period to monitor their vitality following the traumatic incident, as teeth which may initially not respond to testing may well do so after a period of months (Pitt Ford & Patel, 2004). Therefore, patient was asked to report after a month for vitality test and to initiate endodontic treatment.

Restoration of endodontically treated teeth is a complicated procedure because of the various factors that need to be considered. These factors include retention of the restoration, the amount of remaining sound tooth structure, masticator forces, prevention of micro leakage and also the aesthetic performance in the case of anterior teeth.

It is critical to establish a minimal circumferential ferrule of 1.5 mm. This effect requires approximately 4.5 mm of tooth structure above the osseous crest: 1.5 mm for the ferrule and 3.0 mm of biologic width. Failure to heed this guideline reduces the prognosis and longevity of the restoration (Lenchner & Lenchner, 1989). Since patient did not want his aesthetics to be compromised at any cost and fractured tooth was closed to mesial gingival margin, post and core was indicated.

The traditional custom-cast dowel core provides a better geometric adaptation to excessively flared or elliptical canals, and almost always requires minimum tooth structure removal (Smith et al., 1998). Custom cast post-and-cores adapt well to canals with extremely tapered canals or those with a noncircular cross section and/or irregular shape, and roots with minimal remaining coronal tooth structure. This technique incorporates the advantages of both FRC post and custom-made post.

FRC posts were introduced as an aesthetic alternative; their use is based on the mechanical notion that materials restoring endodontically treated teeth should have similar mechanical properties with that of tooth substance (Asmussen et al., 1999). Composite posts possess an elastic modulus close to that of dentin, thus creating a more homogenous restorative system consisting of the post, resin cement, core material along with the tooth substance. In this way, distribution of stresses to the root is more even and there is less risk of a root fracture (Dean et al., 1998).

Braided or woven fibers, which can resist multi directional forces, are good choice for chair side reinforcement -restorative technique. The fiber reinforces the post and composite that was added to it. For optimal retention, between one half and two thirds of the post should be anchored into an osseous supported root. This requires the preparation of a space in the root canal system to anchor the post. Unfortunately, the preparation of a root canal space to fit a prefabricated post with the manufacturer's specific post drill has become generally accepted. In this case deliberately a small sized post was selected and was modified to adapt the canal anatomy with minimal preparation of the root space.

Weine (1996) has stated that more endodontically treated teeth are lost due to improper restoration than to endodontic failure. This technique allows immediate core build up with composite, reduces the number of appointment and minimal laboratory procedures.

## Conclusion

The use of skills, knowledge of the material and adequate ferrule effect, should yield a quantum leap in the long-term success of post endodontic and restorative care of fractured tooth in a young permanent dentition.

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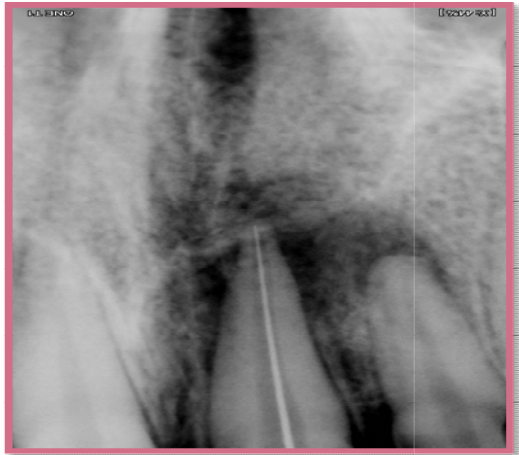
### Figures for Case Report



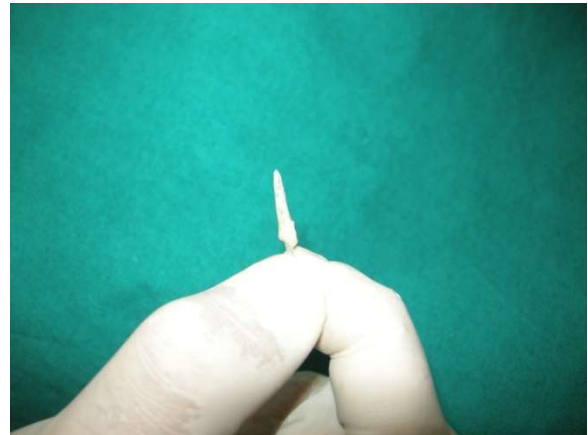
**Figure 1 Ellis Class Iii Fracture Irt 21**



**Figure 2: IOPAR irt 21**



**Figure 3: Working Length Determination**



**Figure 6: Custom Made Fiber Post**



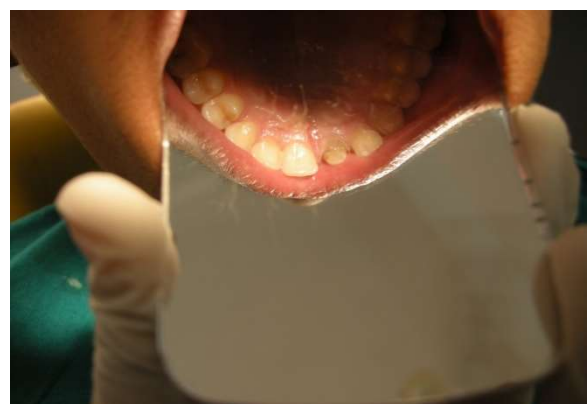
**Figure 4: Calcium Hydroxide Placed**



**Figure 7: Tooth Preparation Facial View**



**Figure 5: Sectional Obturation By Gutta Percha**



**Figure 8: Tooth Preparation Palatal View**



**Figure 9: Porcelain Fused Metal Crown Irt 21**