

# Comprehensive Management of Crown-En Masse Fracture: A Clinical Case Report

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## Abstract

The aim of this article is to report a successful treatment of crown en masse fracture. Ellis Class VIII tooth fracture involves the loss of crown en-masse and its replacement. Fracture of a tooth below gingival attachment or crest of the alveolar bone requires the treatment procedures such as crown lengthening with electrosurgery or periodontal surgery with removal of bone and the orthodontic extrusion. A case of complicated crown fracture of tooth number 21 in a 13-year-old boy is presented. To minimize the psychological trauma resulting from extraction, fiber post, and core buildup of maxillary anterior tooth was planned followed by porcelain-fused metal crown after endodontic treatment of the tooth diagnosed as Ellis Class VIII fracture.

**Keywords:** Fiber posts, metal ceramic crowns, trauma

## INTRODUCTION

A dental injury is an emergency-requiring immediate treatment to reduce pain and restore the tooth's function and esthetics. At any assault to the facial region, the incidence of maxillary anteriors, being injured, is 37% as they are most anteriorly placed in the arch and their protrusive eruptive pattern,<sup>[1]</sup> followed by maxillary laterals (16%) and mandibular central incisors. The incidence of complicated crown fractures varies between 2% and 13% of all the dental injuries.<sup>[2]</sup> An injury to the maxillary anterior region cause significant disfigurement of the patient's appearance as well as function which in turn imparts deep psychological impact.<sup>[3]</sup> Dental traumatic injuries occur mostly at 1–3 years in a primary dentition and 8–11 years in permanent dentition.<sup>[4]</sup>

Ellis Class VIII tooth fracture involves the loss of crown en-masse and its replacement. There is a fracture of the crown below the gingival attachment which violates its biological width, resulting in chronic pain inflammation of the gingival and unpredictable loss of alveolar bone.<sup>[5]</sup> Fracture of a tooth below gingival attachment or crest of the alveolar bone presents a very difficult restorative problem. Hence, sufficient tooth structure is required above the

attached gingiva. Crown lengthening procedures, such as electrosurgery of the gingival margin or periodontal surgery with removal of bone, are attempted where the tooth is esthetically important.<sup>[6]</sup>

Anterior teeth in which more than 50% tooth structure is lost. Root canal treatment followed by post and core and finally restored with porcelain fused to metal is mandatory.<sup>[7]</sup>

Restoration of the endodontically treated tooth is very important as it affects long-term prognosis of tooth. When a huge amount of clinical crown has been lost due to damage, it is often impossible to achieve the sufficient anchorage of a restoration in the remaining dentin. This hard tissue tooth structure leads to decreased occlusal load carrying capacity of root canal-treated tooth. Therefore, posts are essentially indicated for root canal-treated teeth to prevent fracture of the remaining tooth structure and to prevent tooth loss.<sup>[8,9]</sup>

The aim of this case report is to present a case of complicated crown fracture requiring endodontic treatment and the use of

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**Figure 1:** Preoperative.



**Figure 2:** Preoperative Intra Oral Peri Apical Radiograph (IOPAR).



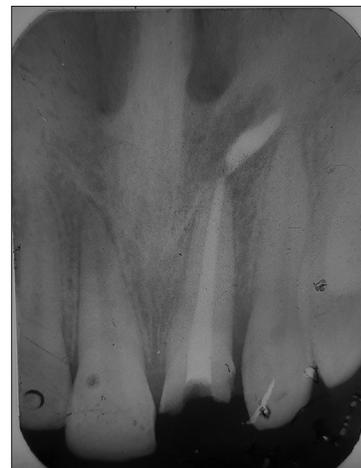
**Figure 3:** Post gutta-percha removal.



**Figure 4:** Intracanal medicament.



**Figure 5:** Working length IOPAR.



**Figure 6:** Obturation.

fiber post aimed at creating a central support stump to restore dental morphology followed by porcelain-fused metal crown.

## CASE REPORT

A 13-year-old male accompanied by his mother reported to the Department of Pediatric and Preventive Dentistry Himachal

Dental College, Sundernagar, Himachal Pradesh, with the chief complaint of broken crown in upper left front region. Detailed history revealed that patient had fallen while playing at school 1 day back. On clinical examination, left maxillary



Figure 7: Crown buildup.



Figure 8: Postoperative IOPAR.



Figure 9: Postoperative.

central incisor crown was found to be fractured [Figure 1]. Patient gave the history of root canal treatment in upper left front tooth 1 year back. On radiographic examination, there was incomplete obturation and periapical radiolucency in relation to 21 [Figure 2]. The access cavity was re-entered using Endo access bur (Dentsply). Coronal gutta-percha was heat softened and engaged with the help of H file (Mani) and

the entire gutta-percha of the canal was removed and confirmed radiographically [Figure 3]. Canal was irrigated with saline to flush the gutta-percha and sealer remnants. A size 45 H file was inserted into the main root canal, and working length was determined at 19 mm. Intracanal medicament Metapex (Meta Bio med, America) was pushed into the root canal for 3 months [Figures 4 and 5].

After the healing of periapical radiolucency, the shaping of the canal was done using modified crown down technique with nickel–titanium rotary files – ProTaper Gold (Dentsply). The orifice and the coronal portion were prepared with S<sub>x</sub> files, coronal and middle third of canals were shaped with shaping files S<sub>1</sub> and S<sub>2</sub>, and the apical portion of the canal with F<sub>1</sub> and F<sub>2</sub> files. The solution of 5.25% NaOCL in combination with 17% ethylenediaminetetraacetic acid was used for rinsing. After finishing the preparation and drying the canal, obturation was done using lateral condensation technique with F<sub>2</sub> gutta-percha cone (Dentsply) with respect to 21 [Figure 6].

As the patient was called after 3 months of placement of intracanal medicament and tooth margins were covered with gingival tissue, so prior to placement of post, crown lengthening procedure was performed with BP blade number 15 to remove the gingival tissue to see the tooth margins and obtain ferrule effect [Figure 7]. After 1 week, the post space was prepared in 21 using Peeso reamers (Mani number 3), leaving 4–6 mm of gutta-percha (Dentsply) at the apical third of tooth. Fiber post (Tenax, Fiber Trans, Coltene Whaledent Switzerland) was then trimmed according to adequate length. The dual core resin (Coltene Whaledent, ParaCore) was used to cement the post and core buildup. Crown preparation was done with 21, and impression was made in putty and porcelain fused to metal crown was given [Figures 8 and 9]. At 1-year follow-up, teeth were esthetically functional and asymptomatic and metapex got resorbed after 1 year showed no pathology with the treated tooth.

## DISCUSSION

The most common type of facial injuries is traumatic dental injury accounting for as high as 18% of the all facial injuries.<sup>[10]</sup> Fracture of maxillary anterior teeth occurs frequently in young patients (Andreasen 1981). Restoration of fractured tooth is a better option compared to extraction of teeth (Goldson *et al.* 1981). There are different treatment methods for the treatment of fractured anterior teeth which includes crown lengthening with osteotomy and gingivectomy, orthodontic extrusion, and surgical extrusion. Crown lengthening with osteotomy and gingivectomy may result in varied gingival heights between adjacent teeth compromising the esthetics. It also results in loss of supporting bone with variations in the length of the clinical crowns between adjacent teeth (Smidt *et al.* 2005).<sup>[11]</sup>

Orthodontic extrusion can be performed by a stiff arch wire with elastic thread, stainless steel ligature on a light arch wire, flexible arch wire, and an elastic thread and piggyback Niti on stiff base arch wire. A 20–30 g of force is the

optimum force required for extrusion (Bulem *et al.*, 2008). Bone remodeling at the end of orthodontic extrusion causes new bone formation which occurs at about 4–5 weeks after orthodontic extrusion (Andreasen *et al.*, 1994). Fiberotomy of the supracrestal periodontal fibers was carried out to prevent relapse due to the stretching of the marginal and apical periodontal fibers. Sometimes, remodeling continues for about 3–5 months after the completion of orthodontic treatment (Reitan, 1969).<sup>[11]</sup>

Traditionally, cast posts have been used for a long time to restore complicated crown fracture. Depending on developments in adhesive dentistry, resin-based fiber-reinforced posts have been used in the restoration of maxillary anterior teeth. Fiber resin posts show similar hardness to dentin and exhibit greater durability than the metal posts. Elastic modulus is similar to dentin strengthens the remaining tooth structure and increases resistance to tooth fracture. Because of these advantages, fiber post was used in this case to restore the fractured teeth with composite resins.<sup>[7]</sup>

Gbadebo *et al.* conducted a study to compare the clinical performance of metallic and glass fiber posts in the restoration of endodontically treated tooth and conclude, over a 6 month period, the clinical performance of the glass fiber post was slightly better than that of metallic post, although this was not found to be statistically significant. However, a long-term review of the restorations will be required for further assessment.

Roshan Uthappa, Deepika Mod *et al.* conducted a study to compare fiber post and metal post in the endodontically treated teeth restoration and concluded less chance of failure was seen with fiber post retained restored teeth than that of the metal post. Endodontically treated teeth restored with fiber dowel-composite core and all-porcelain crowns, the survival rate of the tested posts was high (96%) after 24 months of observation. According to some authors, the fiber posts root fractures are rare compared with metallic posts.<sup>[12]</sup>

## CONCLUSION

The trauma of losing anterior teeth from maxillary esthetic zone can adversely affect human psychology. Renovation of teeth using post and core followed by artificial crown is a successful treatment regimen in crown en-masse fracture. The use of fiber posts with resin composite core is preferred when the hard dental tissue loss is moderate, and dental esthetics is

of primary concern. The new fiber posts provide impressive esthetic results in the anterior esthetic zone, but long-term clinical trials are necessary in order to assess their mechanical properties and clinical performance.

## Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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## Conflicts of interest

There are no conflicts of interest.

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