



## Effective Reduction of Mental Trauma with a Multidisciplinary Approach to Treatment of Dental Trauma

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### ABSTRACT

*The purpose of this case report and review is to present the successful management of complicated crown-root fracture of maxillary central incisor with a multidisciplinary approach. A 57-year-old male patient reported with a complaint of unpleasant appearance due to a broken 21. Clinical and radiological examination revealed a complicated oblique crown-root fracture extending below the gingival margin. The tooth was endodontically treated. Surgical crown lengthening with osseous recontouring was performed. After 7 days prefabricated temporary crown was cemented, 6 weeks after surgery fiber post was placed followed by composite core build up. The tooth was restored with a permanent restoration of porcelain fused to the metal crown with gingival porcelain. Examination after 3 months revealed the good periodontal health, esthetic, normal function and patient satisfaction. The key factor in the successful functional and esthetic rehabilitation of a complicated crown-root fracture is weighing of all the available options with a multidisciplinary approach.*

**Keywords:** Surgical crown lengthening, Crown-root fracture, Fibre post, Gingival veneer, Esthetics

### INTRODUCTION

Trauma to teeth and orofacial structures is encountered as a very common phenomenon on a day-to-day basis in dental practice. As long as people remain active, accidents will occur. The management of dental trauma requires a range of skills, judgment, and experience unequalled by any other challenge in dental practice. It, therefore, dictates the necessity of careful and conscious clinical management of such cases. The most common causes of dento-alveolar trauma are falls and collisions, physical abuse, contact sports and road traffic accidents [1].

Traumatic injuries to teeth and their supporting structures vary in severity from simple enamel fractures to avulsions [2]. Anterior teeth are the most commonly traumatized. Trauma could result in fractures involving the crown, the root or a combination of the 2. Crown-root fractures comprise of 0.3%-5% of the injuries affecting the permanent dentition and have been defined as a fracture involving the enamel, dentin, and cementum. This may be classified as complicated or uncomplicated depending on pulpal involvement [3-5]. In anterior teeth, these fractures are usually caused by direct trauma and pose major complication in fully erupted teeth [3].

The potential for psychological and social impacts of dental trauma has become a common finding with consequences that may impair the social functioning, emotional balance and well-being of the individual. People can and do recover from the effects of trauma if they receive the right treatment and support at the right time. Long-Term successful rehabilitation of traumatized teeth requires a multidisciplinary approach as complications associated are multifaceted [6].

In this era of multidisciplinary intervention, there has been a paradigm shift in the way dentistry has dealt with the problem of tooth fractures. Today with a better understanding of aesthetics, form, and functions of teeth coupled with an improvement in restorative materials and collaboration between specialists from different fields enables designing an ideal treatment plan which not only restores the functional and esthetic needs of the patient but also satisfies the desire of a healthy periodontium [7]. There is an unparalleled need of an excellent clinical dexterity and an equally apt clinical aptitude of judgment when the treatment plan for such cases is chalked out.

### Case Report

A 57-year-old male patient reported to the outpatient department with a complaint of unpleasant appearance due to a

broken maxillary left central incisor. Trauma to the tooth has resulted from a fall incurred 8 months ago. The patient was also reported with a history of incomplete endodontic treatment initiated immediately after a traumatic incident. Clinical examination revealed an oblique crown-root fracture with 21, and high maxillary labial frenal attachment (Figure 1).



**Figure 1 Preoperative photograph with maxillary labial frenal attachment**

On extraoral examination, a low lip line was noted. Radiographically the extent of fracture line extended till the level of the alveolar crest. Incomplete endodontic treatment and periapical radiolucency with 21 were seen radiographically (Figure 2). The case was diagnosed as complicated crown-root fracture [8,9].



**Figure 2 Incomplete endodontic treatment with periapical radiolucency with 21**

Treatment decision required weighing of all treatment options available of which the two treatment modalities shortlisted in this situation were orthodontic extrusion and surgical crown lengthening. Due to the time constraint

expressed by the patient, orthodontic extrusion was ruled out and the option of surgical crown lengthening followed with restorative treatment was selected. Informed consent was attained prior to the start of the treatment procedures. They were carried out as follows:

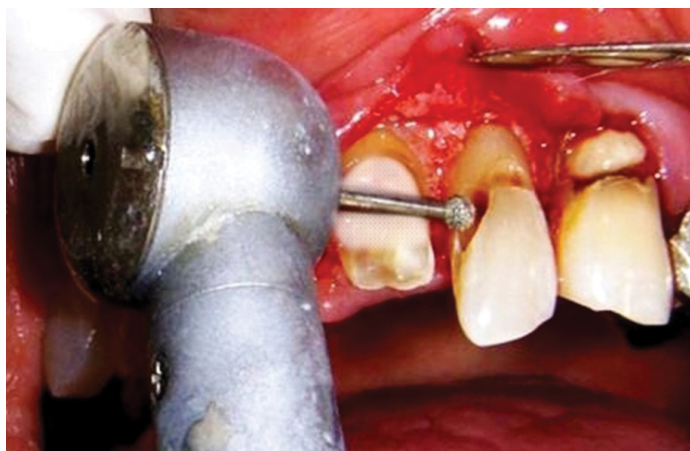
Visit 1: Tooth 21 was endodontically treated and the tooth was temporarily sealed. Scaling and root planning were performed and the patient was given oral hygiene instructions in the same visit.

Visit 2: Post space was created, an impression taken and a temporary acrylic crown with post fabricated. The tooth was then temporarily sealed (Figure 3).



**Figure 3 Temporary acrylic crown with post fabrication**

Visit 3: After 15 days of surgical crown lengthening with osseous recontouring was performed with 21 along with maxillary labial frenectomy. Transsurgical restorations were placed in the adjacent carious teeth. The patient was given post-operative instructions (Figure 4).



**Figure 4 Surgical crown lengthening with 21 and 11 with cavity preparation and placement of trans-surgical restoration with 11**

Visit 4: After 7 days periodontal pack and sutures were removed and satisfactory healing was observed. The prefabricated temporary acrylic crown was then cemented for esthetic rehabilitation (Figure 5).



**Figure 5 Temporary crown was placed**

Visit 5: After 6-weeks temporary crown was removed. Fiber post of appropriate size was selected (Nordin Glassix Glass Fibre Composite Post, Harald Nordin S.A). Fiber post was etched 9% hydrofluoric acid (Porcelain Etch Ultradent Products) and silanized (Ultradent Silane, Ultradent Products) followed by cementation with self-etch dual-cure resin cement (3M Rely X Adhesive Cement 3M ESPE). This was followed by a composite core build. Tooth preparation for porcelain fused to the metal crown was done followed by placement of a provisional acrylic crown (Figure 6).



**Figure 6 Post silanized post luted with RelyX™ unicem self-adhesive universal resin cement (3M ESPE)**

Visit 6: A permanent restoration of porcelain fused to the metal crown with gingival porcelain was cemented (Figure 7).



**Figure 7 Permanent restoration of porcelain fused to the metal crown with gingival porcelain was cemented with 21**



## DISCUSSION

Successful rehabilitation of traumatized teeth requires a multidisciplinary approach as restoration of the tooth fractured in the coronal third of the root is a complicated procedure. For any restorative procedure, efforts must be made to avoid tooth loss and restore form and function paying due respect to the attachment apparatus also [5].

Crown-root fracture invariably invades the biological width and hence presents a demanding situation for any clinician. Effectively restoring the teeth with crown-root fractures mandates the exposure of the fracture margins that can be achieved either by surgical crown lengthening, surgical intra alveolar transplantation or orthodontic extrusion. In cases where the fracture line extends down along the long axis of the tooth extraction is indicated [9].

If the fracture line extends only up to the coronal third of the root and the remaining root structure is long enough to support the subsequently planned restoration, then the fractured fragment can be extracted and root canal therapy can be performed. Later surgical crown lengthening or surgical or orthodontic extrusion of the apical fragment is necessary to convert the subgingival fracture into a supragingival one in order to restore the fracture with the original fragment or composite restoration [3].

Orthodontic extrusion of the fracture fragment is a good treatment option however disadvantages such as increased plaque retention, could impair good aesthetic resolution because the cervical diameter of the extruded teeth is smaller than that of the adjacent teeth, time required to achieve the final result is longer and tipping of the adjacent teeth if the main archwire is deflected [10].

The treatment modality opted for in the present case was surgical crown lengthening. This involves the surgical removal of the hard and soft periodontal tissues to gain supracrestal tooth length allowing for longer clinical crowns and re-establishment of the biological width [8]. Gargiulo determined the physiologic dimensions of the tooth gingival junction in humans and reported the following mean values: epithelial attachment: 0.97 mm; connective tissue attachment: 1.07 and gingival sulcus width: 0.69 mm [11]. Therefore, the total length of the dentogingival complex is 2.73 mm. Preservation of the gingival biological width is critical for the long-term success of the treatment [12]. Placement of the margin of the restoration in the biologic width frequently leads to chronic gingivitis, loss of clinical attachment, periodontal pocket, and gingival recession. Several authors have suggested surgically removing the periodontal support to an extent, leaving a distance from the level of the planned reconstruction margin to the level of the newly recontoured osseous crest of 3 mm, 2.5 mm to 3 mm and 4 mm in the exposed tooth [13,14].

Surgical crown lengthening was considered as a suitable treatment option as on transgingival probing with 9, a measurement of 2.0 mm was observed, which depicts an inadequate biologic width. Due to the presence of an adequate zone of the width of attached gingiva, the surgical site was classified under Type I B. Thus, gingivectomy and osseous recontouring was considered to achieve adequate biologic width [15]. The choice of surgical crown lengthening was also supported by the presence of a low lip line. After the surgery as esthetics was of prime importance, a temporary acrylic crown with the post was placed. Due to lack of adequate crown structure intraradicular support was taken in the form of a temporary post. Restorative margins were kept supragingival to achieve the most desirable biologic compatibility.

A temporary crown was retained for a period of 6-weeks as the periodontium continues to remodel and mature for a period of 6-weeks and 6-months postoperatively [15]. A fiber post was used to restore the badly mutilated tooth as its physical properties are close to that of dentin and can be adhesively luted when compared to custom made cast post [16]. Gingival porcelain was incorporated in the final porcelain fused to metal crown restoration in order to mask the altered gingival zenith 21 and aesthetically balance it with that of 11 [17].

## CONCLUSION

Key to successful management of mutilated teeth lies in a team effort comprising of an interdisciplinary approach and weighing of all available treatment options. One that suits the patients the best are then selected and appropriately executed.

## DECLARATIONS

### Conflict of Interest

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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