

Management of Complicated Crown Fractures with Rapid Orthodontic Extrusion and Surgical Crown Lengthening: Two Case Reports

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ABSTRACT

Complicated crown fractures that involve more than 50% tooth loss and with the fracture line extending subgingivally are of great concern to the dentist. The final restoration should be aimed to provide the adequate retention without compromising the esthetics. So, in this article 2 cases were treated with rapid orthodontic extrusion and surgical crown lengthening respectively to preserve and restore the natural tooth structure.

Keywords: Complicated crown fracture, Rapid orthodontic extrusion, crown lengthening

INTRODUCTION

Complicated crown fractures involve enamel dentine and pulp with the reported incidence of 2% to 13 % of all the dental injuries. [1] These fractures are most commonly seen in maxillary anteriors which possess major concerns regarding esthetics and emotional concerns. Several treatment approaches are available depending on the severity of fracture such as removal of fractured segment and restoration, [2] reattachment of fragment, gingivectomy and crown lengthening, [3] orthodontic extrusion with/without gingivoplasty, [2,3] extraction followed by fixed partial denture [4] or implant. [3] In the present case series of two case reports where the teeth were badly mutilated with subgingival margins, a multidisciplinary approach was selected for both cases. Orthodontic extrusion involves the coronal movement of tooth by applying traction forces in all the regions of periodontal ligament. [5] In the first case endodontic treatment, post and core, orthodontic extrusion and prosthetic

rehabilitation was planned. Crown lengthening is the surgical procedure used to expose the tooth structure for the proper restoration with adequate retention and esthetics. [6] In the second case endodontic treatment, post placement, crown lengthening and prosthetic rehabilitation was planned.

CASE REPORT:1

A 17-year-old female patient reported to the department of Conservative Dentistry and Endodontics Post Graduate Institute of Dental Sciences, Rohtak, Haryana 1 hour after the road side accident. Complete medical, dental and trauma history was taken. Periapical radiographs (PA) were taken at different angulations. PA radiograph revealed mature root and complicated crown fracture of maxillary right central and lateral incisor [Fig 1(A)]. On clinical examination the fractured segments were mobile and the teeth were negative to electric pulp test. Local anesthesia was achieved with 2% lignocaine

hydrochloride with epinephrine 1:80,000 (ICPA Health Products Ltd, Ankleshwar, India). The fractured segments were removed that were extending subgingivally and there was more than 50% loss of tooth structure [Fig 1(B)]. Root canal treatment, post and core followed by orthodontic extrusion and prosthesis were planned. Gingivectomy was done to expose the crown margins. A single sitting root canal treatment was performed. Post space was prepared and prefabricated metal posts were cemented into the canal after checking its fit. After maintaining proper isolation, the standard protocol of etching (Ivoclar Vivadent Eco Etch), bonding (Ivoclar Vivadent TE-Econom Bond) was followed and incremental composite (Ivoclar TE-Econom Flow) build up was done and radiograph was taken [Fig 1(C, D)]. Patient was put on follow up and recalled after 2 weeks. Patient was then referred to the Department of Orthodontics and Dentofacial Orthopedics, PGIDS, Rohtak. Rapid orthodontic extrusion was planned by the orthodontists. Rapid orthodontic extrusion

was achieved using a 19 gauge round rigid stainless-steel wire with two loops made in the wire for stabilization. Vertical bends were given in the wire to attain a larger length of elastic chain for adequate force generation. The wire was then bonded to adjacent teeth i.e. right maxillary canine and left maxillary central incisor with the composite resin. Bondable buttons were bonded to the right maxillary central incisor and lateral incisor. Then the elastic chain was stretched between the button and the loop wire to avoid slipping of elastic chain. The elastic chain was replaced every 2 weeks till the desired extrusion was achieved. The total extrusion was completed in 2 months [Fig 1(E-H)]. After the stabilization period gingivectomy and crown cutting was done [Fig 1(I)]. Prosthetic rehabilitation was done by metal ceramic crown placement [Fig 1(J, K)]. Patient was put on follow up. At 12 months follow up there were complete absence of any signs and symptoms and with no radiographic changes [Fig 1(L)].

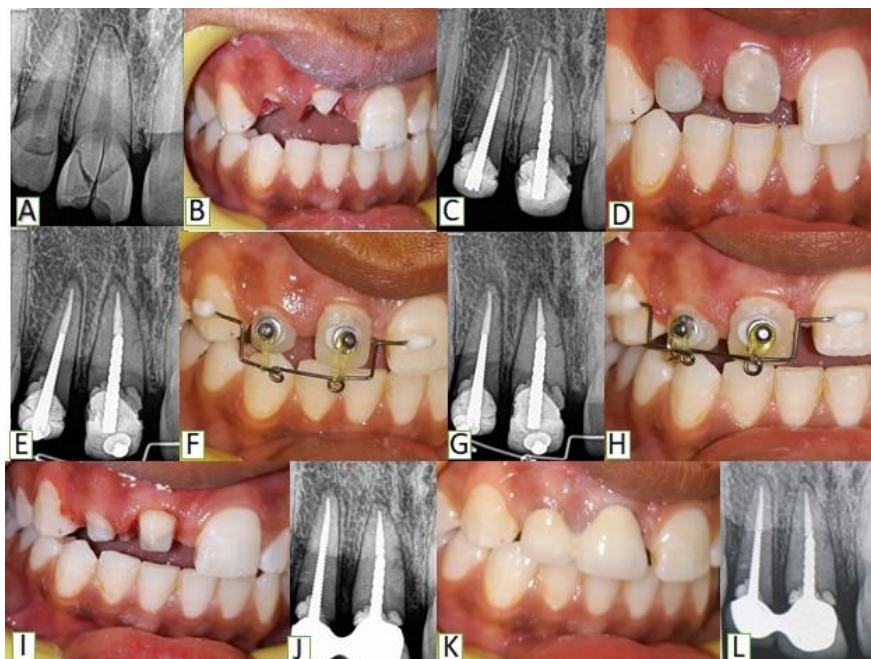


Fig 1, Case Report 1: (A)Pre-operative radiograph with complicated crown fracture. (B) Pre-operative clinical picture after segment removal. (C)Radiograph after post cementation and core buildup. (D)Clinical picture after post cementation and core build up. (E, F) Orthodontic extrusion after 1 month. (G, H) Final orthodontic extrusion at 2 months. (I) Crown cutting. (J) Post-operativepicture. (K) Follow up at 12 months.

CASE REPORT:2

A 30-year-old male patient reported to the Department of Conservative Dentistry and Endodontics Post Graduate Institute of Dental Sciences, Rohtak, Haryana for the treatment of maxillary anterior teeth. Complete medical, dental and trauma history was taken. Dental history revealed road side accident 6month before followed by root canal treatment and tooth colored filling from the private practitioner. Filling got dislodged one week back while eating non vegetarian food. Periapical radiographs were taken at different angulations. PA radiograph revealed adequate primary root canal treatment and complicated crown fracture of maxillary right and left central incisors. On clinical examination the teeth were badly mutilated and gingival growth was seen [Fig 3 (A)]. Surgical Crown lengthening followed by post and core with artificial prosthesis was planned. Local anesthesia was achieved with 2% lignocaine

hydrochloride with epinephrine 1:80,000 (ICPA Health Products Ltd, Ankleshwar, India). Gingivectomy was done. Then the flap was raised and ostectomy was done to maintain the adequate biological width of 3mm. Flap was sutured [Fig 3(B)]. Patient was recalled after 2 weeks. On follow up healing was checked and post space preparation was done. Prefabricated metal posts were cemented after checking the fit [Fig 3 (C, D)]. After maintaining proper isolation, the standard protocol of etching (Ivoclar Vivadent Eco Etch), bonding (Ivoclar Vivadent TE-Econom Bond) was followed and incremental composite (Ivoclar TE-Econom Flow) build up was done. Crown cutting was done, and adequate ferrule was achieved. [Fig 3 (E)]. Finally, the prosthesis with metal ceramic crown was delivered [Fig 3 (F)]. At 12 months follow up there were complete absence of any signs and symptoms and with no radiographic changes.



Fig 2, Case Report 2:(A) Pre-operative clinical picture. (B)Clinical picture after crown lengthening. (C) Radiograph after post cementation. (D) Clinical picture after post cementation. (E)Crown cutting. (F)Post-operative picture.

DISCUSSION

Dental traumatic injuries are more common in young individuals and are of great challenge to a dentist. [7] The crown fractures which extend subgingivally are challenging. [8] In such conditions the treatment should be aimed to obtain isolation and expose the crown margins for the expose the margins for the final restoration. [2] Different treatment modalities were indicated for the present

case reports which included crown lengthening, orthodontic extrusion and extraction followed by implant placement or fixed partial denture. As the patients were willing to save the teeth so rapid orthodontic extrusion and crown lengthening were selected as the treatment modalities. In the first case we preferred rapid orthodontic extrusion also known as vertical eruption, forced eruption or assisted eruption [9,10] as the patient belong to local place and was

ready to cooperate for the treatment. It can be achieved either by removable or fixed orthodontic appliance. [9-12] This approach of treatment offers many advantages like it is a conservative method that allows retention of tooth, [5] restores the periodontal attachment and alveolar bone is preserved. [9,13] As aesthetics is the main concern in ant region it maintains the gingiva in position. [7] However there are certain limitations of rapid orthodontic extrusion which include patient cooperation that is considered as the most critical factor [14] as it requires longer period of retention for the stabilization of the periodontium at the newly acquired position, also it may have aesthetic concerns during the treatment. [5] As the traction forces applied are more in rapid orthodontic extrusion there may be a risk of root resorption [15] or tooth ankylosis. [9] Crown lengthening is the procedure done to increase the clinical crown length without violating the biologic width. [16] This was chosen as the treatment plan for the second case as the patient want the treatment to be completed in minimum appointments. Gingivectomy followed by ostectomy was done to maintain the adequate biological width of 3mm. [5] The limitation of this procedure is that the additional surgical procedure is required, in some cases the sound bone has to be removed for achieving adequate biological width and the gingival margins may shift apically compromising the esthetics. [7] However, in our case both the maxillary central incisors were involved so we were able to keep the gingival margins at the same position.

CONCLUSION

The short clinical crowns with subgingival margins after dental trauma may lead to poor retention form thereby leading to improper tooth preparation. Rapid orthodontic extrusion or crown lengthening procedures can be a good option for managing such cases after proper evaluation of the cases on the individual basis.

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