

Orthodontic Extrusion of Traumatized Anterior Teeth by Simplistic Approach: A Case Report

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Abstract:

A crucial aspect of dentistry practice is the management of patients who underwent severe traumatic injuries of the anterior teeth. Treatment for anterior teeth with subgingivally extended fractures is complex and treatment should be done keeping biologic, aesthetic, and functional aspects, including speech and mastication into consideration. Crown fractures frequently require a multidisciplinary approach to treatment. Restorative challenges arise; however, from crown-root fractures with a fracture line below the gingival attachment or alveolar bone crest so orthodontic extrusion should be done in order to better prosthetic rehabilitation. This case report is of 11-year old boy that resulted in fractures to his upper right and left central incisors in road traffic accident. During a clinical examination, it was discovered that the fracture line extended horizontally in the upper right and left central incisors, resulting in an oblique fracture at the cervical one-third level exposing pulp. This case report explains the simplistic approach to orthodontic extrusion of traumatized anterior teeth.

Keywords: Traumatic injuries, Orthodontic extrusion, anterior teeth, fixed orthodontic treatment

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INTRODUCTION

General restorative dentists and orthodontists face significant challenges when treating patients with traumatized teeth in the aesthetic region of the face. Because the upper anterior teeth are visible on smile it is important role to maintain the delicate contour of the teeth through micro esthetics. Extraction is still the most often used treatment option given to the patient followed by dental implant placement; but preservation of natural tooth structure followed by restoration is the best treatment option to be chosen, extraction should be considered as a last option.

A multidisciplinary approach is used in these treatment modalities, which include orthodontic

extrusion, crown lengthening by gingivectomy, root canal treatment by endodontics, followed by prosthetic rehabilitation. When undergoing orthodontic intervention, the tooth is forcibly extruded, resulting in resorption of alveolar bone and periodontal crown lengthening. In both cases, the goal is to extrude coronal tooth structure to support an appropriate prosthetic restoration.

Extrusion of the teeth by orthodontic treatment is a method to avoid the potential for compromised aesthetic results from crown lengthening procedures that indicates excess root material.[1-4] Two main approaches for orthodontic extrusion of traumatic teeth are commonly used they are:

(1) Using brackets and archwires as a component of fixed orthodontic treatment.

2) Application of tractional forces to the fractured tooth via the attachment of a stiff wire stretched across the neighbouring teeth.

Fixed appliances are mostly used to achieve orthodontic extrusion. Extrusion in orthodontic treatment requires 20–30 g of force. This paper aims to provide an overview of the multidisciplinary treatment plan to extrude the traumatized maxillary central incisor; its management by restoration of tooth structure, bone structure and its periodontal health.

CASE REPORT:

This is a case-report of 11-year-old male patient reported to the department with a chief complain of fractured teeth in the upper front region of jaw after road traffic accident. On clinical examination patient had Ellis Class III fracture in maxillary right and left central incisors. On clinical examination there was oblique fracture of upper left and right central incisor 11 and 21. The fractured fragment of the traumatized teeth was embedded into the lower lip during trauma it was removed.



Fig 1: Orthopantomogram

Orthopantomogram reveals that patient is having mixed dentition with Ellis Class III with intruded 11 21 due to trauma. (Fig. 1)

Treatment progress:

Lingual buttons were bonded to both the central incisors 11,21. Bondable molar tube with 16,26 MBT 0.022 bracket were bonded on 12,22 and Begg's

bracket were bonded on the upper first premolars of both the side to avoid slippage and to support the archwire. 0.019' X 0.05' SS archwire was placed as a base wire in the upper arch with archwire sleeves to reduce irritation and maintain space wherever desired.

At the beginning of treatment extrusive force was applied by tying elastomeric chain from the archwire to the lingual button. (Fig 2) After 2 weeks of extrusive force elastomeric module was inserted into the archwire and engaged into the lingual button of teeth 11, 21. (Fig 3)



Fig 2: Extrusion using elastomeric chain



Fig 3: Extrusion using elastomeric module (a) Right lateral (b) frontal (c) Left lateral

A Dontrix gauge was used to measure the force level upto 30 g.

The elastomeric module was changed after 15 days. In the subsequent visits, piggyback technique was used in which archwire using 0.014" NiTi archwire was passed above the incisor for extrusive force and ligated to the adjacent brackets with ligature wire to 12 22. (Fig. 4)



Fig 4: Extrusion using 0.014" NiTi piggyback archwire

Extrusion was achieved after 2 months and labial retainer was placed for retention purpose. (Fig 5) After extrusion patient was referred to the department of Pedodontics for root canal treatment (apexification). After endodontic treatment patient was recalled for 6 months follow-up and checked for the treatment outcome were stable and symptomless. (Fig 6)



Fig 5: Labial retainer



Fig 6: Labial retainer 6- month follow-up

Intraoral photographs of patient after 1 year follow-up (Fig 7)



Fig 7: Labial retainer 1 year follow-up (a) right Lateal (b) frontal (c) Left lateal



Fig 8: RVG after root canal

DISCUSSION

Orthodontic extrusion (OE) is the movement of an orthodontic tooth in a the coronal direction to change the tooth's position and cause modifications to the surrounding soft tissues and bone for therapeutic purposes. Tractional forces are imposed throughout the periodontal ligament during tooth extrusion in order to promote the marginal apposition of crestal bone. Because connective tissue attaches gingival tissue to the root, the gingiva follows the vertical movement of the root during extrusion. The alveolus, connected to the root by the periodontal ligament, is pulled along with the root.[5] In cases where the fracture line is situated below the gingival margin, alveolar bone and if the root segment is sufficiently

long to accommodate a coronal restoration, the root may be treated endodontically after being orthodontically extruded to elevate the fracture plane above the gingival margin.

When extrusion of teeth occurs, traction forces are applied throughout the periodontal ligament, stimulating the crestal bone's marginal apposition. Traction of the impacted teeth and tooth exposure to allow for restorative procedures are common indications, to modify the position of tooth due to malalignment or trauma.

If orthodontic extrusion is planned for a tooth that has intruded, it should begin as soon as possible and not be delayed for longer than 3-4 weeks after trauma as signs of ankylosis can be seen 11-13 days post trauma. By ensuring that enough tooth structure is extruded for good sealing and aesthetics prosthodontic coronal restoration can be given to the patient thus maintaining the health of the periodontal tissues, these procedures make it possible for the restoration to function better.[6] Teeth can be slowly extruded with forces up to 30 g.

Root movement usually extends over a 4-8-weeks resulting in about 1 mm of movement every 1-2 weeks by application of 15-30 g of orthodontic force. A slow movement does not require force more than 30 g, according to some authors[7,8], more than 50 g of force is required for extrusion of the teeth.[9] Higher forces are required for orthodontic extrusion, the tooth must be stabilized for the periodontium to remodel and adjust to the newly acquired tooth position. This requires longer retention periods. Two studies, Ulusoy et al. [10] and Fidel et al. [11], reported a method of extrusion of teeth by orthodontic treatment by bonding brackets on the adjacent teeth followed by extrusive forces on the intruded teeth.

Ankylosis or hypercementosis, vertical root fracture, premature closure of embrasures, root proximity are the common complications of orthodontic extrusion.[12,13] This fixed orthodontic treatment of orthodontic treatment is a simplistic approach which involves minimal bonding of brackets to the teeth and is easier to perform by orthodontists for extrusion of the intruded traumatic teeth.

CONCLUSION

A multidisciplinary approach is required for the treatment of traumatized teeth so that restoration of the teeth can be done after extrusive movement by endodontic and prosthodontic treatment if required. This clinical report described a forced eruption therapy treatment modality that reduces treatment time and is comfortable and aesthetically acceptable to the patient. Using this forced eruption technique could benefit general dentists by improving patient satisfaction and aesthetic outcomes.

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