

Management of Fracture Crown En Masse in Maxillary Central Incisors in a 13-Year-Old Child – A Multidisciplinary Approach

Abstract

Traumatic dental injuries are the most common orofacial injuries sustained during play and sports. Injuries to anterior teeth with subgingival fractures present a clinical challenge for a predictable esthetic outcome. The treatment modalities of subgingival fractures are surgical crown lengthening and orthodontic extrusion. The purpose of this article is to report a case of a 13-year-old male patient with a subgingival fracture of maxillary anterior teeth managed by a multidisciplinary approach, utilizing orthodontic extrusion after endodontic treatment followed by prosthetic rehabilitation.

Keywords: *Incisors, orthodontic extrusion, subgingival fracture, tooth injuries*

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Introduction

Trauma to the teeth in the anterior region poses a challenge to the pediatric dentist. Especially if the fracture line is below the gingival level then the prognosis is questionable.^[1] Myriad of techniques has been mentioned to preserve and restore the natural tooth structure. Such treatment modalities are multidisciplinary approach including endodontics, periodontal crown lengthening, and/or orthodontic extrusion followed by prosthetic rehabilitation. Contrary to crown lengthening, orthodontic extrusion does not alter the crown root ratio and esthetics.^[2,3]

Indications of orthodontic extrusion

The treatment of a subgingival or infraosseous lesion of the tooth between the cemento-enamel junction and the coronal third of the root (e.g., caries, oblique, or horizontal fractures, perforations caused by a pin or post, and internal or external root resorption), especially when there are esthetic considerations.

Contraindications to orthodontic extrusion

- Ankylosis or hypercementosis (the extra load would cause intrusion of the anchor teeth)^[4]
- Vertical root fracture
- Root proximity and premature closure of embrasures

- Short roots, which do not allow for adequate support of the restoration (i.e., when the crown root ratio is <1:1).

Rapid extrusion due to excessive force application can cause pulp necrosis and root resorption. Nevertheless, pulpal death can be managed by endodontic treatment, and also root rarely show signs of resorption after extrusion.^[5] Thus, orthodontics extrusion was considered as a choice of treatment for the present case.

The intent of this article is to report a case of maxillary central incisors with fracture of crown en masse and its rehabilitation by multidisciplinary approach.

Case Report

A 13-year-old male patient reported to the department of pedodontics and preventive dentistry, with the chief complaint of broken upper front teeth region while playing. Clinical examination revealed horizontal coronal fracture of 11 and 21 with pulpal exposure [Figure 1]. In tooth 11, the fracture line extended subgingivally toward the palatal side, while on the labial aspect of 21, about 2 mm of tooth structure was intact, with no mobility on either of the teeth. Radiographic examination revealed intact periodontium with no signs of root fracture [Figure 1]. The fractured coronal tooth fragments could not be found, so the alternative of reattachment was omitted. The choice of extraction versus a

Submitted : 05-Feb-2019

Revised : 13-Mar-2020

Accepted : 16-Apr-2020

Published : 07-Aug-2020

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Access this article online

Website:
www.contempclindent.org

DOI: 10.4103/ccd.ccd_98_19

Quick Response Code:



How to cite this article: Jaiswal N, Khan A, Kaur H, Yeluri R. Management of fracture crown en masse in maxillary central incisors in a 13-year-old child – A multidisciplinary approach. *Contemp Clin Dent* 2020;11:165-7.

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multidisciplinary treatment was presented to the parents, and parents opted for the latter. With the parent's consent, the single-visit endodontic treatment was done. After a hiatus of symptom-free 1 week, the rapid orthodontic extrusion was initiated. A 19G rigid stainless steel stabilizing wire was bonded from 53 to 63. A J-hook was made with another wire of the same cross-section, and the post space preparation was done to cement a J-hook with glass ionomer cement in 11 and 21. Around 3–4 mm, extrusion was planned on the basis of the depth of the palatal fracture line. The distance between the J-hook was adjusted accordingly, so the desired extrusion could be carried out. The cemented wire was bent vertically with respect to canine teeth, so that the wire segment rotation could be prevented. The elastic module engaged to the J-hook applied the extrusion force on the root [Figure 2]. The module was changed every 3rd day until desired extrusion was attained. By the end of 2 weeks, about 2.5 mm of extrusion was accomplished; and around 1 mm of the tooth structure was exposed palatally in 11, which was sufficient to provide a ferrule of 1 mm. The stabilization of the extruded teeth was done with composite

splinting to the original wire for about 8 weeks. The J-hook cemented inside the teeth was removed with ultrasonic instruments. This was followed by the assessment of the coronal structure, which was adequate for retaining a definitive full coverage restoration. Prosthetic rehabilitation was done using Glass fiber post and cementation of the polycarbonate crown [Figure 3]. After a follow-up of 1 year, the outcome of the treatment was stable, and the patient was symptomless.

Discussion

Studies have shown that one out of every four persons under the age of 18 years may encounter traumatic anterior teeth fracture.^[6] Whenever the fracture fragment is available, reattachment should be the first choice of treatment.^[7] In the present case of complicated crown fracture requiring endodontic therapy, the fractured fragment was unavailable, so the orthodontic extrusion was performed. Tooth movement by extrusion includes all regions of periodontal ligament for applying tractional forces to stimulate the marginal apposition of crestal bone. During the extrusion process, the gingiva follows the vertical movement of the root because the gingival tissue is attached to the root by connective tissue. Furthermore, the alveolus is attached to the root by the periodontal ligament and is pulled along with the root movement.^[8] Among all orthodontic movements, the extrusion is easiest to carry out because it resembles the eruption movement of natural tooth.^[9] When the fracture line extends below the free gingival margin and alveolar bone, and the segment of the root length is sufficiently adequate to help a coronal restoration; the root canal therapy is carried out followed by orthodontic extrusion for the fractured plane elevation above the gingival margin. These procedures provide favorable prosthodontic coronal restoration that provides both esthetics and preservation of healthy periodontal tissue.^[10] Different appliances and splints^[11] have been suggested for orthodontic forced eruption. Normally, the low-intensity extrusive forces are applied to the movements of gingiva and bone. In rapid extrusion, the stronger traction forces are applied; the coronal migration of tooth supporting tissues is less as the rapid movement exceeds their capacity for physiologic adaptation.^[12] Thus, rapid extrusion is must to inhibit movement of the gingival collar and alveolar bone



Figure 1: (a) Clinical photograph showing the fractured central incisor 11 and 21. (b) Diagnostic radiograph



Figure 2: (a) Clinical and (b) radiographic photograph of 11 and 21 for rapid orthodontic extrusion

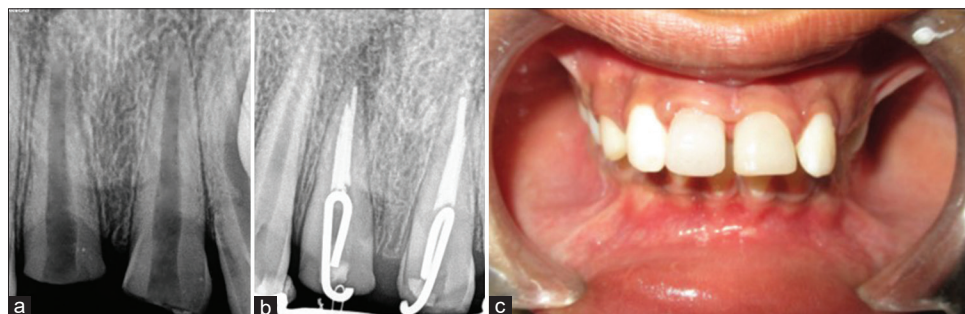


Figure 3: Radiograph showing tooth #11 and 21 (a) before and (b) after extrusion (c) postoperative clinical photograph showing full coverage restoration of the fractured teeth 11 and 21

with the extruded tooth. If one tooth fractured or luxated, there are chances of damage to adjacent teeth as well, hence 2–3 healthy teeth were taken as an anchorage.^[13] For the present case, the fracture line was below the gingival level on the palatal side. Thus, it did not provide adequate structure and biological width for restoration of coronal portion. Hence, the patient was given the choice of extraction followed by prosthodontic rehabilitation or retaining the natural root by root canal therapy, followed by surgical crown lengthening or orthodontic extrusion. The parents opted for the latter as it was more physiological, conservative and cost-effective in nature.

Conclusion

This afore-mentioned treatment modality preserves the root structure and avoids atrophy of supporting structure. Furthermore, this method of extrusion instills natural movement and subsequently aids in recuperation of tooth and periodontal ligament. Thus, this amalgamated approach involving forced extrusion can be considered as a viable option for resuscitation of subgingivally traumatized anterior teeth.

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.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

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