Journal of Advanced Medical and Dental Sciences Research

@Society of Scientific Research and Studies

Journal home page: www.jamdsr.com doi: 10.21276/jamdsr Index Copernicus value = 85.10

(e) ISSN Online: 2321-95 (p) ISSN Print: 2348-6805

Case Report

Orthodontic eruption of traumatized anterior tooth for rehabilitation

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ABSTRACT:
Crown fractures are more commonly reported for the permanent dentitionwhereasLuxation injuries are the most common TDIs in the primary dention. A 20-year-old male patient reported with the chief complaint offorwardly placed upper front teeth and fractured upper right front teeth. Intraoral examination showed Ellis class IV fracture of maxillary right central and lateral incisors and Angle's class II division 1 malocclusion. The case was treated using a multidisciplinary approach including endodontics, orthodontic extrusion followed by prosthetic rehabilitation.

Received: 10 May, 2021 Accepted: 17 June, 2021

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This article may be cited as: Naik BM, Trivedi K, Parekh V, Tatu S, Suthar H. Orthodontic eruption of traumatized anterior tooth for rehabilitation. J Adv Med Dent Scie Res 2021;9(7):15-18.

INTRODUCTION

Trauma to the anterior tooth is thesecond most common cause of compromised aesthetics in dental fraternity. Traumatic dental injuries(TDIs) occur with great frequency in preschool, school-age children, and young adults comprising 5% of all injuries for which people seek treatment.[1,2]Crown fractures are more commonly reported for the permanent dentitionwhereasLuxation injuries are the most common TDIs in the primary dentition.[1,3,4]Anterior teeth with fractures extendingsubgingivally require a complex treatment plan that addresses biologic, aesthetic, and functional factors, such as mastication and speech. The form and function of these teeth are restored through a comprehensive and multidisciplinary treatment plan.Since the gingival display of the upper anterior teeth contributes to the micro aesthetics of the smile, maintenance of this delicate contour is of prime importance.

In case of dental trauma, every attempt should be made to preserve and restore the natural tooth structureespecially when it is concerned with anterior aesthetic region. In such cases, treatment modalities involve a multi-disciplinary approach including endodontics, periodontal crown lengthening, and/or orthodontic extrusion followed by prosthetic rehabilitation. Periodontal crown lengthening involves the removal of supporting crestal alveolar bone while orthodontic intervention forcibly extrudes the tooth. Both are the attempts to expose sufficient coronal tooth structure for proper prosthetic restoration. However, crown lengthening procedures may expose excess of root and in turn, may compromise aesthetic results that can be avoided by the use of orthodontic extrusion, which also helps in maintaining the crown root ratio.

Here presenting a case of fractured maxillary right lateral incisor, which has been treated by orthodontic - endodontic interdisciplinary approach.

CASE- REPORT

A 20-year-old male patient reported with the chief complaint offorwardly placed upper front teeth and fractured upper right front teeth. Patient gave history of trauma resulting in fracture of maxillary right central and lateral incisor.

Intraoral examination showed Ellis class IV fracture of maxillary right central and lateral incisors and Angle's class II division 1 malocclusion. [Figure1]

Figure 1

TREATMENT ALTERNATIVES

Following clinical and radiographic examination including the cephalometric analysis, it was inferred that patient had a forwardly positioned and proclinedmaxillary incisor (U1-SN=118 degrees, U1-NA = 33 degrees and 7mm), for correction of which space was needed by extraction of teeth followed by retraction of anterior teeth. There were two alternatives for extraction of teeth, for this particular case –

- Extraction of 14, 24 and anterior retraction
- Extraction of 24, 12, anterior retraction, and then substituting canine for lateral incisor and 1stpremolar for canine on the right side of the arch.

TREATMENT PLAN

In order to maintain smile aesthetics and the canine guided occlusion for optimal functional occlusion, it was planned to restore the upper right lateral incisor and thus selecting the first treatment alternative of extracting upper premolars and anterior retraction. It was decided to extrude 12 with the use of orthodontic mini-implant of 1.5 mm diameter and 8 mm length.

RCT was done with respect tomaxillary right central and lateral incisors. The working length of lateral incisor was 19 mm. After obturation,post space of 8 mm was prepared initially for the cementation of the orthodontic mini-implant in the canal space. A modified Nance palatal button was fabricated with 21-gauge wire and a hook made up of 19-gauge wirewas acrylized along with the appliance to be used as the attachment for force unit. A short clear e-chain was used as a force unit from implant to the hook onto the Nance button. The e-chain was changed every 20 days till the desired extrusion was obtained. (Figure 2)

Figure 2

The intraoral pictures after extrusion of lateral incisor are shown in Figure 3.

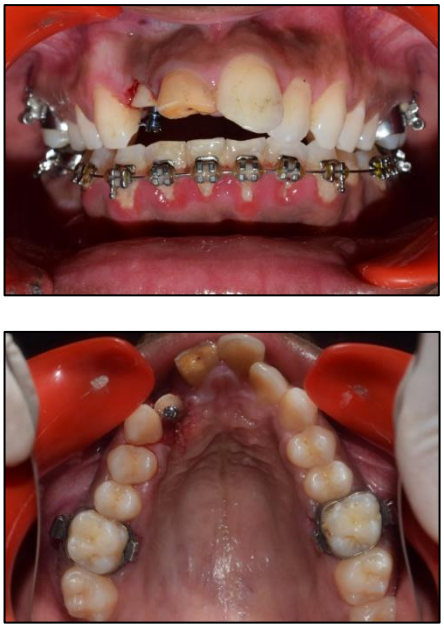

Figure 3

After the desired amount of extrusion was achieved, the mini-implant was removed from the previously prepared post space of 8mm and then an additional 6 mm of post space was prepared accounting for total post space of 14mm, leaving 5mm of apical gutta percha.

A cast post was fabricated and cemented, followed by cementation of temporary acrylic crown on central and lateral incisors (Figure 4). Comprehensive orthodontic treatment was then carried out.

Figure 4

DISCUSSION

Movement of a tooth by extrusion involves applying tractional forces in all regions of the periodontal ligament to stimulate marginal apposition of crestal bone. The gingiva and the periodontiumfollow the vertical movement of the root during the extrusion process, thus maintaining the health of the attachment apparatus of the tooth.[5]

If the fracture line is positioned both below alveolar bone and gingival free margin, and if the length of the root segment is sufficient enough to support a coronal restoration, then the root can be endodontically treated and afterwards orthodontically extruded to elevate the fracture plane above the gingival margin. These procedures enable more favourable prosthodontic coronal restoration by securing its good sealing and aesthetics, and moreover, preserving a good periodontal tissue health.[6] Recently, Simon [7] and Heithersay[8] have successfully used vertical orthodontic movement to extrude teeth with fracture lines below the crest of the bone or the gingival attachment. Extrusion of these teeth allows the elevation of the fracture line above the epithelial attachment where definitive finishing margins can be created for proper restoration.

A force of 20 to 30 gm is an optimal orthodontic force for single rooted tooth; the applied force should be based on the physiologic response of individual tooth depending on its root size, root length, root morphology, and periodontal support [5]. Based on the rate of tooth movement, 1 mm of extrusion per week is considered physiologic for slow extrusion.[9]

CONCLUSION

A multi-disciplinary approach thusproves to be an efficient method for the restoration of tooth fractured at a subgingival level taking into consideration the aesthetic, periodontal health and stability factors.

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