

SECTIONAL FIXED ORTHODONTIC EXTRUSION TECHNIQUE IN MANAGEMENT OF TRAUMATICALLY FRACTURED CENTRAL INCISOR - A CASE REPORT

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ABSTRACT

Traumatic dental injuries are more common among children and adolescent age group, the treatment of such injuries critical and depends on the amount of the dental and adjoining periodontal tissue damage, traumatic dental injuries may extend from simple enamel fracture to the complex crown mass fracture, in later there is need of the treatment modality where the crown has been lost and remaining tooth structure is not enough to retain the restoration that is inadequate ferrule. Many treatment options can be considered like Surgical extrusion of the tooth, Orthodontic extrusion of the tooth followed by provisional restoration, Surgical Crown lengthening, extraction and provisional restoration. In such a situation orthodontic tooth extrusion is a less invasive, simple and successful treatment option in the child and adolescent age group. Here is a case report of the 12- year- old child presented with the fracture of the right upper central incisor and the remaining tooth structure was not enough to retain a restoration, in which we opted a sectional orthodontics.

KEY WORDS

traumatic dental injuries, ferrule, orthodontic extrusion

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INTRODUCTION

The prevalence of traumatic dental injuries in India has been found to be 13 cases per 100 individual and is more common in males of <6 years of age. Traumatic dental injuries increased due to inadequate lip coverage, increased overjet among other risk factors¹.

Fracture, displacement or loss of teeth that are an outcome of facial trauma can have a significant negative functional and esthetics effect on the individual². Traumatic dental injuries have also shown to occur in males and with single tooth involvement being the most affected are class 2 fracture³.

It has been found that children are affected emotionally due to missing or broken anterior teeth and they become socially introverted^{4,5}. So it is very important to properly diagnose and treat such cases for the emotional and functional wellbeing of the patients.

There are few treatment approaches for the treatment of fractured anterior teeth.

Tooth Fragment reattachment, Surgical extrusion, Orthodontic extrusion, crown lengthening followed by post-core, etc.

Orthodontic extrusion of a root fractured tooth in the coronal third was first described by Heithersay in 1973⁶. The principal aim of orthodontically extruding a fractured tooth, so that it can be restored, is to provide asupra - gingival tooth margin. This will make it possible to provide an extra-coronal restoration that won't interfere with the periodontium⁷.

Orthodontic extrusion has been successfully used in treating intrusive luxation injuries and it has been shown that using orthodontic extrusion technique reduces the possibility of external root resorption by 30 to 40 percent⁸.

CASE REPORT

A 12-year-old boy came to The Department of Pedodontics and Preventive Dentistry with a chief



Fig-1: Ellis- Davis class 3 fracture, and loss of two-third crown structure.



Fig-2 : showing a section fixed orthodontic procedure, where the MBT brackets are placed from right premolar to left lateral incisor, with section of 0.014inch diameter nickel titanium arch wire is placed and secured with ligature rings.



Fig 3: Showing adequate extrusion of right upper central



Fig 4 : Brackets removed, 11 restored with composite



Fig 5 : 1 month post operative follow-up

complaint of fractured anterior tooth. The patient gave a history of fall from stairs during playing in school. The patient reported of having pain which has subsided after taking pain medications, the patient was stable without any other remarkable medical history.

On clinical examination it was found out there was an Ellis Davies class 3 fracture [fig 1] of upper right central incisor with the disto-proximal fracture line extending just above the gingival margin. Root canal treatment was done following standard irrigation protocol and obturation was done till the working length.

On the next visit the patient was symptom free and since there was inadequate ferrule in the disto-proximal side, orthodontic extrusion followed by rehabilitation of the fractured tooth was planned. Sectional orthodontic approach was taken and brackets were placed on adjacent two teeth on both side of the fractured tooth along with the tooth itself. A sectional Ni Ti wire of 0.014 inch diameter was placed and secured with the brackets using elastic modules [fig 2].

The ends of the Nickel Titanium wire were covered with composite resin to make the ends rounded to avoid any injury to the lips.

The patient was given advice on maintaining proper oral hygiene and was asked to come after 1 month for follow up [fig 2]. It took two months for adequate extrusion [fig3] of the fractured tooth and the brackets were removed.

The remaining composites were cleaned and polished following which a composite restoration was done to restore the defect of the fractured Right central incisor [fig 4]. Supra-crestal fiberotomy was done followed by placement of a lingual retainer for a predictable outcome. Figure 5 shows the 1-month follow-up, A crown lengthening surgery followed by full coverage crown was planned after completion of growth.

DISCUSSION

Traumatic dental injuries causing loss of coronal tooth portion along with intrusion of the tooth, results in the inadequate remaining tooth structure that is the ferrule, making it difficult to retain a restoration.

The treatment options for managing such conditions includes^{7,8,9,10}. Surgical extrusion of the tooth, Surgical Crown lengthening¹⁰. Orthodontic extrusion of the tooth followed by provisional restoration^{14,15}. Extraction and provisional restoration till implant placement.

Considering the age of the child the extraction was avoided as it affects the esthetics and function. Surgical extrusion is also avoided at instance as it is invasive. Surgical crown lengthening, is also avoided as it requires apical repositioned flap with bone resection¹¹, as apical flap reposition alters the gingival zenith, and esthetics. Orthodontic extrusion can be done by fixed, removable orthodontic appliances,

temporary anchorage device, and sectional orthodontic therapy^{6,9,14,15}.

Surgical extrusion of the tooth involves careful flap elevation, apical exploration and carefully elevating the tooth. Time required for extrusion is less, but is invasive procedure¹⁰. According to Martina Cordaro, the orthodontic extrusion is safe, simple and the force are lighter are under the control of the operator¹¹.

Orthodontic extrusion is indicated horizontal fracture of the tooth and in cases of inadequate ferrule, states that the orthodontic tooth extrusion is physiological and easy to carry out and as it doesn't depend on the patient compliance¹³.

Sectional fixed orthodontic extrusion is a simple procedure, where only a few teeth are utilized for anchorage and extrusion is accomplished by basic mechanics of orthodontics^{14,15}.

Here in our case report we have adopted sectional fixed orthodontic extrusion as it is a minimally invasive procedure, and we have used a fixed mechanotherapy rather than a removable appliance hence the child compliance to wear appliance is avoided. The basic mechanics of MBT bracket system combined with the shape memory nature of nickel titanium wire have been applied to extruded the tooth. Our primary goal for extruding right upper central incisor is to have a adequate ferrule for the restorative purposes. And according many authors the contour gingiva is unpredictable but it was not observed in our case.

After the orthodontic therapy relapse is unavoidable hence, we opted a supra-crestal fibrotomy.

Treating a fracture of anterior teeth is crucial especially in a child and adolescents as to be in a part of peer and for self-esteem.

Treatment of the fracture tooth is a multidisciplinary approach as it includes a endodontic, orthodontic rehabilitation aspects for completion of the treatment. Initial endodontic therapy was done on first appointment followed by application of the sectional orthodontics that is positioning the MBT braces from right upper canine to left upper canine followed by placement of the 0.014 inch diameter nickel titanium wire, engaging it by a ligature tie as the nickel titanium wire straightens due to its shape memory the tooth is extruded. After the extrusion was satisfactory the brackets were removed, supra-crestal fibrotomy was done and crown build was using composite, considering the age of the patient.

CONCLUSION

According to many authors section orthodontics is simple and predictable. As it is fixed unlike removable orthodontic extrusion appliances the

patient compliance, and less invasive than surgical extrusion, and more conservative approach than extraction with provisional restoration.

Surgical crown lengthening is also a treatment modality but it is done at an expense of bone resection, which hampers the periodontal health.

In contrast of all the above treatment modalities Sectional orthodontics tooth extrusion where tooth movement is physiological, involves the simple mechanics of orthodontics and under the control of the operator.

Hence its application in the trauma for the tooth extrusion, was promising and successful in our case.

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