



ORTHODONTIC EXTRUSION OF A SUB-GINGIVALLY FRACTURED INCISOR TOOTH- A MULTIDISCIPLINARY APPROACH

Orthodontics

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ABSTRACT

This case report details the multidisciplinary treatment approach of restoring a sub-gingivally fractured maxillary left central incisor of a 12-yr old boy. Orthodontic extrusion, tooth exposure with electrocautery, endodontic treatment and composite direct veneer was planned after careful examination and diagnosis. After taking preliminary records, maxillary arch was bonded with pre-adjusted fixed orthodontic appliance (022 slot MBT prescription) and 0.018" AJ Wilcock wire was indirectly ligated to the lingual button bonded on the fractured tooth. Approximately 3 mm of orthodontic extrusion was achieved in three months' time with orthodontic extrusive mechanics and the fracture line was brought above the supragingival level. The fractured tooth was then taken up for aesthetic rehabilitation. This multidisciplinary approach helped in saving front tooth of a young boy, preserved the supporting alveolar bone, limited the involvement of adjacent teeth and improved quality of life of this child. Six months follow up after treatment revealed good periodontal health, aesthetics and normal function.

KEYWORDS

Dental trauma, Orthodontic extrusion, Aesthetic treatment

INTRODUCTION

It is rightly said "Alone, we can do so little; together, we can do so much"- Hellen Keller.

Dentistry is a dynamic profession, constantly evolving due to the introduction of newer and advanced treatment options. Teeth, once deemed hopeless or severely damaged can now be treated and restored efficiently using multidisciplinary treatment approach, ultimately improving the patient's quality of life.

Unfortunate incidences like anterior tooth fractures can occur due to a variety of reasons such as sports injuries, traffic accidents, physical fights, child abuse, neglected caries, falls and accidental collisions¹. Trauma not only damages the tooth, but deprives the child of his innocent smile.

Endodontists frequently encounter such debilitated and non-restorable teeth having minimal clinical crown length and, in such cases, orthodontic extrusion is considered the "gold standard" for producing an aesthetic result without jeopardizing the periodontal health of adjacent teeth. It is defined as orthodontic movement in a coronal direction through the application of gentle continuous forces to cause changes in soft tissues and bone.¹

To achieve optimal aesthetic results and healthy periodontium, a total of 3-4 mm of tooth length i.e., 2.04 mm for the biological width (epithelial and connective tissue) plus 1-2 mm of tooth coronal to the epithelial attachment for the margin of the restoration is needed.^{2,3} Violation of the biological width results in gingival inflammation, bleeding and increased plaque accumulation (made worse with patient's inability to clean the area) leading to iatrogenic periodontal breakdown and a premature loss of restoration or prosthesis.

The following case describes a multidisciplinary approach of treating a badly fractured maxillary left central incisor, incorporating orthodontic extrusion, endodontic treatment and composite build-up.

A 12-year-old boy with his anterior tooth fracture visited the Out-patient department of JCD Dental College, Sirsa and was referred to Department of Endodontics for needful. They found Ellis Class VIII of maxillary left central incisor and further referred the case to the Department of Orthodontics, seeking opinion for orthodontic extrusion. Patient complained of tooth fracture and bad appearance of his left upper central incisor after dental trauma. Intra- oral and radiographic examination revealed Ellis Class III fracture of tooth 11, Ellis Class VIII fracture of 21, avulsed 22 and improper gingival

marginal contour (Fig 2). The fracture line extended below the gingival level at the palatal surface of the tooth. Radiographic examination (IOPA) revealed reduced biological width on mesial surface of 21, sufficient root length, closed apex, no periapical inflammation and no root resorption (Fig 3).



Fig 1: Extra-oral (pre-treatment-smiling)



Fig 2: Intra-oral pictures (pre-treatment)

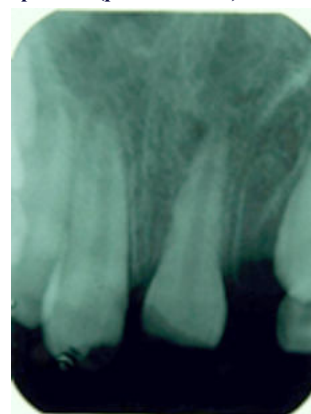


Fig 3: Intra-oral periapical radiograph (pre-treatment)

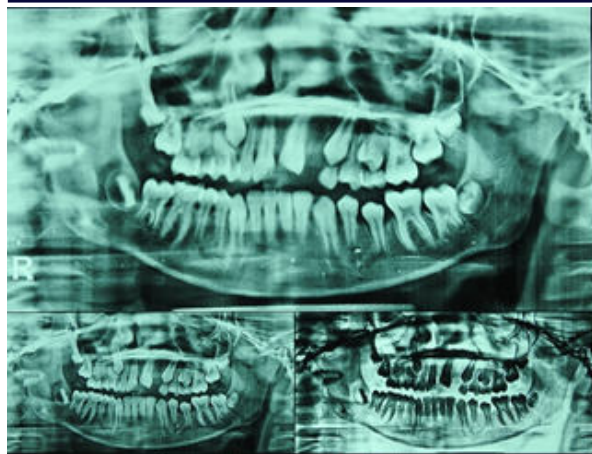


Fig 4: OPG (Pre-treatment)

After taking the preliminary records, maxillary arch was bonded with pre-adjusted edgewise appliance (022 slot MBT prescription). Right maxillary central incisor (11) and both the deciduous canines were not included in the strap up (Fig 5A).

A lingual button was bonded on the fractured maxillary left central incisor as there was insufficient space for bonding a bracket. 0.018-inch AJ Wilcock wire with two helices (3 mm each) was fabricated and shaped according to the arch form of the patient (Fig 5B). The arch wire was then inserted in the molar tubes, ligated in the pre-molar brackets, but bypassed the maxillary right lateral incisor and was bonded to the maxillary right central incisor (11).

Out of the two helices, one helix was positioned mesial to the fractured 21 and one distal to it. Initially wire was indirectly ligated to the lingual button through the distal helix to have a disto-occlusal force component (Fig 5C). Plastic sleeves were placed on the wire wherever not ligated, to prevent impingement of the soft tissues. Occlusal bite ramps (blue bite) were bonded on the palatal cusps of maxillary arch to open the bite (Fig 5D).

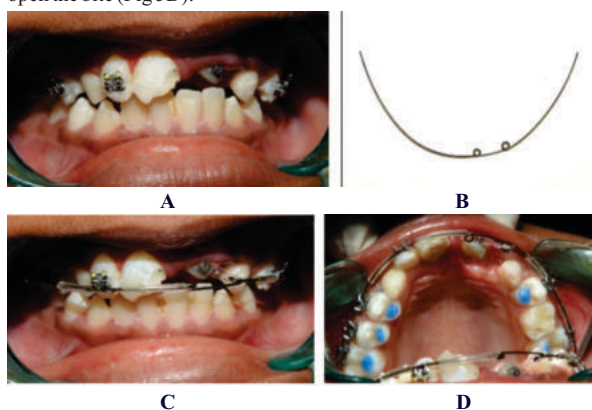


Fig 5: Orthodontic extrusion

Electrocautery procedure was performed in the next appointment to re-establish the gingival margin and once the gingiva healed, composite build up was done on 21 (Fig 6). 0.016" stainless steel wire was indirectly ligated above the lingual button.



Fig 6: Mid-treatment frontal picture



Fig 7: Extra-oral smiling (post extrusion)



Fig 8: Intra-oral pictures (post-treatment)



Fig 9: Intra-oral periapical radiograph (post-treatment)

The active orthodontic treatment phase for this case was three months (Fig 7) and patient reported 6 months for a follow up (Fig 8).

CONCLUSION

A number of treatment options have been proposed for fractured teeth, each with their own advantages and disadvantages⁶. Extraction should not be the first choice of treatment for a fractured or extremely broken young permanent tooth in the anterior area, because it leads to loss of bone in the area, compromising future treatment with implants.^{7,8}

When considering orthodontic extrusion, it is important to consider some confounding factors such as crown-root ratio, root abnormalities, fracture type and location, interocclusal space, the patient's lip-line aesthetics (e.g., smile line), gingival margin levels and periodontal status of adjacent teeth.^{9,10} The advantages of slow orthodontic extrusion is that it is safe and minimally invasive with no loss of surrounding bone and the extrusive forces not only increase the visibility of fractured tooth in the oral cavity but also provides a better periodontal status at the end of the treatment.

After careful diagnosis and a discussed treatment plan, this patient was taken up for orthodontic extrusion, electrocautery, endodontic treatment and composite core build up. Post-operative follow-up after 6 months showed that the patient had intact restorations, adequate root length, and was satisfied with the treatment.

It was due to the multidisciplinary involvement of an Endodontist and Orthodontist that a severely damaged front tooth of a young boy was successfully restored with good function and aesthetics.

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