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Extrusion of Fractured Maxillary Anterior Teeth Using Conventional Mechanics - A Case Report

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Type of Publication: Case Report

Conflicts of Interest: Nil

Abstract

Management of subgingival fractures in maxillary anterior teeth poses a clinical challenge due to compromised biological width and aesthetic concerns. Orthodontic extrusion is a conservative treatment modality that facilitates coronal repositioning of the fractured tooth using light forces, thereby exposing sound tooth structure while preserving periodontal health. A 17-year-old male patient reported with a history of trauma to the maxillary anterior region following an automobile accident. Clinical examination revealed oblique crown fractures involving the permanent maxillary left central incisor and lateral incisor, affecting approximately three-fourths of the clinical crown with pulpal exposure. Endodontic therapy was completed prior to orthodontic intervention. A customized orthodontic extrusion appliance fabricated using 0.016-inch AJ Wilcock wire and Begg’s brackets was employed. Following standard bonding protocol with 37% phosphoric acid etching, primer application, and light curing, controlled extrusive forces of approximately 50 grams were applied. Forced eruption of approximately 3 mm was achieved using light continuous forces (0.2–0.3 N), with monthly follow-up visits to monitor progress. Successful extrusion resulted

in adequate supragingival tooth structure, enabling proper prosthetic rehabilitation while maintaining periodontal integrity. Post-treatment evaluation showed satisfactory functional and aesthetic outcomes. Orthodontic extrusion is an effective and minimally invasive approach for managing subgingival fractures in anterior teeth. It preserves natural tooth structure and biological width, providing favorable restorative outcomes when combined with interdisciplinary care and proper case selection.

Keywords: Orthodontic extrusion, subgingival fracture, anterior teeth, forced eruption, biological width, interdisciplinary approach

Introduction

Orthodontic extrusion is a conservative and effective treatment modality for managing subgingival fractures of maxillary anterior teeth. This technique involves the gradual movement of the fractured tooth coronally using light orthodontic forces, thereby repositioning the fracture line above the gingival margin[1]. This approach preserves the natural tooth structure and maintains the biological width, which is crucial for periodontal health and aesthetic outcomes[2].

Case Report

A 17-year-old male patient was referred to the Department of Orthodontics and Dentofacial Orthopaedics with a history of an automobile accident and injury to the upper front teeth.

Initial examination revealed an oblique fracture on permanent maxillary left central incisor (MLCI) and permanent maxillary left lateral incisor (MLLI) involving three-fourths of the clinical crown with associated exposure of the pulp & Root canal treatment of the above affected teeth were done in the Department of Conservative Dentistry and Endodontics.

Figure 1: Pre-treatment photographs

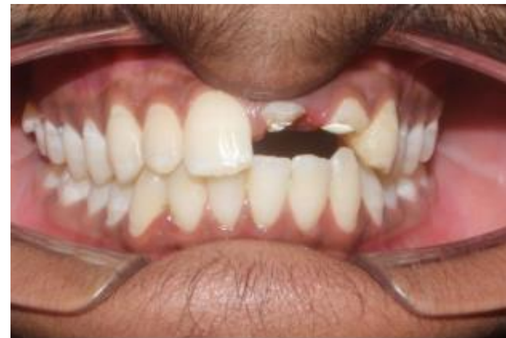

Fig 1.1: Frontal pre treatment photographs

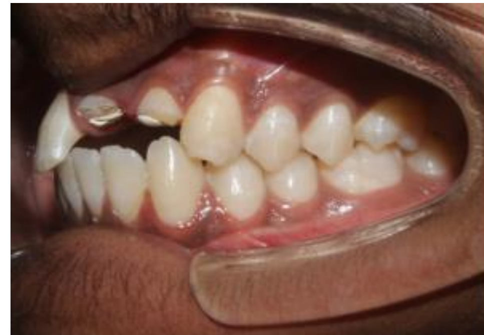

Fig 1.2: Right side view pre treatment photographs

To restore the fractured crowns with the prosthesis, minimum of 3-4 mm distance from the alveolar crest to the coronal extension of the remaining tooth structure has been recommended for optimal periodontal health.

In our case, after taking impressions of the patient, and case analysis, a custom-made appliance was fabricated for the patient and the forced eruption was limited to 3 mm (maximum 5 mm as suggested by Ingle and was achieved with minimal force of 0.2-0.3 N).

Fig 2: After placement of the customised appliance

Fig 2.1: Frontal view of customised appliance

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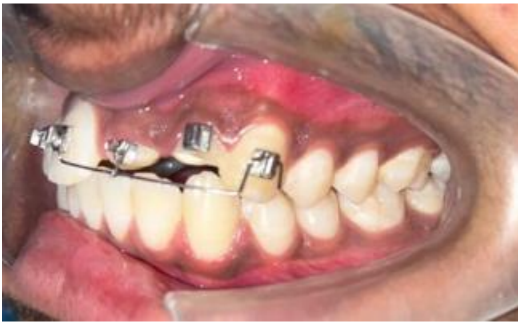
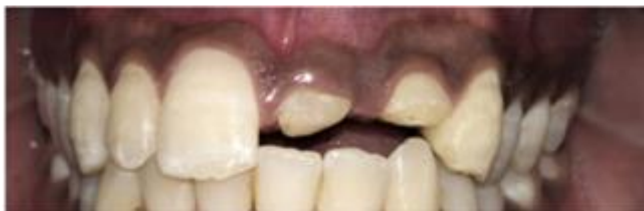


Fig 2.1: Right side view of customised appliance

This customised appliance is made by 0.016 inches AJ WILCOCK wire. The teeth that included in this, underwent etching with 37% Phosphoric acid gel for 15 seconds followed by rinsing and drying until it appeared dry frosty. After etching , primer was applied to the teeth and bonded with begg's brackets and cured with a wavelength bandwidth of 400-515 nm. The customised appliance is then inserted and ligated with ligature wire. A vertical traction force of 50gms (35-60gms) is applied.Patient is recalled every one month till the desired amount of teeth is exposed for placement of crowns.

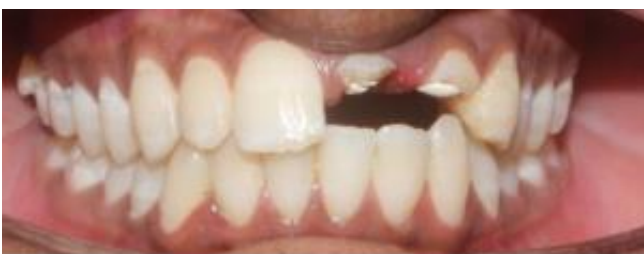
Figure 3: Post debond picture



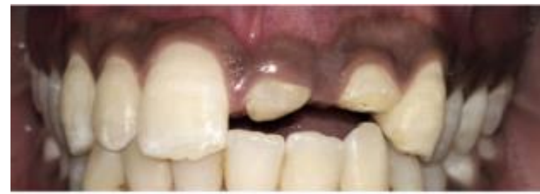
The teeth are then debonded and referred to Department of Endodontics for further treatment.

Figure 4: Comparision of Pre and Post Treatment Pictures:

Pre Treatment



Post Treatment



Discussion

Management of subgingival crown-root fractures in maxillary anterior teeth is often challenging due to violation of the biological width and difficulty in achieving adequate retention and aesthetics. Various treatment modalities such as surgical crown lengthening, surgical extrusion, and orthodontic extrusion have been advocated. Among these, orthodontic extrusion is considered a conservative and predictable approach that preserves periodontal health and maintains alveolar bone support[1,2].

Orthodontic extrusion works by applying controlled light forces to gradually move the tooth coronally, thereby repositioning the fracture margin above the gingival level. Agarwal S et al.[1] demonstrated the successful use of a 'J' hook mechanism for extrusion of a subgingivally fractured maxillary central incisor, emphasizing the importance of controlled forces and interdisciplinary management. Similarly, Dede DO et al.[2] highlighted that a multidisciplinary approach involving endodontic, orthodontic, and prosthodontic intervention ensures optimal functional and aesthetic rehabilitation.

In the present case, extrusion of approximately 3 mm was achieved using light continuous forces (0.2–0.3 N), which is in accordance with the findings of Singhal DS et al.[3] and Wang J et al.[4], who reported that slow orthodontic extrusion with forces ranging between 30–60 grams facilitates favorable periodontal adaptation and minimizes root resorption. The gradual eruption allows coronal migration of both hard and soft tissues, thereby maintaining gingival architecture and biological width.

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Alternative techniques such as surgical extrusion have also been reported in the literature. However, Elkhadem A et al.[7], in their systematic review, noted the potential for complications such as root resorption, ankylosis, and marginal bone loss associated with surgical extrusion. Similarly, Grira I et al.[8] suggested that although surgical extrusion can be a viable option, it is technique-sensitive and may not always provide predictable long-term outcomes.

The combination of orthodontic extrusion with restorative procedures has been shown to yield excellent results. Suprabha BS et al.[6] demonstrated that reattachment along with orthodontic extrusion can effectively restore both aesthetics and function in fractured anterior teeth. This supports the present case, where adequate tooth structure was exposed to facilitate prosthetic rehabilitation while preserving periodontal integrity.

Overall, orthodontic extrusion offers a minimally invasive, biologically sound, and aesthetically favorable treatment option for managing subgingival fractures. Proper case selection, application of controlled forces, and close interdisciplinary coordination are critical factors influencing the success of this treatment modality[1-4,6-8]

Conclusion

Orthodontic extrusion serves as a valuable technique in the management of subgingival fractures of maxillary anterior teeth. By preserving the natural tooth and surrounding periodontal structures, it offers a conservative approach that can yield excellent functional and aesthetic outcomes[3-6]. However, careful case selection and interdisciplinary collaboration are essential to achieve optimal results.

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