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Conservative Management Of Sub Gingivally Fractured Anterior Teeth By Surgical Exposure & Orthodontic Extrusion: A Case Report

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Abstract:
Traumatic dental injuries to anterior teeth can have profound aesthetic, functional, and psychological impact, especially in young adults. Avulsion injuries with subgingival fracture lines present a unique restorative challenge due to violation of the biologic width and difficulty in achieving adequate retention for definitive restorations. This case report describes the conservative management of an 18-year-old woman who sustained avulsion and complicated crown-root fracture of the maxillary left central incisor following a road traffic accident. The tooth was repositioned, endodontic therapy initiated, and controlled orthodontic extrusion performed using a fixed appliance system to expose sound tooth structure above the gingival margin. This approach allowed for preservation of periodontal health, creation of a proper ferrule, and achievement of optimal aesthetics without the need for aggressive surgical intervention. Orthodontic extrusion proved to be an effective, biologically compatible method for restoring function and smile harmony in anterior trauma cases. Analgesia, one of the components of triad of anaesthesia

Key Word*: Avulsion injury, Orthodontic extrusion, Subgingival fracture, Anterior trauma, Conservative treatment*

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I. Introduction

Traumatic injuries to maxillary anterior teeth, particularly crown–root fractures and avulsion, are common in young adults and can have significant aesthetic, functional, and psychosocial consequences. When the fracture line extends subgingivally, the biologic width is violated, complicating restorative planning and making conventional approaches less predictable [1,2]. Preservation of the natural tooth is often preferred over extraction to maintain periodontal architecture, alveolar bone volume, and proprioception [3].

Orthodontic extrusion, also known as forced eruption, is a conservative treatment that repositions the fracture margin coronally, re-establishes a healthy biologic width, and provides favorable soft tissue contours [4,5]. Compared with surgical crown lengthening, it avoids compromising aesthetics or causing unnecessary bone loss, making it particularly advantageous in the anterior region [6].

This case report describes the multidisciplinary management of an 18-year-old female patient who sustained avulsion and subgingival crown–root fracture of the maxillary central incisor, treated successfully using endodontic therapy, controlled orthodontic extrusion, and definitive restorative rehabilitation.

II. Case Report

An 18-year-old female presented to the Department of Conservative Dentistry and Endodontics, CSMSS Dental College, Chhatrapati Sambhajinagar, with the chief complaint of fractured upper front tooth for the past month following a road traffic accident. She expressed significant concern regarding esthetics and function. The patient was in good general health, with no relevant past medical or dental history, no history of malocclusion, and no periodontal disease.

Clinical Examination:

Extraoral findings were unremarkable. Intraorally, the maxillary left central incisor (#21) was fractured and not clinically visible, and the gingival tissue at the edentulous site appeared healed. Adjacent teeth were intact, with normal mobility and vitality. The occlusion was Angle's Class I with no midline deviation. Periodontal probing around adjacent teeth showed normal sulcus depth. Periapical radiography revealed the presence of the retained root fragment of #21 with complete root development, intact periodontal ligament space, and adequate alveolar bone height. No periapical radiolucency or alveolar fracture was observed

Treatment Planning:

Given the patient's young age, desire for a fixed esthetic solution, and favorable root condition, a multidisciplinary approach was planned:

1. Surgical exposure of the retained root followed by orthodontic extrusion to achieve supragingival ferrule.
2. Conventional root canal treatment.
3. Post and core build-up for structural reinforcement.
4. Definitive porcelain-fused-to-metal (PFM) crown restoration.

Procedure methodology:

1. Surgical Exposure and Orthodontic Extrusion

Under local anesthesia (2% lignocaine with 1:80,000 epinephrine), a minimal crestal incision and mucoperiosteal flap reflection exposed the coronal portion of the root. A fixed orthodontic appliance was bonded, and an eyelet bracket was attached to the exposed tooth structure. Continuous light extrusive force (~50 g) was applied using an elastomeric chain. Over a period of 6 weeks, the tooth was extruded approximately 3 mm, achieving biological width and ferrule height as recommended in the literature [7,8]. Retention was maintained for 4 weeks to allow periodontal and bone remodeling. (Figure 1,2,3,4)

2. Endodontic Therapy

After orthodontic retention, rubber dam isolation was achieved. Cleaning and shaping were performed using a step-back technique up to master apical file size #60. Irrigation was done with 2.5% sodium hypochlorite, followed by saline flush. Obturation was carried out using gutta-percha and AH Plus sealer by lateral condensation.

3. Post and Core Placement

Post space preparation was done using Peeso reamers, maintaining at least 5 mm of apical gutta-percha for sealing. A prefabricated fiber-reinforced composite post (two-thirds of root length) was selected for optimal retention and stress distribution [9]. Core build-up was completed with dual-cure resin composite. (Figure 5,6)

4. Definitive Crown Restoration

Tooth preparation for a full-coverage crown was performed with 1.5 mm labial reduction, 1.0 mm lingual clearance, and shoulder finish line. A shade-matched PFM crown was fabricated and cemented using glass ionomer luting cement (Figure 7).

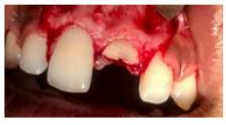
Figure 1 
Figure 2 
Figure 3 

Figure 4 
Figure 5,6 
Figure 7 

The patient was reviewed at 1, 3, and 6 months. The restored tooth remained asymptomatic with healthy gingival margins, normal probing depths, and excellent esthetic integration. The patient reported high satisfaction with both function and appearance.

III. Discussion

Management of subgingivally fractured or retained roots in esthetically critical areas is challenging, particularly in young patients where implant therapy may not be ideal due to ongoing alveolar development. Orthodontic extrusion offers a predictable, conservative solution to achieve coronal tooth structure exposure while maintaining periodontal health [7,8].

In this case, the delayed presentation (1-month post-trauma) ruled out replantation, consistent with findings that prolonged extra-oral dry time leads to ankylosis and inflammatory resorption[10]. The presence of a mature root with no periapical pathology made the tooth a suitable candidate for salvage.

Key factors for long-term success include adequate ferrule height (≥2 mm), preservation of the apical seal during post space preparation, and use of a fiber post to distribute functional stresses and reduce root fracture risk [9,11]. Literature supports the use of light continuous orthodontic forces (approximately 50 g) for extrusion over 4–6 weeks, followed by retention to allow biological adaptation [7,8,12].

Compared to surgical crown lengthening, orthodontic extrusion maintains crestal bone and gingival architecture, which is crucial in the anterior maxilla for esthetic harmony [7,11]. The PFM crown provided durable esthetics while allowing for optimal occlusal loading.

IV. Conclusion

This case demonstrates that interdisciplinary management—combining surgical exposure, orthodontic extrusion, endodontic therapy, post and core build-up, and full-coverage restoration—can successfully rehabilitate a traumatized maxillary central incisor with a retained root fragment, even when treatment is initiated one-month post-trauma. Careful case selection and adherence to biological principles yield predictable functional and esthetic outcomes.

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