



CASE REPORT

Direct Restorative Treatment via Forced Eruption of Broken Incisor in 65 years Old Male Patient

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Abstract

It is not easy to preserve and restore individual teeth that have been damaged in the apical region of the alveolar bone crest due to various causes such as caries, crown fracture, perforation, or external resorption. In these cases, the dentist must decide whether to preserve the tooth root or extract it. Elective treatments following root extraction include replacing the missing tooth with various types of prostheses or implants, but if preservation of the tooth root is desired, elective treatments include surgical lengthening of the clinical crown (crown lengthening) or forced eruption orthodontics. Crown lengthening surgery, especially in the anterior upper region, is associated with significant problems in terms of providing aesthetics. Periodontal surgery to increase crown length and establish biological coverage requires the removal of a large amount of supporting bone from adjacent teeth. Therefore, forced eruption is considered as the treatment of choice in these cases.

Introduction

The treatment planning for teeth with crown-root fractures is challenging due to the subgingival or crestal location of the defects. Especially the decision making in esthetic zones like maxillary incisors depend on many crucial factors. The treatment approaches include reattachment of the coronal fragment, direct composite restoration of accessible fractures and surgical crown lengthening, or extrusion of the root segment [1,2]. In any treatment plan decision in such teeth, 2 mm biologic width and 2 mm ferrule design are deemed to be ideal distances from the alveolar crest up to the coronal extent of the remaining dental hard tissue. As many studies demonstrated crown lengthening can predictably increase crown length, but tissue

rebound might occur, particularly during the first three postoperative months [3]. Also, the esthetic zone might be compromised by such alterations, which can affect the teeth nearby [4]. Thus, crown lengthening should be carefully considered in patients with a high lip-line and excessive gingival appearance [5]. On the other hand forced eruption treatment might facilitate the re-establishment of biologic width and allow restoration margins to be placed on sound dental hard tissue. This treatment can improve the esthetic zone maintenance or creation of a regular gingival contour. The forced eruption technique in axial direction avoids compression of the periodontal tissues and especially root resorption, while in extraction treatment biological complications might occur. In conclusion, forced eruption technique is more conservative and physiologic than surgical extrusion. This technique was first introduced by Heithersay as coronal orthodontic movement achieved by applying continuous orthodontic force for the purpose of preserving soft tissues and gaining vertical bone height [6,7].

Case Report

The patient is an 65 year old man without systemic problems with a fractured crown of tooth number 8. The patient stated that he had a motorcycle accident about 3 months ago and he suffered from this fractured tooth due to impaction and severe pain. He had RCT treatment 9 weeks ago, but after the pain subsided, he did not return for further treatment due to his economic problems. He had visited several centers for treatment in the last few days, but he had not achieved

any results, and finally, due to deep decay in mesial and distal, he was advised to extract the tooth. When he was clinically examined in Restorative Dentistry Department of Tehran University of Medical Sciences, the RCT treatment was assessed and the decay was entered into the coronally aspect of the root. The deepest carious area was located approximately 2 mm below the mesial bone crest, so during crown lengthening surgery, at least 5 mm of bone had to be removed from this area to reach the minimum acceptable amount of healthy tooth tissue, excluding the bone from the mesial side of tooth number 8 (Figure 1). This procedure required extensive osteotomy on adjacent teeth, and performing it on the central teeth of the upper jaw would have created significant cosmetic problems for the patient. Considering the mentioned problems, the patient's age and, the best cost effective choice in this case was forced eruption.

Therefore, after removing the caries and performing RCT retreat and after resolving the inflammation, a post with a hook was cemented into the prepared dental canal using a 0.9 mm steel wire. Using the composite & wire technique, appropriate anchorage was obtained from the canine to the maxillary canine. The horizontal wire was as close as possible to the incisal edge and passed completely above the desired mold with two bends in the root area of the number 8 tooth (Figure 2). Growth force was applied using an appropriate elastic band. These elastics were replaced weekly. By applying light and continuous force, 5 mm of tooth extrusion was achieved over a period of 10 weeks.

After the elastic bands were removed, a 1 mm osteotomy was required in the mesial area of the tooth. After the osteotomy and osteoplasty, the flap was sutured and after the frenectomy, the area was dressed. Four weeks after surgery, bone formation and trabeculation were observed in the apex of tooth number 8 on radiographs. At this time, the horizontal wire and composite were removed, and one month later, the tooth was restored with fiberpost cementation and direct composite buildup and buccal



Figure 1: Tooth number 8 at first visit of 65years old patient.

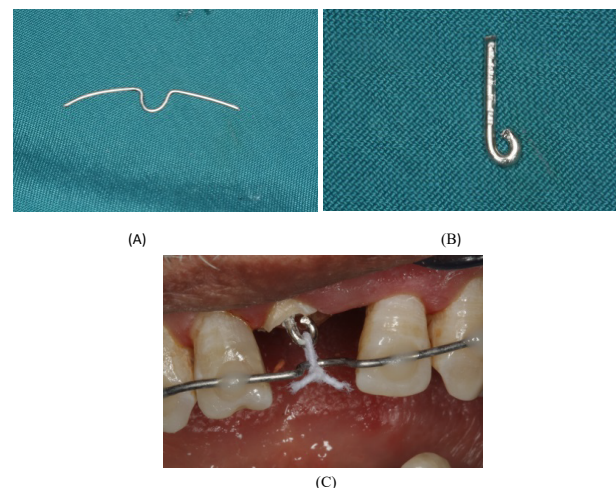


Figure 2: Force eruption technique by the use of (A) Horizontal orthodontic wire (B) Metal hooks (C) Applying elastic bands.



Figure 3: Five mm eruption of clinical crown.



Figure 4: A) Composite buildup of tooth number 8 after forced eruption; B) 6 months later, keratinized gingiva has filled the space between veneered teeth number 8 and 9.

veener (Figure 3 and Figure 4A). Tooth number 9 was composite veneered to rehabilitate the most symmetry and aesthetic condition.

Clinical evaluation 6 months after veneering showed a one-millimeter increase in the width of the keratinized gingiva (Figure 4B).

Discussion

Surgical lengthening of the clinical crown, especially in the maxillary anterior region, is usually associated with significant problems in terms of aesthetic matters. The use of the Eruption Forced technique does not always eliminate the need for surgical treatment, but it can provide greater aesthetics. The composite and wire technique is a simple, inexpensive and feasible method for enhancing sufficient clinical crown. In this case, slow

orthodontic tooth movement has increased the alveolar height. The tooth number 8 had sufficient root length to provide good support for the clinical crown and due to heavy caries existence, it was treated endodontically first. Forced eruption has more advantages for coronal direct or indirect restorations by enhancing proper sealing, esthetics and health preservation of periodontal tissue [8]. Studies address that extrusion of endodontically treated teeth did not have any adverse effect. They also reported that the alveolar process moves in the occlusal direction as the tooth is extruded, followed by bone deposition at the alveolar crest [9]. In this case, the other treatment choice was extraction followed by implant rehabilitation but forced eruption was deemed to be the best choice.

The important fact in this treatment is the recalls of the patient every 1 to 2 weeks to reduce the occlusal surface of the tooth being extruded, inflammation control and precise monitoring of the progress. The patient's age, the distance of tooth movement, and the PDL viability determine the forced eruption timing [10]. After 10 weeks of extrusion, 5 mm of the root was exposed at an average speed of 0.5 mm/week, while other authors reported an average extrusion rate of 1 mm/week [11]. According to some studies, the maximum force for a slow movement should not exceed 30 g [12,13]; however, rapid extrusion is accomplished by applying forces > 50 g. Therefore, extended retention periods are necessary for stabilizing the tooth for the remodeling and adaptation of the periodontal structures to the new tooth position [14]. The final treatment in this case was direct composite build up with fiber post and veneering of the two central incisors in regard to patient's age and difficult economic situation. Excellent esthetic results have been achieved by comparing preoperative and postoperative pictures of the tooth. Moreover, compared to all-ceramic restorations, which require a shoulder finish line, this treatment was considered more conservative [15].

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