



## CASE REPORT

# Orthodontic Extrusion with Circumferential Supracrestal Fiberotomy: A Report of Two Cases

Elvan Önem Özbilen<sup>1</sup> , Hanife Nuray Yılmaz<sup>2</sup> , Kemal Naci Köse<sup>3</sup> 

<sup>1</sup>Private Practice, İstanbul, Turkey

<sup>2</sup>Department of Orthodontics, Marmara University School of Dentistry, İstanbul, Turkey

<sup>3</sup>Department of Periodontology, Marmara University School of Medicine, İstanbul, Turkey

ORCID IDs of the authors: E.Ö.Ö. 0000-0002-5052-2320; H.N.Y. 0000-0003-4932-6717; K.N.C. 0000-0002-0423-8011.

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## ABSTRACT

Surgical extrusion, surgical crown lengthening, and orthodontic extrusion (OE) with circumferential supracrestal fiberotomy (CSF) are reported as effective methods in cases when clinical crowns are destroyed. The aim of these case reports was to evaluate the results of OE+CSF in a canine and a mandibular second molar tooth. Case 1: A 24-year-old male patient was referred with a fracture of the maxillary canine at the subgingival level. After the examinations, OE+CSF was planned. Following leveling-aligning, a mini-screw was placed into the root canal of the canine, and 50 g of extrusive force was applied from the mini-screw to a stainless steel (SS) wire. Case 2: A 67-year-old female patient was referred with a mandibular second molar destroyed at the gingival level. OE+CSF was planned. An extrusive force (50 g) was applied from the segmental SS wire to the hook inserted into the root canal. CSF and root planning (RP) were performed weekly in both patients. Overall, 5 mm of extrusion was achieved for the upper canine after 6 weeks of active extrusion in Case 1. In Case 2, 5 mm of extrusion was achieved after 3 weeks of active extrusion. OE+CSF is an effective and rapid method for the extrusion of teeth with insufficient clinical crown.

**Keywords:** Circumferential supracrestal fiberotomy, orthodontic extrusion

## INTRODUCTION

The main concern in restorative dentistry is to reestablish the function, form, and esthetics of teeth. Post-core treated teeth require at least 2 mm of ferrule design for fracture resistance (1). However, tooth preparation usually extends under the gingival level to achieve a ferrule design, which compromises the biological width (2). The treatment options considering the biological width are surgical extrusion (SE) (3), surgical crown lengthening (SCL) (4), and orthodontic extrusion (OE) (5-7).

Heithersay (5) and Ingber (6) were the first authors who proposed OE. In slow extrusion, with light forces (30 g), tensions of the periodontal fibers are delivered to the bone, and coronal migration of periodontium occurs (6). In rapid extrusion, a force greater than 50 g is required, and supracrestal circumferential fiberotomy (CSF) is performed to move the tooth, leaving its alveolar bone behind (8). The resection of stretched fibers will prevent the gingival margin and bone to follow the tooth movement (8-10). However, after CSF, the remaining fibers on the root surface would reconstruct gingival fiber apparatus in some parts of the root (11). To prevent reattachment, Kozlovsky et al. (10) suggested root planning (RP) with CSF. Carvalho et al. (12) compared OE with/without CSF+RP and reported that CSF+RP is an effective method to prevent the coronal tissue migration.

**The first case was presented at the Turkish Orthodontic Society Annual Session, 2015, Eskişehir, Turkey; the second case was presented at the Turkish Orthodontic Society Annual Session, 2016, Antalya, Turkey.**

**Address for Correspondence:** Elvan Önem Özbilen, Private Practice, İstanbul, Turkey  
E-mail: elvanonem89@gmail.com

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Mostly, forced eruption is applied to anterior teeth because of esthetic reasons and having one-root. There are no available data in the literature reporting the results of OE+CSF in molar teeth. This article presents the treatment results of a canine and a second molar tooth treated with OE with CSF+RP. The criteria of rapid extrusion in these cases were the presence of single/fused roots, an adequate root length, healthy periodontal tissues, and to achieve the extrusion without any changes at the gingival level.

**CASE PRESENTATIONS**

**Case 1**

A 24-year-old patient was referred with a fractured upper right canine at the subgingival level (Figure 1). Radiographic examination revealed that the root length was 17.5 mm initially without any dilacerations. A periodontal examination showed an adequate biological width without any sign of a periodontal disease. Because the patient had a missing upper lateral incisor, instead of extraction, an extrusion of the canine was decided, and an in-

formed consent was obtained. Following the leveling-aligning, a 16x22 SS wire was inserted on the upper arch, and a mini-screw placed into the root canal of the canine was used to apply extrusive forces by an elastic thread (50 g) (Figure 2, 3). CSF+RP was performed weekly for 6 weeks. The crown-to-root ratio was 2:5 after the 5 mm of extrusion on the maxillary canine as it was planned at the beginning, and then the tooth was stabilized for 8 weeks. The mandibular right canine was leveled, and OE without CSF was performed; therefore, the gingival margin followed the tooth movement (Figure 4).

**Case 2**

A 67-year-old patient was referred with a lower left second molar damaged at the gingival level. Radiographic examination revealed that the molar had a fused root with 12 mm of root length. A periodontal examination showed an adequate biological width without any signs of a periodontal disease. Because the patient did not complain about the anterior crowding and having multiple missing teeth, OE with CSF+RP was planned for this tooth with

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Figure 1. Initial photographs and radiograph in Case 1



Figure 2. Treatment mechanics in Case 1



Figure 3. Intermediate photographs in Case 1

segmental technique, and informed consent was obtained. A temporary metal crown was fabricated with a bracket soldered for the lower second premolar (Figure 5). Following the leveling-aligning, a 16x22 SS wire was inserted. A hook was bent from the 16x22 SS wire and cemented into the root canal of the lower second molar. Then, 50 g of force was applied by an elastic thread from the hook to the SS wire. CSF+RP was performed weekly for 3 weeks (Figure 6, 7). The crown-to-root ratio was 1:1 after 5 mm of extrusion; later, the tooth was stabilized for 8 weeks (Figure 8).

## DISCUSSION

The main goal of restoration is to reestablish the function, form, and esthetic of a tooth. Placing the margin of restoration on a

sound tooth structure is crucial for long-term stability and periodontal health (1, 2).

Orthodontic extrusion is an effective method for crown lengthening (5, 6). With light extrusive forces, periodontium follows the tooth movement, which is desirable when there is an uneven gingival margin between the adjacent teeth (6). To avoid periodontium move with the tension of fibers, it was suggested to apply greater forces together with CSF (8-10). Kozlovsky et al. (10) suggested RP together with CSF to prevent reattachment of fibers. A randomized clinical trial comparing OE with/without CSF+RP reported that fiberotomy prevents coronal tissue migration (12). In presented cases, it was not possible to place the margins of restorations on a sound tooth structure without affecting



Figure 4. Final photographs and radiograph in Case 1



Figure 5. Initial photographs and radiograph in Case 2



Figure 6. Treatment mechanics in Case 2



Figure 7. Intermediate photographs in Case 2



Figure 8. Final photographs and radiograph in Case 2

the biological width. It was decided to perform OE with CSF+RP, and 50 g of extrusive force was applied for rapid extrusion (8).

Fiberotomy can be performed either at 7- to 10-day intervals or every 2 weeks (9, 10). In our study, CSF+RP was performed weekly. OE was finished in 6 weeks in the first case and in 3 weeks in the second case. Especially in adult cases, a rapid dental correction is very important for both cooperation and functional stability (13). Although the same extrusive force was applied in both cases, the same amount of extrusion was achieved in different times because some factors such as the age of the patients, form of the teeth, and root surface area affect treatment outcomes.

Crown-to-root ratio is an important factor for prognosis. Ideally, it should be 1:2 or minimum 1:1 in extreme cases (14). While extruding a tooth, it is mandatory to take the crown-to-root ratio into consideration. In our study, both cases presented an adequate crown-to-root ratio.

Besides several advantages of OE with CSF+RP, it should be conducted carefully to avoid causing root resorption, ankylosis, or mobility (15). Furthermore, CSF should not be performed in ectopically erupted teeth and in teeth associated with periodontal defects.

## CONCLUSION

There are several treatment options for teeth damaged at the gingival or subgingival levels. Deciding on a treatment protocol depends on several factors, such as esthetic needs, the crown-to-root ratio, bony support, and clinician's preference/skill. Among all treatment options, OE with CSF+RP is a successful approach with stable results, which prevents periodontium to follow the tooth movement and eliminate corrective surgical procedures.

**Informed Consent:** Written informed consent was obtained from the patients

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