

## Periodontally Accelerated Osteogenic Orthodontics - A Case Report

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**Abstract:** Corticotomy-assisted orthodontic treatment is an established and efficient orthodontic technique that has recently been studied in a number of publications. It has gradually gained popularity as an adjunct treatment option for the orthodontic treatment of adults. It involves selective alveolar decortication in the form of decortication lines and dots performed around the teeth that are to be moved. It is done to induce a state of increased tissue turnover and a transient osteopenia, which is followed by a faster rate of orthodontic tooth movement. This technique has several advantages, including faster tooth movement, shorter treatment time, safer expansion of constricted arches, enhanced post-orthodontic treatment stability and extended envelope of tooth movement. The aim of this article is to present a comprehensive review of the literature, including historical background, contemporary clinical techniques, indications, contraindications, complications and side effects.

**Keywords:** Corticotomy, decortication, Periodontally Accelerated Osteogenic Orthodontics (PAOO), orthodontic treatment.

### Introduction:

An increasing number of adult patients are seeking orthodontic treatment.<sup>1</sup> There are several psychological, biological and clinical differences between the orthodontic treatment of adults and adolescents. Adults have more specific objectives and concerns related to facial and dental aesthetics, the type of orthodontic appliance and the duration of treatment. Growth is an almost insignificant factor in adults compared to children, and there is increasing chance that hyalinization will occur during treatment.<sup>2</sup> In addition, cell mobilization and conversion of collagen fibers is much slower in adults than in children. Finally, adult patients are more prone to periodontal complications since their teeth are confined in non-flexible alveolar bone.<sup>2</sup> These considerations make orthodontic treatment of adults different and challenging as well as necessitate special concepts and procedures, such as the use of invisible appliances, shorter periods of

treatment, the use of lighter forces and more precise tooth movements.

The development of corticotomy-assisted orthodontic treatment opened doors and offered solutions to many limitations in the orthodontic treatment of adults. This method claims to have several advantages. These include reduced treatment time, enhanced expansion, differential tooth movement, increased traction of impacted teeth and, finally, more post-orthodontic stability. The evidence of the success of corticotomy as an adjunct to orthodontic treatment has not been well documented, and few published reports are available.

### CASE REPORT:

A 27-year-old female patient complained of forwardly placed upper and lower teeth and wanted to correct it within a few months. The diagnosis of the case was Class I molar relationship with bimaxillary protrusion. Periodontally Accelerated



Osteogenic Orthodontics (PAOO) using micromotor unit was planned in this patient to correct the malocclusion. Under local anesthesia, a full thickness flap was raised from 13-23. A corticotomy was done in relation with 12 -13 and 22-23 using a surgical round bur of diameter 0.5 mm then bone graft was placed (healguide). A major disadvantage of micro-motor was the pressure applied by the operator and the need to use an additional irrigating agent. The flap closure was performed using 4-0 resorbablevicryl suture. The corticotomy was completed in in a single sitting. Both the subjects were recalled after 2 weeks for the application and activation of the orthodontic appliance and were instructed to visit the department every 15 days for activation. Patient was recalled after 15 days, 3 months and 6 months for follow-up.



#### Discussion:

Case selection is a very important step; both the orthodontist and the periodontist should agree upon the need for corticotomy, treatment plan and the extent and location of the decortication cuts. The PAOO technique described by Wilcko is as follows<sup>3</sup> full-thickness flaps are reflected labially and lingually using sulcular releasing incisions. The releasing incision can also be made within the thickness of the gingival attachment or at the base of the gingival attachment (mucogingival junction). Vertical releasing incisions can be used, but they should be positioned at least one tooth away from the "bone activation". Flaps should be carefully reflected beyond the apices of the teeth to avoid damaging the neurovascular complexes exiting the alveolus and to allow adequate decortication around the apices. Selective alveolar decortication is performed in the form of decortication cuts and at points up to 0.5 mm in depth, combined with selective medullary penetration to enhance bleeding. This poses little threat to tooth vitality and makes it much safer than the osteotomy technique, in which cuts extend into the medullary bone around the teeth that are to be moved. Adequate bio-absorbable grafting material is placed over the injured bone. Tooth movement should start one or two weeks after surgery. Wilcko et al(2009) attributed the increased rate of tooth movement after corticotomy-facilitated orthodontics to a Regional acceleratory phenomenon (RAP),



which is characterized by greater bone turnover and a drop in mineral.<sup>3</sup> The RAP phenomenon was first explained by Frost HM et al.<sup>4</sup> The onset of RAP in alveolar bone is accompanied by a burst of osteoclastic activity resulting in lower bone density and augmented osteoblastic activity. Tooth movement is affected by alveolar mineralization, the greater the mineralization of the alveolar bone the more difficult teeth are to move. Moreover, osteoclastic activity is known to be integral to tooth movement. Thus, faster tooth movement is expected when stimuli lead to greater bone turnover and lower bone density. PAOO was reported to accelerate the tooth movement. In this case report, retraction was started two weeks post-surgery as recommended by Wilcko et al. On contrary started retraction immediately after corticotomy.<sup>4</sup> Two weeks delay between surgery and initiation of retraction was followed so that the post-operative pain and swelling could subside in patient. Originally, conventional corticotomy-facilitated orthodontic treatment involved buccal and lingual osteotomy cuts with orthopedic forces.<sup>5,6</sup> Alveolar augmentation with demineralized bone graft was also used to cover any fenestration and dehiscence and to increase the bony support for both the teeth and overlying soft tissues.<sup>5,6</sup> Recent reports showed the results of selective corticotomy that was limited to the buccal and labial surfaces to reduce operation time and postoperative patient discomfort and to avoid the risk of violating vital lingual anatomy.<sup>7</sup> In addition, there is no evidence in the literature that bone grafting of the alveolus enhances the stability of the orthodontic result.<sup>16</sup> Therefore, in this report, a selective corticotomy technique, limited to the buccal surfaces and without bone grafts, was used. Patients with

active periodontal disease or gingival recession are not good candidates for corticotomy. In addition, corticotomy should not be considered as an alternative for surgically assisted palatal expansion in the treatment of severe posterior cross-bite. Corticotomy-assisted Orthodontic Treatment (CAOT) also should not be used in cases where bimaxillary protrusion is accompanied with a gummy smile, which might benefit more from segmental osteotomy.

### **Conclusion:**

Corticotomy is a promising technique that has many applications in the orthodontic treatment of adults because it helps to overcome many of the current limitations of this treatment, including lengthy duration, potential for periodontal complications, lack of growth and the limited envelope of tooth movement. Its effects and mechanism were confirmed by recent well designed histological studies. However, further randomized testing in humans is still needed to confirm the claimed advantages of this technique and to evaluate the long-term effects.

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