



## Wilckodontics - Accelerated Osteogenic Orthodontics- A Review

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### Abstract

The systematic improvements in orthodontic treatment involves various specialties. With the increasing number of adult patients willing to undergo treatment to improve esthetics and function, Orthodontists are focusing on newer techniques to reduce the orthodontic treatment time and get better results among which Wilckodontics or periodontally accelerated osteogenic orthodontics is one of them. The following article gives an overview and discusses the biological reasons underlying and criteria's and its uses in orthodontic specialty.

**Keywords:** Accelerated Orthodontics, Alveolar Corticotomy, Rapid Orthodontic Treatment

### Introduction

Due to various advancements in orthodontic treatment modalities, orthodontics have become popular among adult patients in recent years. More adult patients are becoming concerned about esthetics and function of their masticatory system. As the growth of bone teeth and surrounding tissues stops after adolescence, treatment in adult patients require a long duration. The average treatment period for adults, ranging from 18.7 to 31 months, is considerably higher than adolescents [1]. Also, adult patients are more prone to root resorption and periodontal problems and the bone metabolism also reduces due to some systemic conditions in the adulthood. Therefore, in adults undergoing orthodontic therapy, newer techniques have been introduced which will promote stability and provide esthetics.

### Historical background

In 1893, Cunningham presented "Luxation, or the immediate method in the treatment of irregular teeth" at the International Dental Congress in Chicago [2]. LC Bryan in 1893 introduced corticotomy facilitated tooth movement and it was published in the textbook by SH Guilford [2]. However, the evolution of corticotomy facilitated orthodontics was introduced by Henrich Kole's publication in 1959 [3]. According to his theory, the most resistance to tooth movement was offered by continuity and thickness of the denser layer of cortical bone [3]. His theory is known as "bony block movement" which moves the tooth by disrupting the continuity of

cortical layer of bone [3]. In 1972, Bell and Levy did study on alveolar corticotomy in 49 monkeys [4]. They gave vertical interdental osteotomy cuts as it mobilized all dento-osseous segments [4]. Further, Duker's study in beagle dogs showed non vitality of teeth and marginal periodontium and he emphasized on preservation of marginal crest bone where interdental cuts are placed i.e at least 2 mm short of the alveolar crestal bone level [5]. The method of PAOO patented by Wilcko brothers came to be further known as "Wilckodontics" [6].

### Biomechanics

Orthopedist Herald Frost found out that there was increased cellular activity adjacent where corticotomy cuts are made and termed it as "The Regional acceleratory phenomenon" (RAP) [7,8]. The main mechanism of RAP is which tissue regenerating faster than normal by local response of tissues to noxious stimuli [9]. In human bone. the duration of RAP usually lasts about four months and by local response of tissues to noxious stimuli and depends on tissue type [10]. This phenomenon causes bone healing to occur 10-50 times faster than normal bone turnover [10]. The periodontally accelerated osteogenic orthodontics (PAOO) also termed as Wilckodontics, involves full-thickness labial and lingual alveolar flaps accompanied with limited selective labial and lingual surgical scarring of cortical bone (corticotomy) [11]. After corticotomy surgery, the demineralization occurring on the thin layer of bone over a root prominence can increase applied orthodontic forces

response [12]. When combined with alveolar augmentation, one is no longer strictly at the mercy of the original alveolar volume, and osseous dehiscence's and fenestrations can be corrected over vital root surfaces. This is substantiated with computerized tomographic and histologic evaluations [12]. The therapy concludes with the application of conventional orthodontic movement. the accelerated osteogenic orthodontics technique provides for efficient and stable orthodontic tooth movement.

### Clinical Considerations

#### Indications and Contraindications

Following the first reports by Wilcko brothers, various clinical indications were made after doing alveolar cortectomies in combination with mechanic forces like increase in orthodontic treatment time and also to correct simple to complex malocclusions whereas the contraindications are patients with poor periodontal status, teeth with poor prognosis after endodontic treatment, prolonged corticosteroid usage, certain medicines like bisphosphonates or non-steroidal anti-inflammatory drugs (NSAID) which interfere with metabolism of bone [12-14].

#### Case selection and treatment planning

Case selection and treatment planning are the mutual tasks of the orthodontist and the surgeon as the orthodontist determines the plan, identify the teeth to provide anchorage and arch segments to be expanded or contracted while the surgeon considers the clinical periodontal status, mucogingival structure, options for minimally invasive surgery and incorporation of aesthetic needs of the patient into the treatment plan [13,15]. Orthodontic bracketing and activation of arch wires should be performed no later than two weeks postoperatively to take the full advantage of the limited time. In fact, the orthodontist is challenged with a time period of 4 to 6 months following the surgical phase to accomplish OTM which makes it obligatory to engage the largest arch wire possible initially and advance arch wire sizes rapidly [1]. During active orthodontic treatment, follow ups are required at least every two weeks to monitor the risk of recalcification in midtreatment and to facilitate proper tooth movement [15]. Also, maintenance of proper oral hygiene should be inculcated in the patients undergoing treatment [16].

#### PAOO procedure

A full thickness mucoperiosteal flap is reflected under local anesthesia, after an intra crevicular incision that connects the releasing incisions buccally and lingually is placed [17]. The flap is reflected beyond the apices of the teeth [1]. Using round burs with water irrigation, vertical corticotomy cuts are given extending

from distal of second premolars to the distal of the opposing second premolars and interradiarily on both arches [1]. Care should be taken to extend the cuts approximately 2 mm above the teeth apex and then horizontal corticotomy cuts are joined. The vertical and horizontal extends through the entire thickness of cortical bone without touching the cancellous bone [1].

#### Patient Management

If going for the PAOO procedure in the both maxillary and mandibular arches, it may require long duration patient under sedation. For better wound healing, pain and inflammation post-surgery short-term steroids, antibiotics and analgesics are prescribed. As the NSAIDs interfere with the bone remodeling process, long-term administration of NSAIDs is discouraged whereas application of ice pack is encouraged to reduce post-operative swelling and oedema [15]. Although no much adverse effect on teeth, periodontium and bone was reported in the studies, more researches and case reports are still required [14].

#### Conclusion

Periodontally and surgically assisted orthodontic treatment has evolved drastically which provides with shorter treatment duration, covering simple and complex malocclusions and good clinical stability and less relapse tendency compared to conventional treatment approach still more research and data needs to be collected and evaluated to prove the efficiency of such a novel technique which will attract more adult patients to undergo orthodontic treatment.

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