

# Periodontally Accelerated Osteogenic Orthodontics-Review

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## ABSTRACT:

Periodontally Accelerated Osteogenic Orthodontics (PAOO) is a clinical procedure that combines selective alveolar corticotomy, particulate bone grafting and the application of orthodontic forces. Demineralization of a thin layer of bone over a root prominence after corticotomy surgery can optimize the response to applied orthodontic forces. This procedure is theoretically based on the bone healing pattern known as the regional acceleratory phenomenon (RAP). When combined with alveolar augmentation, one is no longer at the mercy of the original alveolar volume and osseous dehiscences, and fenestrations can be corrected over vital root surfaces. PAOO results in an increase in alveolar bone width, shorter treatment time, increased post treatment stability and decreased amount of apical root resorption. The present paper reviews about PAOO.

**Key words:** Regional acceleratory phenomenon (RAP), Corticotomy, PAOO-periodontally accelerated osteogenic orthodontics.

## INTRODUCTION:

Orthodontic treatment combined with alveolar corticotomy plus augmentation grafting is a technique known as Periodontally Accelerated Osteogenic Orthodontics. This innovative combination with orthodontic treatment results in an acceleration of orthodontic treatment, enhanced stability of orthodontic results and long term improvement of the periodontium.<sup>1</sup> With this technique, one is no longer at the mercy of the preexisting alveolar volume, and teeth can be moved 2 to 3 times further in 1/3 to ¼ the time required for

traditional orthodontic therapy. It can be used to treat moderate to severe malocclusions in both adolescents and adults and can reduce the need for extractions.<sup>2-4</sup>

## HISTORY:

The application of corticotomy surgery to correct malocclusion was first described in 1892 by L.C. Bryan.<sup>1</sup> It was Henrich Krole in 1959 who set the stage for the subsequent evolution of refined decortication - facilitated orthodontics. In 1991, Suya reported surgical orthodontic treatment of 395 adult Japanese patients with an improved surgical

procedure that he referred to as “corticotomy - facilitated.” In 1986, Anholm et al reported the treatment of a 23 year old man with a severe malocclusion using corticotomy - facilitated orthodontics.<sup>3</sup>

In 2001, Wilcko et al reported in a surface CT scan, evaluation of selectively decorticated patients that the rapid tooth movement was not the result of bony block movement, but rather due to a transient localized demineralization - remineralization phenomenon is the bony alveolar housing consistent with the wound healing pattern of the regional acceleratory phenomenon (RAP), developed by Frost and Lee and described in the periodontal literature by Yaffe and coworkers.<sup>2, 3</sup>

### **REGIONAL ACCELERATORY PHENOMENON:**

Orthopedist Harold Frost recognized that surgical wounding of osseous hard tissue results in striking reorganizing activity adjacent to the site of injury in osseous and / or soft tissue surgery. He collectively termed this cascade of physiologic heading events, the Regional Acceleratory Phenomenon (RAP).<sup>3</sup> RAP healing is a complex physiologic process with dominating features involving accelerated bone turnover and decreases in regional densities.

### **BIOLOGICAL RATIONALE:**

The clinical technique involving selective alveolar decortications is a form of periodontal tissue engineering resulting in a transient osteopenia and high turnover adjacent to the injury site. Alveolar decortications' initiates a heading response, the degree of which is directly related to the intensity and proximity of the decortication side except for 7 weeks decortications.

### **INDICATIONS:<sup>1</sup>**

- a) Increased alveolar volume and enhanced periodontium (i. e correction of dehiscence and fenestrations).
- b) Accelerated treatment (i. e 3-4 times more rapid)
- c) Greater stability of clinical outcomes & less relapse
- d) Enhanced scope of malocclusion treatment.
- e) Enhancement of patient's profile when indicated
- f) Rapid recovery of impacted

PAOO increases the scope of orthodontic tooth movement and the positions of the teeth after decortications and augmentation grafting are stable long term. Sarver and profit (2005) offered guidelines as to the limits of central incisor tooth movement in the adult patient with orthodontic treatment alone.<sup>5-7</sup> Ferguson et al (2006) suggested that these limits can be expanded 2 to 3 fold in all dimensions except retraction following PAOO and that the stability of these positions is probably due to loss of tissue memory from high turnover of the periodontium as well as increased thickness of the alveolar cortices from the augmentation grafting.<sup>1</sup>

### **LABIALLY IMPACTED CANINES:<sup>1</sup>**

Reflect the full thickness labial flap using a sulcular incision with vertical releasing incisions mesial to the first premolars to reveal the upper cuspid crowns labial to the upper permanent lateral incisors. No lingual flap is reflected.

### **PERIODONTAL SURGICAL PROCEDURES FOR ORTHODONTIC ACCESS, AESTHETICS AND STABILITY<sup>1</sup>**

Gingivectomy and gingivoplasty contribute meaningfully to orthodontic access, aesthetics and treatment outcome stability. According to Sarver (2004)<sup>7</sup>, exposure of the clinical crowns that contribute most to the aesthetics smile, the maxillary central incisors should be 80% width compared to height. Gingivoplasty atleast 2 weeks before removal of fixed appliances allows sufficient gingival healing to enable the fabrication of an overlay, Essix type of orthodontic retainers etc

Post orthodontic gingivoplasty can contribute to both smile aesthetics and stability of treatment outcomes. The supracrestal gingival fibres have been identified as contributing to orthodontic relapse, especially rotation relapse and a procedure called supracrestal fibrotomy.<sup>8-15</sup> Others have suggested that orthodontic treatment outcome stability is more likely due to an increase in the elasticity of the whole compressed gingival tissue.<sup>16</sup>

### **CONCLUSION:**

The fact that the teeth can be moved more rapidly resulting in shortened treatment time is certainly advantages to the patient's periodontal health because less time in fixed appliances reduces patient “burnout.”<sup>2</sup> The increased alveolar volume can provide for a more intact periodontium, a

decreased need for extractions, a degree of facial reshaping and an increase in the bony support for both the teeth and overlying & soft tissues. From an esthetic perspective, PAOO technique not only addresses tooth alignment, but also facial features and, as such, is truly in vivo tissue engineering.<sup>2</sup>

By combining the talents of the Periodontist and the Orthodontist, we now have a viable and safe orthodontist treatment that can be completed in a fraction of the time required for conventional orthodontics.<sup>3</sup> The PAOO technique requires the utilization of numerous modern diagnostic and treatment parameters, but once these are mastered the orthodontist has a powerful new treatment option to offer his or her patients.<sup>2</sup>

The procedure provides a safe alternative for those patients with moderate crowding who desire the benefits of orthodontic treatment in a relatively short period of time.<sup>2</sup>

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