REVIEW ARTICLE

WILCKODONTICS: Periodontally Accelerated Osteogenic Orthodontics

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ABSTRACT

With an increasing number of adult patients desiring for orthodontic treatment, the orthodontist should focus more on the treatment which can lead to accelerated tooth movements. Surgical intervention to affect the alveolar bone and tooth movement has been described in various forms for over many years. However, due to interdisciplinary approaches, orthodontics has gained novel orthodontic tooth movement protocols. Periodontal accelerated osteogenic orthodontics (PAOO) is a clinical procedure that combines selective alveolar corticotomy, particulate bone grafting, and the application of orthodontic forces. This protocol is based on the regional acceleratory phenomenon (RAP). Tooth movement can be accelerated and cases are completed with additional benefits, thereby augmenting gingival and facial esthetics. The purpose of the present article is to overview the chronicles of PAOO procedure.

INTRODUCTION

Conventional orthodontic treatments require more than 1 year to complete mostly. Unfortunately many potential orthodontic patients drop out from the treatment, due to time factor. The development of corticotomy-assisted orthodontic treatment (CAOT) opened doors and offered solutions to many limitations in the orthodontic treatment of adults. Kole1 in 1959 first introduced CAOT as a mean for rapid tooth movement. It was hypothesized that the cortical plates of bone are responsible for resistance to tooth movement and by breach in its continuity, orthodontics could be completed in much less time than normally expected. Kole’s procedure involves the reflection of mucoperiosteal flaps to expose buccal and lingual alveolar bone, followed by interdental cuts through the cortical bone and barely penetrating the medullary bone (corticotomy style). The subapical cuts given horizontally connecting the interdental cuts were osteotomy style, penetrating the full thickness of the alveolus. It was never widely accepted due to its invasive nature. The term “Bony block” arose from Koles work to describe the suspected movement after corticotomy surgery. Koles interpretation of bony block concept prevailed until 2001 publication of Wilcko et al.2 Wilcko et al. introduced a novel surgical orthodontic therapy referred to as periodontally accelerated osteogenic orthodontics (PAOO). It is the procedure that combines selective alveolar corticotomy, particulate bone grafting and application of orthodontic forces.

On the biological basis of regional accelerated phenomenon (RAP), PAOO was introduced. Frost3 in 1983 first introduced RAP, although this phenomenon has been familiar to many histomorphometrists since 1966. Frost noted that the original injury lead to acceleration of the normal regional healing processes. This acceleration process can be attributed to regional acceleratory phenomenon. The RAP begins within a few days of injury, typically peaks at 1–2 months, usually lasts 4 months in bone and may take 6 to more than 24 months to subside. RAP is prolonged as long as tooth movement continues.

CASE SELECTION FOR PAOO

This procedure can be used to accelerate tooth movement in cases of Class I malocclusion with moderate to severe crowding, Class II malocclusions requiring expansions or extractions and mild Class III malocclusions. It can be successfully combined with gingival augmentation procedures too.

Surgical technique for PAOO consists of several steps (Table 1) viz. full thickness flap reflection, selective decortication, particulate grafting, closure and orthodontic force application.

The orthodontic brackets placement and arch wires activation are done one week prior the surgery. However, bracketing can also be done up to 1–2 weeks post surgery. If delayed, the advantage of RAP could fail to occur. The orthodontist has 4–6 months as window period for rapid movement. After which finishing movements occur with normal speed.

Nowzari et al. (2008)4 reported for the first time the use of particulate autogenous bone grafts with corticotomy-assisted rapid orthodontic procedure. They concluded PAOO with autogenous
4. Frequency of relapse reported to be very low.
5. Extra-oral appliances and headgear are not very necessary
6. Good patient outcomes

Disadvantages
1. Expensive procedure due to surgical intervention
2. Crestal bone loss and recession may occur post surgically.
3. Post surgical complications like pain, swelling and infection are common.

CONCLUSION
PAOO being new procedure, few case reports are reported in the literature. Long term studies are needed to evaluate the advantages and disadvantages of this technique. Careful consultation and communication between orthodontist and periodontal surgeon is required for the proper treatment planning.

REFERENCES

Table 1  Detailed steps in PAOO.

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<th>Steps in PAOO</th>
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<td>Orthodontic appliances are placed one week prior to the surgery</td>
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<td>Crevicular incision is made buccally and lingually extending at least two to three teeth beyond the area to be treated</td>
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<tr>
<td>Full thickness flap is reflected on both buccal and lingual aspects beyond the apices of the teeth if possible</td>
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<td>Any interdental papillary tissue remaining interproximally should be left in place</td>
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<tr>
<td>Selective decortications can be performed on both buccal and lingual sides</td>
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<td>Vertical corticotomy cuts are made between the roots using a diamond round bur</td>
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<td>Bone graft materials are then placed over the decorticated areas</td>
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<td>The mucoperiosteal flap is then sutured with interrupted sutures</td>
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<td>Suture removal after 2 weeks</td>
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PAOO: periodontal accelerated osteogenic orthodontics.

Bone graft as effective treatment approach for orthodontic treatment in adults.

Advantages
1. Reduced time of the treatment to one-third the time of conventional orthodontics.
2. Due to decreased resistance of cortical bone there is less root resorption
3. More bone support due to the addition of bone graft.


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