



Wilckodontics- Bridging Orthodontics and Periodontics

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ABSTRACT

Achieving success in orthodontic therapy for adults is clinically challenging and lengthened in time due to the cease of dentoalveolar development. Additively; aplastic, narrow, less vascular periodontal membrane and alveolar bone morphology observed in adults make these patients more vulnerable to root resorptions and periodontal pathologies during or following active orthodontic treatment. Therefore, some treatment modifications in regard to surgical modalities have been suggested to reduce the treatment time and achieve optimal clinical results with long-term stability in adults undergoing orthodontic therapy. Wilckodontics/ Periodontally accelerated osteogenic orthodontics (PAOO) described by Wilcko brings about easy tooth movement in short period of time. This article will help you understand perspective of PAOO technique through its historical background, principle, technicalities, indications and contraindications.

KEYWORDS : accelerated orthodontics, alveolar corticotomy, wilckodontics, periodontal disease

INTRODUCTION

The periodontium is a dynamic tissue and regulation of its remodeling gives an edge in the traditional orthodontic treatment. The alveolar bone has its own dynamicity and to regulate its remodeling capacity has always been a challenge on the periodontic as well as the orthodontic front.¹ Synergism between periodontists and orthodontists creates crucial opportunities to enhance clinical outcomes of combined therapies regarding both disciplines. Collaboration of these specialties leads to promoted periodontal health as a result of orthodontic treatment or intensified orthodontic therapy due to proper periodontal maintenance, reciprocally. Co-operative approaches of periodontology and orthodontics play significant role not only in conventional therapies but also in emerging treatment alternatives such as periodontal accelerated osteogenic orthodontics (PAOO).²

Periodontal accelerated osteogenic orthodontics (PAOO) is a clinical procedure that combines selective alveolar corticotomy, particulate bone grafting, and the application of orthodontic forces. This is theoretically based on the bone healing pattern known as the regional acceleratory phenomenon (RAP). Its results in an increase in alveolar bone width, shorter treatment time, increased post treatment stability, and decreased amount of apical root resorption.¹

HISTORY

Orthodontic treatment usually lasts 1 to 2 years, and even more time is required for extraction cases. To shorten the time of orthodontic tooth movement, various attempts have been made.³

Surgically assisted orthodontic tooth movement has been used since the 1800s. Corticotomy - facilitated tooth movement was first described in 1893 by L.C Bryan. In 1959, Kole introduced it as a rapid tooth movement. Kole's procedure involves the reflection of full thickness 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 horizontal cuts were osteotomy style, penetrating the full thickness of alveolus. Since, the Kole's technique was invasive, it was never widely accepted.⁴

Duker used Kole's basic technique on beagle dogs to investigate how rapid tooth movement with corticotomy affects the vitality of the teeth and marginal periodontium. It was concluded that neither the pulp nor the periodontium was damaged following orthodontic tooth movement after corticotomy surgery.⁵

In 1990s, the Drs. Wilcko, using computed tomography, discovered that reduced mineralization of the alveolar bone was the reason behind the rapid tooth movement following corticotomies. They used their knowledge of corticotomy and their observation of rapid acceleratory phenomenon (RAP) to develop patented periodontally accelerated osteogenic orthodontics (PAOO) technique in 1995⁶ which is the combination of selective decortication orthodontic technique and alveolar augmentation. It is also known as Wilckodontics.

PRINCIPLE

Unlike a usual corticotomy, PAOO does not just cut into the bone, but decorticates it- that is, some of the bone's external surface is removed. The bone then goes through a phase known as osteopenia, where its mineral content is temporarily decreased. The tissue of the alveolar bone release rich deposits of calcium, and new bone begins to mineralize in about 20-55 days. While the alveolar bone is on this transient state, braces can move teeth very quickly, because the bone is softer and there is less resistance to the force of the braces. Research has shown that after the alveolar bone heals and the teeth are in new desired positions, additional alveolar bone has formed. The Dr Wilcko and other researchers have proven that the aftermath of PAOO is as stable and long lasting as conventional orthodontic treatment.¹

INDICATIONS & CLINICAL APPLICATIONS^{2,4}

1. To accelerate corrective orthodontic treatment, as a whole.
2. To facilitate the implantation of mechanically challenging orthodontic movements.
3. To enhance the correction of moderate to severe skeletal malocclusions.
4. Resolve crowding and shorten treatment time.
5. Accelerate canine retraction after premolar extraction.
6. Enhance post- orthodontic stability.
7. Facilitate eruption of impacted tooth.
8. Facilitate slow orthodontic expansion
9. Molar intrusion and open bite correction.
10. Manipulation of anchorage.

CONTRAINDICATIONS^{2,4}

1. Patients with sign of active periodontal disease or gingival recession.
2. PAOO should not be considered as an alternative for surgically assisted palatal expansion in the treatment of severe cross-bite.
3. PAOO should also not be used where bimaxillary protrusion is accompanied with a gummy smile, which might benefit more from

segmental osteotomy.

4. Inadequately performed or prognostic poor endodontic treatment.
5. History of prolonged corticosteroid usage.
6. Current medication interfering bone metabolism such as bisphosphonates or non-steroidal anti-inflammatory drugs (NSAID).

CASE SELECTION

PAOO can be done on people of any age, as long they have healthy periodontium. According to Dr Wilcko, the technique has been done on children as young as age 11 and on senior citizens as old as 70. PAOO can be used in most cases in which traditional fixed orthodontic therapy is used. It is efficacious in the treatment of class I malocclusions with moderate to severe crowding, class II malocclusions requiring expansions or extractions.¹

SURGICAL TECHNIQUE

The surgical technique for PAOO consists of 5 steps viz. raising of flap, decortication, particulate grafting, closure and orthodontic force application.

Flap Design

The basic flap design is a combination of a full thickness flap in the most coronal aspect of the flap with a split-thickness dissection performed in the apical portions. Split thickness dissection is done to provide mobility of the flap thereby it can be sutured with less tension. Periosteal layer is removed to provide access to the alveolar bone and helps to identify underlying neurovascular structures. Mesial and distal extension can be done to reduce the need for vertical releasing incisions. Interdental papilla should be preserved to obtain better esthetics. So in case of anterior teeth 'tunneling' can be done from the distal aspect.¹

Decortication

Decortication refers to the removal of the cortical portion of the alveolar bone. However, it should be just enough to initiate the RAP response and should not create movable bone segments. After flap elevation, decortications of bone adjacent to the malpositioned teeth is performed by using low-speed round burs under local anesthesia (Figure 1). In the PAOO procedure, decortication is performed at clinical sites without entering the cancellous bone, avoiding risk of damage to underlying structures, such as the maxillary sinus and the mandibular canal. The corticotomies may also be achieved with a piezoelectric knife.^{7,8} The corticotomies are placed on both the labial and lingual (palatal) aspects of the alveolar bone.⁹

Particulate Grafting

Grafting is done in the areas that have undergone corticotomies. Volume of the graft material depends on direction and amount of tooth movement, pretreatment thickness of alveolar bone, and need for alveolar support. Most commonly used materials are deproteinized bovine bone, autogenous bone, decalcified freeze dried bone allograft. Use of platelet - rich plasma or calcium sulfate increases the stability of graft material (Figure 2).¹

Closure Techniques

The flap should be closed using non resorbable interrupted sutures without creating excessive tension. No packing is required. The sutures are usually left in place for 1 to 2 weeks.⁹

Timing of Orthodontic Treatment

The placement of orthodontic brackets and activation of the arch wires are typically done the week before the surgical aspect of PAOO is performed. However, if complex mucogingival procedures are combined with the PAOO surgery, the lack of fixed orthodontic appliances may enable easier flap manipulation and suturing. After flap repositioning, an immediate heavy orthodontic force can be applied to the teeth and in all cases initiation of orthodontic force should not be delayed more than 2 weeks after surgery. A longer delay will fail to take full advantage of the limited time period that the RAP is occurring. The orthodontist has a limited amount of time to accomplish accelerated tooth movement. This period is usually 4 to 6 months, after which finishing movements occur with a normal speed.⁹ Given this limited "window" of rapid movement, the orthodontist will need to advance arch wire sizes rapidly, initially engaging the largest arch wire possible.

ADVANTAGES¹

1. Enhanced scope malocclusion treatment (i.e., an increase in the limits of tooth movement and a decreased need for extractions)
2. Decreased treatment times (increased rate of tooth movement)
3. Increased alveolar volume and a more structurally complete periodontium (correction of preexisting fenestrations and dehiscence)
4. Alveolar reshaping, enhances patient's profile
5. Simultaneous recovery of shallow unerupted teeth
6. In certain situations, the additional alveolar bone can also provide improved lip posture
7. Less likelihood of root resorption.
8. History of relapse has been very low
9. There is less need for appliances and head gear
10. Both metal and ceramic brackets can be used

DISADVANTAGES¹

1. Expensive procedure
2. Mildly invasive procedure and like all surgeries it has risk of some pain, swelling, and the possibility of infection.
3. Patients who take NSAIDs on a regular basis or have other chronic health problems will not be treated with this technique.

CONCLUSION

Being a relatively new procedure PAOO/ Wilckodontics provides benefits of better scope of malocclusion treatment by reducing extractions, orthognathic surgeries and reducing orthodontic treatment time (reducing patient "burnout") as compared to conventional approach. It enhances the esthetics and post treatment orthodontic stability. It also increases the access of the patient towards orthodontic therapy. The only limiting factor of this technique is its cost. Once the numerous modified diagnostic and treatment parameters are mastered, the clinician can offer new treatment option to his/her patients. The success of this therapy involves interdisciplinary coordination between orthodontist, periodontist, and oral and maxillofacial surgeon.

FIGURES



FIGURE 1- Decortication of alveolar bone



FIGURE 2- Grafting done over corticotomy sites

REFERENCES

1. Priyanka M, Jaiganesh. Periodontally accelerated osteogenic orthodontics. *International journal of Pharmacy and Pharmaceutical Sciences* 2013;5(4):49-51 |
2. Yener ÖZAT, Ruhi NALÇACI. Periodontally accelerated osteogenic orthodontics: A review of the literature. *Balikesir Health Science Journal* 2013; 2(1):54-60 |
3. Sanadi RM, Doshi M, Ambulgekar JR, Khambatta XD. Wilckodontics- Accelerated osteogenic orthodontics and piezocision. *Global Research Analysis* 2012;1(5):93-95 |
4. Amit G, JPS K, Pankaj B, Suchinder S, Parul B. Periodontally accelerated osteogenic orthodontics (PAOO)- a review. *J ClinExp Dent* 2012;4(5):292-296 |
5. Diiker J. Experimental animal research into segmental alveolar movement after corticotomy. *J MaxillofacSurg* 1975;3:81-84 |
6. Pathak TS, Kini V, Kanagotagi S, Balasubramanian K, Gupta H. Wilckodontics. *J Contemp Dent* 2013;3(1):15-19 |
7. Dibart S, Sebaoun JD, Surmenian J. Piezocision: a minimally invasive, periodontally accelerated orthodontic tooth movement procedure. *CompendContinEduc Dent.* 2009;30:342-344,346,348-350 |
8. Kim SH, Kim I, Jeong DM, Chung KR, Zadeh H. Corticotomy-assisted decompensation for augmentation of the mandibular anterior ridge. *Am J OrthodDentofacialOrthop* 2011;140:720-731 |
9. Murphy KG, Wilcko MT, Wilcko WM, Ferguson DJ. Periodontal accelerated osteogenic orthodontics: a description of the surgical technique. *J Oral Maxillofac Surg.* 2009;67:2160-2166 |