

REGIONAL ACCELERATORY PHENOMENON

Here follows an excerpt from Dr.s Wilcko from AJODO referenced below to explain the RAP effect:

“Corticotomy surgery provides for a periodontal ligament-mediated acceleration in tooth movement as a result of a stimulated regional acceleratory phenomenon in conjunction with the proper morphologic situation of a thin layer of bone in the direction of movement. The induced increase in bone turnover and decrease in mineral content of the bone (demineralization) are conducive to accelerated tooth movement. The soft-tissue fraction of the demineralized bone follows the roots and remineralizes as the regional acceleratory phenomenon resolves, but the remineralization process of the soft-tissue fraction is incomplete in adults, resulting in a reduction in bone volume including residual labial and lingual bony dehiscences.”

These dehiscences require alveolar augmentation which “facilitates a greater scope of tooth movements and reduces the need for extractions while ensuring adequate periodontal support.” In addition, “anchorage teeth become more effective anchors if not decorticated; conversely, decorticated teeth move with greater ease. The pattern of decortication is of little consequence; rather, it is the intensity and proximity of the decortication that dictates the extent of the response and therefore the greater ability of teeth to move quickly.”**

Copyright 2017 Dr. Pamela Nicoara

PERIODONTALLY ACCELERATED OSTEOGENIC ORTHODONTICS

PAOO is a procedure intended to shorten the course of orthodontic treatment by stimulating bone turnover through regional accelerator phenomenon (RAP) in areas of intended tooth movement. It is also commonly known as Wilckodontics, among multiple other synonyms, because of the most recent resurgence in the use of the procedure as popularized by William and Thomas Wilcko.

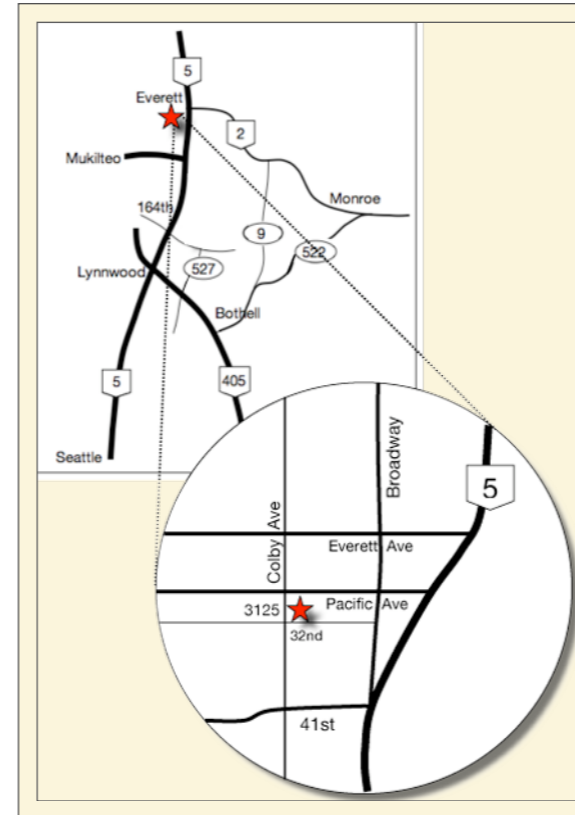
The procedure was initially described in 1931 by Bichlmayr to treat severe maxillary protrusion with orthodontic appliances after removing wedges of bone from between the teeth to be retracted. In 1959, Kole published articles expanding the procedure to include correction of cross bite or large interdental spaces. He showed in as little as 6-12 weeks, major tooth movements were accomplished without significant root resorption or damage to the roots. More recently, the procedure has been adapted to include only more superficial corticotomy rather than deep osteotomy, as well as application of bone and soft tissue grafting to thicken the facial bone and soft tissues in areas where facial tooth movement might move teeth outside of the alveolus.

Dr.s Wilcko describe a reduction of traditional orthodontic treatment time by a third to a quarter, and that a greater degree of tooth movement can be achieved with greater post treatment stability. They also indicate that post orthodontic tooth movements are less uncomfortable because of the ease of movement of decorticated teeth.

This issue of ProbeTips will further explore the concept of PAOO, review a case, and discuss those ideas in contrast to the points made by Dr.s Wilcko.

Pamela A Nicoara DDS MSD PLLC

PERIODONTOLOGY IMPLANTOLOGY ORAL MEDICINE



3125 Colby Avenue, Suite H
Everett WA 98201
T: 425-374-5380 F: 425-374-5382

www.NICOARaperio.com
doctor@NICOARaperio.com

PROBE TIPS

A QUARTERLY PERIODONTAL
NEWSLETTER

BY PAMELA NICOARA DDS MSD

PAOO
Periodontally Accelerated
Osteogenic Orthodontics



VOLUME 10, No. 4

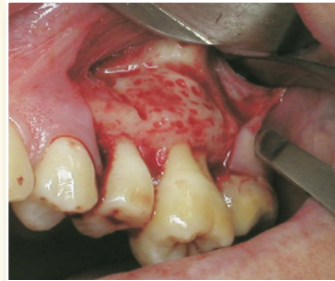
FEBRUARY 2018

Periodontally Accelerated Osteogenic Orthodontics

GENERAL CONSIDERATIONS

Treatment begins with appropriate case selection.

In the broad sense of reducing treatment time, **any case** would potentially benefit from corticotomy with or without the supplemental bone and soft tissue grafting. This can be applied to a single super-erupted tooth, shown here, to an uncomplicated full arch or mouth.



Oliveira et al 2008

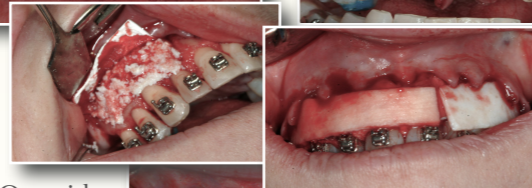
More recently, because of the significant increase in cost particularly when adding grafting materials, and because of the increased difficulty in tooth movement and post-treatment stability, the use of PAOO for **narrow maxillary arches** has been touted. In such narrow maxillary arch cases where expansion of the arch more likely will cause thinning of facial alveolar bone with resultant recession or bony dehiscence or fenestration, PAOO with grafting offers some potential protection against the negative consequences of excessive facial tooth movement. The case which follows is an example of such a situation.

In addition to appropriate case selection, it is important to note that NSAIDS are not to be used immediately post treatment in order not to disrupt or slow the RAP from the "PDL mediated sterile inflammatory process."**

Finally, active tooth movement should occur for 1-2 weeks prior to surgery for the best RAP.

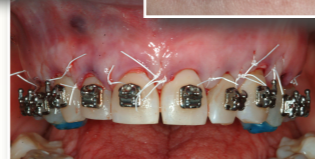
NARROW MAXILLARY ARCH

The case below shows a 50 year old female with bilateral posterior cross bite, facial recession of the canines especially, missing maxillary molars, and a periodontal defect mesial to tooth #22 with diastema. Despite the thicker biotype, the facial recession prompted concern for buccal tooth movement of the maxillary posterior teeth. The goal was not faster tooth movement as much as it was to "facilitate[s] a greater scope of tooth movement and ... ensure[ing] adequate periodontal support."** Corticotomy with apical perforation was performed.



BioOss with collagen membrane

Alloderm



BioOss was used to augment facial bone, covered with a collagen membrane, and covered with Alloderm cadaver donor gingival grafting material.

Follow up at 3 months and 1 year show thick buccal tissues and root coverage of the maxillary canines. Scaling and root planing only was performed for tooth #22.



3 months



1 year

CONTRASTING OPINIONS

Several ideas have been questioned regarding the Wilcko explanation of this procedure.

First, it is argued that the increased speed of tooth movement from corticotomy induced RAP is due to **a more rapid removal of tooth-movement inhibiting byaline by macrophages** from the PDL caused by tooth compression rather than due to a **demineralization process in the bone**. Experiments have shown a doubling of the speed of tooth movement in adults in the first 2 months of treatment.

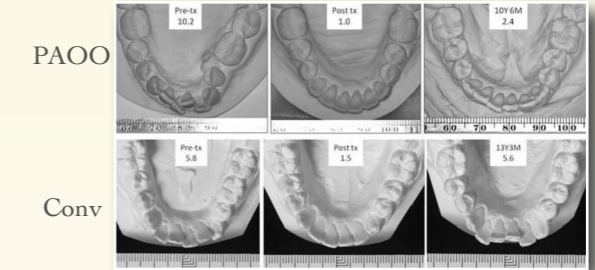
Second, faster alignment doesn't necessarily indicate a high quality outcome of orthodontic treatment, and finishing a case may still require several months post alignment.

Third, the bone augmentation has not been proven to be anything more than fibrous encapsulation of bone grafting material, rather than a true augmentation of bone onto the root surfaces.

Finally, the fee for PAOO for the whole mouth with grafting is generally equivalent to complete orthodontic treatment.

LONG TERM STABILITY

One very interesting paper from 2015 shows that patients treated with PAOO with grafting of the lower incisors had more stable outcomes at 10 years than those treated in a conventional manner.



CONCLUSIONS

PAOO can double the speed of tooth movement for about 3-4 months, reducing treatment time by this amount, which may be very important to some patients. The use of this technique will increase the cost of treatment, particularly the more materials that are used such as bone and soft tissue grafting materials which may be of long term benefit to soft tissue stability, even if it is just very thick fibre-osseous tissue. Tooth position stability seems to be a benefit of PAOO. As long as patients are informed, then the clinician can aid the patient in deciding whether the cost and time for PAOO is right for their particular situation.

REFERENCES

- AJODO. Oliveira et al. 2008.
- JOMS Murphy, Wilcko, Wilcko, Ferguson. 2009.
- AJODO Wilcko et al. 2013.**
- AJODO Mathews & Kokich. 2013.
- Angle Ortho. Makki et al. 2015.