

FACULTY PERSPECTIVE

VIEWS ON DENTAL TOPICS & TRENDS

Accelerated Osteogenic Orthodontics

For the last three decades, more and more adults have been seeking orthodontic treatment to correct their malocclusions for functional needs and to improve their smiles, demanding short treatment time without compromising the quality of treatment. Among the different options, accelerated osteogenic orthodontics (AOO), also known as corticotomy-facilitated orthodontics, has gained popularity during the last several years. This requires a periodontist and an orthodontist and involves periodontal procedures, including alveolar bone perforation around the teeth, followed by applying orthodontic forces, and is often combined with bone grafts. Studies have shown that this technique significantly induces an acceleration of tooth movement.^{1,2}

The idea of AOO has been around for many years. In 1959, Köle³ illustrated a faster orthodontic tooth movement when the cortical layer of the alveolar bone was osteotomized both buccally and lingually after a mucoperiosteal flap was reflected. He believed that the main resistance to tooth movement was encountered in the cortical layer, hence the corticotomy between the teeth would allow the tooth with the sectioned blocks of bone to move more rapidly under orthodontic forces.³ Köle's hypothesis was widely accepted by clinicians for many years until 2001, when Wilcko et al.⁴ reported that AOO was not simply due to the result of movement of the tooth with sectioned bony blocks, but rather due to a transient localized bone demineralization-remineralization phenomenon in the bony alveolar housing around the tooth consistent with the regional acceleratory phenomenon. They suggested that the increased rate of bone turnover and demineralization of bone resulting from corticotomy were conducive to accelerated tooth movement.

More recently, Iino et al.⁵ examined the effects of corticotomy on orthodontic tooth movement and alveolar bone reaction histo-

logically. They found that the corticotomy procedure significantly elevated cellular activities in the periodontal ligament. As a result, the sterile necrotic tissue (hyalinization) on the pressure side of the periodontal ligament induced by orthodontic force was removed more quickly and tooth movement was accelerated considerably. It should be noted that the length of the regional acceleratory phenomenon induced by corticotomy is about 4 months; therefore any accelerated tooth movement would need to be executed within this period. After that, the rate of tooth movement would return to normal.²

In addition to corticotomy, another important aspect of the AOO in adults is alveolar augmentation (bone graft). Since the cellular activity of adult bones is not as active as that of children's bones, after corticotomy, the bone demineralization occurs, but the remineralization process may be incomplete, resulting in a reduction in bone volume. Thus, the bone graft added to the facial and lingual cortical bones during the corticotomy procedure can help increase the alveolar bone volume. The augmented alveolar bone would allow for a greater scope of tooth movement.

One disadvantage of AOO is its high cost. The fees for the corticotomy surgery vary greatly, but generally they are similar to the fees for orthodontic treatment. Another disadvantage is that corticotomy surgery could be invasive. For this reason, several modified alveolar corticotomy techniques to minimize surgical intervention have been developed recently.^{7,8} For example, without the need of reflecting the flap, the Piezocision technique combines small incisions from gingival to periosteum with selective tunneling that allows for hard- or soft-tissue grafting and piezoelectric incisions into cortical bone.⁸ However, more studies are needed to evaluate and compare the efficiency and efficacy of different corticotomy techniques on accelerated tooth movement. ■



Contributed By:
CHUN-HSI CHUNG, BDS, DMD, MS
*Chauncey M. F. Egel Endowed Chair and
Associate Professor of Orthodontics
Director, Postdoctoral Orthodontic Program*

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