

# Surgically Enhanced Orthodontic Treatment

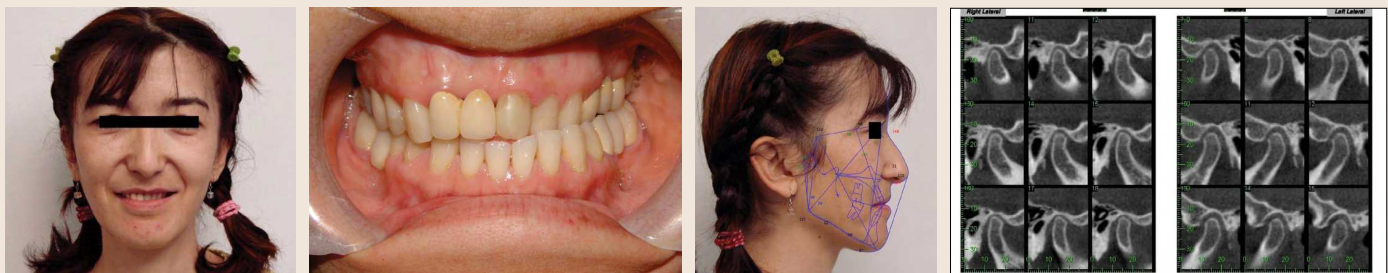
## Case Presentation

Daniel A. Kuncio, D.D.S.; Maria A. Karpov, D.M.D., M.S.; Sherrill Fay, D.M.D., M.D.

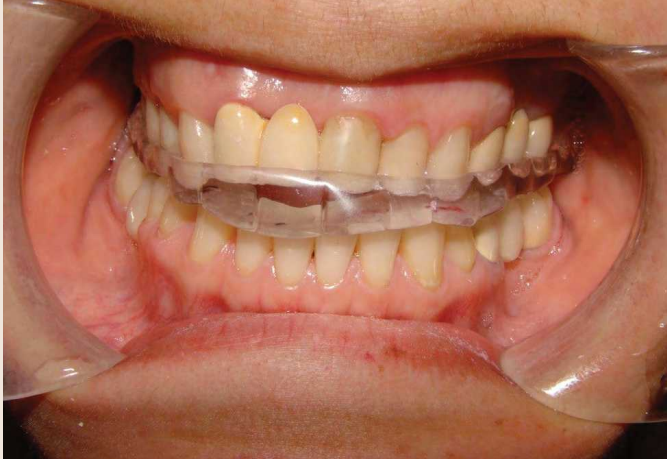
### ABSTRACT

**Comprehensive adult treatment has always been a challenging subspecialty in orthodontics because of the lack of a helpful growth component and frequent multidisciplinary cases. Recently, orthodontists have been teaming with oral surgeons to expand options for adult patients requiring treatment of severe malocclusion. This case report details the use of an osteotomy procedure to enhance comprehensive orthodontic treatment in an adult woman.**

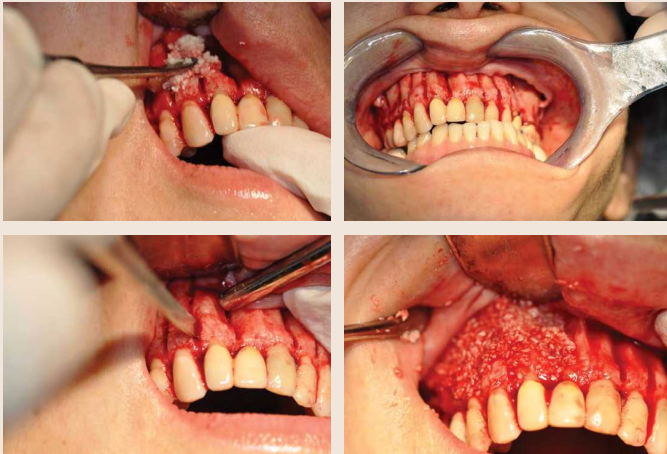
Dentoalveolar distraction osteogenesis (DDO) is a surgical technique for the mechanical induction of new bone and soft-tissue formation after controlled displacement of the dental alveolus. DDO has several applications in dentistry, including bone formation for dental implant placement and modification of craniofacial defects.<sup>1</sup> Combined with comprehensive orthodontics, the technique has been used as an alternative to orthognathic surgery for correcting alveoloskeletal relationships.<sup>2</sup> Other indications for DDO in orthodontics include moving ankylosed teeth or malpositioned implants, and increasing the rate of orthodontic movement for shorter treatment times.<sup>1,3</sup>



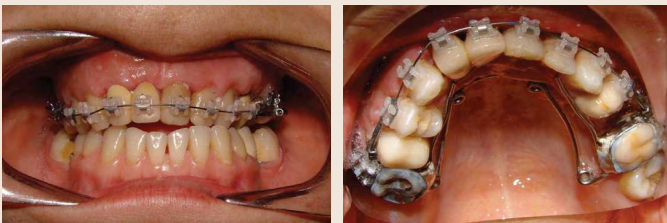
**Figure 1.** Initial orthodontic records and tomographs for F.B. Note displacement of left condyle.



**Figure 2.** Maxillary anterior guided orthotic (MAGO) splint for mandible deprogramming.



**Figure 3.** Surgical procedure: careful elevation and retraction of mucosa; bur osteotomy through labial cortex only. Thin, flexible osteotome to avoid roots, horizontal osteotomies at least 4 mm from root apices; no decortication over denuded or thinly covered roots. Gently pack grafting material into all osteotomy sites.



**Figure 4.** Quad-helix appliance; maxillary arch bonded with Innovation (GAC) clear brackets and starting nickel-titanium wire. Our current protocol is to get patient into heavier, stainless-steel arch wires prior to osteotomy for more predictable orthodontic control.



**Figure 5.** Mandibular arch bonded; heavier stainless-steel wires inserted; heavy Class III elastics begun.



**Figure 6.** Four months later. Nearly entire skeletal discrepancy corrected.

As described in this case report, after full diagnosis and treatment planning with the orthodontist, oral surgeon and restorative dentist, the patient is bonded in the edgewise orthodontic appliances of choice. Once the patient is in heavy orthodontic arch wires, the surgeon incises through both the cortical and medullary bone around the entirety of the teeth/bony segments to be displaced.

After a brief healing period (no more than 7 to 10 days), traction is begun on those segments using the orthodontic appliances. Because of distraction and the regional acceleratory phenomenon (RAP), the teeth/bony segments move rapidly, requiring weekly orthodontic adjustments. The orthodontist has four to five months to complete the planned tooth/bone movement, after which enough healing has taken place to make DDO no longer possible. At this point, normal orthodontic principles are applied to finish the case and to get the patient into retention.<sup>3,4,5</sup>

### Case Report

F.B. is a 32-year-old female whose chief complaints on presentation are jaw pain and that her bite is “off.” Orthodontic diagnosis is a Class III skeletal pattern from a hypoplastic, narrow-tapered maxilla/mandibular shift to the left, with condylar displacement causing a bilateral posterior cross-bite, anterior cross-bite and mild dental crowding in both arches. Teeth #2, #8, #13, #19 and #30 are missing. The left temporomandibular joint is painful upon palpation and the condyle is displaced (Figure 1).

The treatment plan was three to six months of splint therapy to deprogram the mandible into centric relation (CR) (Figure 2).<sup>6,7</sup> Once the mandibular position was set and stable, a full maxillary osteotomy procedure was performed (Figure 3), and a quad-helix orthodontic appliance was cemented and immediately activated, along with complete maxillary straight-wire braces (Innovation, GAC) (Figure 4).



**Figure 7.** Twelve months later. Surgical site completely healed, dental arches coordinated and all spaces closed; patient is referred to prosthodontist for approval of tooth positions for restorative work.



**Figure 8.** Final results.

A week later, the mandibular arch was bonded and elastics were begun to address the Class III occlusion (Figure 5). Normal orthodontic adjustments were performed weekly for four months, at which point, the skeletal discrepancy was corrected (Figure 6). With the DDO complete, regular monthly orthodontic adjustments proceeded until the patient was ready for restorative work (Figure 7).

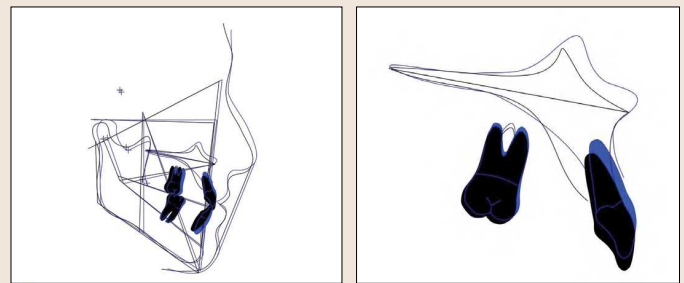
The restorative treatment plan included fixed bridges: teeth #7 through #10, #18 through #20 and #29 through #32; PFM crowns on teeth #4, #5, #12; implant crown tooth #13. All appliances were then removed and final restorations cemented (Figure 8). Clear removable retainers were fabricated to be worn 24 hours a day for three months and during sleep afterwards. The total treatment time was 22 months.

Comparison of before and after photographs and superimpositions illustrates the dramatic change in the patient's face and occlusion, with relatively subtle and stable tooth movement (Figure 9). The maxillary dentoalveolus was expanded and repositioned for better symmetry and occlusion. Previously, only orthodontics, combined with orthognathic surgery, could have produced such a result. But cases using DDO are being completed routinely in our offices. //

*The clinical orthodontic work described in this report was performed by Dr. Karpov; surgery by Dr. Fay; implant placement by Dr. Rada Sumareva; restorative work by Dr. Vasos Eracleous. Queries about this article can be sent to Dr. Kuncio at [drkuncio@gmail.com](mailto:drkuncio@gmail.com).*

#### REFERENCES

1. Fernandes FHCN, Orsi IA, Bezzon OL. Distraction osteogenesis in dentistry. *Int J Morphol* 2010;28(3):743-748.
2. Uribe F, Agarwal S, Janakiraman N, Shafer D, Nanda R. Bidimensional dentoalveolar distraction osteogenesis of treatment efficiency. *Am J Ortho Dentofacial Orthop* 2013;144(2):290-8.
3. Iseri H, Kisnisci R, Bzizi N, Tuz H. Rapid canine retraction and orthodontic treatment with dentoalveolar distraction osteogenesis. *J Oral Maxillofac Surg* 2002; 60:389-94.



**Figure 9.** Superimpositions.

4. Roblee RD, Bolding SL, Landers JM. Surgically facilitated orthodontic therapy: a new tool for optimal interdisciplinary result. *Compend Contin Educ Dent* 2009; 30(5):264-75.
5. Baloul SS, Gerstenfeld LC, Morgan EF, Carvalho RS, Van Dyke TE, Kantarci A. Mechanism of action and morphologic changes in the alveolar bone in response to selective alveolar decortication-facilitated movement. *Am J Orthod Dentofacial Orthop* 2011; 39(4 Suppl):S83-101.
6. Ikeda K, Kawamura A. Assessment of optimal condylar position in with limited cone-beam computed tomography. *Am J Orthod Dentofacial Orthop* 2009;135(4):495-501.
7. Chen HM, Fu KY, Zhang ZK. Positional changes of the temporomandibular joint disk and condyle with insertion of anterior repositioning splint. *Hua Xi Kou Qiang Yi Xue Za Zhi* 2009;27(4):408-12.



Dr. Kuncio



Dr. Karpov



Dr. Fay

**Daniel A. Kuncio, D.D.S.**, is an orthodontist on the Upper West Side of Manhattan. He is a diplomate of the American Board of Orthodontics and a clinical attending and assistant professor of orthodontics at Bronx-Lebanon Hospital/Icahn School of Medicine at Mount Sinai.

**Maria A. Karpov, D.M.D., M.S.**, is an orthodontist in private practice in Tribeca and the Upper West Side of Manhattan. She is a diplomate of the American Board of Orthodontics and was a clinical attending at the University of Pennsylvania for 10 years.

**Sherrill Fay, D.M.D., M.D.**, is an oral and maxillofacial surgeon in Tribeca, NY, NY. She is a diplomate of the American Board of Oral and Maxillofacial Surgery and is on staff at The Mount Sinai Hospital and at SBH Health System, St. Barnabas Hospital, New York, NY.