E
deficient distalization of the
maxillary molars requires a
reduction of molar resistance to
tooth movement, avoidance of
distal crown tipping, good vertical
control, and maintenance of ante-
rior anchorage. Because molar
distalization is a distolateral
movement, however, it tends to
dislodge the teeth from the alve-
olus. Corticotomy may be a use-
ful adjunct procedure in such
cases, since it has long been used
to accelerate tooth movement and
to minimize root resorption, loss
of vitality, and relapse of ortho-
dontic corrections.1-7

Suya suggested that most
surgical and orthodontic proce-
dures be performed in the first
cases to four months after corti-
cotomy, before fusion of the tooth-
bone units.8 In a report of two
cases of crowding, Wilcko and
colleagues described the combi-
nation of corticotomy with the
grafting of resorbable, alloplas-
tic freeze-dried bone implants to
increase the volume of alveolar
bone, regenerate bone affected by
dehiscence and fenestration, and
avoid gingival recession result-
ing from expansion of the arches.9
They argued that orthodontic
movement results not from simple
repositioning of single tooth-bone
units, but from a cascade of phys-
iological events leading to bone
healing, which Frost has termed
the “regional accelerated phe-
omenon”.10-13 An increase in
bone metabolism in the perio-
dontal tissues after surgical inter-
vention has been demonstrated in
beagle dogs14 and in Wistar
rats.15,16 These phenomena are
responsible for the rapid dental
movement observed when ortho-
dontic forces are introduced after
corticotomy.

The present article describes
the implantation of freeze-dried
bovine bone in the buccal alveo-
lus after selective buccal and
apalatal decortication of the max-
illary molars. This approach has
the following advantages:
• Corticotomy stimulates bleed-
ing and capillary proliferation in
the bone marrow, creating the
perfect bed for a bone implant.
• Corticotomy allows the identi-
fication and resolution of any
areas of transitory secondary
osteoporosis.
• Dehiscence, fenestration, and


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The Use of Segmental Corticotomy to Enhance Molar Distalization

Fig. 1 18-year-old female patient with dental and skeletal Class II malocclusion before treatment.
gingival recession, which are commonly observed in the molar regions, can be improved by a graft with good osteoconductive properties.

**Diagnosis and Presurgical Treatment**

An 18-year-old female in the permanent dentition presented with a dental and skeletal Class II malocclusion (Fig. 1). Cephalometric analysis (Table 1) revealed significant forward rotation of the mandible (SN-GoGn = 22°) and vertical collapse of the lower third of the face (ANS/PNS-GoGn = 12°). The maxillary incisors were extremely proclined (U1-ANS/PNS = 140°), and the overjet was pronounced (9mm).

The initial phase of treatment consisted of leveling and alignment of both arches, using .022” brackets on an .018” × .025” preformed stainless steel archwire (Fig. 2). This was followed by bilateral buccal and palatal corticotomies.

**Surgical Procedure**

One hour before surgery, the patient was administered amoxicillin, 2g. Thirty minutes before surgery, she was given Nimesulide, 100mg, which she was instructed to take every eight hours during the first day after surgery. A .12% chlorhexidine rinse was performed immediately before the procedure, and Lidocaine 2% with epinephrine 1:100,000 was infiltrated at the surgical sites.

Buccal and palatal sulcular incisions were made, with mesial and distal vertical releases one tooth away from each area to be decorticated. Full-thickness flaps were reflected, but the buccal flaps were reflected palatally beyond the apices of the teeth, since a natural curve of palatal reflection was not possible. Any remaining interproximal papillary tissue was left in place. Exposure of the surgical sites revealed fenestration.
on the buccal cortices (Fig. 3).

Decortication was then performed with a round bur on a high-speed handpiece (20,000 rpm) under normal saline irrigation. Vertical incisions were made between the roots of the first and second molars and connected by horizontal cuts beyond the apices, ending 1-2mm below the alveolar crests. Several holes were then drilled, both buccally and palatally, to create a bleeding bed for the graft (Fig. 4). Each cortex was penetrated on the buccal side of the alveolar site, taking care to avoid damage to the roots. Bio-Oss* freeze-dried bovine bone implant material was placed buccally to cover the decorticated areas (Fig. 5). The flaps were closed with silk 4-0 sutures.

Molar Distalization

One week after surgery, the sutures were removed. Molar distalization was initiated by placing 200g nickel titanium coil springs** on the maxillary archwire between the second premolars and first molars (Fig. 6). The patient was seen every four weeks (Fig. 7) until distalization of the molars was complete, about eight weeks after the corticotomies (Fig. 8). No anterior anchorage devices

Fig. 4 Holes and grooves drilled on buccal side of alveolar site in preparation for grafting.

Fig. 5 Bio-Oss* freeze-dried bovine bone implant material grafted buccally over decorticated areas.

Fig. 6 One week after corticotomies, molar distalization initiated with nickel titanium coil springs between second premolars and first molars.

Fig. 7 Four weeks after corticotomies.

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***G&H Wire Company, P.O. Box 248, Greenwood, IN 46142; www.ghwire.com.
were needed.

The second premolars, which showed the greatest movement, were rotated mesially by the force of the compressed springs, despite being blocked by metal ligatures. The distal movement of the two molars was radicular, with minimal distal crown tipping. During distalization, the teeth showed no increase in mobility, and the patient did not report any pain or sensitivity.

Intrusion of the upper anterior segment and closure of the spaces between the second premolars and first molars were accomplished in another four weeks, using Class II elastics to an .018” Australian Special Plus wire*** with coil springs between the lateral incisors and canines (Fig. 9). Treatment was completed in 11 months (Fig. 10).

After orthodontic treatment, the periodontal health of the upper premolar and molar regions had improved, and the initial gingival recession and apical root resorption of the orthodontically repositioned teeth had diminished. The upper third molars were extracted before appliance removal,

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Fig. 8 Eight weeks after corticotomies.

Fig. 9 Class II elastics attached to .018” Australian Special Plus wire,*** with coil springs between lateral incisors and canines, for intrusion of upper anterior segment.
Fig. 10 A. Patient after 11 months of treatment. B. Superimposition of pre- and post-treatment cephalometric tracings.
allowing clinical confirmation of the graft attachment and the absence of fenestration (Fig. 11).

Discussion

This case demonstrates that segmental corticotomy and maxillary molar distalization can be an effective combination in correcting Class II molar relationships. The corticotomies reduced molar resistance to distal movement and eliminated the need for anterior anchorage. Optimal leveling and alignment of both arches was required before surgery to minimize the friction generated by the sliding mechanics and avoid occlusal interference from the mandibular molars.

In cases where the arches cannot be fully leveled and aligned before molar distalization, segmental corticotomy may be combined with other procedures or appliances to reduce molar resistance. The presence of the third molars seems to have no effect on distal movement; in the present case, where the maxillary third molars were extracted at the end of treatment, distalization of the first and second molars occurred without distal crown tipping or significant loss of anchorage.

Grafting of the Bio-Oss material in the buccal area increased the volume of alveolar bone and improved the condition of the periodontal tissues around the distalized molars. The time required for distalization and for the entire treatment was significantly less than would have been needed for conventional orthodontics.

REFERENCES


Fig. 11 Increased buccal alveolar bone and healing of right second molar fenestration after extraction of upper third molars, immediately before appliance removal.