Orthodontic procedures that improve the periodontal prognosis

Try coordinating orthodontic movement with periodontal surgical techniques.

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During the past decade, orthodontic movement has become an acceptable and integral part of treatment for the patient with advanced periodontal disease. This article presents methods to manage osseous defects that are not amenable to conventional resective or regenerative osseous surgery alone but can be corrected by a combination of orthodontic movement and periodontal surgical techniques.

The general dentist, orthodontist, and periodontist, who often have different philosophies, may not be aware of how they might coordinate treatment with this basic concept.

Two types of tooth movement will be discussed: uprighting to correct mesially tipped teeth and forced eruption. Mechanisms of movement and their indications and contraindications will be presented.

These factors should be considered in differentiating this treatment from the orthodontic treatment of an adolescent: growth and development are not influencing factors; treatment is shorter and ranges from approximately three to six months; sectional appliances usually suffice; in determining the movement of teeth, the morphologic structure of the alveolar crest is as important as the aberration in position of the tooth; and ideal cuspal and contact relationships are not always mandatory, as the involved teeth will usually be restored and stabilized with a fixed prosthesis.

Correction of mesially tipped teeth
The mesially tipped tooth has several common characteristics that create periodontal and restorative problems. The mesial alveolar crest slants apically and creates a vertical osseous defect. This morphologic aberration has the predilection for the development of a progressive periodontal pocket. Furthermore, the occlusal forces are not received within the vertical axis of the tooth. Restorative complications, moreover, include inadequate space for the pontic and lack of parallelism.

Uprighting of the mesially tipped molar is accomplished with use of a sectional orthodontic appliance and a maxillary Hawley bite plane. The first phase of movement uses an uprighting spring (Brousard) that initiates a rotational and occlusal movement as the roots are torqued mesially (Figure 1, top). This stage of the movement is most important in eliminating the osseous defect.

After four to six weeks, the second phase of movement is begun. An open coil spring is used in conjunction with the uprighting spring (Figure 1, bottom) and effectively creates an adequate space for the pontic.

A Hawley bite plane is used for disarticulation to prevent occlusal trauma during the movement of teeth. However, occlusal adjustment must be continuously done to prevent traumatic contact, as the tooth extrudes while it is being uprighted. If this appliance is not used, intrusive mobility and incomplete elimination of the osseous defect might result.

Termination of movement of teeth is based on four criteria: radiographic evidence of crestal leveling; clinical probing that discloses minimal depth of the pocket or a significant reduction in depth; proper axial inclination; and creation of adequate space for the pontic — the width of a premolar or greater.

When the aforementioned criteria have been met, the tooth is splinted to maintain its position. If an intracoronal wire and acrylic splint is used, definitive occlusal adjustment must also be done.

With the tooth in a normal vertical position, the periodontal prognosis has been enhanced. Occlusal forces are received in an axial...
direction. Moreover, the crown-to-root ratio has been improved by occlusal reduction that was made possible by the extrusion of the tooth during the uprighting procedure. The mesial alveolar crest has either been leveled or the osseous defect has been made amenable to osseous resection or regenerative procedures; a pocket-free environment has resulted.

These results were achieved in a 32-year-old patient, whose mandibular right second and third molars were tipped mesially into the space of the first molar (Figure 2, top left). Radiographic examination disclosed the alveolar crest to be vertically angulated towards the mesial surface of the second molar. A phase I appliance was inserted (Figure 2, top right) and, six weeks later, it was replaced with a Phase II appliance (Figure 2, bottom left).

The final position of the tooth was achieved after four months of movement, at which time the teeth were splinted into place with acrylic resin and wire. Residual sulcular depth was 2.0 mm, and radiographic evidence of crestal leveling was apparent (Figure 2, bottom right).

This example demonstrates the use of the uprighting procedure where the level of the interproximal crest is merely following the disparity in height of cemento-enamel junctions on adjacent teeth. However, severe osseous lesions can result when inflammatory periodontal disease is superimposed on an angular crest, and the uprighting technique applied in such an instance can produce significant changes (Figures 3, 4).

**Forced eruption**

Forced eruption
ew can be used to alter an osseous defect that has formed as a result of inflammatory periodontal disease with or without occlusal trauma. Several different techniques can be used to forcibly extrude a tooth. Ingber
ew described an intracoronal device (Figure 5); however, sectional orthodontic appliances (Figure 6) or interarch elastic bands (Figure 7) can also be used.

A one-wall infrabony pocket or hemiseptal defect is particularly suited to treatment by this procedure. Elimination of such a defect by osseous resection would remove valuable supporting bone from adjacent teeth. After forced eruption is complete, a residual two- or three-wall infrabony defect remains. This deformity is amenable to a self-regeneration procedure, an autogenous osseous graft, a moderate form of resection, or a combination of these techniques (Figure 8).

Before initiating this movement, all inflammation must be controlled.
by either open or closed debride-
ment. Positive osseous remodeling
will not occur while inflammation is
present.

Criteria for the termination of
the eruptive movement are radi-
ographic evidence of crestal level-
ing and apparent reduction in depth
of the pocket demonstrated by
probing. When these goals have
been accomplished, the tooth must
be stabilized in position.

Another benefit resulting from
this technique is an improvement
of the crown-to-root ratio as the
elevated tooth is reduced occlusally
to conform to the adjacent occlusal
plane.

Discussion
Orthodontic movement of teeth
has proved a predictable mechan-
ism by which teeth with advanced
periodontal disease can be given an
improved prognosis. Furthermore,
this is particularly significant in
terms of abutments for restorative
dentistry; elimination of pockets
can be accomplished without the

Figure 3. Top, alveolar crest is affected by both position of
tooth and inflammatory periodontal disease. Bottom, after
two months, tooth is splinted into place. Four months after
completion of tooth movement alveolar crest has mineralized.

Figure 4. Top, osseous defect that is not treatable by
conventional surgical techniques is present on mesial aspect
of mandibular right second molar. Bottom, three months after
initiation of movement of teeth, defect is considerably
reduced.

Figure 5. Ingber appliance for extrusion of teeth. Clasps
engage grooves on buccal and lingual surfaces apical to
normal position on tooth.

Figure 6. Arch wire is used to extrude tooth with hemiseptal
lesion.
removal of significant amounts of supporting bone, crown-to-root ratio can be improved, and proper parallelism can be provided.

The basic biologic concept that is applied in these techniques is that the attachment apparatus will follow the movement of a tooth in the presence of periodontal health. It is therefore essential that before orthodontic procedures are initiated, the patient must be able to control plaque and all calculus deposits must be removed.

**Summary**

Osseous defects not amenable to conventional resective or regenerative osseous surgery alone may respond to a combination of orthodontic and periodontal techniques.

Two orthodontic procedures — correction of mesially tipped teeth and forced eruption — have been described that may enhance the periodontal prognosis.

Each procedure is accomplished with use of sectional orthodontic appliances and each requires a short time for treatment.

**References**


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Figure 7. Interarch elastic bands can be used to extrude tooth.

Figure 8. Above, interosseous defect is present on distal aspect of mandibular left second premolar. Top, after three months, level crest seems apparent. Bottom, surgical entry shows level crest between second premolar and first molar.