Using a Fixed Provisional as an Orthodontic Anchor in Forced Eruption

Frank Celenza, DDS*
Vincent Celenza, DMD†

The Challenge

Forced eruption is a form of tooth movement that — unlike mesiodistal movement — imparts tension exclusively without a zone of pressure. Due to the lack of resistance incurred by this form of tooth movement, this treatment modality has often been referred to as rapid extrusion. Utilization of forced eruption as an orthodontic adjunct has been documented in the literature for the leveling of isolated infrabony defects and the conservation of osseous tissues adjacent to the defect sites.[1-8] Acquisition of clinical crown length and subsequent salvation of nonrestorable teeth is facilitated by the use of forced eruption in conjunction with periodontal surgery.[7]

Forced eruption has other clinical applications including the alteration of free gingival margin levels in order to provide enhanced aesthetics.[8] The incorporation of a fiber resection procedure during eruption has resulted in the elimination of tension stimuli upon the alveolar crest by severing the periodontal fiber apparatus during tooth movement.[9] This procedure subsequently facilitated control of crestal morphology. Clinical and histological evaluations have demonstrated the effect of forced eruption and the associated tooth movements on the morphology of hard and soft tissues to facilitate site development.[5,9-11] In order to recontour the hard and soft tissues and allow subsequent implant placement, hopeless teeth were erupted to permit orthodontic extraction.[12] Indications for forced eruption, with regard to periodontics and restorative dentistry, include alteration of infrabony morphology for leveling osseous defects, acquisition of clinical crown length for the restoration, modification of gingival architecture for aesthetic enhancement, and implant site development in compromised situations. As anchorage requirements are minimal and control of movement is easily attained, appliance mechanotherapy provides a predictable means of performing forced eruption.

*Associate Clinical Professor, Departments of Post-Graduate Orthodontics, and Implant Dentistry, New York University, New York, New York; private practice, New York, New York.
†Private practice, New York, New York.

Patient Presentation

A 40-year-old male patient presented with a high smile line in the maxillary left quadrant (Figure 1). Since the lateral incisor was missing, the first premolar was deemed to be a strategic and important abutment to prevent a pier-abutment situation. Salvation of this tooth was considered to be important to the stability of the proposed four-unit bridge. The forced eruption technique facilitated salvation of the first premolar without adverse aesthetic side effects that would have occurred as a result of traditional periodontal surgery.

The primary challenge was to restore the compromised first premolar as an abutment without traditional means of pocket elimination and crown-lengthening procedures, which could have adversely affected the aesthetics of the region. Based on these criteria, a decision as to the optimal method of treatment had to be rendered by the clinician.

Figure 1. Preoperative view of the four-unit provisional restoration (#10 through #13) with a cantilevered pontic and 3 abutments. A deep periodontal pocket was noted on the mesial surface of the first premolar.

Figure 2. A post and core was fabricated for the first premolar and featured a mesiodistal hole that allowed elastic cord insertion and traction.

THE SOLUTION

Based on the aesthetic position of the treatment zone, the existence of a multiunit provisional restoration, and the indicated morphologic alterations to the hard and soft tissue structures for implant placement, a treatment plan was formulated. Since the patient was missing the lateral incisor, a four-unit restoration was planned across abutments #13(25), #12(24), and #11(23), with a cantilevered pontic for the posterior lateral incisor. Tooth #12(24) would be shifted occlusally with forced eruption in order to adjust the location of the perforation, facilitate conservative periodontal surgery, and allow aesthetic restoration of the quadrant with successful coverage and sealing of the perforation. Tooth movement would be facilitated with an orthodontic elastic cord attached to the provisional restoration and the tooth to be erupted.

Clinical Procedure

Extrusive Phase

The first premolar tooth received a post and core designed to facilitate rapid extrusion. The core featured a mesiodistal hole along the gingival extent to allow placement of an elastic cord (Figure 2). The provisional restoration was modified to serve as an anchorage unit and to prevent contact with the adjacent tooth. Two holes were subsequently drilled into the occlusal surface of the provisional restoration. Following cementation, the orthodontic cord was threaded around the occlusal surface and through the hole in the core to force the

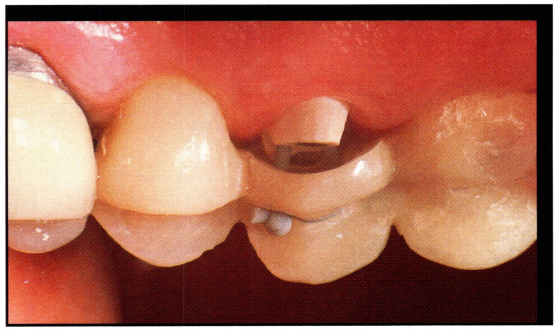

Figure 3. Lingual view of the modified provisional restoration. Tooth eruption into the fixed partial denture was facilitated with an orthodontic cord.

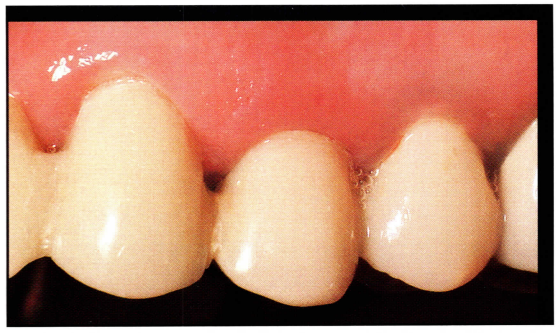

Figure 4. The activated appliance is virtually indistinguishable from the buccal perspective.

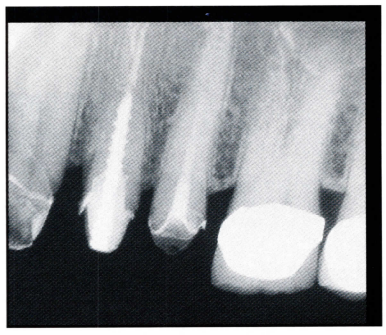

Figure 5. Periapical radiograph of the maxillary site prior to the initiation of forced eruption.

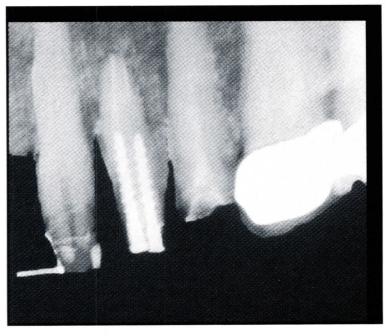

Figure 6. Radiograph following 2 months of forced eruption. Note the modified position of the first premolar tooth.

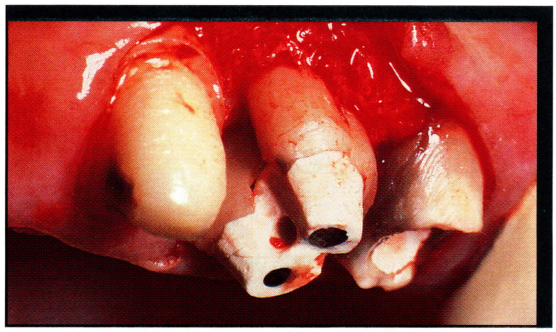

Figure 7. The conservative flap design limited surgical invasion of the area that surrounded the compromised tooth and subsequently maintained optimal aesthetics.

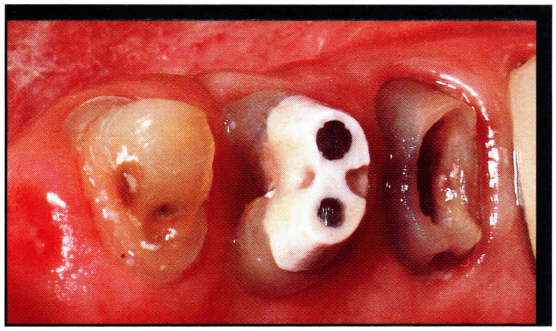

Figure 8. Occlusal view during healing exhibits the perforation, which is now positioned supragingivally.

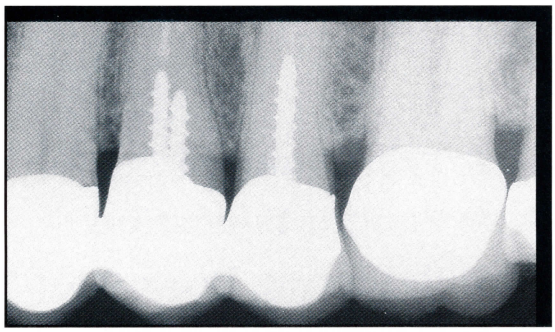

Figure 9. Postoperative radiograph demonstrates successful coverage of the perforation with respect to the biologic width.

Figure 10. Postoperative retractive view demonstrates healthy gingival tissues and lack of root exposure.

tooth into the provisional restoration (Figure 3). The orthodontic appliance was not visible buccally (Figure 4), and the cord was utilized to further secure the restoration. The patient was reevaluated every 10 days in order to retie the cord, eliminate interferences, and recement the provisional restoration and extrusion appliance.

Surgical Phase

The eruptive phase of treatment was monitored clinically and radiographically. Definitive periodontal flap elevation was performed once eruption was deemed to be sufficient. As a result of the altered tooth position, the surgical procedure was facilitated with a conservative design, and the resective and repositioning requirements were greatly reduced. While periodontal analysis revealed a healthy gingival condition, the mesial surface of the first premolar exhibited an excess probing depth as a result of an endodontic perforation. Although a periapical radiolucent area associated with the eruptive tooth was evident radiographically, it did not imply pathology (Figures 5 and 6). This area was a remnant of the bony socket from which the tooth had erupted and was expected to fill in time. The length of the flap was also reduced and confined to the immediate area of the compromised tooth (Figure 7). This conservative flap design reduced potential aesthetic deformities (eg, root exposure, loss of papillary tissue, uneven gingival margins) that may have resulted from traditional flap elevation. Successful coverage of the perforation with respect to the biologic width was achieved and healing proceeded

Figure 11. A high smile line and aesthetic preservation of the papillary tissue and confluent free gingival margins were evident 11 years following treatment.

uneventfully (Figures 8 through 11). A porcelain-fused-to-metal fixed bridge from tooth #13(25) to #11(23) with #10(22) cantilevered anteriorly was constructed as the definitive prosthesis.

Conclusion

The indications and application of the forced eruption technique were reviewed, and a simplified form of mechanotherapy for use with a multiunit provisional restoration and a devitalized tooth that required eruption was illustrated. This predictable method did not require special orthodontic components other than the elastic cord, was easily managed, comfortable, and nonintrusive. Utilization of forced eruption to adjust the hard and soft tissue contour remains a useful adjunct for the acquisition of favorable morphologic and anatomic alterations. Flap design for definitive periodontal management can be altered over traditional flap designs in order to enhance the definitive aesthetic result.

Acknowledgment

The authors declare no financial interests in the techniques presented in this article.

References

1. Oppenheim A. Artificial elongation of the teeth. Am J Orthod Oral Surg 1940;26:931.
2. Sterr N, Becker A. Forced eruption: Biological and clinical considerations. J Oral Rehabil 1980;7(5):395-402.
3. Amsterdam M. Periodontal prosthesis. Twenty-five years in retrospect. Alpha Omegan 1974;67(3):8-52.
4. Potashnick SR, Rosenberg ES. Forced eruption: Principles in periodontics and restorative dentistry. J Prosthet Dent 1982;48(2):141-148.
5. Celenza F. The development of forced eruption as a modality for implant site enhancement. Alpha Omegan 1997;90(2):40-43.
6. Ingber JS. Forced eruption: Part I. A method of treating isolated one and two wall infrabony osseous defects — Rationale and case report. J Periodontol 1974;45(4):199-206.
7. Ingber JS. Forced eruption: Part II. A method of treating nonrestorable teeth — Periodontal and restorative considerations. J Periodontol 1976;47(4):203-216.
8. Ingber JS. Forced eruption: Alteration of soft tissue cosmetic deformities. Int J Periodont Rest Dent 1989;9(6):416-425.
9. Atherton JD, Kerr NW. Effect of orthodontic tooth movement upon the gingivae. An investigation. Br Dent J 1968;124(12):555-560.
10. Salama H, Salama M. The role of orthodontic extrusive remodeling in the enhancement of soft and hard tissue profiles prior to implant placement: A systematic approach to the management of extraction site defects. Int J Periodont Rest Dent 1993;13(4):312-333.
11. Atherton JD. The gingival response to orthodontic tooth movement. Am J Orthod 1970;58(2):179-186.
12. Pontoriero R, Celenza F, Ricci G, Carnevale G. Rapid extrusion with fiber resection: A combined orthodontic-periodontic treatment modality. Int J Periodont Rest Dent 1987;7(5):30-43.