

CASE REPORT

Orthodontic Intrusion of Periodontally Involved Teeth

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The following case report describes the interface between orthodontics, periodontics, and prosthetic dentistry in the treatment of an adult patient with periodontal disease complicated by a missing central incisor.

Diagnosis and Treatment Plan

A 55-year-old female presented with the chief complaint of incisor spacing and protrusion and consequent speech difficulties. The mandibular left central incisor had been extracted at an earlier age. She had a history of severe periodontal disease that had been treated over a five-month period with deep scaling and root planing, followed by regular periodontal maintenance.

Clinical examination re-

vealed generalized gingival recession with 3mm pockets, no bleeding on probing, and incisor mobility limited to Grade 2. The patient displayed a full profile with potentially competent lips. She had a Class I buccal occlusion with proclined, spaced, and elongated incisors, 10mm of spacing in the maxillary arch, and 9mm of spacing in the mandibular arch (Fig. 1).

Radiographic analysis showed generalized horizontal bone loss, particularly in the incisor regions, and furcation involvement of the mandibular molars. Since only adjunctive orthodontic treatment was planned, no lateral cephalogram was taken.

The treatment plan called for:

1. Intrusion and retraction of the mandibular incisors and then the

maxillary incisors, with torque control.

2. Reinforcement of anchorage with a mandibular lingual holding arch and a transpalatal arch.

3. Redistribution of space, according to the recommendation of the esthetic dentist, to allow prosthetic replacement of the missing mandibular incisor.

4. Maintenance of periodontal health by home care, under the supervision of a specialist.

5. Finishing and detailing.

6. Retention with a maxillary fixed lingual retainer and a mandibular Rochette bonded bridge.

Treatment Mechanics and Progress

The mandibular lingual holding arch was cemented to the first molars and placed gingi-

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Fig. 1 55-year-old female with Class I malocclusion, excessive overjet, and flared, spaced, and elongated incisors before treatment.

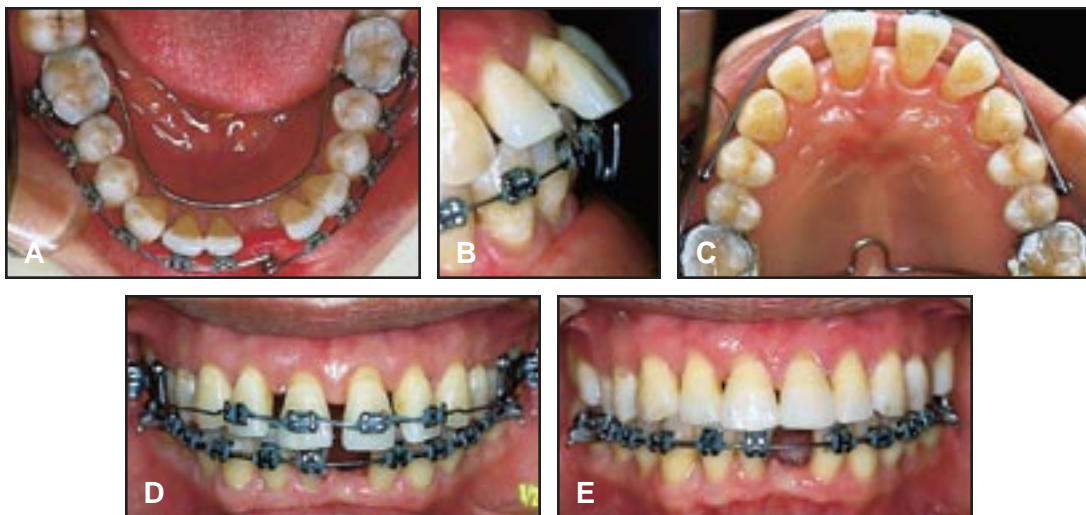


Fig. 2 A. Lingual holding arch for anchorage and .016" x .022" TMA archwire with compensating bends in buccal segment. B. Overjet after mandibular incisor retraction. C. Transpalatal arch for anchorage and .017" x .025" TMA archwire for maxillary intrusion and space closure. D. Maxillary lateral incisors incorporated into retracting archwire after significant intrusion of central incisors. E. Residual space distributed distal to maxillary central incisors, which were then built up distally with composite resin.

vally enough to permit retraction of the mandibular incisors. A full .022" preadjusted edgewise appliance was bonded to the mandibular arch, and an .016" × .022" TMA* archwire with anterior closing loops was inserted and activated slightly (Fig. 2A).

After the mandibular incisors had been retracted and adequate overjet achieved (Fig. 2B), treatment was begun in the maxillary arch with cementation of the transpalatal arch and bonding of the central incisors only. An .017" × .025" TMA archwire with bilateral closing loops and an intrusion bend was used to simultaneously retract and intrude the maxillary central incisors (Fig. 2C). The activation force of the maxillary and mandibular closing loops was kept at a minimum to prevent further periodontal damage during treatment.

The mandibular wire size was progressively increased to .017" × .025", and lingual root torque was applied to the incisors. Once significant intrusion of the maxillary central incisors had been achieved, the lateral incisors were incorporated in the archwire for alignment (Fig. 2D). Maxillary closing loops were reactivated for retraction and intrusion, and elastic chain was added for incisor traction.

Six months into treatment, 6mm of space was available for prosthetic replacement of the missing mandibular incisor (Fig.

2E). Residual maxillary spaces were closed by adding composite resin to the distal of the central incisors. After another month of treatment, the orthodontic appliances were removed.

A multistranded .018" wire was bonded lingually for maxillary retention. The mandibular resin-bonded bridge served not only as a prosthetic replacement, but also as a fixed retainer.

Treatment Results

After orthodontic treatment, the patient showed an improvement in lip competence. The dental midlines were coincident with the facial midline, both archforms had improved, and the good buccal occlusion was preserved. The incisal relationship was normalized, with proper overjet and overbite. Intrusion of the incisors was evident both clinically and radiographically, and the periodontal condition had improved (Fig. 3).

The maxillary and mandibular spaces were eliminated by the orthodontic retraction, prosthetic replacement of the missing incisor, and composite restoration of the maxillary central incisors (Fig. 4). Because of the improvement in esthetics and speech, the patient reported a higher level of self-confidence and self-esteem and was generally happier and more cheerful.

Discussion

Orthodontic tooth movement is seldom routine in periodontally involved patients.¹

This paper describes a team approach to the management of such patients, with treatment planning carried out by the orthodontist, the periodontist, and the esthetic dentist.

The patient was referred to the graduate periodontics program for vigorous preparation of root surfaces and gingival tissues.² Before orthodontic intrusion was initiated, deep pockets were eliminated to prevent apical displacement of plaque that could have produced periodontal lesions.³ Once the patient had demonstrated the ability to maintain a high level of oral hygiene, orthodontic treatment was begun. During treatment, the patient received monthly reinforcement of plaque removal, as well as subgingival debridement at three-month intervals, as recommended by Vanarsdall.⁴

Full-mouth periapical radiographs were taken to allow a thorough assessment of every tooth for orthodontic mechanotherapy. Because the second molars showed more bone loss than the first molars, the first molars were used as anchorage units.

We elected to start treatment in the mandibular arch to create enough overjet for retraction of the flared maxillary incisors. This also allowed us to delay bonding of the periodontally involved maxillary central incisors until absolutely necessary. Once adequate overjet had been attained, lingual root torque was applied to compensate for the moment created during retraction of the maxillary incisors. By moving the roots

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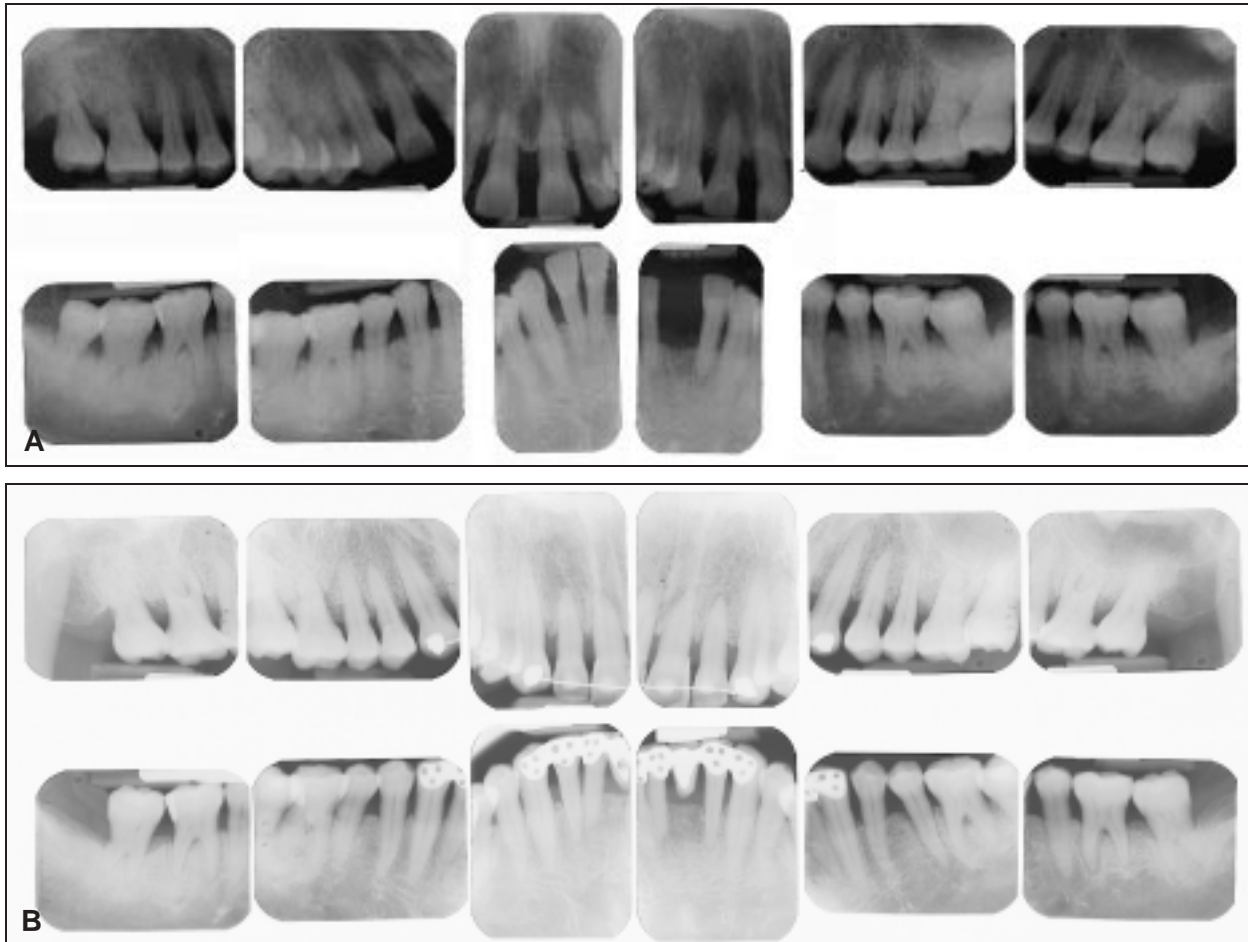


Fig. 3 A. Periapical radiographs before treatment, showing reduced periodontal support. B. Radiographs after treatment, showing improved periodontal condition after orthodontic intrusion.

palatally, we could also improve the labial bone plate. As Kessler noted, favorable changes in osseous topography can be accomplished by moving teeth into an area of the arch with greater bone volume and by repositioning periodontally involved teeth.⁵

The finding of Melsen and colleagues^{2,3} that incisor intrusion in adult patients with marginal bone loss has a beneficial

periodontal effect was substantiated by the present case, where the post-treatment radiographs showed positive bone remodeling (Fig. 3). Melsen also reported that a new connective tissue attachment can be formed during the intrusion of periodontally involved teeth if gingival inflammation is eliminated and root surfaces are adequately scaled.⁶ Other researchers, however, have found only pseudo- or

hemidesmosomal attachment rather than a new periodontal ligament attachment.^{7,8}

A given force applied to the crown of a periodontally compromised tooth produces greater pressure on the PDL than it would on a normally supported tooth, because of the diminished PDL area.^{9,10} In this case, the long span of the initial 2 × 2 maxillary appliance, followed by the 2 × 4 appliance (Fig. 2D), al-

lowed us to keep orthodontic forces to less than 20g per incisor.

Once the overjet and overbite had been almost normalized, the esthetic dentist was consulted about the composite build-up of the maxillary central incisors and the space available for prosthetic replacement of the missing

mandibular incisor. This prosthesis also served as an orthodontic fixed retainer and a periodontal splint for the adjacent teeth. Because bonded bridges, especially those with multiple abutments, are notorious for bond failures, we decided to perforate the framework, as originally described by Rochette¹¹

with a periodontal splint and later by Howe and Denehy¹² with a bridge. The perforation makes it easy to rebond by removing the cement through the holes, without having to remove the whole prosthesis (Fig. 4).

A completely passive retainer should be used to ensure stability of the orthodontically



Fig. 4 Patient after seven months of orthodontic treatment and placement of resin-bonded prosthesis. Buccal occlusal relationship has been preserved, midlines are coincident, and patient has normal overjet and overbite.

moved teeth between the impression taking and cementation of the prosthesis. The retainer is removed for the impression, which is taken with an elastomeric material, and replaced in exactly the same position while the prosthesis is being constructed.

REFERENCES

1. Fields, H.W.; Ackerman, J.L.; Sinclair, P.J.; Thomas, P.J.; and Tulloch, J.F.C.: Treatment for Adults, in *Contemporary Orthodontics*, 2nd ed., ed. W.R. Proffit, C.V. Mosby Co., St. Louis, 1993, pp. 553-584.
2. Melsen, B.; Agerbaek, N.; and Markenstam, G.: Intrusion of incisors in adult patients with marginal bone loss, *Am. J. Orthod.* 96:232-241, 1989.
3. Melsen, B.: Tissue reaction following application of extrusive and intrusive forces to teeth in adult monkeys, *Am. J. Orthod.* 89:469-475, 1986.
4. Vanarsdall, R.L.: Orthodontics and periodontal therapy, *Periodontol.* 2000 9:132-149, 1995.
5. Kessler, M.: Interrelationships between orthodontics and periodontics, *Am. J. Orthod.* 70:154-172, 1976.
6. Melsen, B.; Agerbaek, N.; Eriksen, J.; and Terp, S.: New attachment through periodontal treatment and orthodontic intrusion, *Am. J. Orthod.* 94:104-116, 1988.
7. Polson, A.; Caton, J.; Polson, A.P.; Nyman, S.; Novak, J.; and Reed, B.: Periodontal response after tooth movement into intrabony defects, *J. Periodontol.* 55:197-202, 1984.
8. Ericsson, I.; Thilander, B.; Lindhe, J.; and Okamoto, H.: The effect of orthodontic tilting movements on the periodontal tissues of infected and non-infected dentitions in dogs, *J. Clin. Periodontol.* 55:197-202, 1984.
9. Kusy, R.P. and Tulloch, J.F.C.: Analysis of moment/force ratios in the mechanics of tooth movement, *Am. J. Orthod.* 90:127-131, 1986.
10. Miller, B.H.: Orthodontics for the adult patient, Part 2: The orthodontic role in periodontal, occlusal and restorative problems, *Br. Dent. J.* 148:128-132, 1980.
11. Rochette, A.L.: Attachment of a splint to enamel of lower anterior teeth, *J. Prosth. Dent.* 30:418-423, 1973.
12. Howe, D.F. and Denehy, G.E.: Anterior fixed partial dentures utilizing the acid-etch technique and a cast metal framework, *J. Prosth. Dent.* 37:28-31, 1977.