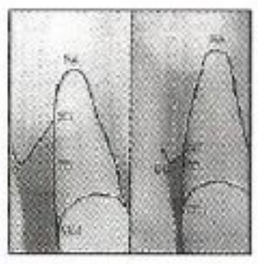
The Use of Orthodontic Intrusive Movement to Reduce Infrabony Pockets in Adult Periodontal Patients: A Case Report



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Clinicians often encounter osseous defects that are best treated by conventional surgical techniques, including bone grafting and guided tissue regeneration, with a goal of establishing a new connective tissue attachment. On occasion, the recognition of an infrabony defect proximal to a tooth with a large diastema may present an opportunity to consider resolution by orthodontic tooth movement. Ideally, the tooth could be moved in the proximal direction until there was no further radiographic or clinical evidence of the predisposing defect. The authors decided to treat an advanced case of adult periodontitis, with extrusion and migration of a maxillary central incisor, using a multidisciplinary approach. Radiologically, a large infrabony defect was present on the mesial aspect of the incisor, with an initial probing depth of 9 mm. After the surgical periodontal therapy, the orthodontic movement started and the incisor was repositioned using an intrusive mechanism, also leading to the closure of the diastema. At the end of the treatment, there was a significant clinical decrease in the probing depth values, and radiographs showed a remarkable reduction of the infrabony defect volume. (Int J Periodontics Restorative Dent 2002;22:365–371.)

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Several papers investigated the role of orthodontic tooth movement on periodontal tissues.[1,2] Experimental research on animals shows that tooth movement is not able to create loss of connective tissue attachment.[3–5] This may be because orthodontic forces act on the portion of the periodontium that is bordered by hard tissue on both sides, whereas the suprabony connective tissue remains unaffected[6,7]; on the other hand, loss of connective tissue attachment may take place if tooth movement is executed in the presence of plaque-induced gingival inflammation.[4,8–10]

A number of authors have tried to correct infrabony defects using orthodontic forces. Coronal movement seems to be able to fill osseous defects if the alveolar bone follows the tooth in its displacement.[11] However, it seems possible to eliminate the defects by moving teeth with a reduced healthy periodontium into infrabony pockets,[6,12–14] suggesting the possibility to investigate the presence of a new connective tissue attachment. Moreover, intrusive displacement has the potential to reestablish a healthy and well-

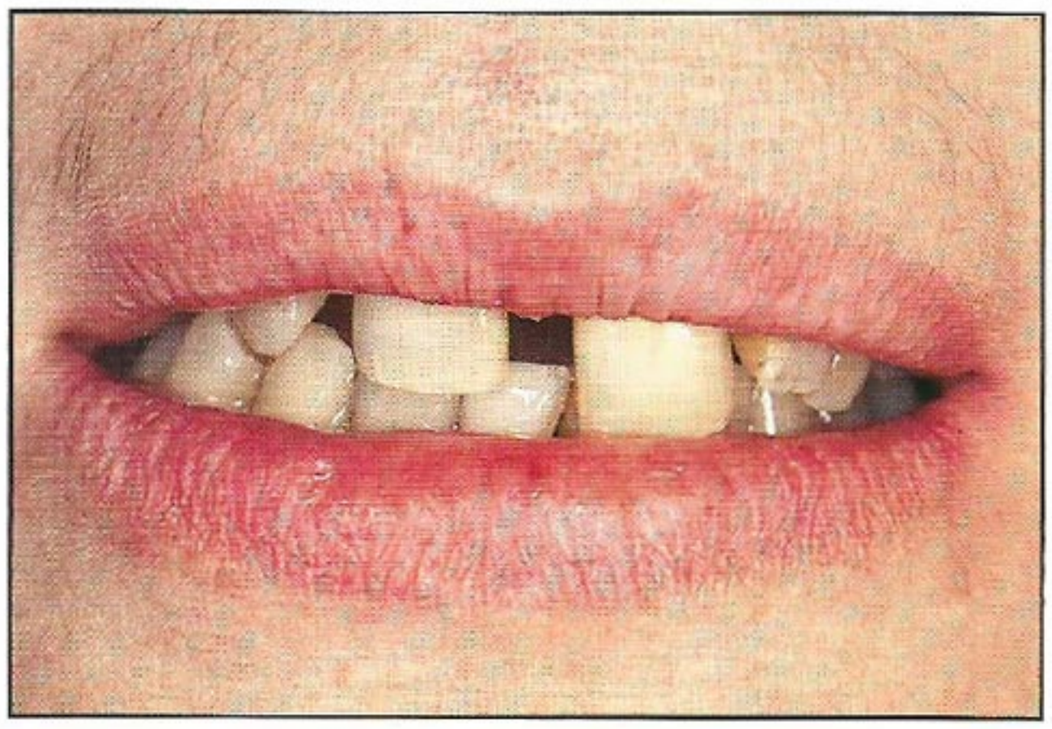


Fig 1 (left) *Anterior view of the patient at the beginning of the treatment shows esthetic abnormalities.*

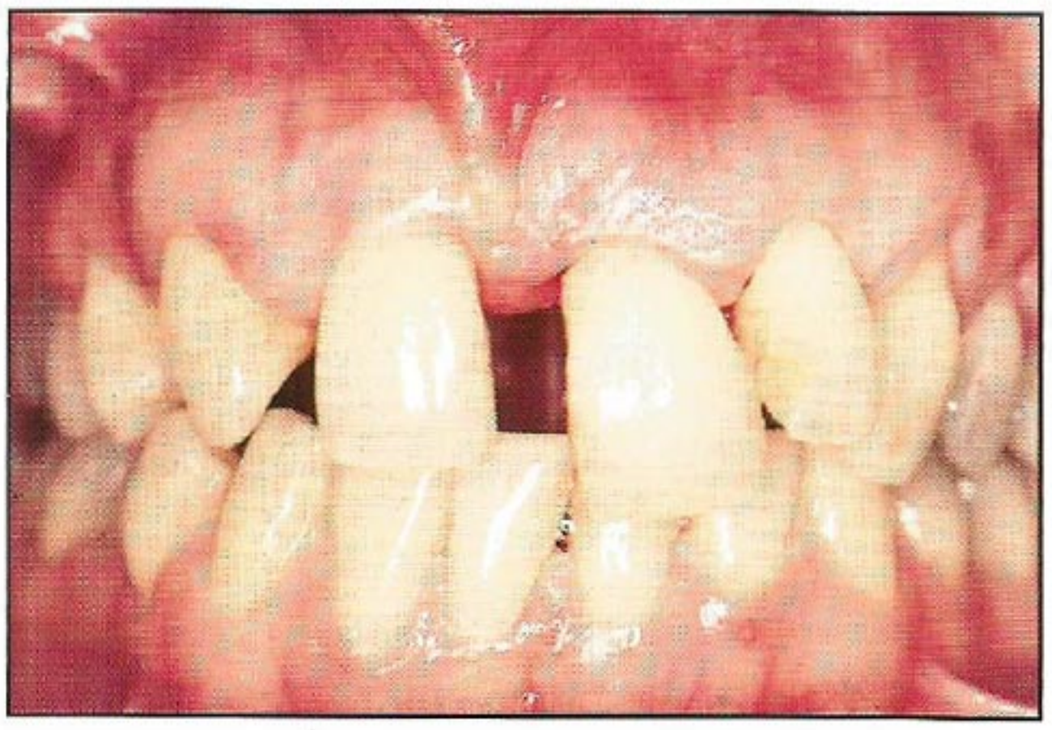


Fig 2 (below left) *Anterior view shows the large diastema, the extruded left central incisor, and the missing right lateral incisor.*

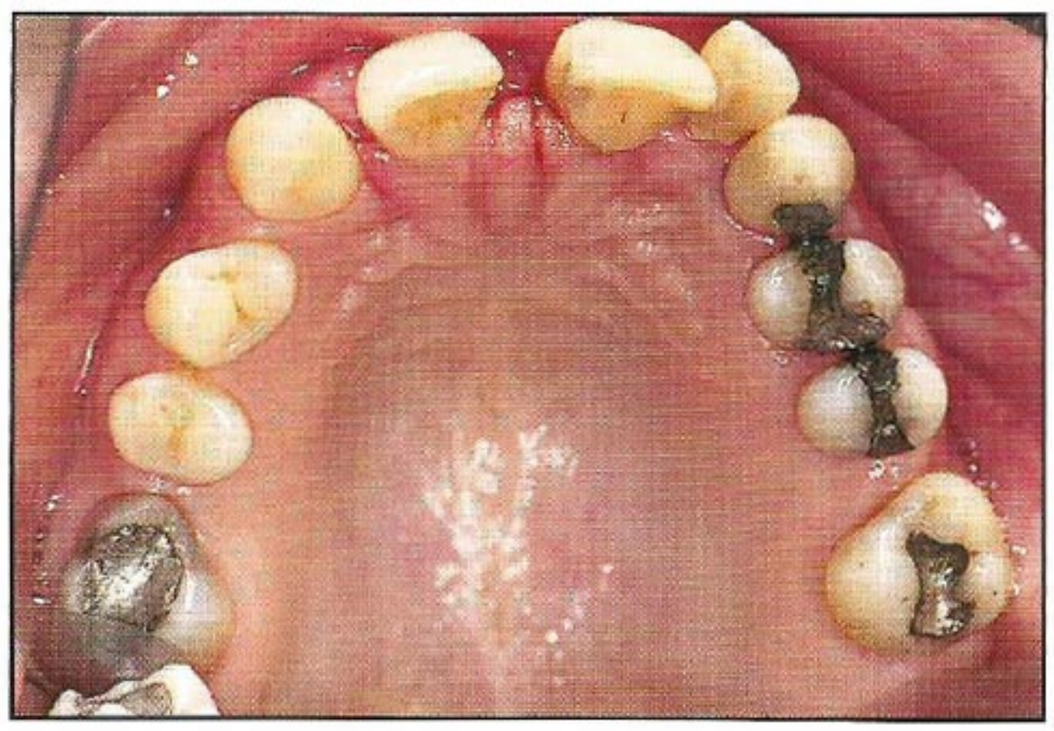


Fig 3 (below) *Occlusal view shows the malpositioned incisors.*

functioning dentition, with favorable psychologic and esthetic results.[15]

This work describes the effect of an orthodontic-periodontal combined treatment in a case of adult periodontitis that led to extrusion and migration of a maxillary central incisor with a large osseous defect on its mesial aspect.

Case report

A 44-year-old woman had advanced adult periodontitis, with severe functional and esthetic problems (Fig 1). A wide diastema opened between the maxillary central incisors following the loss of the right lateral incisor and the extrusion and migration of the left central incisor (Fig 2). The left lateral incisor moved buccally, the right first premolar rotated, and the left first molar was lost (Fig 3). Initial probing depth on the mesial surface of the left central incisor was 9 mm, while gingival recession was 3.5 mm (Fig 4). Radiographic evaluation showed a deep angular bony defect (Fig 5) with no signs of periapical infection. The tooth always maintained a normal vital response to pulp testing during the treatment.

Study casts, a complete radiologic evaluation (panoramic, intraoral, and lateral radiographs), cephalometric evaluation, gnathologic evaluation, occlusogram,[16] and intraoral clinical status assessments were made. The patient received supragingival and subgingival scaling with oral hygiene instruction. In addition, surgical periodontal treatment with a Widman modified flap was performed on the incisor to

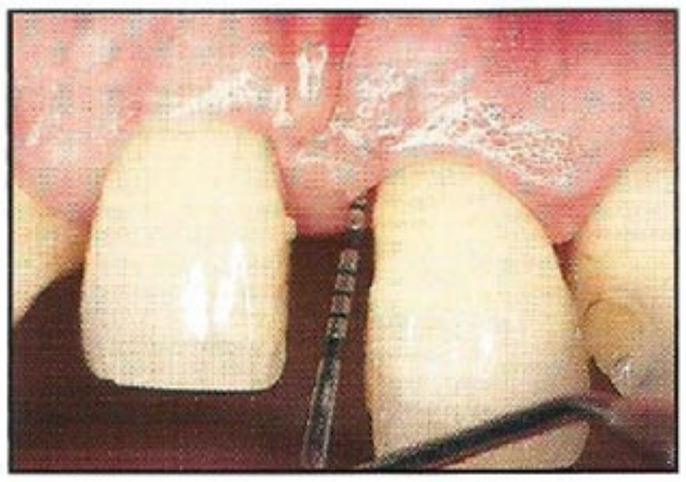


Fig 4 *Initial clinical probing on the mesial surface of the left incisor (9 mm).*

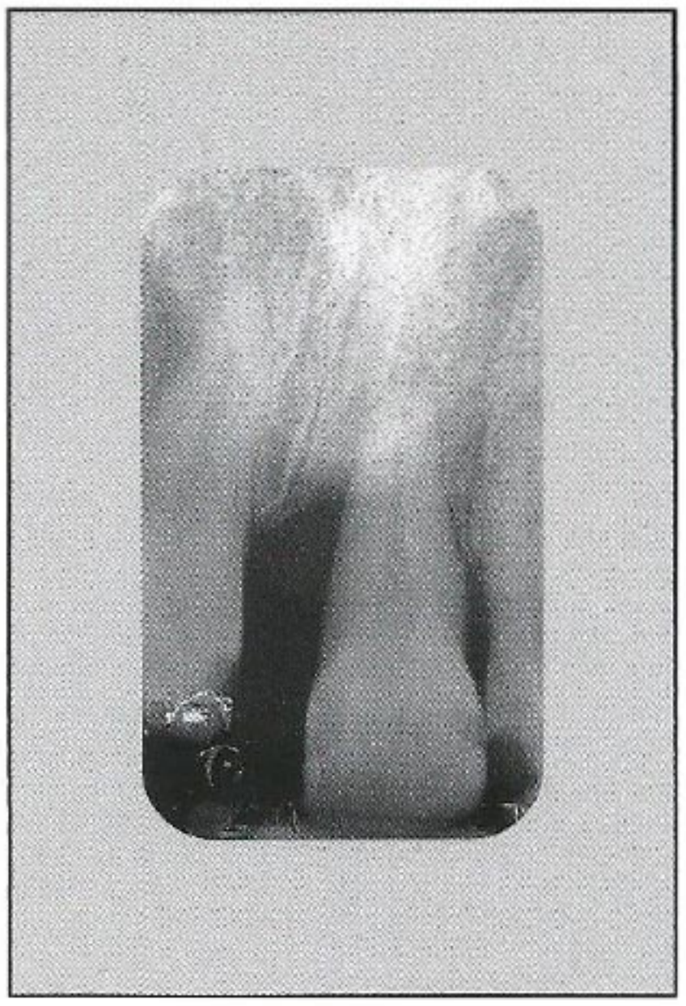


Fig 5 (right) *Initial periapical radiograph shows the osseous defect.*

Fig 6 *Intraoperative view. The osseous defect after flap reflection and complete debridement of the root surface.*

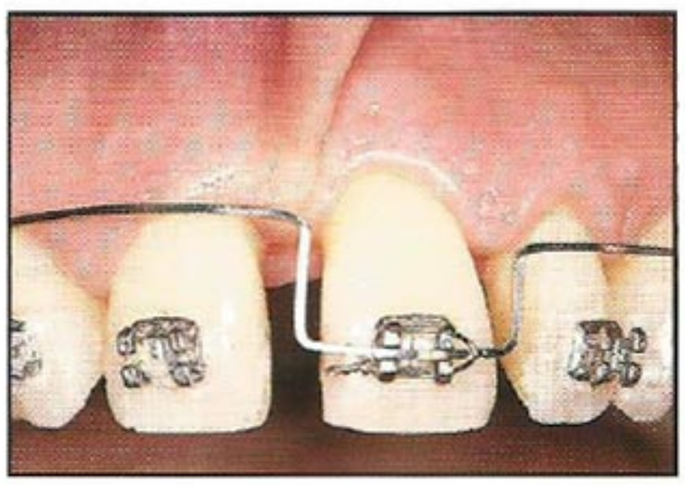


Fig 7 *Biomechanics used to intrude and move the central incisor into the defect.*

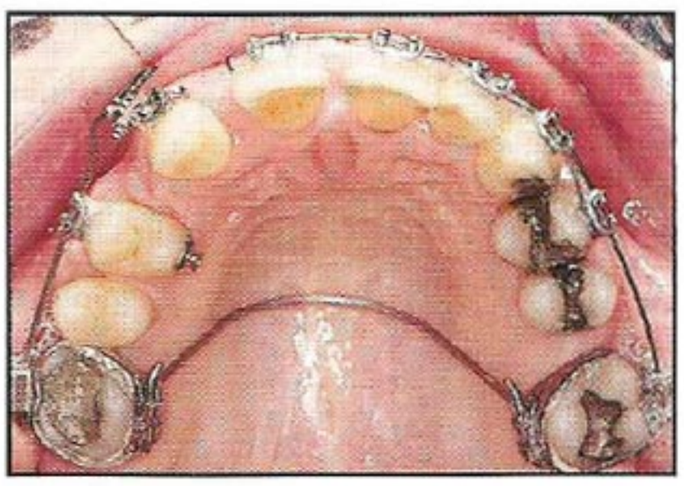


Fig 8 *Occlusal view shows the anchorage unit (palatal arch) and the PG spring used to distally move the canine.*

Fig 9 *Anterior view at the end of the treatment. The teeth are retained by means of a resin-bonded splint.*

completely eliminate the deep periodontal infection (Fig 6).

The intraoperative observation confirmed the severity of the infrabony defect and loss of attachment. Fixed orthodontic appliances were inserted 1 week after the surgical procedure for early stimulation of the connective tissue progenitor cells necessary to foster regeneration. Orthodontic movement was carried out following the segmented arch technique[17] using light and continuous forces. The incisor was realigned in the maxilla using a two-cantilever system that simultaneously moved the tooth apically and mesially, expressing a force of 10 g (Fig 7). The anchorage unit consisted of a stainless steel palatal arch; the right canine moved distally by means of a PG spring,[18] and the first premolar was rotated by applying a force on its palatal surface (Fig 8). The entire orthodontic treatment lasted about 15 months. During this period, the patient was controlled every 2 weeks, and professional tooth cleaning was performed at 3-month intervals.[19,20]

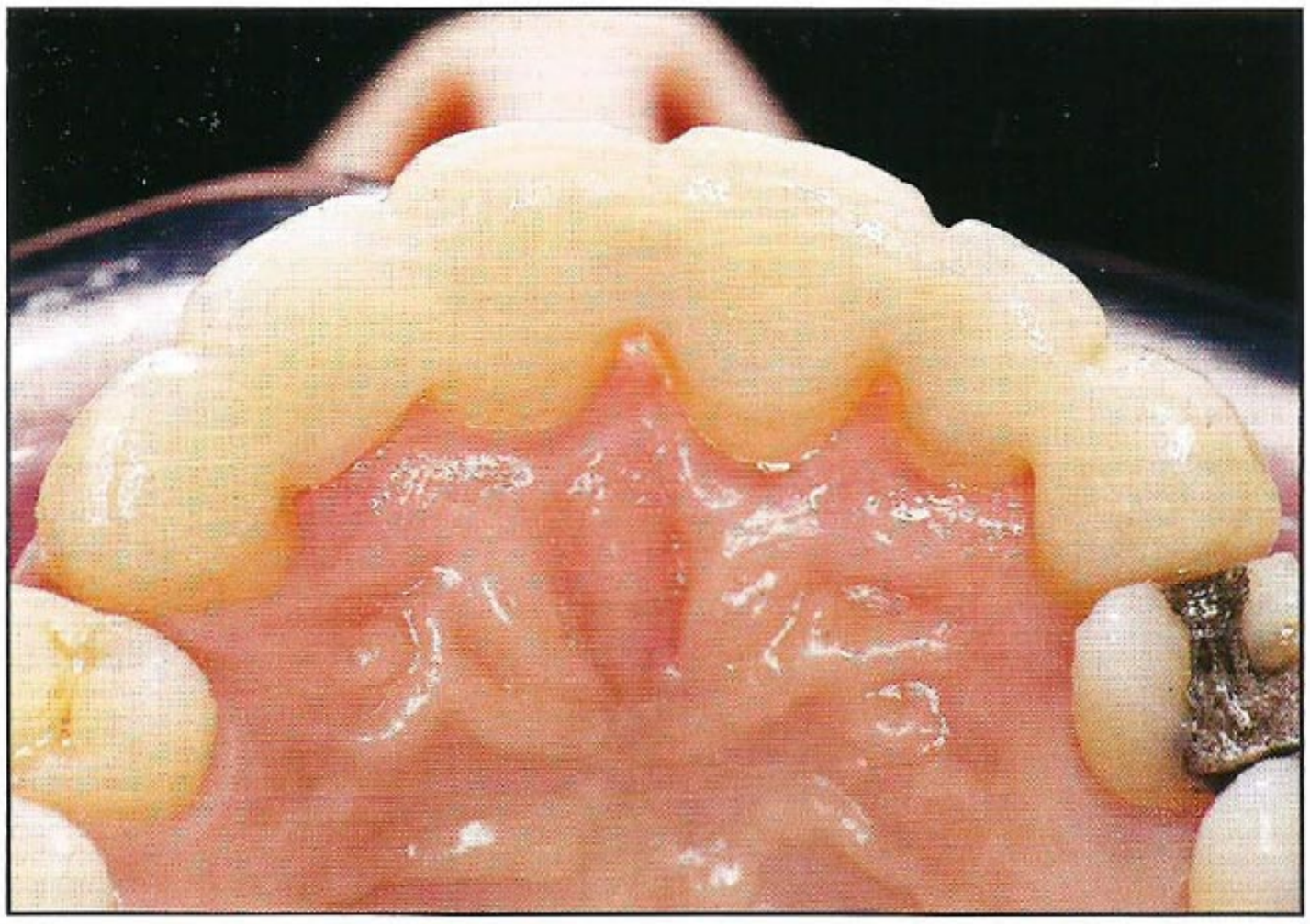


Fig 10 *Occlusal view shows the resin splint and the replaced lateral incisor.*

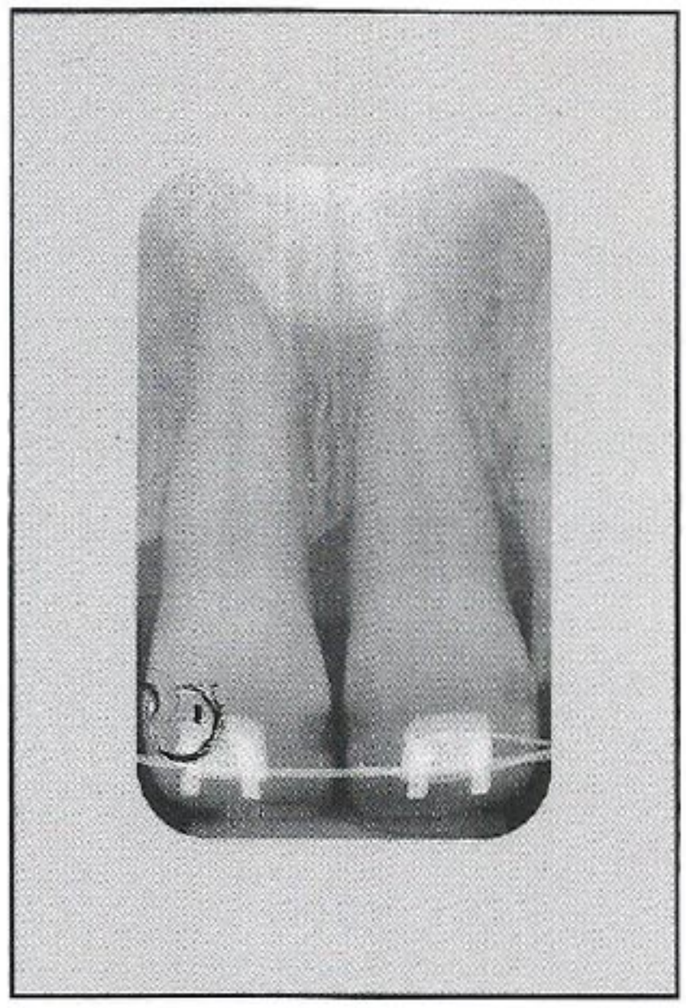


Fig 11 *Final periapical radiograph shows the elimination of the osseous defect.*

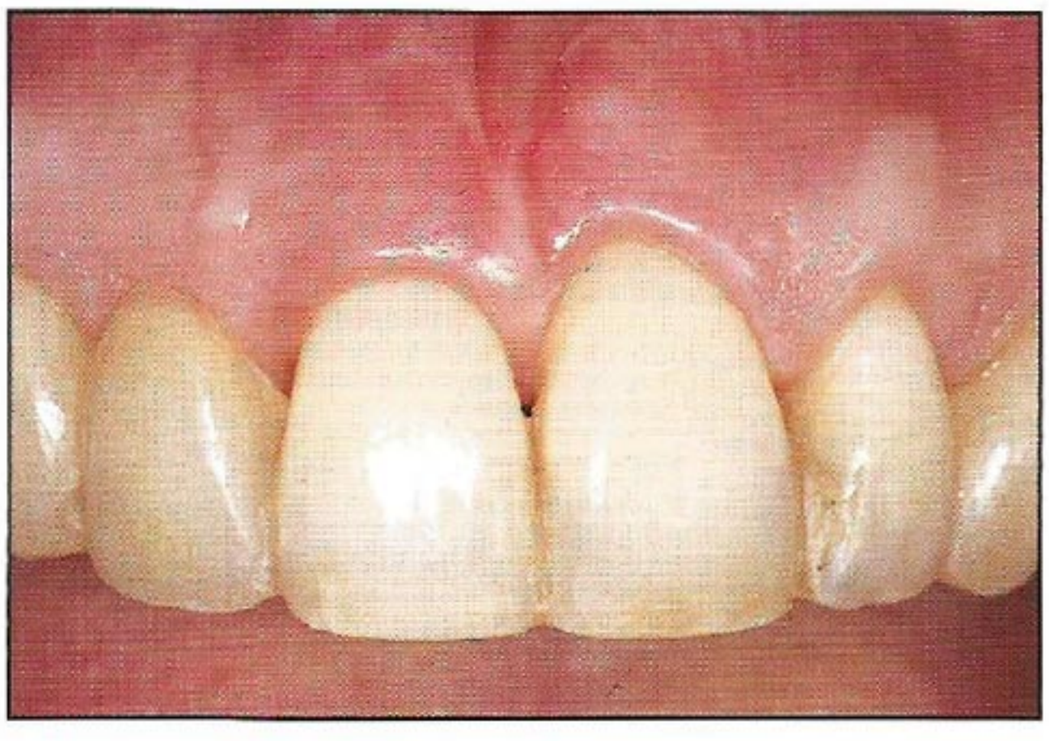


Fig 12 *Final clinical probing on the mesial surface of the incisor. Only a physiologic sulcus is present.*

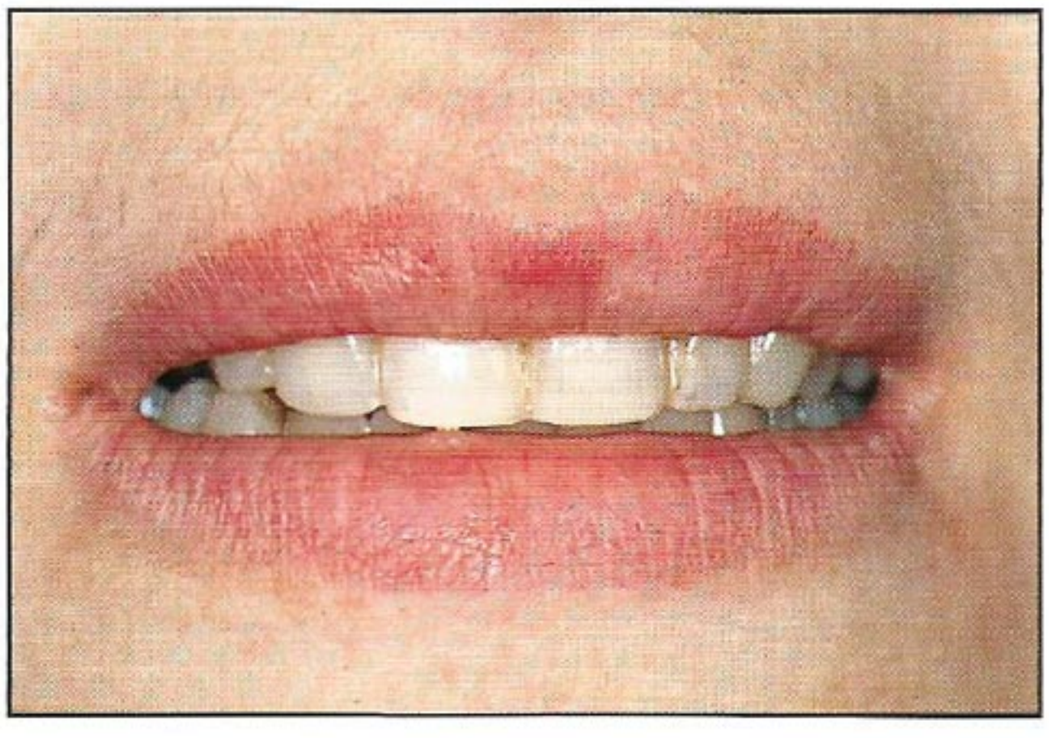


Fig 13 *Final anterior view of the patient shows a good esthetic result.*

between initial and final radiographs showed:

- A decrease in the distance from the cementoenamel junction of the incisor to the bottom of the bone defect (BD)
- A decrease in the distance from the most coronal extent of the interproximal bone crest (BC) to its projection on the root (top of the defect [TD])
- A decrease in the infrabony component of the defect, calculated as the distance from BD to TD
- An increase in the distance from the root apex of the incisor to the deepest point of the defect (BD)

There was also a reduction in the bidimensional area of the defect, calculated on the triangular image from the deepest point of the defect to the most coronal extent of the interproximal bone crest (BD – TD · BC – TD/2; Fig 14 and Table 1). Measurements were made, calculating a difference between the real dimensions of the two radiograph images of approximately 3.5%.

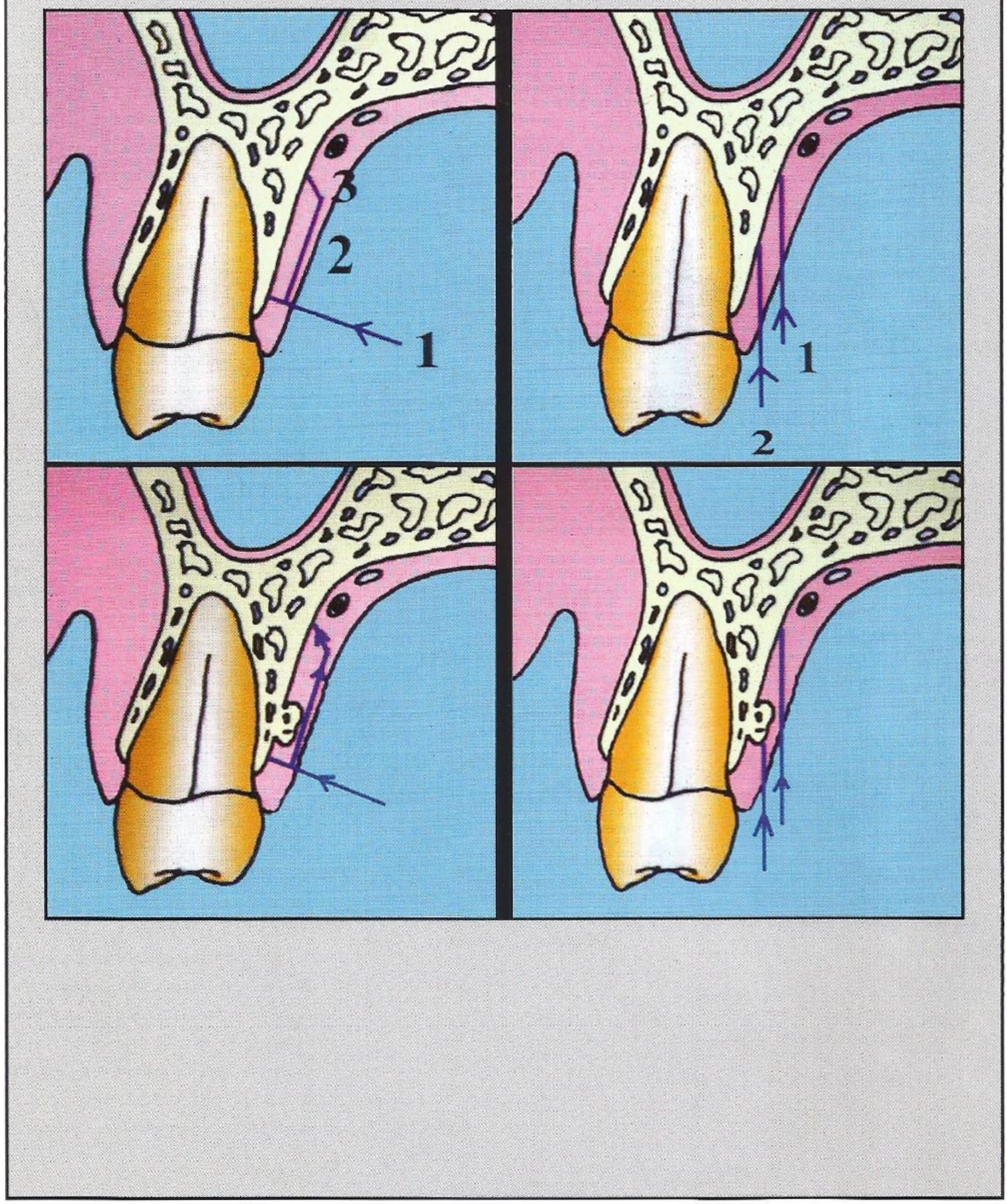
The patient has maintained her natural dentition with a stable occlusion, acceptable masticatory function, and pleasant esthetics. We can suggest that orthodontic forces, kept within biologic limits in a healthy periodontal status, do not cause periodontal breakdown.[5,7,25,26] Moreover, if gingival inflammation is controlled, intrusive movement does not result in a decrease of marginal bone level when performed with light forces.[9,12]

To achieve a good result, it is essential to evaluate the individual morphology and topography of teeth and bone, the soft tissue characteristics, and the biomechanical considerations.[27] Although some histologic reviews demonstrate no incisal gain in connective tissue attachment when teeth are moved into surgically created defects, showing repair with a long junctional epithelium interposed between the root surface and the alveolar process,[5,28] we can affirm that orthodontic treatment is able to assist in the maintenance of the natural dentition of patients[29] as well as positively modify both deep and superficial periodontal tissues, reducing the width of preexisting infrabony defects.[14] Our clinical results suggest the possibility to obtain a new connective tissue attachment. Unfortunately, it is out of the question to perform a histologic block section in this clinical case, so we must therefore speculate on previous research findings demonstrating a new attachment apparatus on root surfaces of orthodontically moved teeth.[30,31]

References

1. Thilander B. Orthodontic tooth movement in periodontal therapy. In: Lindhe J (ed). Textbook of Clinical Periodontology. Copenhagen: Munksgaard, 1989: 480–500.
2. Zachrisson BU. Orthodontics and periodontics. In: Lindhe J, Karring T, Lang NP (eds). Clinical Periodontology and Implant Dentistry. Copenhagen: Munksgaard, 1997:741–793.
3. Karring T, Nyman S, Thilander B, Magnusson I. Bone regeneration in orthodontically produced alveolar bone dehiscences. J Periodontal Res 1982;17: 309–315.
4. Ericsson I, Thilander B, Lindhe J, Okamoto H. The effect of orthodontic tilting movements on the periodontal tissues of infected and non-infected dentitions in dogs. J Clin Periodontol 1977;4:278–293.
5. Polson A, Caton J, Polson AP, Nyman S, Novak J, Reed B. Periodontal response after tooth movement into infrabony defects. J Periodontol 1984;55:197–202.
6. Thilander B. Infrabony pockets and reduced alveolar bone height in relation to orthodontic therapy. Semin Orthod 1996;2:55–61.
7. Wennström JL, Lindskog SB, Nyman S, Thilander B. Periodontal tissue response to orthodontic movement of teeth with infrabony pockets. Am J Orthod Dentofac Orthop 1993;103:313–319.
8. Artun J, Urbye KS. The effect of orthodontic treatment on periodontal bone support in patients with advanced loss of marginal periodontium. Am J Orthod Dentofac Orthop 1988;93:143–148.
9. Melsen B. Tissue reaction following application of extrusive and intrusive forces to teeth in adult monkeys. Am J Orthod 1986;89:469–475.
10. Lindhe J, Svanberg G. Influence of trauma from occlusion on progression of experimental periodontitis in the beagle dog. J Clin Periodontol 1974;1:3–14.

11. 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;45:199–206.
12. Melsen B, Agerbaek N, Markenstam G. Intrusion of incisors in adult patients with marginal bone loss. Am J Orthod Dentofac Orthop 1989;96:232–241.
13. Steffensen B, Storey AT. Orthodontic intrusive forces in the treatment of periodontally compromised incisors: A case report. Int J Periodontics Restorative Dent 1993;13:433–441.
14. Nevins M, Wise RJ. The use of orthodontic therapy to alter infrabony pockets. Part II. Int J Periodontics Restorative Dent 1990;10:199–207.
15. Melsen B, Agerbaek N. Orthodontics as an adjunct to rehabilitation. Periodontol 2000 1994;4:148–159.
16. Marcotte MR. Occlusogram in the treatment planning. Am J Orthod 1976;69: 655–667.
17. Braun S, Marcotte MR. Rationale of the segmented approach to orthodontic treatment. Am J Orthod Dentofac Orthop 1995;108:1–8.
18. Gjessing P. Biomechanical design and clinical evaluation of a new canine retraction spring. Am J Orthod 1985;87:353–362.
19. Boyd RL. Mucogingival considerations and their relationship to orthodontics. J Periodontol 1978;49:67–76.
20. Boyd RL, Baumrind S. Periodontal considerations in the use of bonds or bands on molars in adolescents and adults. Angle Orthod 1992;62:117–126.
21. Tarnow DP, Magner AW, Fletcher P. The effect of the distance from the contact point to the crest of bone on the presence or absence of the interproximal dental papilla. J Periodontol 1992;63:995–996.
22. Ong MA, Wang HL, Smith FN. Interrelationship between periodontics and adult orthodontics. J Clin Periodontol 1998;25:271–277.
23. Nyman S, Lindhe J, Karring T, Rylander H. New attachment following surgical treatment of human periodontal disease. J Clin Periodontol 1982;9:290–296.
24. Stelzel MJ, Flores-de-Jacoby L. Guided tissue regeneration in a combined periodontal and orthodontic treatment: A case report. Int J Periodontics Restorative Dent 1998;18:189–195.
25. Polson A, Zender H. Effect of periodontal trauma upon infrabony pockets. J Periodontol 1983;54:586–591.
26. Ericsson I, Thilander B, Lindhe J. Periodontal conditions after orthodontic tooth movement in the dog. Angle Orthod 1978;48:210–218.
27. Smith RJ, Burstone CJ. Mechanism of tooth movement. Am J Orthod 1983;85: 294–307.
28. Caton J, Zander H. Osseous repair of an infrabony pocket without new attachment of connective tissue. J Clin Periodontol 1976;3:54–58.
29. Re S, Corrente G, Abundo R, Cardaropoli D. Orthodontic treatment in periodontally compromised patients: 12-year report. Int J Periodontics Restorative Dent 2000;20:31–39.
30. Melsen B, Agerbaek N, Eriksen J, Terp S. New attachment through periodontal treatment and orthodontic intrusion. Am J Orthod Dentofac Orthop 1988;94: 104–116.
31. Geraci TF, Nevins M, Crossetti HW. Reattachment of the periodontium following tooth movement into an osseous defect in monkeys. Int J Periodontics Restorative Dent 1990;10:185–197.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