

The Rationale for Maxillary Second Premolar Extractions in Adult Class II Treatment

VINCENT DE ANGELIS, DMD

Most Class II, division 1 and 2 malocclusions are amenable to nonextraction treatment in the late mixed dentition. In these patients, the maxillary arch can usually be adapted to the mandibular arch with part-time headgear therapy and concomitant mandibular growth, assuming favorable sagittal and vertical divergence and transverse skeletal characteristics (Fig. 1). Severe skeletal dysplasia may require more intensive orthopedic therapy, sometimes involving orthognathic surgical correction.

Adults with mild to moderate Class II malocclusions require a different treatment approach. When a non-growing patient presents with a Class II molar relationship and a severe overjet or maxillary anterior crowding, and the lower arch is relatively well aligned, the maxillary anterior dysplasia can be corrected in several ways. One possibility is to distalize the maxillary posterior teeth with extraoral forces or intraoral removable or fixed appliances, but compliance with these regimens is rarely sufficient to attain the desired result. Even when compliance requirements are minimal, molar distalization may adversely affect the vertical and transverse relationship of the arches in the absence of compensatory growth. Moreover, these methods

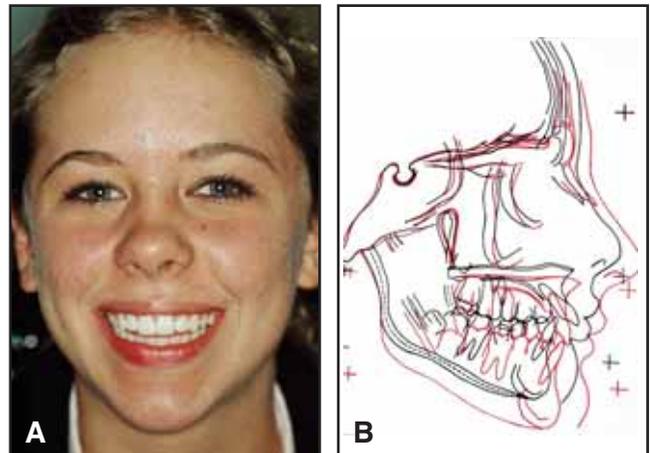


Fig. 1 A. Adolescent patient with Class II malocclusion treated in late mixed dentition without extractions. B. Superimposition of pre- and post-treatment cephalometric tracings.

may result in loss of anchorage, resulting in the need for “round-tripping” and extended treatment time.^{1,2}

A second possible treatment approach is to extract teeth only in the maxillary arch and accept a molar distoclusion. The maxillary first premolars are often extracted to achieve canine neutroclusion and resolve the incisor overjet and anterior crowding, following the long-held principle of extraction closest to the site of the problem. The mandibular arch is leveled and aligned with a combination of reproximation, incisor proclination, and slight expansion.

Maxillary second premolar extraction is another option. This approach usually involves making dentoalveolar corrections as a compromise to camouflage the skeletal dysplasia. In an extreme case, orthognathic surgery may be required to achieve an ideal correction.



Dr. De Angelis is a retired Associate Clinical Professor of Orthodontics, Harvard University, and in the private practice of orthodontics at 80 High St., Suite 2, Medford, MA 02155; e-mail: drvindeangelis@verizon.net.

Experience with Second Premolar Extractions

My clinical experience over several decades has shown that extraction of maxillary second premolars is preferable to removal of first premolars in these adult cases. The clinical crown of the first premolar is generally higher than that of the second premolar (Fig. 2), providing a more esthetic smile (Fig. 3). Moreover, extraction of the first premolar results in an unsightly gap that will not be



Fig. 2 Comparison of clinical crown heights of first and second premolars.



Fig. 3 Good esthetic result after extraction of maxillary second premolars instead of first premolars.

closed for many months, which is especially bothersome to adults (Fig. 4).

In a molar distoclusion, the mesiobuccal cusp of the maxillary first molar occupies the position that the maxillary second premolar would occupy in a neutroclusion (Fig. 5). Consequently, extracting the premolar that more closely approximates the



Fig. 4 A. Unsightly maxillary first premolar extraction site. B. More acceptable appearance after extraction of second premolar.



Fig. 5 Mesiobuccal cusp of first molar taking position that second premolar would occupy in neutroclusion.

mesiodistal width of the first molar mesiobuccal cusp will result in a more harmonious posterior Bolton relationship.^{3,4} If the wider first premolar is extracted, it becomes almost impossible to close the space distal to the canine completely because of this Bolton discrepancy. If a super-Class II molar relationship is created to close the gap, it is generally unstable. The space eventually reopens as the occlusion settles, and operative dentistry may be required for full closure. The extraction space of the second premolar is smaller, but still adequate to correct the anterior problem.

From a purely physical standpoint, the maxillary first premolar is more valuable than the second premolar. The first premolar's bifurcated root is typically 4mm longer than the root of the second premolar.⁵ In addition, the concave mesial root surface of the maxillary first premolar accommodates the convex distal surface of the canine root. Finally, second premolars more frequently have amalgam restorations in adult patients and are therefore more logical candidates for extraction.

Aside from the orthodontic benefits of retaining the maxillary first premolars, their extraction is more complicated than that of second premolars. The longer, bifurcated root, with its triangular cross-section and diminutive apices, is more prone to rupture during extraction, and damage to the buccal plate is more likely. The gingival clefts that remain distal to the retracted canines after first premolar extraction are also avoided when the second premolars are removed.

If a deep overbite exists, the mandibular curve of Spee can be leveled by incorporating the first and second molars in a continuous archwire. Judicious reproximation, incisor proclination, and slight expansion may be needed. In patients with deep overbite, mandibular extractions are contraindicated in the absence of severe crowding, because the removal of teeth will hinder bite opening. Although it is tempting to extract mandibular first or second premolars in an adult Class II patient to achieve molar neutroclusion, there is no evidence that molar distoclusion is less functional than neutroclusion. Extraction of maxillary second premolars can also be effective in a Class II patient with anterior open bite.

The maxillary second molars are generally available in adults to prevent loss of anchorage during distalization of the maxillary first premolars and canines. I have found that extraoral anchorage, transpalatal bars, holding arches, and similar devices are unnecessary if proper mechanotherapy is used after maxillary second premolar extraction. In fact, in adults with good periodontal health, anchorage "burning" methods are frequently required to close residual second premolar extraction spaces near the end of treatment. The total treatment time generally ranges from 12 to 18 months.

Case Report

A 52-year-old female presented with a Class II, division 1 malocclusion, moderate overjet, and severe anterior crowding (Fig. 6). Clinical examination revealed mild gingival recession and extensive amalgam restorative treatment. She was treated with the Amalgamated Technique over a period of 13 months. This method, which I introduced in 1976,⁶⁻⁸ involves the use of light archwires in an .022" × .028" edgewise slot to eliminate uncontrolled tipping and intraslot torque, thus avoiding the "round-tripping" that can occur with round and rectangular wires.

Conclusion

Molar distalization in the adult Class II patient involves extended treatment, biomechanically unsound superfluous tooth movements, and the risk of irreversible tissue damage. In a case with an acceptable Bolton ratio, extraction of the first premolars and acceptance of a molar distoclusion often leaves excessive space distal to the canines. Therefore, I believe the second premolars are better choices for extraction.

The substantial difference in clinical crown height between the maxillary canine and second premolar, as well as the gingival cleft that remains between the canine and the second premolar after first premolar extraction, makes extraction of the second premolar esthetically preferable. The longer, bifurcated root of the maxillary first premolar makes it the logical choice for retention, both from

The Rationale for Maxillary Second Premolar Extractions

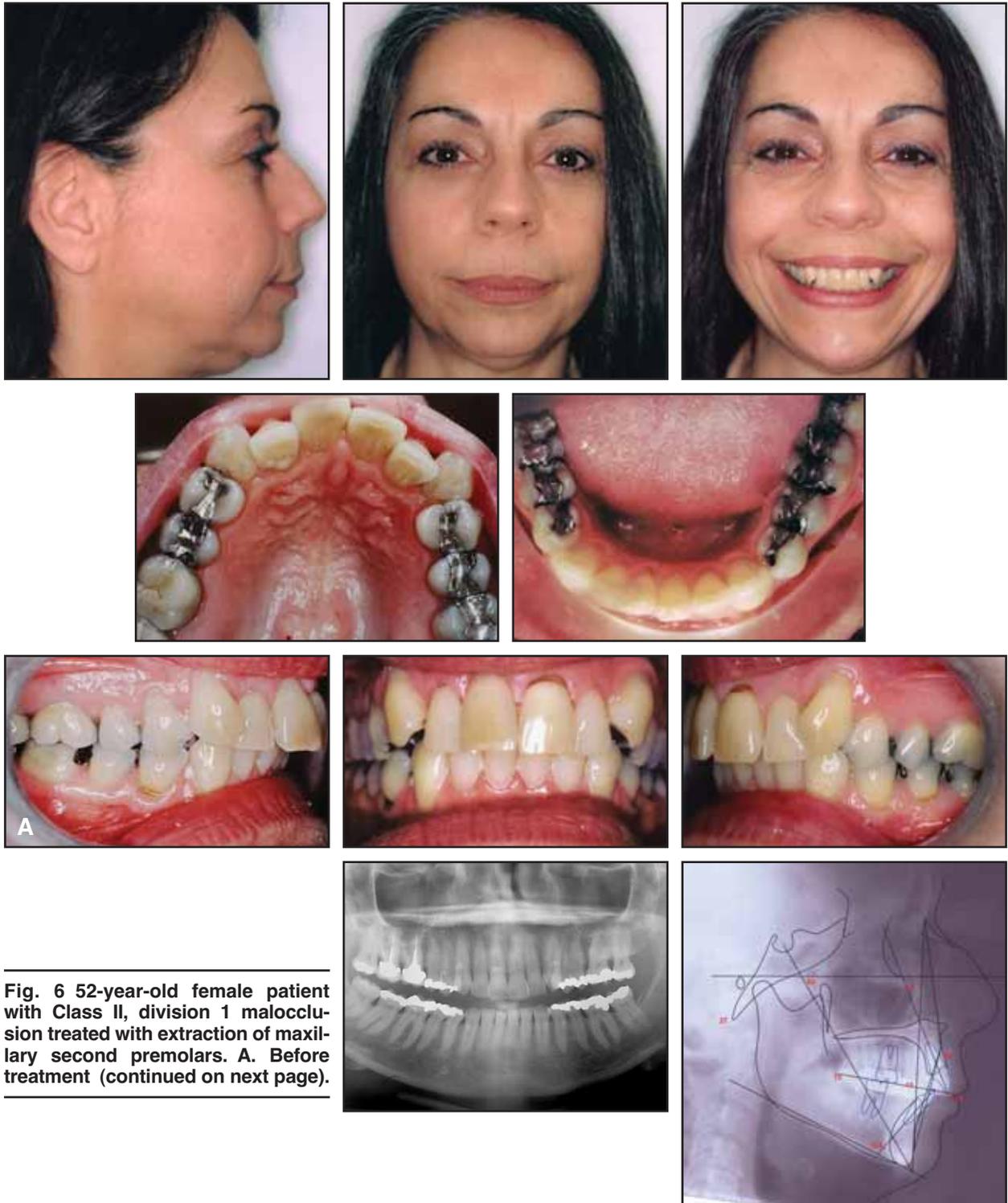


Fig. 6 52-year-old female patient with Class II, division 1 malocclusion treated with extraction of maxillary second premolars. A. Before treatment (continued on next page).



Fig. 6 (cont.) B. After nine months of treatment. **C.** Removal of fixed appliances after 13 months of treatment (continued on next page).

a purely physical standpoint and because it is more difficult to remove than the second premolar.

REFERENCES

1. Gianelly, A.A.: *The Bidimensional Technique: Theory and Practice*, GAC International, Bohemia, NY, 2002.
2. Chiu, P.P.; McNamara, J.A.; and Franchi, L.: A comparison of two intraoral molar distalization appliances: Distal jet versus pendulum, *Am. J. Orthod.* 128:353-365, 2005.
3. Bolton, W.A.: Disharmony in tooth size and its relation to the analysis and treatment of malocclusion, *Am. J. Orthod.* 28:113-130, 1958.
4. Bolton, W.A.: The clinical application of a tooth-size analysis, *Am. J. Orthod.* 48:504-529, 1962.
5. Fuller, J.L. and Denehy, G.E.: *Concise Dental Anatomy and Morphology*, 2nd ed., ed. S.A. Hall, Year Book Medical Publishers, Chicago, 1984.
6. De Angelis, V.: Begg-edgewise: An amalgamated technique, *Am. J. Orthod.* 69:301-317, 1976.
7. De Angelis, V.: The amalgamated technique: A mechanically and biologically efficient method for controlled tooth movement, *Angle Orthod.* 50:1-15, 1980.
8. De Angelis, V. and Davidovitch, Z.: Optimal orthodontics: An achievable target, in *Biomechanics of Tooth Movement and Craniofacial Adaptation*, ed. J. Mah and Z. Davidovitch, 2005, pp. 1-16.

The Rationale for Maxillary Second Premolar Extractions

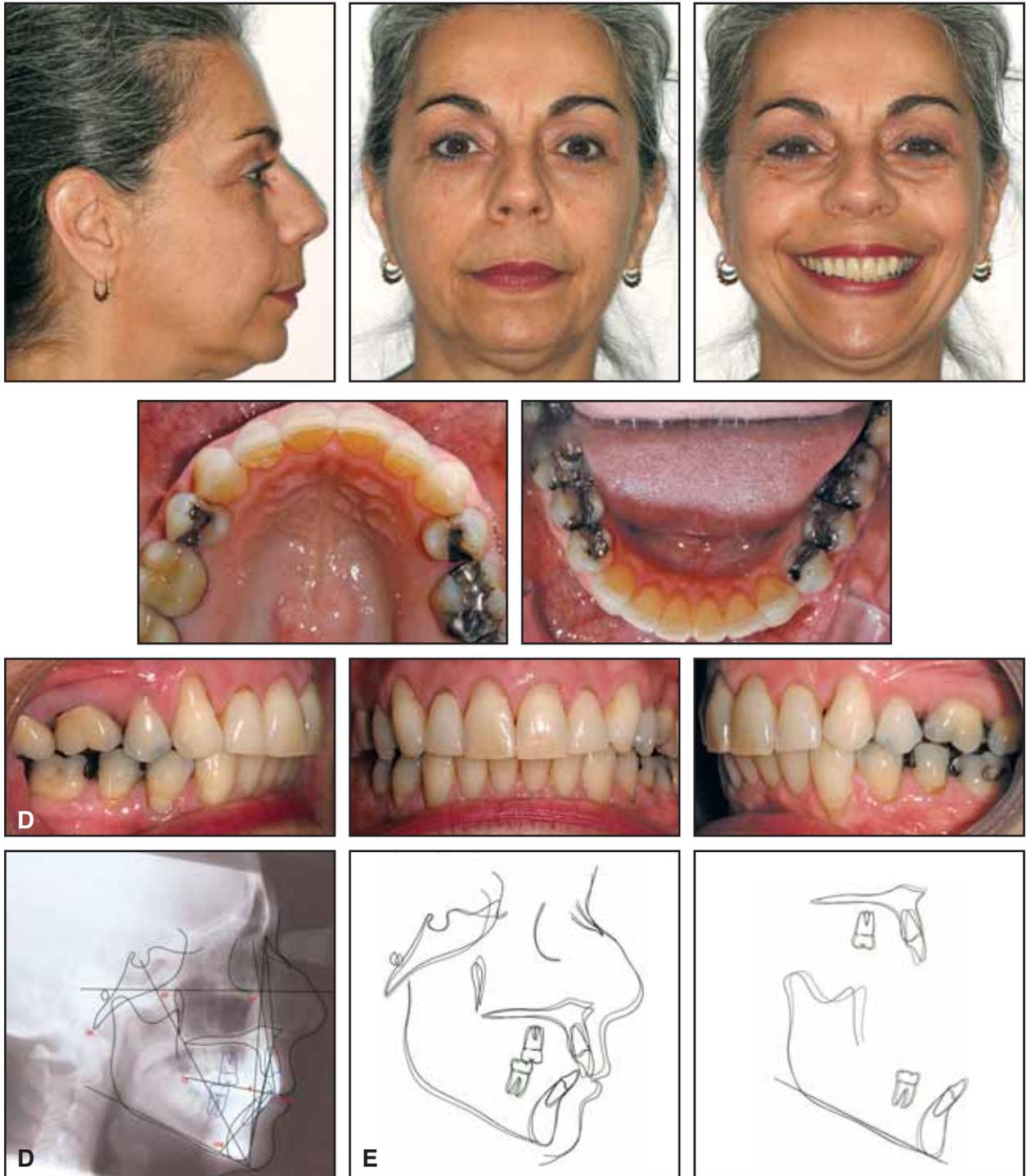


Fig. 6 (cont.) D. Two years after end of treatment. E. Superimposition of pretreatment and two-year post-treatment cephalometric tracings.