

Strategic maxillary second-molar extraction in Class II malocclusion

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Maxillary second-molar extraction in Class II malocclusion is a controversial issue in orthodontics. This treatment protocol is rigorous and not routine. In this case report, we present the orthodontic treatment of a patient with a Class II malocclusion, maxillary crowding, and no mandibular first molars, treated with extraction of the maxillary second molars. The mechanotherapy and indications of maxillary second-molar extraction are discussed. (*Am J Orthod Dentofacial Orthop* 2009;136:878-86)

The decision of whether to extract teeth in patients with dental crowding requires thorough consideration of several factors. One of the most controversial issues concerns maxillary second-molar extraction in a Class II malocclusion.¹ Maxillary second-molar extraction is indicated when the tooth is severely damaged, ectopically erupted, or severely rotated; when there is crowding in the tuberosity area; or when there is excessive labial inclination of the maxillary incisors with no spacing, minimal overbite, and the maxillary third molars are in good position with proper size and shape.¹⁻⁵ Some advantages have been attributed to maxillary second-molar extraction, including reduced treatment time, less potential for reopening of extraction sites, and easier distalization of the first molars.^{3,6,7} The primary disadvantage of second-molar removal is uncertainty about the final position of third molars.^{3,4} The direction and magnitude of facial growth, the eruption path of the third molars, and the patient's expected cooperation also should be considered.^{1,8}

In this case report, we present the orthodontic treatment of a patient with a Class II malocclusion, maxillary crowding, and no mandibular first molars, treated with extraction of the maxillary second molars. The mechanotherapy and indications of maxillary second-molar extraction are discussed.

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DIAGNOSIS

A 19-year-old woman came for orthodontic treatment to the private orthodontic office of the second author (D.V.L.) at Cuiabá, Mato Grosso, Brazil. Her chief complaint was maxillary incisor crowding. Clinically, she had acceptable facial balance and unstrained lip closure (Fig 1). She had a full-cusp Class II molar and canine relationship, maxillary anterior crowding, and increased overjet and overbite (Fig 2). The mandibular first molars were absent, and the maxillary and mandibular third molars were in favorable positions. She had a severe Class II skeletal relationship, and the maxillary and mandibular incisors were linearly well positioned and palatally tipped. The soft-tissue profile was convex (Figs 3 and 4, Table).

TREATMENT OBJECTIVES

The treatment objectives consisted of correcting the Class II relationship, the maxillary anterior crowding, and overjet and overbite to improve the soft-tissue profile.

TREATMENT ALTERNATIVES

One treatment option consisted of nonextraction therapy, with space opening for the mandibular first molars for implant replacement. This treatment option seemed viable, but it would produce bimaxillary dental protrusion, and the resulting soft-tissue profile would be unsatisfactory.

The second option was extracting the maxillary first premolars and retracting the anterior teeth. However, the patient was afraid that the extraction sites could be temporarily unesthetic and was unwilling to wear bonded pontics in the extraction spaces.

The third treatment option included extraction of the maxillary second molars, subsequent distalization of the



Fig 1. Pretreatment extraoral and intraoral photographs.

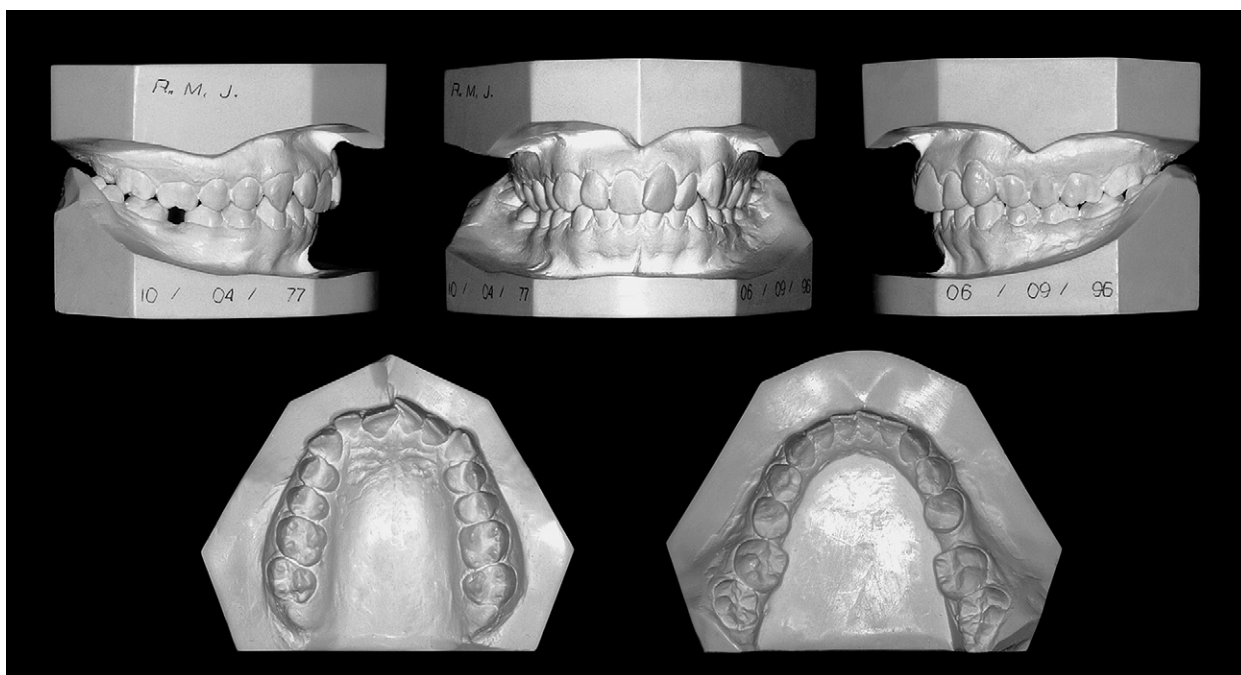


Fig 2. Pretreatment dental casts.

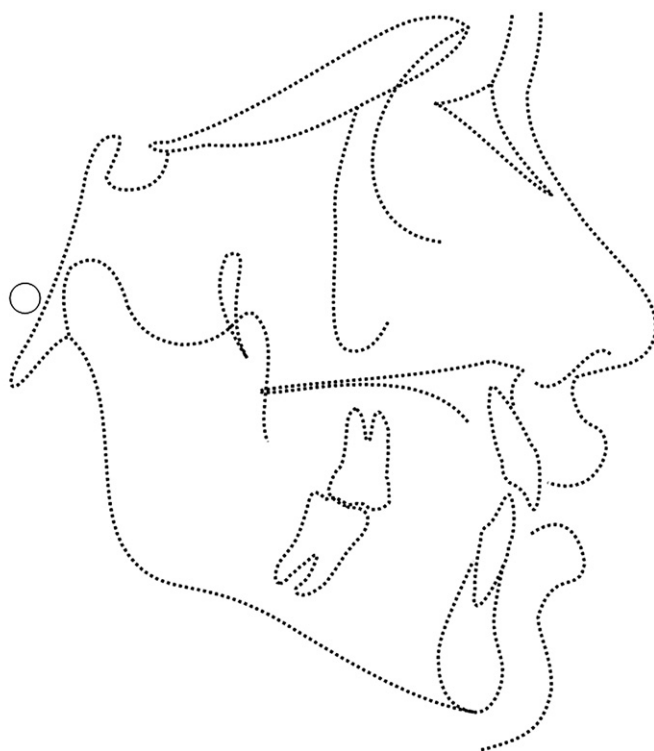


Fig 3. Pretreatment lateral cephalometric radiograph and tracing.



Fig 4. Pretreatment panoramic radiograph.

first molars, and retraction of the anterior teeth. Because of the aforementioned reasons, she chose the maxillary second-molar extraction protocol.

TREATMENT PROGRESS SECOND

Extraction of the maxillary second molars was performed before placement of fixed 0.022-in slot straight-wire appliances (TruStraight-wire Classic Andrews, Ormco, Orange, Calif; 0.022 × 0.028 in). After leveling and alignment, a jig was placed bilaterally in the maxillary rectangular stainless steel archwire (0.019 × 0.025 in); it extended from the distal aspect

Table. Cephalometric measurements at pretreatment, posttreatment, and 7 years posttreatment

Measurements	Pretreatment	Posttreatment	7 years posttreatment
SNA (°)	81	80	79
SNB (°)	76	75	75
ANB (°)	5	5	4
SND (°)	73	72	73
Wits (mm)	6	3	2.9
NAP (°)	8	8	6
FMA (°)	29	29	30
SNOcl (°)	13	17.5	16.5
SNGoGn (°)	40	40	38
NSGn (°)	71	71	71
1.NA (°)	15	20	17
1-NA (mm)	4	2.5	3.5
1.NB (°)	19	28	26
1-NB (mm)	5	7.3	7
H.NB (°)	12	10	10.5

of the canine to the mesial aspect of the first molar. Subsequently, the anteroposterior Class II relationship was corrected with Class II intermaxillary elastics (3/16 in) from a hook soldered in the mesial part of the jig to the mandibular second molar, 22 hours a day (Fig 5). Cervical headgear was also worn at



Fig 5. Intraoral progress photographs show the use of Class II elastics to retract the maxillary teeth.

night. When the canines and the molars reached a Class I relationship, the Class II elastics and headgear were discontinued. The third molars were banded, leveled, and aligned after their eruption. Treatment time was 3 years. For retention, a maxillary Hawley plate and a mandibular bonded canine-to-canine retainer were used.

TREATMENT RESULTS

The facial photographs show that the posttreatment profile was satisfactory, maintaining its original form (Fig 6). The patient was satisfied with her teeth and profile. The final results show Class I canine and molar relationships on both sides, normal overjet and overbite, and the maxillary and mandibular third molars in good positions (Fig 7). There was a counterclockwise rotation of the occlusal plane, the maxillary incisors were retruded and labially tipped, and the mandibular incisors were protruded and labially tipped (Figs 8 and 9, Table). The results were stable 7 years after treatment (Figs 10-14, Table).

DISCUSSION

The extraction of permanent teeth to correct a Class II malocclusion is common in orthodontics.¹ The decision to extract should be based on a proper diagnosis, considering its effects on the occlusion, the facial profile, and the functional balance.

The primary criterion for extracting the maxillary second molars is radiographic confirmation of the presence of the maxillary third molars with good position and anatomy.⁹ This patient's maxillary third molars fulfilled this criterion. When the maxillary second molars are extracted, there is a probability between 96.2% and 99% that the maxillary third molars will erupt in a good or acceptable position.^{10,11} But, if a third molar is rotated or excessively tipped at eruption, correction with appliances is necessary, and patients might not be receptive to a second fixed appliance; moreover, the

orthodontist must allow additional time and bear the expense of retreatment.¹²

The space created after the extraction of the maxillary second molars is considerably larger, and usually farther from the crowding, than the space created after maxillary first-premolar extraction.⁷ A major disadvantage of second-molar extraction is that space is created in the posterior region of the arch, whereas most crowding is in the anterior region.^{13,14} Nevertheless, it was mentioned previously in the literature that proper anterior retraction and natural mesial migration of teeth will close this additional space.^{4,15} But it can take considerable time to achieve the final result. For this patient, it was decided not to wait for the complete eruption of the maxillary third molars and to band them as soon as possible to shorten treatment time.

There is some controversy among orthodontists about whether patients who need maxillary second-molar extractions can be treated in a shorter time than those who need maxillary premolar extractions in Class II malocclusions. Advocates of maxillary second-molar extraction believe that the first molars can rapidly be moved distally into the extraction sites, and the total treatment can be completed in less time than if maxillary premolars were extracted.^{16,17} On the other hand, when extracting the second molars, orthodontists must wait for the third molars to erupt; then a second phase of treatment might be needed to correct the position of these teeth.^{12,15} This would result in a much longer total treatment time than that of the average premolar-extraction protocol.¹²

As with other treatment protocols to correct Class II malocclusion, maximum patient compliance in using the extraoral headgear and the Class II elastics is essential to achieve the desired treatment goals. Since the patient did not want maxillary premolar extractions, she understood the need for greater compliance with these accessories to obtain a successful treatment result. A disadvantage of this protocol is that, when a patient with maxillary second-molar extraction wishes to



Fig 6. Posttreatment extraoral and intraoral photographs.

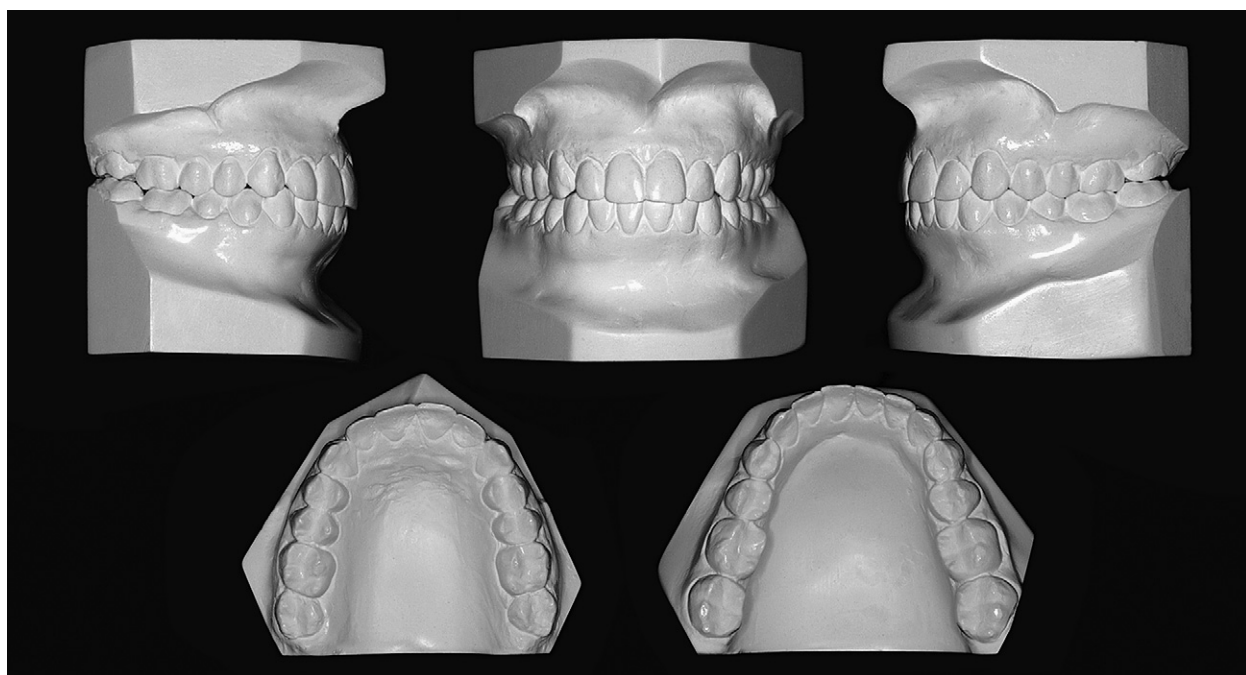


Fig 7. Posttreatment dental casts.

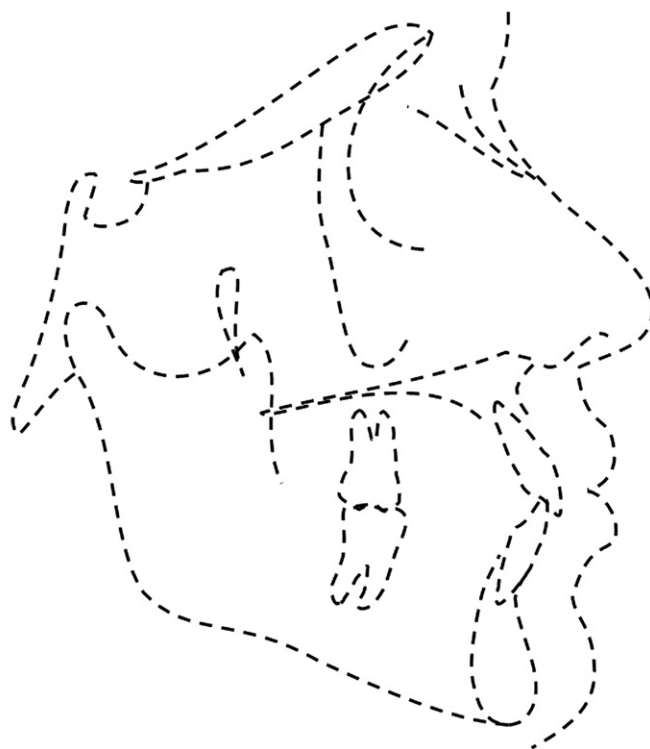


Fig 8. Posttreatment lateral cephalometric radiograph and tracing.

interrupt treatment, the extraction spaces will be closed by the mesial drift of maxillary third molars.¹

One advantage mentioned by several authors when extracting maxillary second molars is that distalization of the maxillary first molars is easier.^{1,9} When comparing Class II patients treated without extractions with those treated with extraction of the maxillary second molars, Waters and Harris¹⁸ found more distalization of the maxillary first molars in the second-molar extraction sample than in the nonextraction group, confirming the aforementioned speculation.^{1,9} But when patient compliance is deficient, and it can happen even when the patient agreed to cooperate, maxillary second-molar extraction treatment becomes still more difficult and longer. For maxillary premolar extraction, the need for cooperation is slightly less than for second-molar extraction, because extraoral traction is used only as anchorage, and the maxillary first molars do not need to be moved distally.

There is some controversy over whether the extraction of the maxillary second-molars results in unopposed and overerupted mandibular second molars.⁹ When a Class I relationship is established for the first molars, there is contact between the maxillary first molar and the mesial aspect of the mandibular second molar that would prevent its overeruption.¹⁵ In this patient,



Fig 9. Posttreatment panoramic radiograph.

the mandibular first molars were previously lost, and then the second and third molars were moved mesially, eliminating this problem.

Many general dentists and some orthodontists believe that extraction of the maxillary premolars in Class II malocclusion treatment is a major etiologic factor in temporomandibular joint disorders.^{19,20} However, studies that investigated whether 2 maxillary premolar extractions cause posterior displacement of the condyles, leading to temporomandibular joint disorders, found no significant association between these factors.^{21,22} Also, it was shown that the functional occlusion is



Fig 10. Seven-year posttreatment extraoral and intraoral photographs.

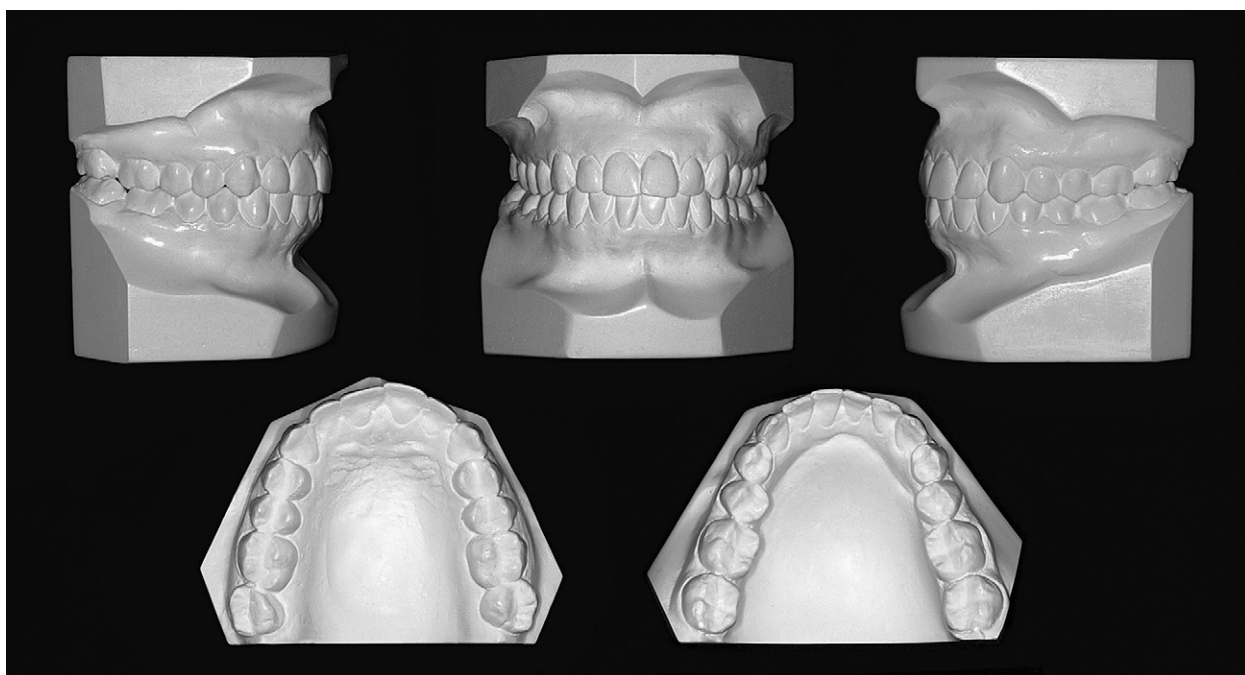


Fig 11. Seven-year posttreatment dental casts.

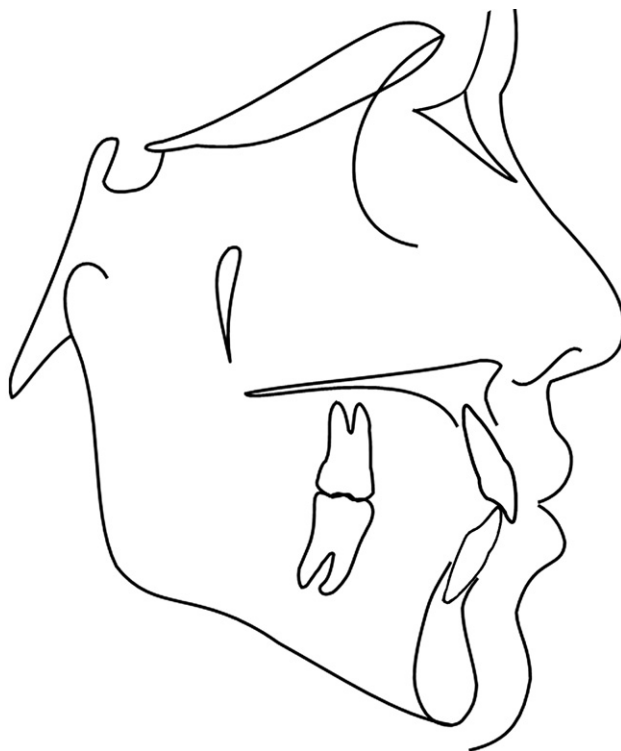


Fig 12. Seven-year posttreatment lateral cephalometric radiograph and tracing.



Fig 13. Seven-year posttreatment panoramic radiograph.

more important than the static occlusion in the etiology of temporomandibular joint disorders.^{23,24}

This patient demonstrated that removal of the maxillary second molars was effective when extraction of the first or second maxillary premolars would be recommended. In our opinion, the treatment mechanics were not easier, when compared with similar patients whose maxillary premolars were extracted. The maxillary second-molar extraction protocol is far from our first treatment option for similar Class II malocclusion patients. This one was an exception to the rule, because she unquestionably discarded the maxillary premolar extrac-

tion option because of esthetics, and consequently we needed an alternative treatment option. Her compliance was great, which contributed to good occlusal, functional, and esthetic results.

CONCLUSIONS

Maxillary second-molar extraction is an alternative approach for dentoalveolar compensation of Class II malocclusion patients. This treatment protocol has rigorous indications and is not routine. For our patient, this plan was a convenient protocol for the dentoalveolar correction of a Class II malocclusion, resulting in good occlusal and esthetic results.

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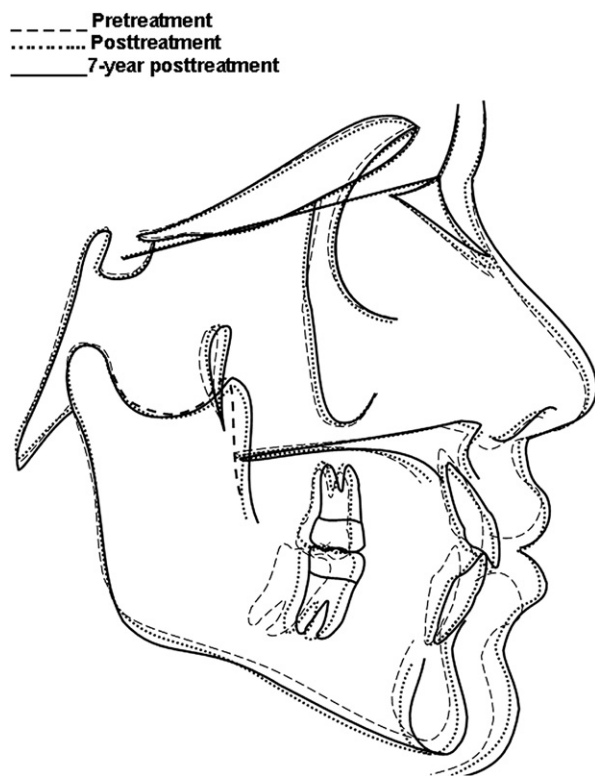


Fig 14. Superimpositions of pretreatment, posttreatment, and 7-year posttreatment cephalometric tracings (SN).

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