CASE REPORT

Facilitation of Midline Correction with a Premolar Extraction Sequence

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The following case demonstrates how a well-planned sequence of extractions can facilitate the treatment of midline discrepancies without adverse side effects.[1-4]

Diagnosis

A 16-year-old male presented with the chief complaint of buccally erupting canines (Fig. 1). The upper and lower midlines were shifted to the right by 4mm and 2mm, respectively. The patient had a convex profile, an obtuse nasolabial angle, a retrognathic mandible, and excessive upper and lower facial heights. The molar relationship was Class II on the right and Class I on the left; the overjet was 7mm. The panoramic x-ray showed that all third molars were present, but that the mandibular third molars were impacted.

Both arches were symmetrical and V-shaped, with an exaggerated curve of Spee in the maxillary arch. Space analysis showed a maxillary arch-length deficiency of 15mm and a mandibular arch-length deficiency of 14mm. Cephalometric analysis confirmed a high-angle, skeletal Class II (Table 1).

TABLE 1
CEPHALOMETRIC DATA

	Norm	Pretreatment	Post-Treatment
Hard Tissue			
NSBa	130.0°	129.4°	128.4°
SNA	82.0°	77.4°	72.6°
SNB	79.0°	72.2°	67.9°
SNPg	81.0°	70.8°	66.4°
ANB	3.0°	5.2°	4.7°
SN/MnPl	34.0°	50.1°	51.9°
SN/MxPl	8.0°	8.3°	9.9°
MxPl/MnPl	26.0°	41.8°	42.0°
N-MxPl	54.0mm	63.4mm (45%)	68.9mm (47%)
Me-MxPl	64.0mm	77.7mm (55%)	78.1mm (53%)
U1/MxPl	118.0°	115.8°	108.9°
L1/MnPl	97.0°	88.5°	96.0°
Interincisal angle	115.0°	113.8°	113.1°
L1-APo	5.5mm	4.6mm	7.2mm
A, B on OP	–4.5mm	–0.6mm	–2.6mm
Soft Tissue			
Upper Lip to E	3.0mm	–2.2mm	2.4mm
Lower Lip to E	4.0mm	6.5mm	9.3mm

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Fig. 1 16-year-old male before treatment.

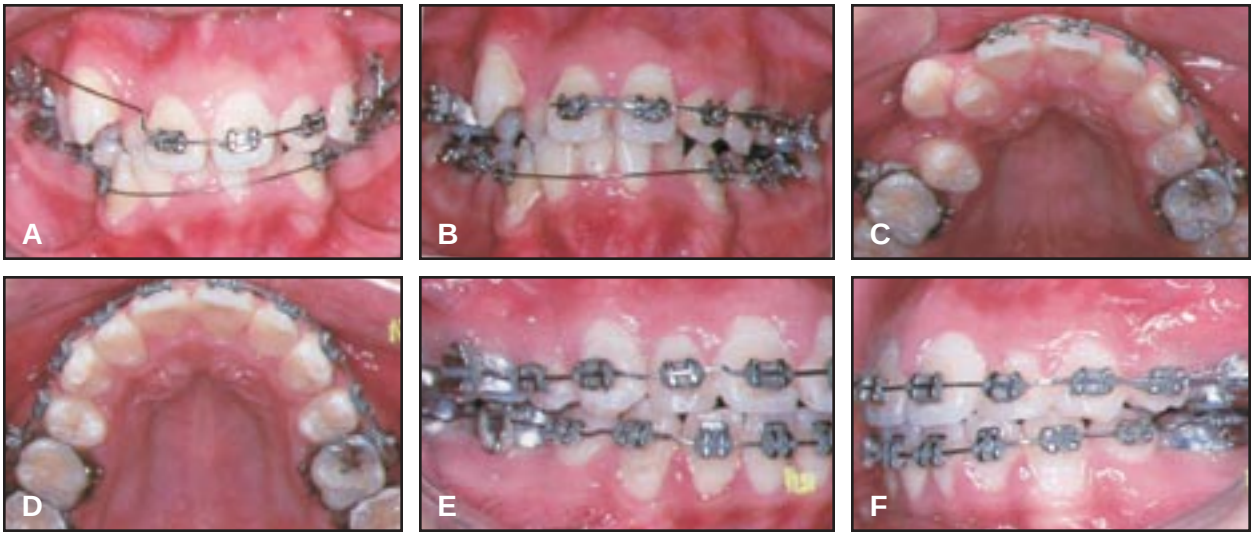

Fig. 2 A. Correction of upper midline by extraction of maxillary left first premolar ahead of maxillary right first premolar. B. After eight months of treatment, showing correction of upper midline and closure of left premolar extraction space. C. After extraction of maxillary right first premolar and drifting of right canine into extraction space for one month. D. After 23 months of treatment, showing alignment of maxillary right canine and movement of third molars into second molar extraction spaces. E,F. Finishing and detailing in both arches.

Fig. 3 Patient after 32 months of treatment.

Treatment Plan

Treatment objectives were as follows:

1. Correction of the Class II, division 1 malocclusion.
2. Correction of the midlines.
3. Alignment of the teeth and harmonization of the dental arches.
4. Maintenance of lower facial height.

Camouflage comprehensive orthodontic treatment was planned as follows:

1. Sequential extraction of the four first premolars, with the maxillary left first premolar removed before the contralateral first premolar to allow correction of the upper midline and to conserve anchorage.
2. Maximum anchorage from a mandibular lingual holding arch and high-pull headgear.
3. Extraction of maxillary second molars as needed.

Treatment Progress

The maxillary left first premolar and mandibular first premolars were extracted. The maxillary right first premolar was left in place to prevent distal drift of the right canine. Preadjusted .018" brackets were bonded to the maxillary teeth from first molar to first molar, except for the right premolars, canine, and lateral incisor, and an .016" nickel titanium archwire was placed. The patient was instructed to wear high-pull headgear 10 hours a day to reinforce anchorage. The mandibular canines were allowed to drift for two months before being leveled and aligned with light force on an .016" nickel titanium archwire.

An .016" × .022" TMA* sectional archwire with a closing loop was then placed to retract the maxillary left canine. An .016" stainless steel sectional archwire with an advancing U-loop was tied from the maxillary right first molar to the left lateral incisor to move the midline to the patient's left (Fig. 2A).

*Registered trademark of Ormco/"A" Company, 1717 W. Collins Ave., Orange, CA 92867.

Eight months into treatment, the upper midline had been corrected, and the maxillary left quadrant was tied in as a unit from the right central incisor to the left first molar (Fig. 2B). The maxillary right first premolar was then extracted, and the right canine was allowed to drift into the extraction space for one month before being bonded (Fig. 2C).

Fourteen months into treatment, posterior crowding mandated extraction of the maxillary second molars. After nine more months of distalizing the maxillary first molars, the third molars were allowed to move mesially into the place of the extracted second molars (Fig. 2D).

Finishing and detailing were carried out in both arches using .016" × .022" stainless steel archwires with 2nd- and 3rd-order bends (Fig. 2E,F). The distal surfaces of the maxillary lateral incisors were then built up with composite.

Treatment Results

The final results were satisfactory, with Class I molar and canine relationships, coincident midlines, and an improved soft-tissue profile due to retraction of the maxillary incisors (Fig. 3). Cephalometric analysis showed only minor increases in the facial angles, since vertical growth had been controlled throughout treatment with the high-pull headgear (Table 1). Superimposition of pre- and post-treatment lateral

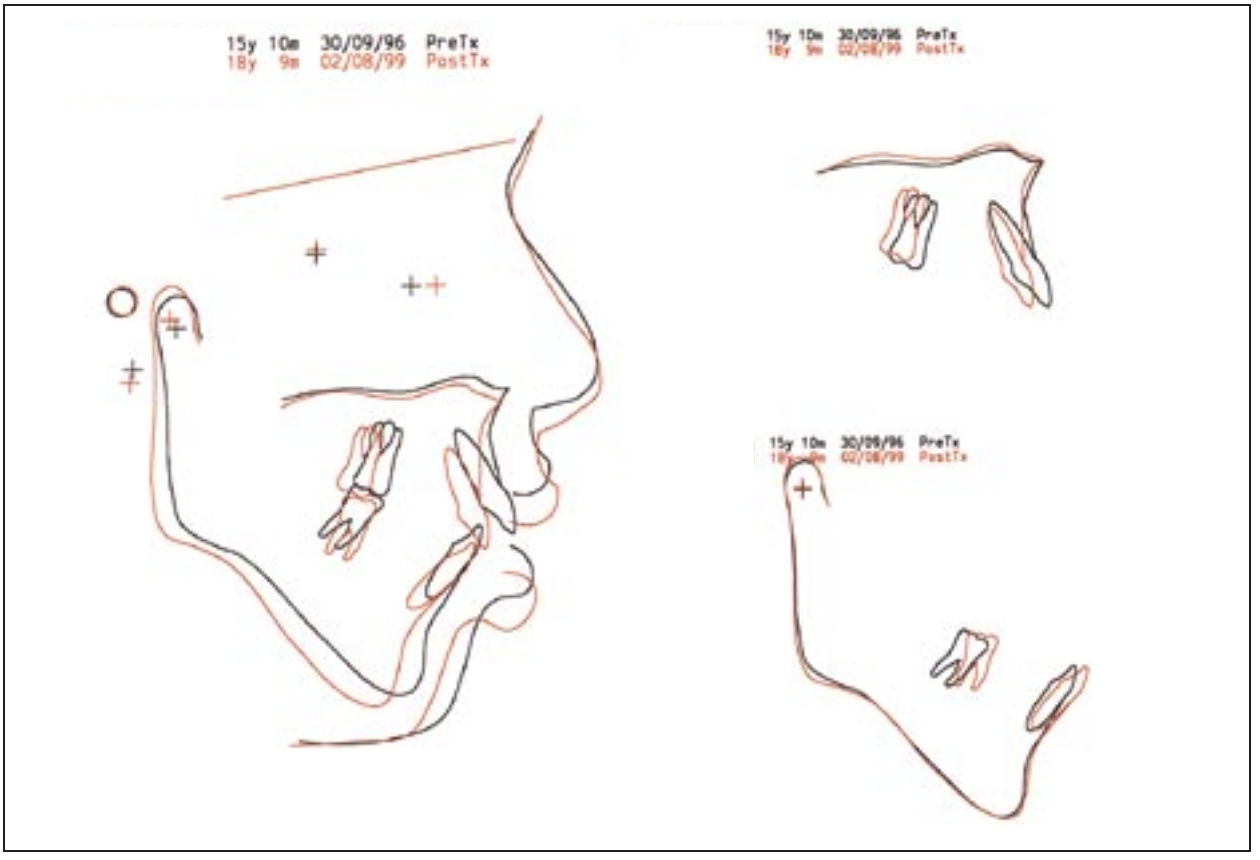

Fig. 4 Superimposition of cephalometric tracings before and after treatment.

cephalograms indicated distalization of the maxillary first molars (Fig. 4).

Discussion

Extraction of the maxillary left first premolar before the right first premolar allowed the midline to be moved to the patient's left before the buccally placed right canine was aligned. If the right canine had moved into the extraction space of the right first premolar before the midline correction, the increased arch asymmetry would probably have required Class III elastics to move the canine and the midline to the patient's left.[4] This complex mechanics would have exacerbated the high mandibular plane angle,[5-8] possibly leading to an open bite, and would have required additional patient cooperation.

Closure of the maxillary left first premolar extraction space and correction of the midline took only eight months. After the maxillary right first premolar was extracted and the canine and second premolar were allowed to drift into the extraction space for one month, leveling and alignment of the canines and premolars and arch coordination took four more months.

The additional treatment time was due to the second and third molars. At this point in treatment, we decided the patient's profile would benefit from extraction of the maxillary second molars and distalization of the first molars.[9,10] The second molar extractions also avoided the likely horizontal impaction of the maxillary third molars, which were allowed to drift mesially into the extraction spaces.

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