

CASE REPORT

Bilateral Transposition of Maxillary Canines to the Incisor Region

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The following case illustrates the orthodontic and restorative management of a Class III patient with bilateral transposition of maxillary canines to the incisor region, complicated by canine impaction and root resorption of both central incisors.

Diagnosis

The patient was a 13-year-old Chinese girl with the chief complaint of a labially erupting canine and anterior crossbite (Fig. 1). Her mandibular dental midline was deviated 1.5mm to the right, and she had a retrognathic maxilla and obtuse nasolabial angle. The mandible was anteriorly displaced, but the patient could achieve edge-to-edge occlusion in centric relation (Fig. 1B). In centric occlusion, the molars were in a Class I relationship and the incisors in a Class III, with an anterior crossbite, overjet of -2mm, and overbite of 4mm (Fig. 1A). Space analysis showed 3mm of crowding in the mandibular arch and 18mm of crowding in the maxillary arch.

The maxillary right canine was transposed and had erupted ectopically, labial to the maxillary central incisors. The

TABLE 1
CEPHALOMETRIC DATA

	Norm	Pretreatment	Post-Treatment
<i>Hard Tissue</i>			
NSBa	130.0°	142.1°	139.1°
SNA	82.0°	73.1°	73.1°
SNB	79.0°	75.7°	76.6°
SNPg	81.0°	76.3°	78.0°
ANB	3.0°	-2.6°	-3.6°
SN/MnPI	34.0°	31.1°	27.1°
SN/MxPI	8.0°	11.7°	6.6°
MxPI/MnPI	26.0°	19.4°	20.6°
N-MxPI	54.0°	52.6°	52.3°
Me-MxPI	64.0°	60.0°	63.6°
U1/MxPI	118.0°	110.1°	119.2°
L1/MnPI	97.0°	89.5°	86.2°
Interincisal angle	115.0°	141.1°	134.0°
L1-APo	5.5mm	4.0mm	1.3mm
A, B on OP	-4.5mm	-3.3mm	-3.4mm
<i>Soft Tissue</i>			
Upper Lip to E	3.0mm	-0.4mm	-6.4mm
Lower Lip to E	4.0mm	0.0mm	-4.0mm

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Fig. 1 13-year-old female with bilateral transposition of maxillary canines to incisor region before treatment. A. Class I molar relationship in centric occlusion. B. Edge-to-edge position in centric relation, showing anterior displacement of mandible. C. Ectopic eruption of canines caused root resorption of both central incisors. D. Angulation of erupting maxillary left canine.

mandibular arch was symmetrical and parabolic in shape, with an exaggerated curve of Spee. The maxillary arch was also symmetrical and parabolic, with a mild curve of Spee.

Radiographic evaluation demonstrated that the maxillary left canine was transposed and horizontally impacted, with its crown pointing toward the maxillary left central incisor. Severe root resorption of the maxillary central incisors was evident (Fig. 1C,D). The lateral cephalogram showed a skeletal Class III pattern with retroclined maxillary

and mandibular incisors and retrusive upper and lower lips (Table 1).

Because the maxillary left and right central incisors were mobile (grade 3), the patient was referred for assessment of these teeth. The prognosis was poor, and the incisors would eventually need to be extracted.

Treatment Plan

1. Extraction of the maxillary central incisors and alignment of the transposed maxillary canines into the place of the centrals.

2. Extraction of the mandibular second premolars.
3. Correction of the anterior crossbite.
4. Finishing in a Class I occlusion.
5. Composite build-ups of the maxillary anterior teeth.

Treatment Progress

The maxillary right central incisor was extracted, the maxillary first molars were banded, and a 2×1 .018" preadjusted edgewise appliance was used with an .018" round stainless

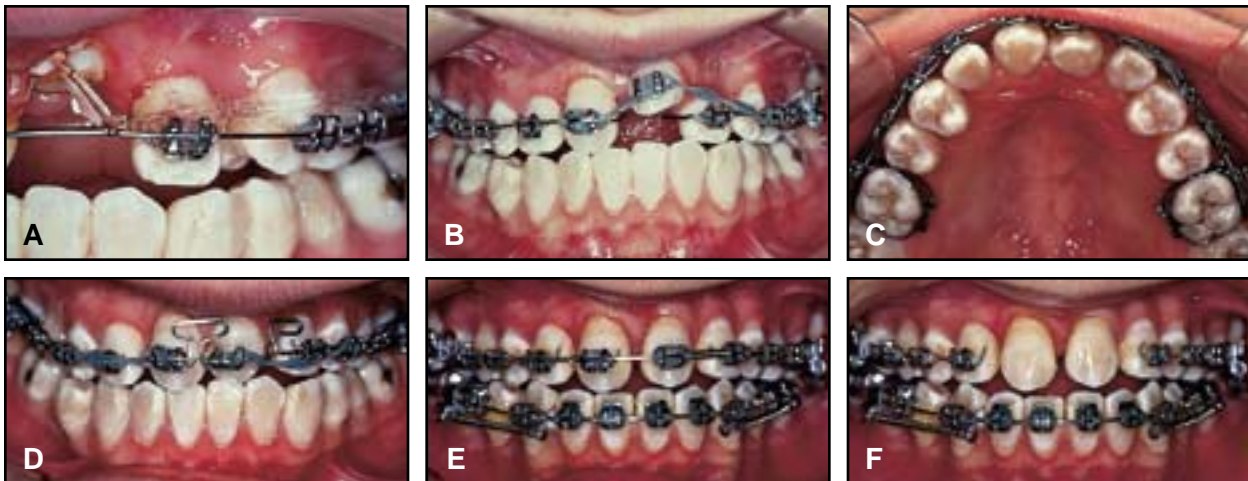


Fig. 2 A. Extrusion of maxillary left canine into position of extracted left central incisor, using .016" × .022" stainless steel archwire as anchorage. B. Extrusion of left canine using power chain, with stops bent into archwire to prevent reciprocal movement of adjacent teeth. C. .016" × .022" TMA archwire with palatal root torque on both canines. D. Power unit with T-loops used to extrude and derotate maxillary left canine. E. .016" × .022" stainless steel archwire with nickel titanium closed-coil springs placed in mandibular arch after extraction of second premolars. F. Maxillary canines debonded for composite build-up.

steel archwire to move the right canine into the central incisor position. Anchorage was provided by a palatal bar.

The maxillary left central incisor was then extracted, and the left canine was surgically exposed. After the entire maxillary arch was bonded, the left canine was moved toward the central incisor position with elastic thread between a bonded button on the palatal surface of the canine and an .016" × .022" stainless steel archwire (Fig. 2A). The canine was brought into the arch using a power chain, with stops bent into the archwire to prevent reciprocal movement of the adjacent teeth during the extrusion (Fig. 2B).

An .016" × .022" TMA* archwire was placed, with palatal root torque on both canines (Fig. 2C), and a power unit was used to further extrude and derotate the left canine (Fig.

2D).

The mandibular second bicuspids were then extracted, and the mandibular arch was banded and bonded. After alignment, mandibular space closure was performed with sliding mechanics, using nickel titanium closed-coil springs to an .016" × .022" stainless steel archwire (Fig. 2E).

Once the transposed canines were in the proper positions (Fig. 2F), they were built up with composite to mimic the appearance of central incisors. Final detailing of the restoration was performed only after the occlusion had been finished (Fig. 3).

Treatment Results

The treatment brought the transposed canines into the central incisor positions and corrected the anterior crossbite. Superimposition of cephalometric tracings on SN at S showed an unchanged skeletal Class III pat-

tern, downward and forward growth of the mandible, and increased prominence of the nose and chin (Fig. 4, Table 1). Superimposition on the palatal plane at ANS revealed proclination of the maxillary canines, and superimposition on the mandibular plane at M demonstrated retroclination of the mandibular incisors and vertical development of the condyles. The PAR index was reduced from 34 to 0.

Discussion

The maxillary canine begins to develop high in the maxilla at about 4-5 months of age. Crown calcification is complete by 6 or 7 years of age. The permanent canine then migrates forward and downward, lying buccal and mesial to the apex of the deciduous canine before erupting along the distal aspect of the maxillary lateral incisor root. This long path of eruption is a common cause of maxillary canine displacement, impaction,

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Fig. 3 Patient after 37 months of orthodontic treatment and composite build-ups of transposed maxillary canines and lateral incisors.

and transposition.¹

The prevalence of maxillary canine impaction in a Caucasian population has been found to be 1-2%, and only 8% of these impactions are bilateral.¹ Resorption of maxillary incisor roots due to impacted canines occurs in .7% of 10-to-13-year-olds.¹ Only two cases of bilateral transposition of maxillary canines to the incisor region have been reported in the literature.² This situation becomes even more complicated when impaction of the transposed canines causes resorption of the incisor roots,³ as in the present case.

Various treatment options

have been proposed for bilaterally transposed teeth, including alignment in the transposed positions, extraction of one or both transposed teeth, and orthodontic movement into the normal arch positions.⁴ Factors such as the positions of the root apices, esthetic and functional occlusion, patient cooperation, and length of treatment must all be considered in treatment planning.

In this patient, the roots of both central incisors were severely resorbed, and the teeth were highly mobile. Together with the severe maxillary crowding, this made extraction of both

central incisors inevitable. When consulting with the restorative dentist on whether to reshape the canines as central incisors, we evaluated the clinical crown height, the crown shape, and the mesiodistal width. Teeth with short, narrow crowns and parallel mesial and distal surfaces have the best chance of being satisfactorily reshaped as central incisors. The other factor to be considered is the size and shape of the lateral incisors. In this case, the canines were acceptable in form, except that they were slightly longer than the laterals.

Malmgren and colleagues

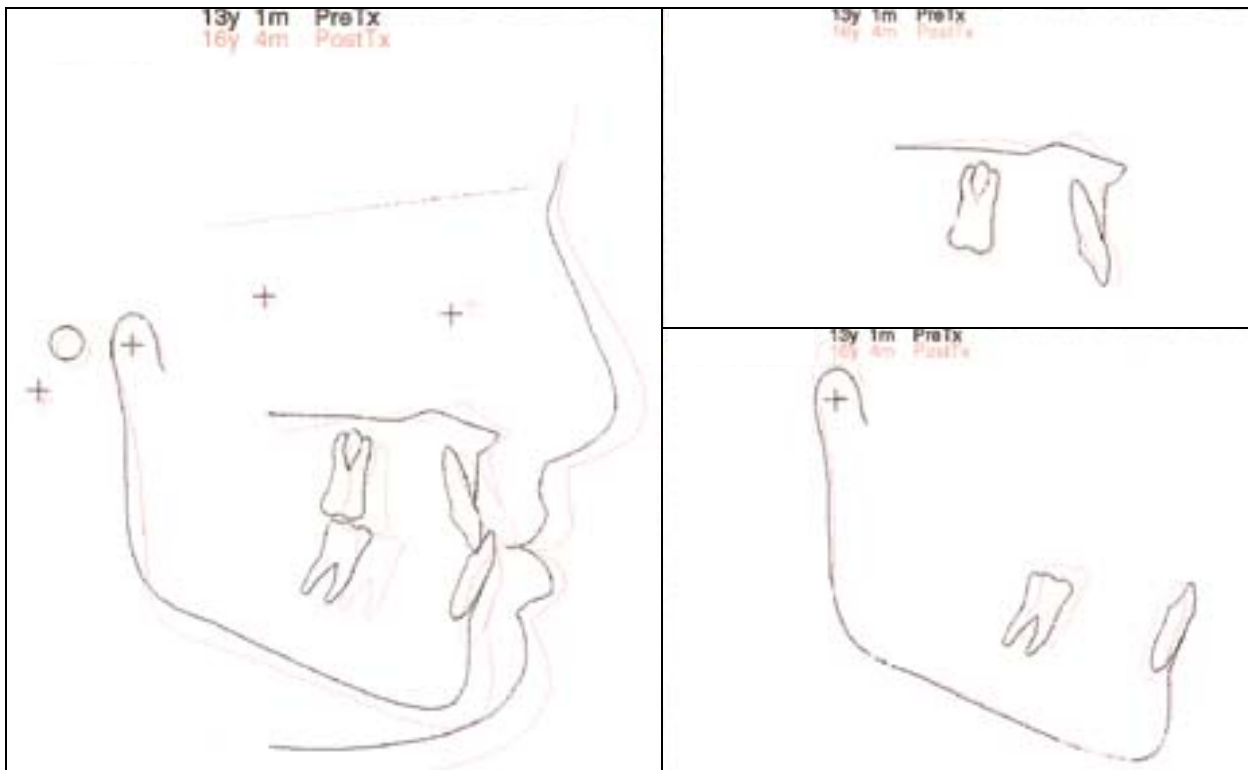


Fig. 4 Superimposition of cephalometric tracings before and after treatment.

showed that canines can be made to mimic central incisors by a combination of grinding the tips, labial surfaces, and sides and a build-up of the mesial corners.⁵ Because the lateral incisors looked small in this patient, they also had to be built up with composite for a harmonious appearance.

The treatment sequence was an important factor in achieving a satisfactory result and maintaining patient cooperation. The maxillary right central incisor was extracted first, so that only a single anterior extraction space would show. After three months, the realigned right canine was then used as an anchor for extrusion and alignment of the left canine. Rectangular archwires were used, with special attention to lingual root torque to maintain healthy gingival margins during the extrusion.

The decision to extract the mandibular second premolars was made for the following reasons:

1. Although the molars were in a Class I relationship in centric occlusion, they were Class II in centric relation, as the mandible moved distally.
2. Extraction of second premolars instead of first premolars would reduce the likelihood of further retroclination of the mandibular incisors.
3. A total of 14mm of space was required for:
 - Retraction of the mandibular incisors to correct the negative overjet (6mm)
 - Leveling of the curve of Spee (2mm)
 - Elimination of crowding (3mm)
 - Movement of the mandibular first molars into a Class I relationship (3mm)

Conclusion

Achievement of optimal function and esthetics in cases such as this requires utmost care in the design of treatment and close collaboration between the orthodontist, oral surgeon, and restorative dentist.

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