

# CASE REPORT

## Management of a Transposed Maxillary Canine and Lateral Incisor

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**A** 14-year-old female presented with the chief complaint of irregular upper front teeth and an unesthetic smile (Fig. 1).

### Diagnosis

The patient had a pleasant facial profile with competent lips. Intraoral examination indicated a Class I molar relationship on the right side and a half-unit Class II on the left. Both arches showed moderate crowding, with a scissor bite in the right posterior region from first premolar to first molar. The mandibular left lateral inci-

isor was lingually displaced. The maxillary left canine was transposed with the lateral incisor, which was also in crossbite; on palpation of the mucobuccal fold of the left maxillary arch, the root of the canine appeared to be next to the root of the central incisor. The maxillary midline was shifted to the left. Oral hygiene was good, and the periodontium was healthy.

Radiographs revealed an incomplete transposition, with the root apices of the lateral incisor and canine in normal positions. The transposition extended above

the midroot level. All permanent teeth, including the developing third molars, were present.

Cephalometric analysis showed that the patient was an average grower with a skeletal Class I pattern (Table 1).

### Treatment Plan

The following treatment objectives were developed:

- Realignment of the transposed maxillary canine and lateral incisor.
- Correction of the crossbite and scissor bite.



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Dr. Sharma



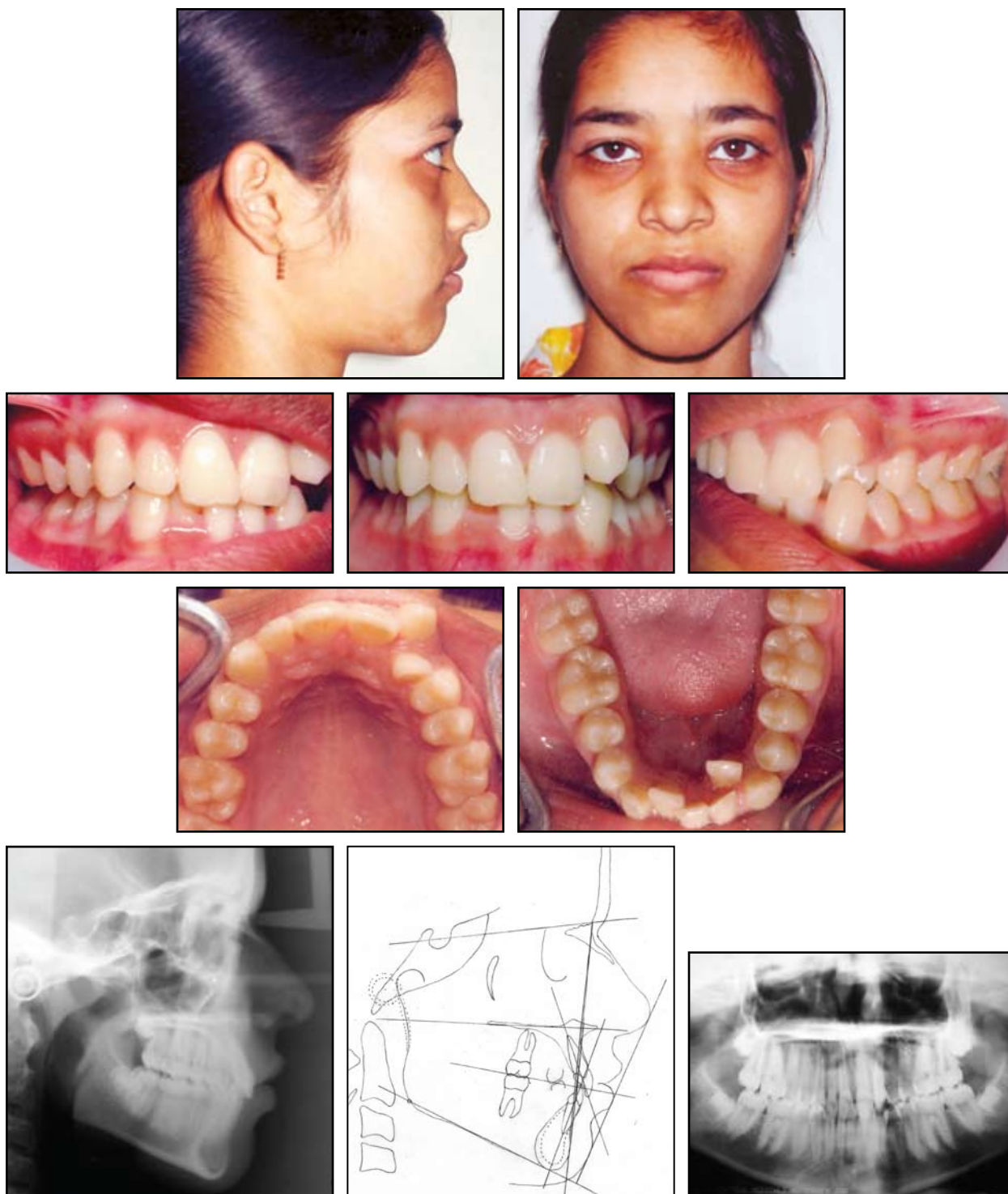
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# Management of a Transposed Maxillary Canine and Lateral Incisor \_\_\_\_\_



**Fig. 1** 14-year-old female with transposed maxillary canine and lateral incisor before treatment.

**TABLE 1**  
**CEPHALOMETRIC DATA**

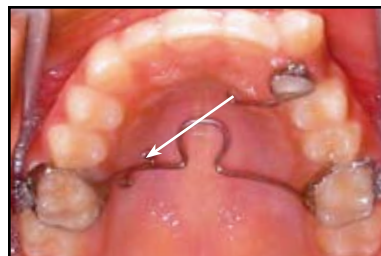
Variable	Norm	Pretreatment	Post-Treatment
SNA	82° ± 3°	79.0°	80.0°
SNB	79° ± 3°	78.0°	77.0°
ANB	3° ± 1°	1.0°	3.0°
Wits appraisal	0mm	-2.0mm	-1.0mm
U1-maxillary plane angle	108° ± 5°	112.0°	111.0°
L1-mandibular plane angle	92° ± 5°	85.0°	93.0°
Interincisal angle	133° ± 10°	141.0°	134.0°
Maxillomandibular plane angle	27° ± 5°	23.0°	23.0°
Upper anterior facial height		51.0mm	51.0mm
Lower anterior facial height		67.0mm	68.0mm
Facial height ratio	55% ± 2%	56.7%	57.1%
L1-APo	0-2mm	2.0mm	2.5mm
Lower lip-Ricketts E plane	-2mm	0.0mm	1.0mm
Upper lip-Ricketts E plane	-2 to -3mm	-2.0mm	-1.5mm

- Achievement of a buccal Class I relationship.
- Correction of the midline.
- Attainment of a good static, functional occlusion.

**Treatment Progress**

Treatment was initiated in the maxillary arch using an .022" × .028" standard edgewise appliance with welded triple tubes on the molar bands. A transpalatal arch was placed, with a hook soldered onto the side opposite the transposition. The left lateral incisor was banded, and a lever arm<sup>1</sup> made of .028" stainless steel wire was soldered to the band to apply a force passing through the center of resistance<sup>2</sup> (Fig. 2).

The maxillary arch was initially leveled with a light, round wire. Class I elastics with a force of 45g each were applied off-center to derotate and translate the maxillary left canine, accord-



**Fig. 2** With line of force passing through center of resistance, tooth will translate bodily, even though point of attachment is at bracket.

ing to the “cue-ball concept” (a force applied on a body, but not through the center of that body, results in translation and rotation<sup>3</sup>). Once the canine was slightly derotated, a T-loop fabricated from .017" × .025" TMA\* wire was ligated to the canine bracket and inserted into the auxiliary molar tubes (Fig. 3A). The beta

\*Registered trademark ofOrmco, 1717 W. Collins Ave., Orange, CA 92867; www.ormco.com.



**Fig. 3** A. T-loop ligated for canine retraction. B,C. .018" stainless steel wire with step-out bends and open-coil spring used to create space.

angulation was increased near the canine to enhance posterior anchorage, and the T-loop was activated 4mm as recommended by Marcotte.<sup>4</sup> Intermediate-pull headgear was worn for 12 hours daily during canine retraction to maintain the Class I occlusion.

At the same time, an elastic chain\*\* was attached from the hook of the lever arm to the hook on the transpalatal arch. About 50g of force was used to move the lateral incisor lingually, thus avoiding any root interference or loss of the canine's already thin labial cortical plate during retraction (Figs. 2,3C). The elastic chain was changed every three weeks.

Step-out bends were then added to an .018" stainless steel archwire to provide clearance in the canine region. An open-coil spring\*\* was compressed to

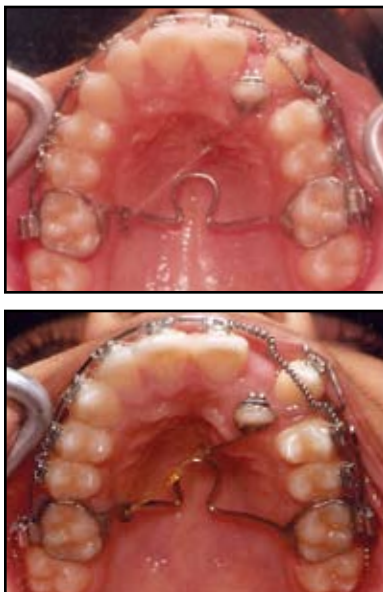
simultaneously create space, align the transposed teeth, and correct the maxillary midline, saving treatment time (Fig. 3B,C). This archwire was later replaced with an .018" × .025" stainless steel

wire in the same configuration to maintain arch integrity.

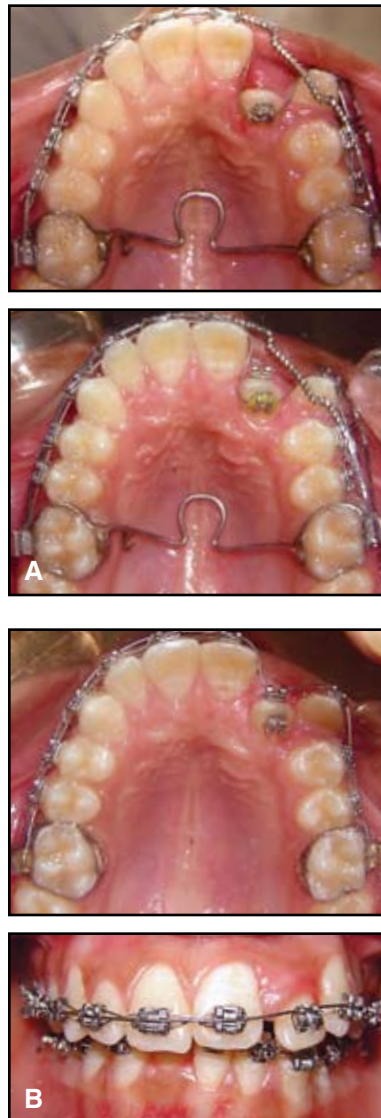
The T-loop was activated every eight to 10 weeks, depending on the root movement of the canine. After the canine had been retracted adjacent to the first premolar (Fig. 4), the T-loop was left in place to increase the moment-to-force ratio for effective root movement. Intraoral periapical radiographs were taken periodically to monitor the root movement of the canine.

After 13 months of treatment, the headgear was discontinued. The lever arm was removed from the lateral incisor, and a bracket was bonded to the lingual surface. An .014" copper nickel titanium (CuNiTi\*) auxiliary wire was ligated to the lingual bracket to track the lateral incisor labially, with toe-in and tipback bends incorporated into the .019" × .025" stainless steel main archwire (Fig. 5A). A mandibular posterior biteplate was added to provide clearance for the cross-bite correction. As the lateral incisor moved labially, a bracket was bonded to the labial surface, and an .016" CuNiTi\* wire was ligated labially (Fig. 5B).

Once the maxillary lateral incisor was aligned, the mandibular arch was bonded (Fig. 6). Increasing the intercanine width to resolve 6mm of lower crowding at this patient's age would have jeopardized the stability of the



**Fig. 4** Retraction of canine and lingual movement of lateral incisor.



**Fig. 5** A. Auxiliary wire used to move lateral incisor labially. B. Bracket bonded to labial surface of incisor for final alignment.

\*Registered trademark of Ormco, 1717 W. Collins Ave., Orange, CA 92867; www.ormco.com.

\*\*Ortho Organizers, Inc., 1619 S. Rancho Santa Fe Road, San Marcos, CA 92069; www.orthoorganizers.com.





**Fig. 6** Patient after 18 months of treatment.

archform.<sup>5,6</sup> We therefore decided to extract the left lateral incisor, which had a mesiodistal width of 6mm. This would also simplify the mechanotherapy and minimize adverse effects on the profile.

Because the patient required significant root movement of the maxillary lateral incisor, the roots were torqued labially with an .019" × .025" stainless steel wire and individual torquing pliers. Thurow has advised against using archwires that completely fill the slots for torquing individual teeth.<sup>7</sup> We used "incremental torque" to move the roots labially, generating a more comfortable torsional force and reducing the risk of root resorption.

After the mandibular crowding had been resolved (Fig. 7), coordinated maxillary and mandibular archwires with artistic positioning bends were placed to



**Fig. 7** Mandibular arch aligned after 22 months of treatment.

correct the mesiodistal angulations. Final settling was accomplished on lighter wires with up-and-down elastics. Toward the end of treatment, the incisal edges of the upper right central and lateral incisors were slightly reshaped to match their counterparts, and mild gingivectomies of the maxillary left and mandibular right lateral incisors were performed to normalize the gingival margins.

Fixed appliances were removed after 27 months of treatment, and bonded maxillary and mandibular lingual retainers were placed.

### Treatment Results

Post-treatment records showed good functional and esthetic results (Fig. 8). Well-interdigitated Class I canine and first molar relationships were obtained, with proper overjet and overbite (Table 1). As expected, the left maxillary lateral incisor root showed mild resorption, but this was limited to the apical third. Both the canine and lateral incisor

maintained their original color and responded normally to vitality tests at the end of treatment.

### Discussion

Considerable treatment time was spent in rotating, uprighting, and paralleling the roots of the canine and lateral incisor. Only light force was used, and special care was taken to avoid any damage to the teeth and supporting structures. The patient was motivated and cooperative throughout the treatment period. Although this kind of treatment requires considerably more time than usual, the esthetic and functional results justify the complex mechanotherapy.

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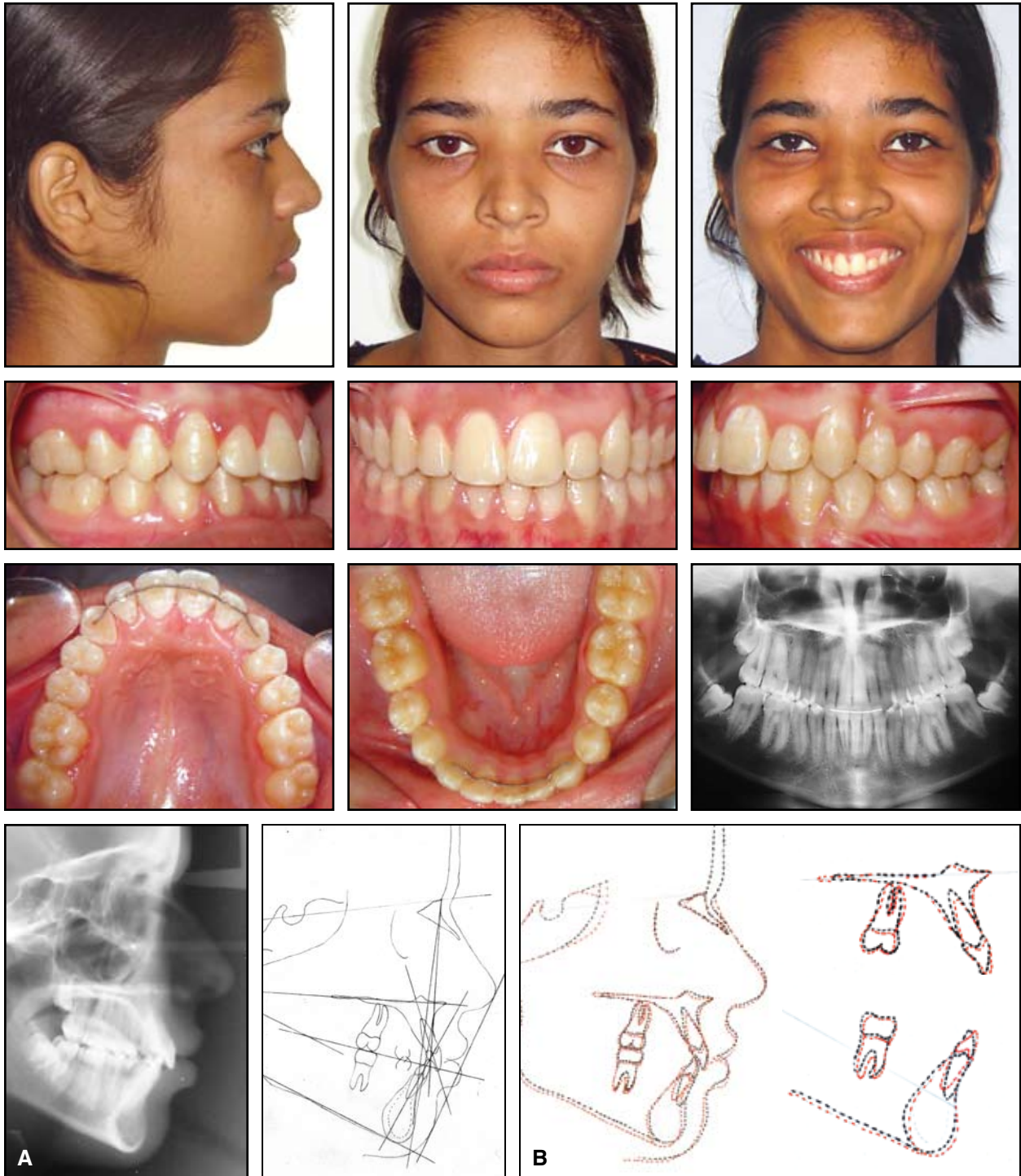


Fig. 8 A. Patient after 27 months of treatment. B. Superimpositions of pre- and post-treatment cephalometric tracings.