

CASE REPORT Complex Surgical-Orthodontic Case with a Transposed Cuspid and Mandibular Asymmetry

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The following case report shows a patient with a transposed maxillary right first bicuspid and canine who was successfully treated with combined orthodontic and surgical therapy. Shortly after removal of the active appliances, an asymmetrical Class III mandibular growth pattern required further orthodontic and orthognathic surgical correction.

Diagnosis and Treatment Plan

A 10-year-old female presented for orthodontic treatment after previous maxillary space maintenance due to early loss of several primary teeth. She had a thumbsucking habit until age 12 1/2.

Clinical examination revealed a Class I malocclusion with a Class II skeletal relationship, as documented cephalometrically by an excessive facial convexity (Figs. 1A, 1B). The profile was mildly convex, and the maxilla and mandible were protrusive relative to the cranial base. The patient's dentition showed a mild bimaxillary protrusion and a mild arch-length discrepancy. She had an anterior open bite coupled with a lack of cuspid rise in lateral excursive movements. The overjet was minimal due to the maxillary arch-length discrepancy and distal drift of the incisors. Radiographic evaluation revealed a facially displaced and transposed maxillary right canine.

The treatment plan was as follows:

1. Align the mandibular arch by using "E" space and facial growth.
2. Extract the maxillary right first bicuspid and surgically expose the transposed canine to facilitate orthodontic movement.
3. Finish the right buccal segment in a Class II molar and Class I canine relationship.

Treatment Progress

A partial .018" x .025" edgewise appliance was used for six months of initial alignment, while a transpalatal arch was placed to angulate and rotate the maxillary molars. The first bicuspid was extracted, and the canine was exposed. An attachment was bonded to the canine for six months of traction with elastic thread.

After alignment of the maxillary arch, spaces were closed with an .016" x .022" closing arch. Class III elastics (3/16", 6oz) were used in the right buccal segment to help move the maxillary molars mesially. Vertical triangle elastics (3/16", 6oz) held the left buccal segment in a Class I relationship during space closure. Final alignment was achieved with .017" x .025" finishing arches.

The patient was seen every four to six weeks, and cooperation was good. The thumb habit was eliminated during treatment. Appliances were removed after 38 months of active treatment, at age 14 (Figs. 2A, 2B). All the orthodontic treatment objectives appeared to have been met, except that the profile remained convex, with a mild mandibular asymmetry to the right.

Subsequent Treatment

Two months after debonding, the maxillary right lateral incisor appeared to be moving into crossbite and the mandibular midline to be shifting to the right. Six months into retention, it was apparent that asymmetrical, prognathic mandibular growth was occurring. Lateral and anteroposterior cephalograms were taken, and the patient was referred to an oral surgeon.

A radioactive nucleotide bone scan documented a unilateral left condylar hyperplasia. The patient was followed at sixmonth intervals for the next three years, with annual lateral and anteroposterior cephalograms taken. Cessation of growth was confirmed by these radiographs and by a follow-up bone scan.

At this point (age 17), the patient showed a pronounced mandibular facial asymmetry to the right (Fig. 3). Analysis also revealed a mild cant to the maxillary occlusal plane, a significant unilateral Class III relationship on the right side, and an anterior crossbite. To obtain the best possible functional and esthetic results, a 2mm asymmetrical maxillary impaction and advancement and a 6mm asymmetrical mandibular setback were planned.

Full edgewise appliances were placed, and the arches were aligned enough to accommodate .017" x .025" surgical wires. Two months into active treatment, however, the patient received a traumatic injury to her maxillary incisors, and maxillary therapy was suspended for eight weeks while root-canal treatment was carried out on the injured teeth.

After nine months of orthodontic preparation, the patient was ready for surgery (Figs. 4A, 4B). The surgical procedures were completed successfully, and asymmetrical Class II box elastics (1/4", 4oz) were used with .016" stainless steel archwires to detail the occlusion. Fixed appliances were debonded after four more months of orthodontic treatment with excellent cooperation (Figs. 5A, 5B), (Table 1).

The patient's third molars were removed, and she is being monitored for any recurrence of the mandibular asymmetry.

Discussion

Although transposition of permanent teeth is relatively rare, the canines are the teeth most often involved.¹⁻⁴ In an exhaustive review, Peck and Peck showed that transposition of the canine and first premolar was by far the most common situation in the maxillary arch.⁵

Mandibular asymmetry, which can occur even in normally developing patients,⁶ can be a significant factor in the formulation of an orthodontic treatment plan. Several authors have identified unilateral condylar hyperplasia as a contributing factor,⁷⁻¹⁰ and methods have been developed to assess condylar growth and its role in the development of mandibular asymmetry.⁹⁻¹³

In this case, an unusual dental transposition, asymmetrical mandibular growth, and a dental trauma required a multidisciplinary treatment plan. The successful results were achieved with a combination of fixed edgewise orthodontic treatment, dentoalveolar surgery, orthognathic surgery, and endodontic therapy.

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FIGURES



Fig. 1A 11-year-old female before treatment.

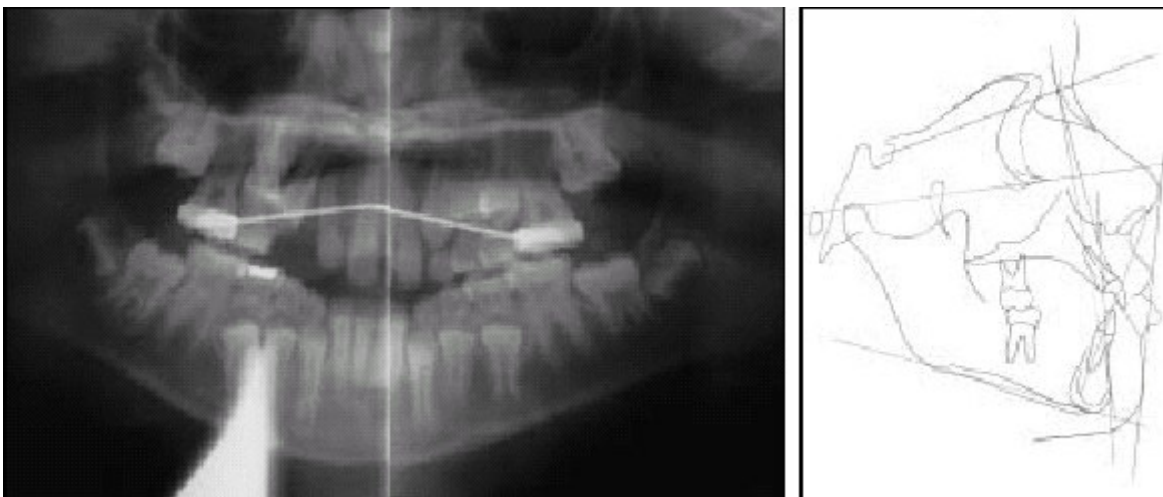


Fig. 1B 11-year-old female before treatment.

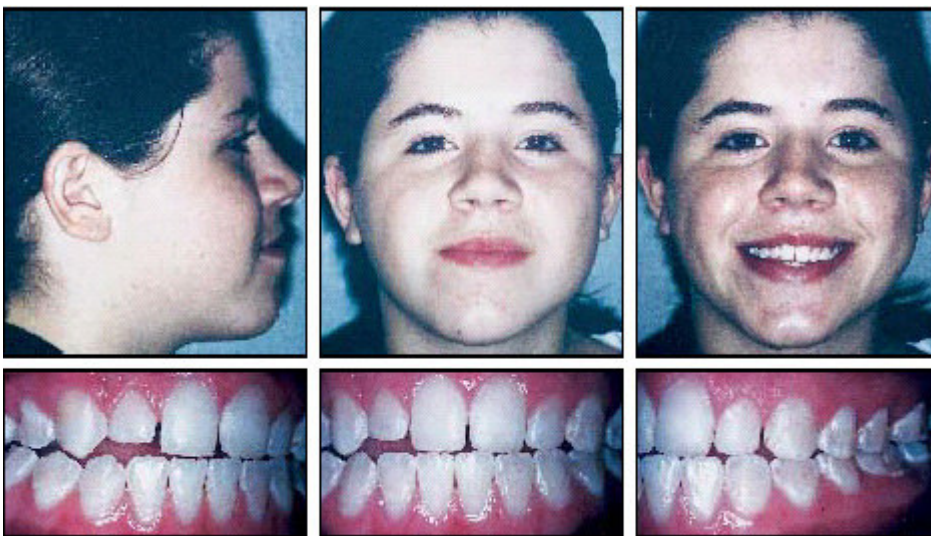


Fig. 2A After 38 months of initial orthodontic treatment.

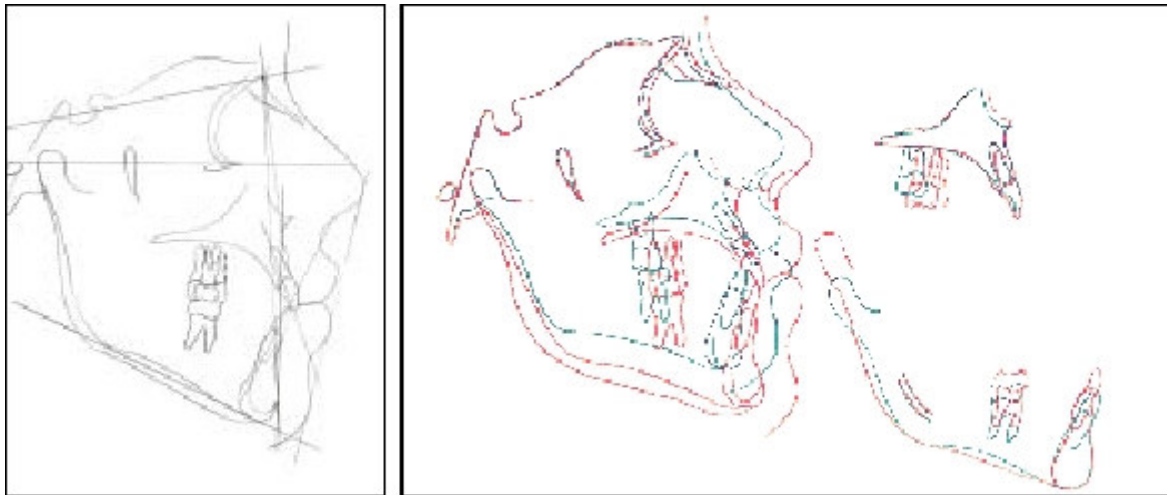


Fig. 2B After 38 months of initial orthodontic treatment (blue = pretreatment; red = post-treatment).

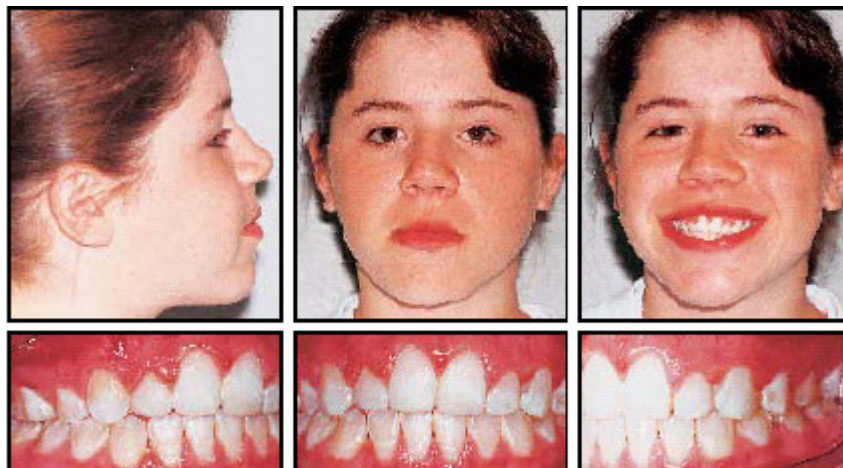


Fig. 3 Three years after initial treatment, showing pronounced mandibular asymmetry.



Fig. 4A After nine months of presurgical orthodontic treatment.

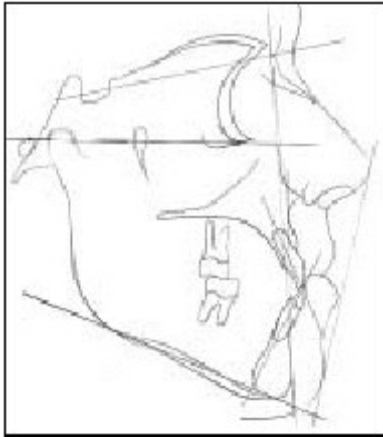


Fig. 4B After nine months of presurgical orthodontic treatment.



Fig. 5A After orthognathic surgery and four months of orthodontic finishing.

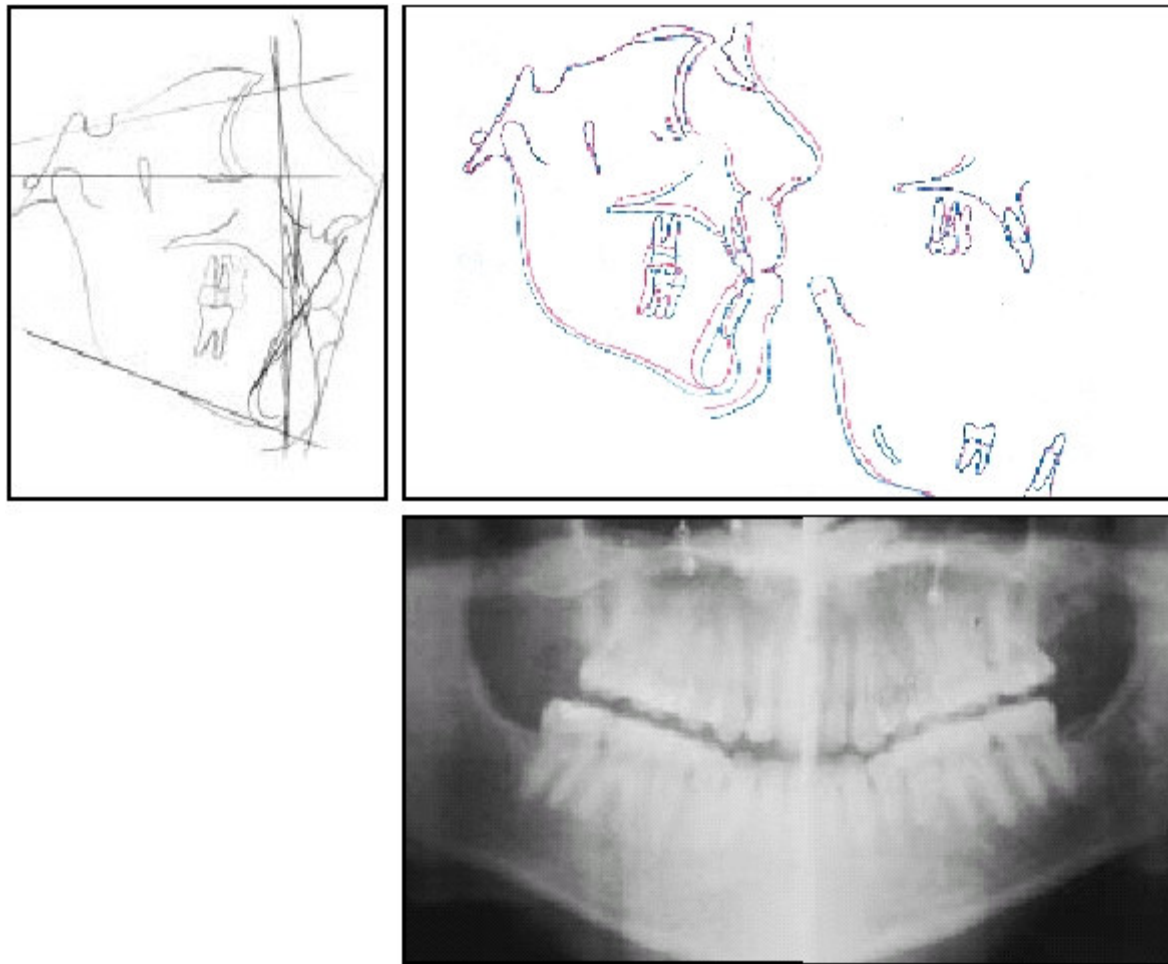


Fig. 5B After orthognathic surgery and four months of orthodontic finishing (blue =presurgery; red = post-treatment).

TABLES

**TABLE 1
CEPHALOMETRIC SUMMARY**

	Measurement	Norm	Pre-Tmt.	After Initial Orthodontics	Pre-Surgical	Post-Tmt.
Cranial base	SNa	69.5mm	66.0mm	68.0mm	68.0mm	68.5mm
Maxillary depth	FH/Na-A	90.0°	97.0°	97.0°	96.0°	98.0°
Facial depth	Na-Po/FH	87.5°	92.0°	91.0°	95.5°	92.0°
Facial convexity	Na-Po/A	1.5mm	4.5mm	4.0mm	3.5mm	5.0mm
Mandibular plane angle	MP-FH	25.5°	24.0°	26.5°	25.0°	20.0°
Maxillary incisor position	$\bar{1}$ -APo	3.5mm	6.5mm	5.0mm	3.0mm	5.0mm
		28.0°	30.0°	22.0°	24.0°	26.0°
Mandibular incisor position	$\bar{1}$ -APo	1.0mm	3.0mm	3.0mm	5.0mm	2.5mm
		22.0°	25.0°	23.0°	29.0°	28.0°
Soft tissue	Lower lip-Esthetic plane	-2.0mm	+3.5mm	+1.5mm	-2.0mm	+1.5mm

Table. 1

REFERENCES

- 1** Parker, W.: Transposed premolars, canines and lateral incisors, *Am. J. Orthod.* 97:431-498, 1990.
- 2** Shapira, Y. and Kuftinec, M.: Maxillary canine-lateral incisor transposition: Orthodontic management, *Am. J. Orthod.* 95:439-444, 1989.
- 3** Joshi, M.R. and Bhatt, N.A.: Canine transposition, *Oral Surg. Oral Med. Oral Pathol.* 31:49-54, 1971.
- 4** Shapira, Y.: Transpositions of canines, *J. Am. Dent. Assoc.* 100:710-712, 1980.
- 5** Peck, S. and Peck, L.: Classification of maxillary tooth transpositions, *Am. J. Orthod.* 107:505-517, 1995.
- 6** Melnick, A.: A cephalometric study of mandibular asymmetry in a longitudinally followed sample of growing children, *Am. J. Orthod.* 101:355-366, 1992.
- 7** Pirttiniemi, P.: Associations of mandibular and facial asymmetries: A review, *Am. J. Orthod.* 106:191-200, 1994.
- 8** Bruce, R.A. and Hayward, J.R.: Condylar hyperplasia and mandibular asymmetry, *J. Oral Surg.* 26:281-290, 1968.
- 9** Erickson, G.E. and Waite, D.E.: Mandibular asymmetry, *J. Am. Dent. Assoc.* 89:1369-1373, 1974.
- 10** Obwegeser, H.L. and Matek, M.S.: Hemi mandibular hyperplasia-hemimandibular elongation, *J. Maxillofac. Surg.* 14:183-208, 1986.
- 11** Matteson, S.R.; Proffit, W.R.; and Terry, B.C.: Bone scanning with ^{99m}technetium phosphate to assess condylar hyperplasia, *Oral Surg. Oral Med. Oral Pathol.* 60:356-367, 1985.
- 12** Pogrel, M.A.: Quantitative assessment of isotope activity in temporomandibular joint region as a means of assessment of condylar hypertrophy, *Oral Surg. Oral Med. Oral Pathol.* 60:15-27, 1985.
- 13** Hendersen, M.J. et al.: Technetium-^{99m} bone scan scintigraphy and mandibular condylar hyperplasia, *Clin. Radiol.* 41:411-414, 1990.