

CASE REPORT

Maxillary Canine-First Premolar Transposition in the Permanent Dentition

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Transposition of two adjacent teeth is an eruption anomaly of uncertain etiology.^{1,2} Three different treatment approaches have been described: alignment of the involved teeth in their transposed positions; movement of the teeth into their normal anatomic positions; and extraction of one of the transposed teeth, followed by closure of the extraction space.³⁻⁵ The first approach is the fastest, but the second is preferred if tooth positions can be corrected without risking injury to periodontal

tissue or root resorption of adjacent teeth. The third option is the most intrusive and therefore is recommended only when extraction is indicated by other factors, such as crowding and caries.

This report describes the treatment of a transposition of the maxillary left canine and first premolar in a young girl.

Diagnosis

An 8-year-old female in the mixed dentition (before the erup-

tion of her maxillary left permanent canine and first premolar) was diagnosed with maxillary canine-first premolar transposition (Fig. 1A). The maxillary left deciduous canine and first deciduous molar were extracted at this time (Fig. 1B).

Clinical examination at age 10 revealed a Class I relationship on the right and a Class II relationship on the left. The patient had a convex profile and an esthetically pleasing smile. The maxillary dental midline was



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Fig. 1 A. 8-year-old female patient in mixed dentition with maxillary left canine-first premolar transposition. **B.** After extraction of maxillary left deciduous canine and first deciduous molar.

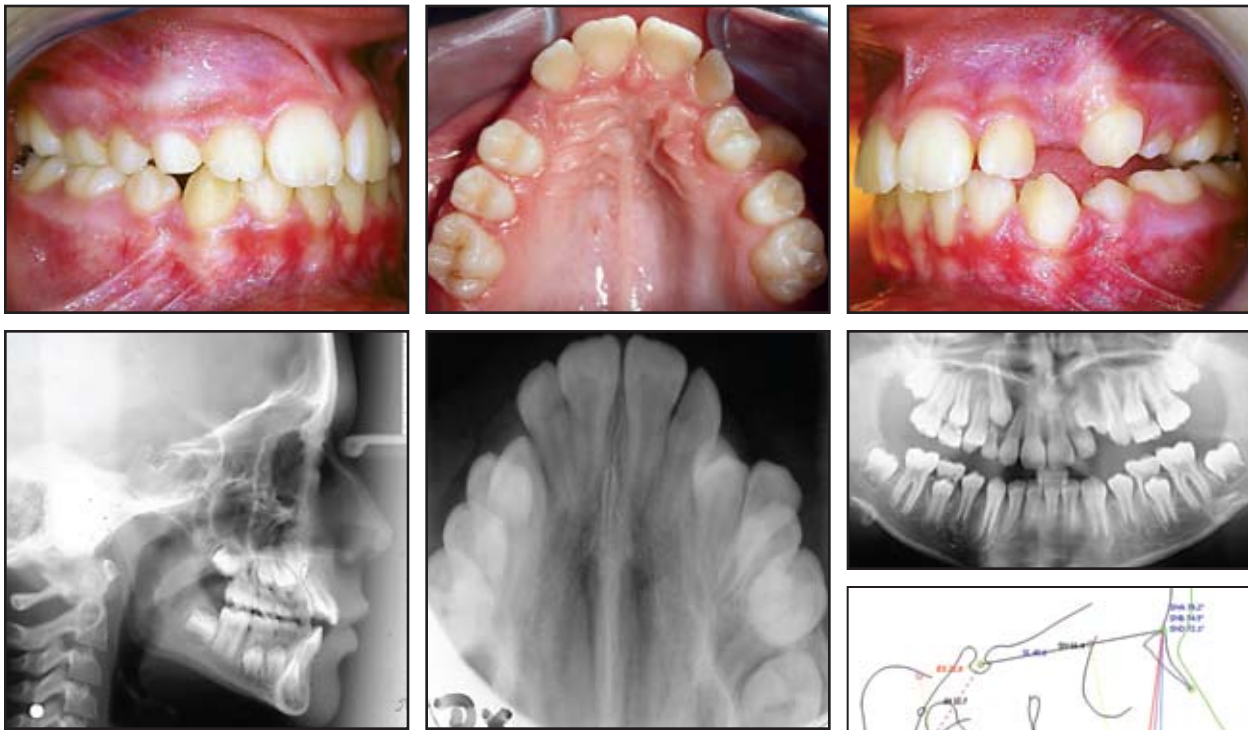


Fig. 2 Patient at age 10, before orthodontic treatment. (Occlusal photo taken 5 months after buccal photos.)



Fig. 3 Initial fixed appliance therapy. A. 90° rotation of maxillary left first premolar. B. Nickel titanium open-coil spring placed between maxillary left canine and second premolar.



Fig. 4 Button bonded to buccal surface of maxillary left first premolar.

deviated 3mm to the right of the mandibular dental midline. The maxillary first molars had rotated



Fig. 5 Bonded button moved to lingual surface of first premolar.



Fig. 6 Two months later, nickel titanium spring replaced with elastomeric chain to complete rotation of first premolar.

mesiopalatally. The left first premolar had erupted palatally and rotated 90°, with the palatal cusp near the lateral incisor. Radiographic examination revealed complete transposition of the canine and first premolar; cephalometric analysis showed a skeletal Class I pattern and normal profile angles (Fig. 2).

Treatment

Orthodontic treatment was initiated by banding the first permanent molars and bonding MBT* brackets in the maxillary arch. A cervical headgear was prescribed to control molar root position and provide anchorage. Treatment consisted of four stages: alignment, mesial movement of the maxillary left canine, creation of space for the first premolar, and derotation and alignment of the first premolar.

The maxillary arch was aligned with light forces, using an .014" thermal nickel titanium archwire for one month and an .016" thermal nickel titanium wire for another four weeks. Mesial movement of the maxillary left canine was achieved by placing a 150g superelastic nickel titanium open-coil spring between the canine and the second premolar on an .017" × .025" stainless steel archwire (Fig. 3).

After mesial movement of the maxillary left canine had been accomplished, a button was bonded to the buccal surface of the transposed left first premolar and

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Fig. 7 Space opened for maxillary right canine during alignment of maxillary left first premolar.



Fig. 8 Patient after 14 months of treatment.



Fig. 9 Mandibular arch bonded after 15 months of treatment.



Fig. 10 First premolar root alignment after 22 months of treatment.

attached to the archwire with elastomeric chain to initiate rotation (Fig. 4). After two months, the button was relocated to the lingual surface of the first premolar and attached to the lingual cleat of the first molar band with a nickel titanium spring (Fig. 5). Two months later, the nickel tita-

anium spring was replaced with elastomeric chain to complete the rotation (Fig. 6). The first premolar was then aligned with .012" and .016" thermal nickel titanium archwires (Fig. 7).

After 14 months of treatment, progress radiographs were taken to check the position of the

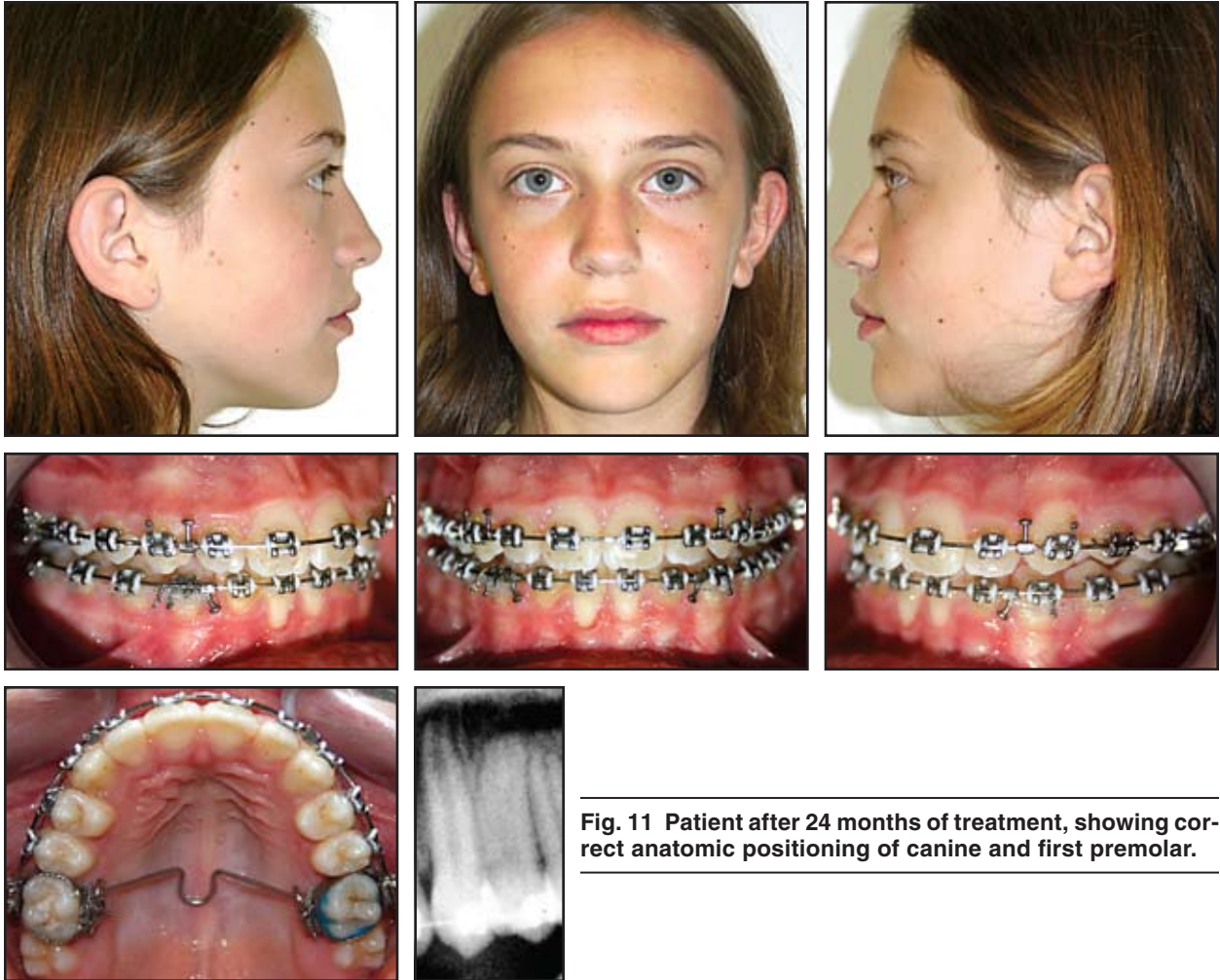


Fig. 11 Patient after 24 months of treatment, showing correct anatomic positioning of canine and first premolar.

first premolar root (Fig. 8). At 15 months, the mandibular arch was bonded (Fig. 9). At 22 months, another progress panoramic x-ray was taken (Fig. 10). At 24 months, radiographs confirmed the correct anatomic positioning of the maxillary left canine and first premolar (Fig. 11).

The total treatment time was 26 months (Fig. 12). A mandibular canine-to-canine retainer was delivered.

Discussion

Much more common in the maxilla than in the mandible, transposition usually affects only the left side.⁶ The canine is most frequently involved, transposed with either the first premolar (71% of cases) or the lateral incisor (20%).⁷ Because the canine develops high in the maxilla and has a long eruptive path, the absence, malformation, or malpositioning of the lateral incisor root

may result in a lack of guidance for canine eruption.⁸

Leaving a maxillary canine and first premolar in transposed positions can result in both esthetic and functional problems. The two teeth may differ considerably in size, shape, and color; moreover, since the gingival contour of the premolar is lower than that of the canine, periodontal gingival recontouring may be required. Functionally, the palatal cusp of

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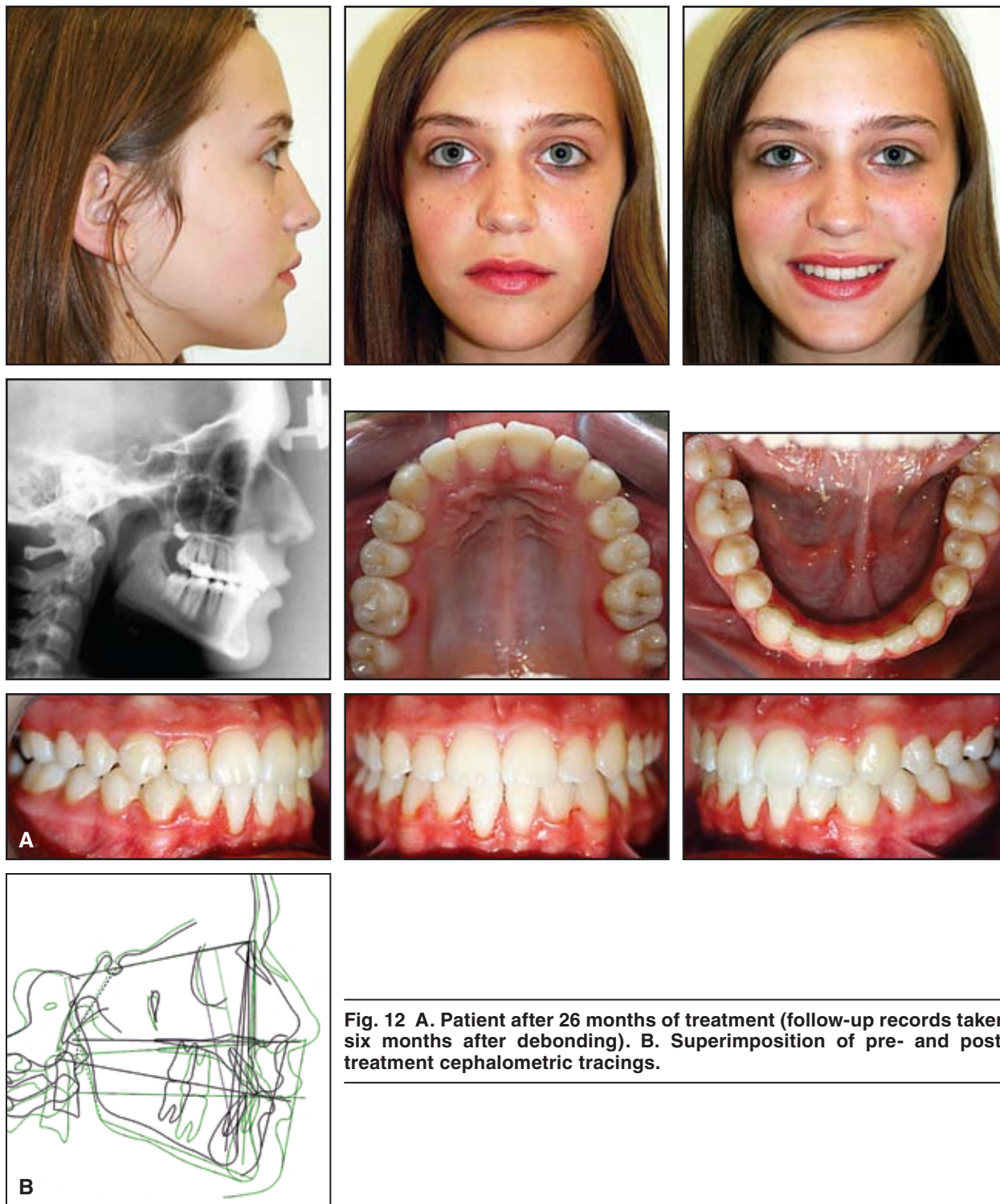


Fig. 12 A. Patient after 26 months of treatment (follow-up records taken six months after debonding). **B.** Superimposition of pre- and post-treatment cephalometric tracings.

the transposed premolar may cause occlusal interference. If the premolar is completely recontoured to resemble a canine, prosthetic restoration will be necessary after pulpectomy.⁹⁻¹¹ In the case reported here, these problems were avoided by moving the canine and first premolar into their anatomically correct positions.

Successful treatment of transposition depends on diagnosis at an early stage,¹² when it can be corrected with minimal risk of injury to the surrounding tissue. If the problem is detected when the patient is in the mixed dentition, as in our case, the appropriate deciduous teeth can be extracted and orthodontic treatment initi-

ated after eruption of the permanent teeth.

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