Autotransplantation of Impacted Canines

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Autotransplantation of teeth is a treatment option in cases of agenesis, ectopic eruption, trauma, or other pathology.[1,2] Autotransplanted teeth are better substitutes than fixed or removable prostheses, and the technique is more cost-effective than other methods.[3,4] Disadvantages include the invasiveness of surgery, the difficulty of projecting long-term stability, and the risk of root resorption and loss of gingival attachment.[5-8]

Andreasen noted that continued root development and pulpal healing can be expected in developing transplanted teeth.[9-11] Claus and colleagues demonstrated that growth of new cell-rich and well-vascularized connective tissue will occur in immature teeth after the original pulp has been removed.[12] In Andreasen's view, the optimum stage for autotransplantation is when three-quarters of the root has formed; the technique can be successful with completely formed roots, but such teeth will eventually need root-canal therapy. According to Jonsson and Sigurdsson, the rate of pulp survival in transplants with partly formed roots is 76%, with the anticipation of continued root growth and normal apical closure.[13-15] Several authors have demonstrated that the periodontal ligament of the transplanted root can be reinserted to form a new periodontal ligament and attachment.[16-19]

Patient selection is critical for predictable results.[20] Only patients with excellent oral hygiene should be considered candidates for dental autotransplantation.

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Case Report

An 11-year-old female presented 10 months into orthodontic treatment. Clinical examination showed poor placement of the fixed appliances, inadequate oral hygiene, a right posterior crossbite, and a midline shift (Fig. 1). Radiographic examination showed retention of the upper left cuspid and root resorption of the upper left central and lateral incisors. The four first bicuspids had been extracted as part of the previous orthodontic treatment, and the four second bicuspids displayed apical root resorption. All four third molars were present. Based on her initial radiographs, the patient's cephalometric analysis revealed a skeletal Class II base with normal growth, proclination of the upper central incisors, and a retrognathic chin (Fig. 2).

The existing appliances were removed, and the patient was referred to a periodontist. New .022" × .028" edgewise appliances were then bonded to the first permanent molars and second bicuspids, and the patient was referred to an oral surgeon for autotransplantation of the upper left cuspid. Because the alveolar crest was too thin, a vertical corticotomy of the alveolar bone was performed on the buccal and palatal surfaces of the crest to provide better mechanical retention and stability for the autotransplanted tooth (Fig. 3). Care was taken to leave as much periodontal ligament as possible on the root and 1mm of periodontal ligament below the alveolar crest (Fig. 4). The patient was observed weekly for six weeks, after which the periodontal ligament was reinserted.

The maxillary anterior segment was bonded, and an .014" stainless steel archwire was placed for four weeks, followed by a passive .017" × .025" stainless steel closing arch for eight more weeks. At this point, the patient was referred to an endodontist for root-canal treatment of the upper left central and lateral incisors due to necrosis of the pulp. The transplanted cuspid remained vital after meticulous endodontic testing.

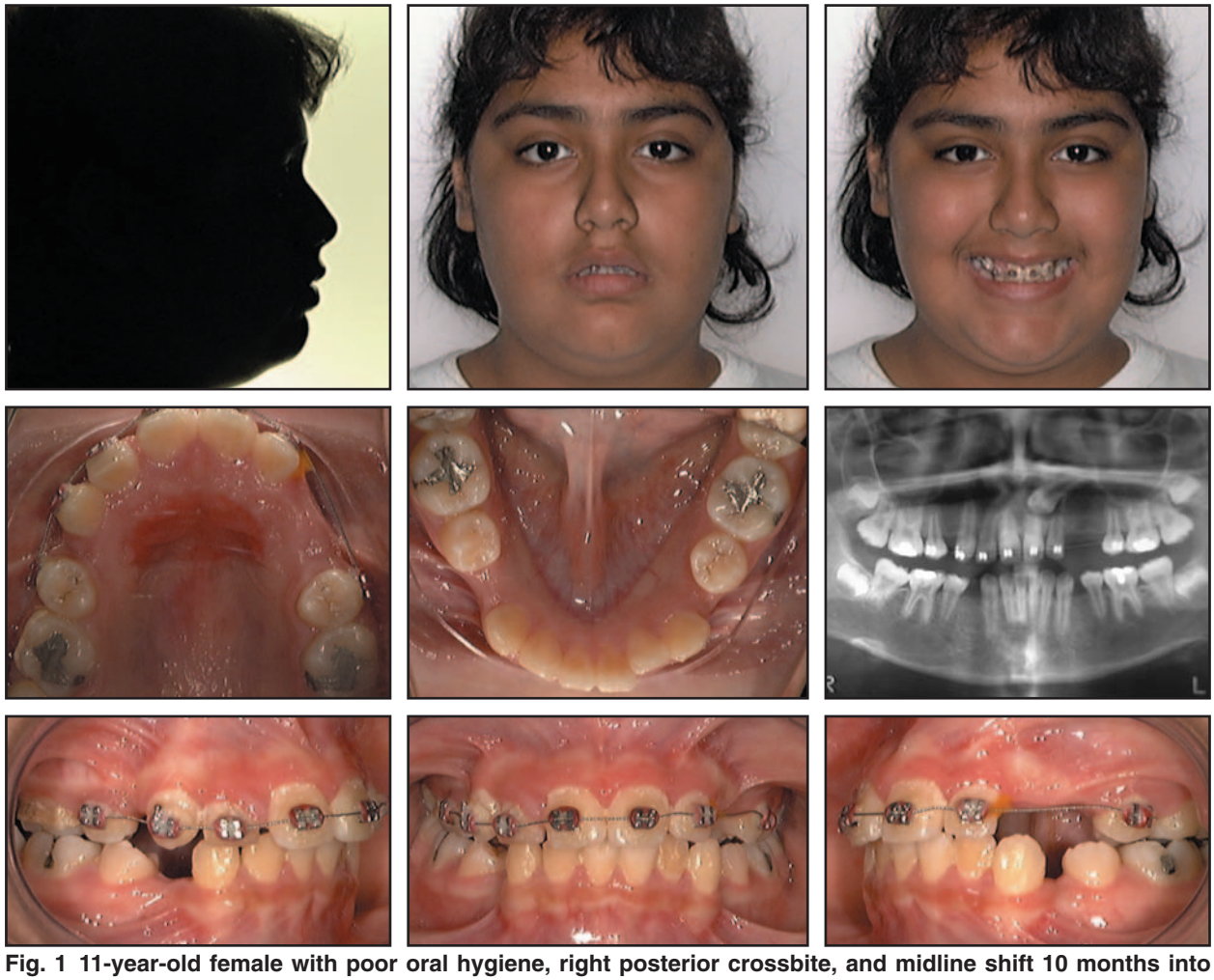


Fig. 1 11-year-old female with poor oral hygiene, right posterior crossbite, and midline shift 10 months into orthodontic treatment.

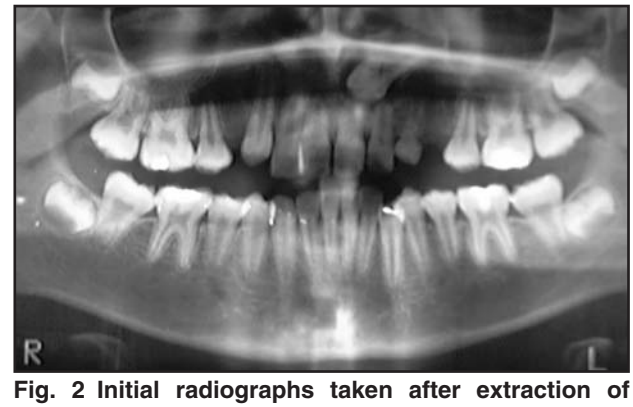
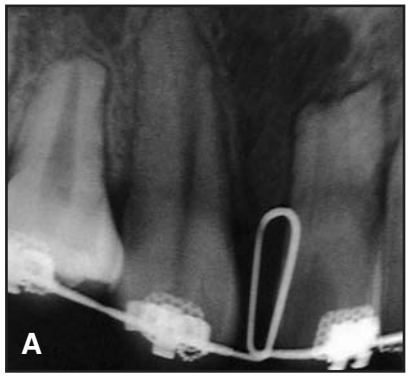


Fig. 2 Initial radiographs taken after extraction of upper first bicuspids.

The mandibular arch was then bonded and aligned with an .018" nickel titanium archwire. Eight weeks later, an .018" stainless steel archwire was placed in the lower arch. Because of root resorption in the upper anterior segment, the upper archwire was activated gradually, at a rate of 1mm every eight weeks (Fig. 5). After 22 months of active treatment (Fig. 6), all spaces

Fig. 3 Vertical corticotomy of buccal and palatal segment prior to autotransplantation.

Fig. 4 Transplanted upper left cuspid in place.



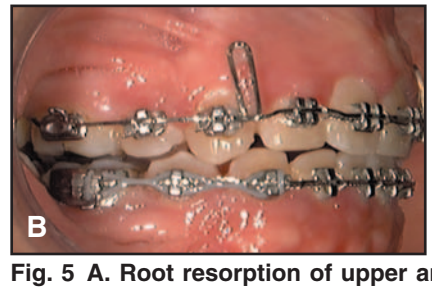


Fig. 5 A. Root resorption of upper anterior teeth four months into treatment. B. Large vertical closing loops used to close spaces with light force.

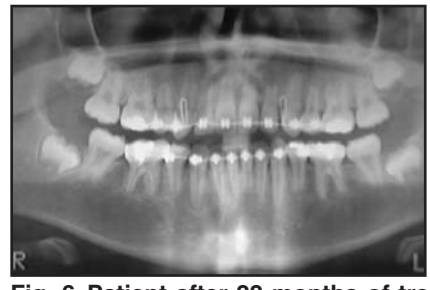


Fig. 6 Patient after 22 months of treatment, before settling of occlusion during retention.

had been closed, the molar and cuspid relationships were Class I, and the roots were parallel. The patient would later be referred for third molar extraction.

Retention is critical in this type of treatment. I prescribe an upper Essix*-type appliance to be worn for six months at night only, and instruct the patient to chew gum during the day to let the occlusion settle. Once this has occurred, I bond a 3-3 lingual .028" twisted gold-wire retainer.

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*Registered trademark of Raintree Essix, Inc., 4001 Division St., Metairie, LA 70002.

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