

CASE REPORT

Orthodontic Extrusion of a Horizontally Impacted Mandibular Canine

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The male patient shown in this report presented at age 9 years, 10 months. The mother reported a previous history of thumbsucking and mouthbreathing, in addition to eye surgery for correction of strabismus.

The family dentist had pointed out a congenitally missing lower left central incisor,

which was confirmed by the panoramic radiograph (Fig. 1). What had not been noticed until the x-ray was taken was that the lower left permanent canine was horizontally impacted, in a Mupparapu type II classification,¹ with its incisal tip near the root tip of the opposite lateral incisor.

Diagnosis and Treatment Planning

Examination revealed a dental and skeletal Class II, division 1 relationship with a 90% overbite and a 15mm overjet. Due to the missing lower incisor, the midlines were off by 4mm. All deciduous first and second molars were still present. Cephalometrically, a

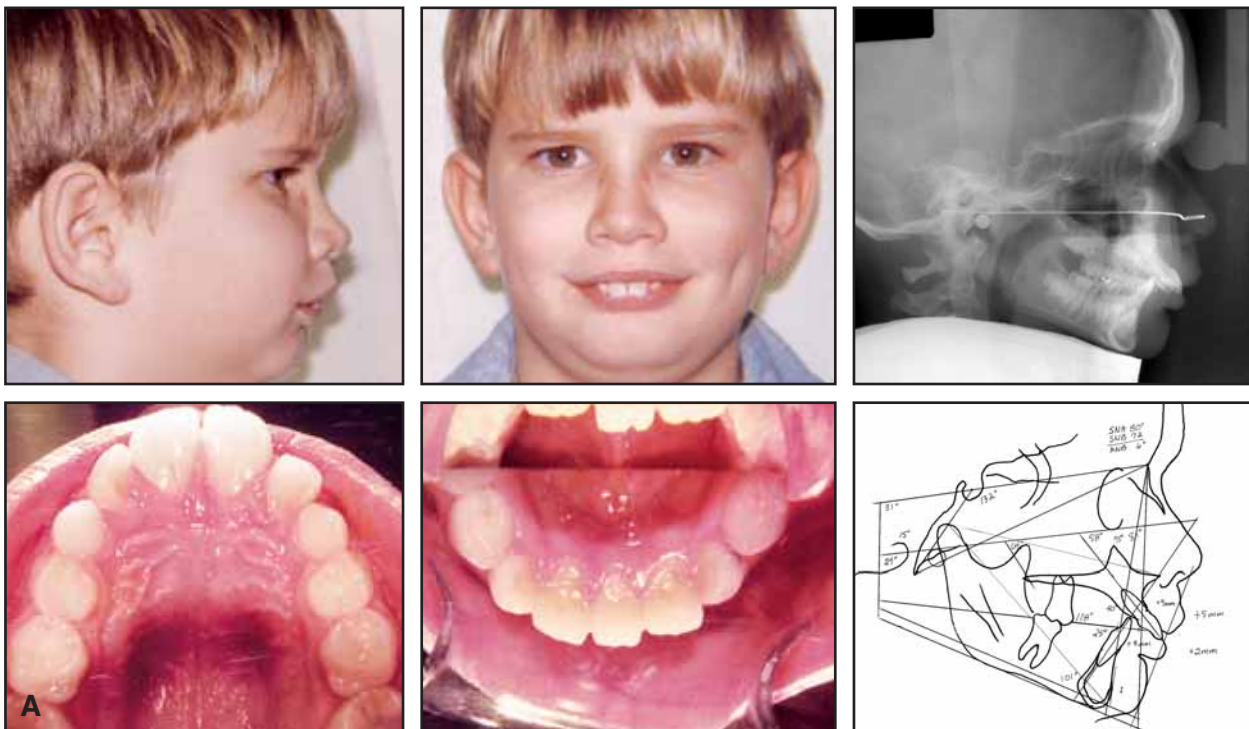


Fig. 1 A. 9-year-old male Class II, division 1 patient with horizontally impacted mandibular left permanent canine (continued on next page).

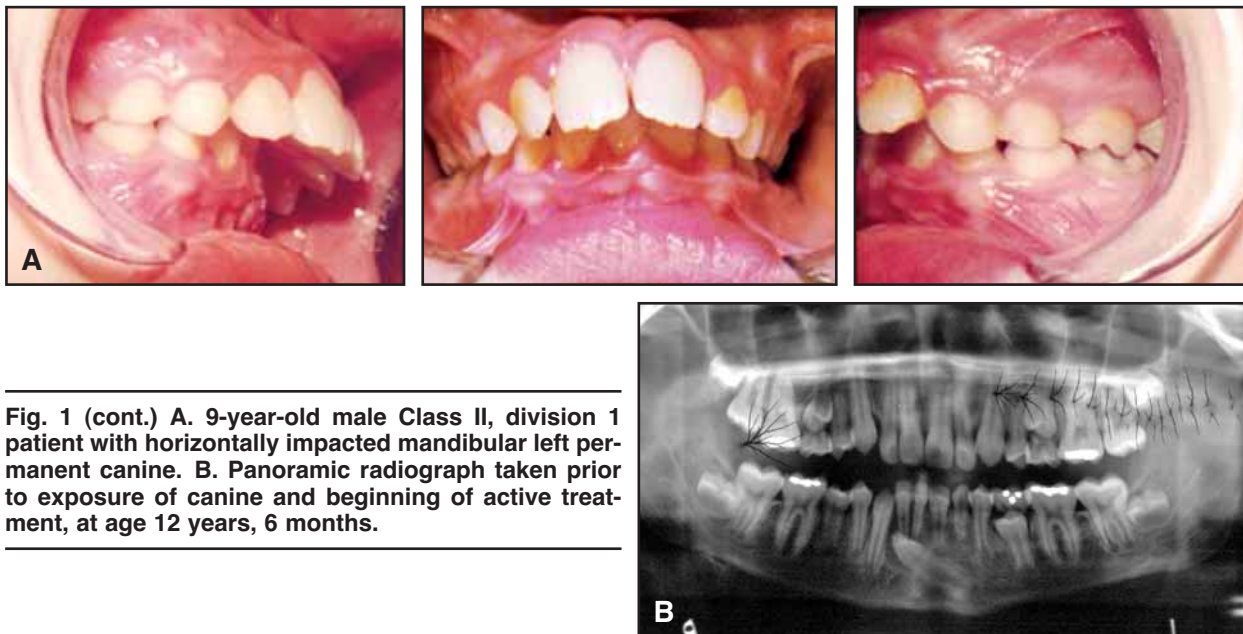


Fig. 1 (cont.) A. 9-year-old male Class II, division 1 patient with horizontally impacted mandibular left permanent canine. B. Panoramic radiograph taken prior to exposure of canine and beginning of active treatment, at age 12 years, 6 months.

TABLE 1
CEPHALOMETRIC DATA

	Norm	Pre-treatment	Post-Treatment	Two Year Post-Treatment
SNBa	130±6°	132°	132°	133°
SNA	82°	80°	79°	78°
NA-FH	90°	81°	78°	82°
SNB	80°	72°	75°	74°
NPo-FH	87°	75°	80°	80°
ANB	2°	6°	4°	4°
AB-NPo	-4.5°	-12°	-8°	-8°
NA-NPo	0°	21°	6°	2°
Wits	2-3mm	9mm	1.5mm	3mm
TMJ-ANS		93mm	93mm	99mm
TMJ-Po		101mm	120mm	121mm
Y-axis to FH	59°	64°	63.5°	62.5°
SN-GoGn	32°	31°	31°	29°
FMA	25°	29°	28°	25°
U1-L1	131°	118°	118°	116°
U1-NA	22°	40°	23°	26°
L1-NB	25°	25°	35°	32°
U1-FH	115°	122°	115°	109°
IMPA	90°	101°	108°	110°
NB-NPo	2mm	1mm	2.5mm	3.5mm
U1-NA	+4mm	+9mm	+6mm	+5mm
L1-NB	+4mm	+3mm	+4mm	+7mm

convex posterior divergent growth pattern was evident (Table 1).

Treatment objectives were to inhibit further vertical growth while restricting maxillary growth, thus reducing the ANB differential. The plan was to correct the overbite while adjusting the inclination of the incisors for the best overall relationship, despite the missing lower central incisor. With one anterior tooth already missing, the parents agreed to an extended treatment time in hopes of retrieving the impacted canine.

Because of the expected degree and duration of the forces needed to retrieve and upright the canine while correcting the midline, it was decided that progressive bionators with customized canine extrusion hooks would be used to the extent possible. Edgewise brackets would be bonded only in the finishing stages.



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Treatment Progress

A bionator was constructed with a hook soldered to the bottom of the lower left canine loop. The impacted canine was surgically exposed, and a cleated bracket was bonded to its labial surface (Fig. 2). Traction was initiated with $\frac{3}{16}$ ", 4½oz elastics.

The patient showed excellent cooperation in wearing the removable appliances and elas-

tics over four and a half years. As the impacted canine was uprighted and guided toward its eventual position, the deciduous canine was removed, and brackets were placed in the lower arch. The maxillary teeth were never bonded.

Treatment Results

After four and a half years of treatment, the lower left canine

was properly positioned in the arch (Fig. 3). The patient's downward and forward growth had a positive influence on the correction: The upper incisors were uprighted, while the lower incisors became more procumbent (Table 1). Class I molar relationships were established, and the ANB differential was significantly reduced.

The patient didn't wear the removable retainers that were

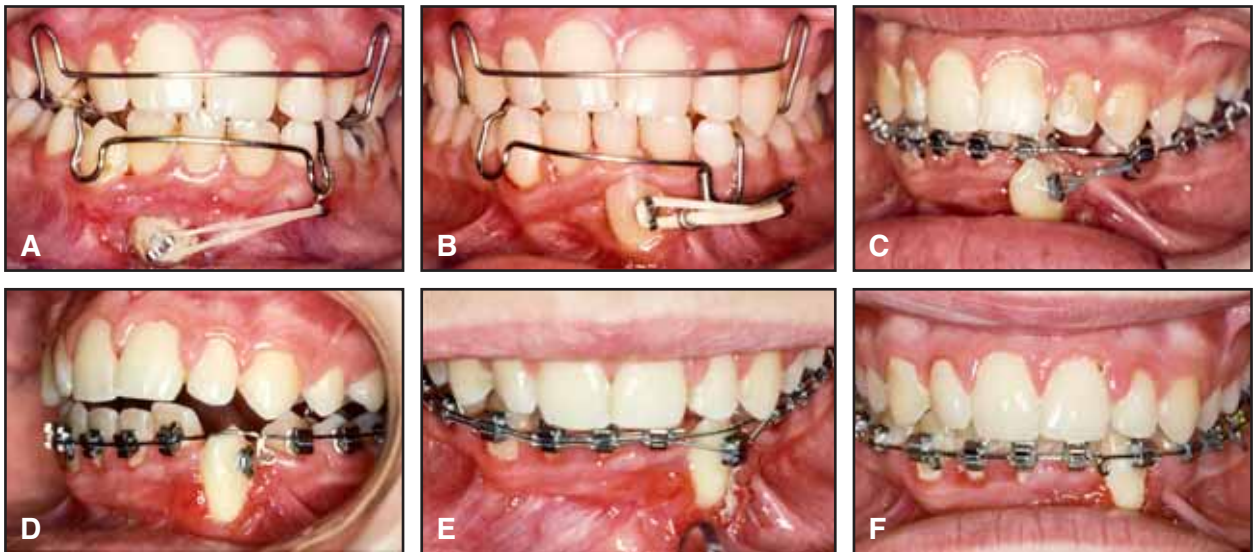


Fig. 2 Progressive bionators with customized canine uprighting hooks. A. Bracket bonded to exposed canine and attached to uprighting hook. B. Uprighting hook modified to produce distal movement of canine and to prevent contact of canine roots with incisor roots. C. After extraction of deciduous canine, bionator and hook replaced by lower double-slotted brackets and elastomeric chain. D. Canine moved into position, just beneath archwire. E. Overlay archwire inserted in double-slotted brackets for completion of canine movement. F. Canine in position near end of treatment. G. Panoramic radiograph showing early progress of uprighting.



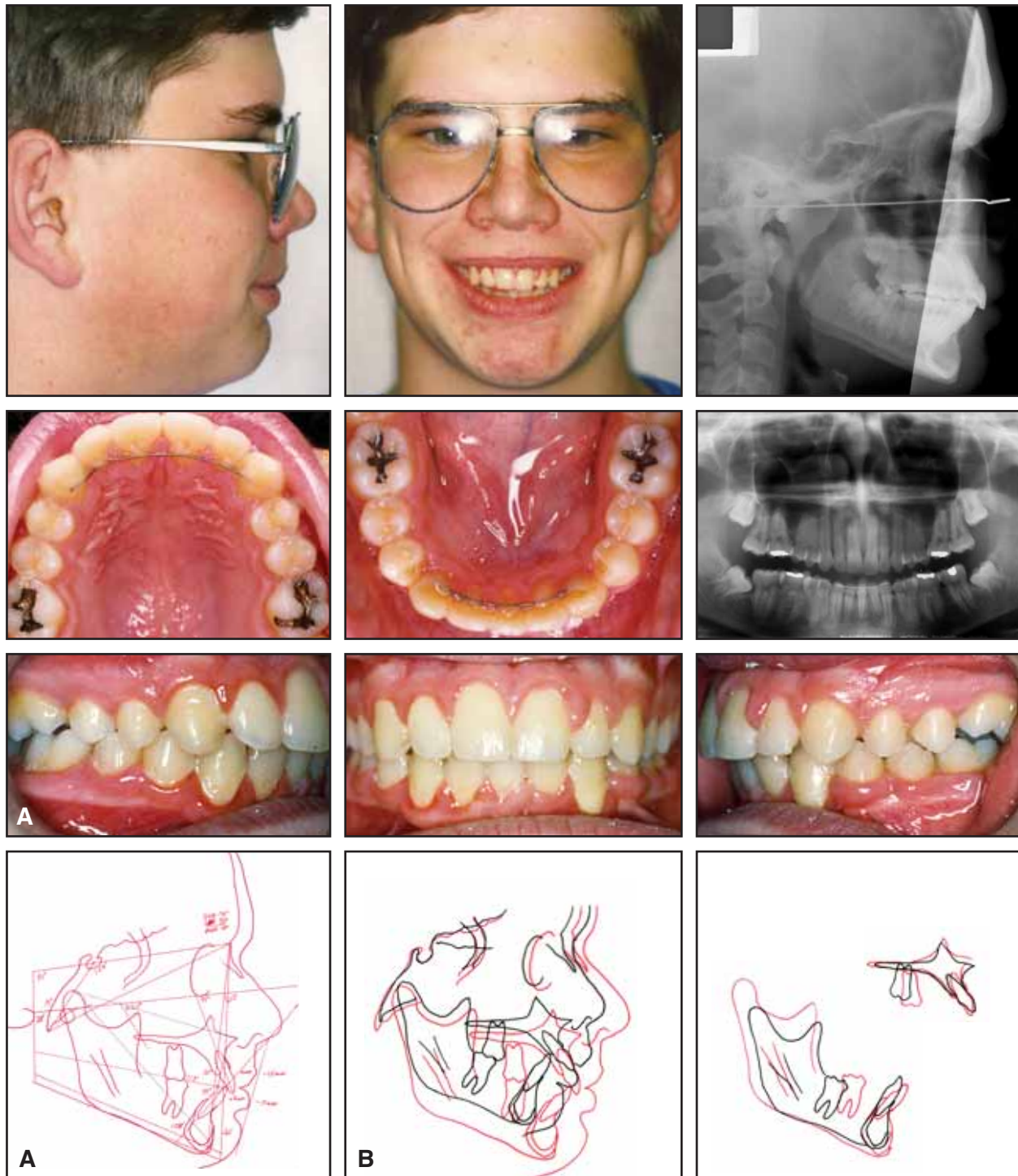


Fig. 3 A. Patient after four and a half years of active treatment. B. Superimposition of cephalometric tracings before and after treatment.

delivered, but the bonded wire retainers remained in place for more than seven years. Progress photographs were taken two years after treatment (Fig. 4) and at intervals thereafter (Fig. 5). More than 14 years after retention, the canine is still healthy except for minor gingival recession, which

was noted at debonding and has not progressed.

Discussion

Extraction of the impacted canine would have left the patient with two missing anterior teeth, and with a 90% overbite before

treatment, the bite was certain to deepen with extraction. If the impacted canine had been extruded with conventional fixed appliances, there was a good possibility of adverse reciprocal shifting of the midline. In addition, the prospect of long-term treatment of a less-than-coopera-

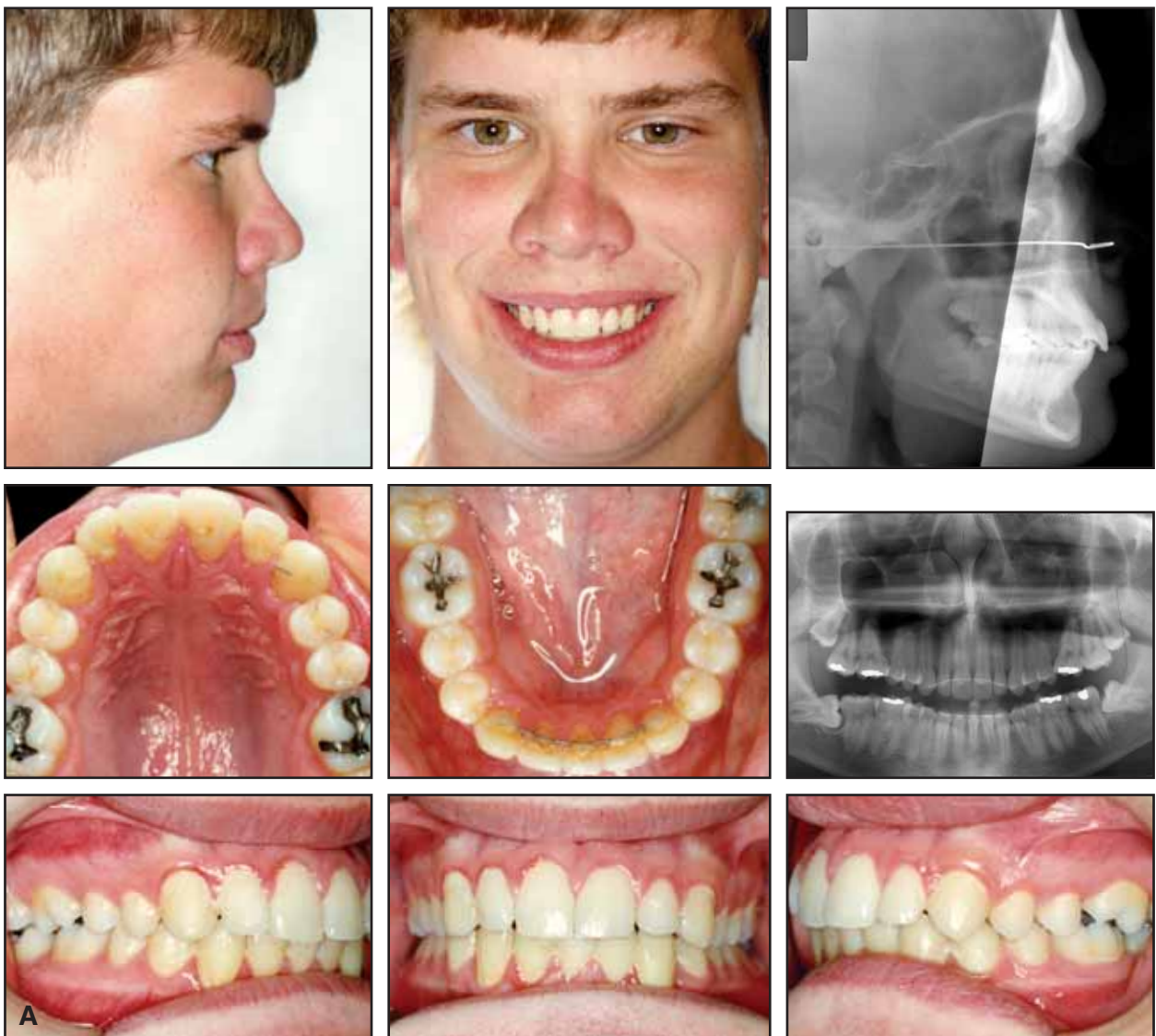


Fig. 4 A. Patient two years after treatment (continued on next page).

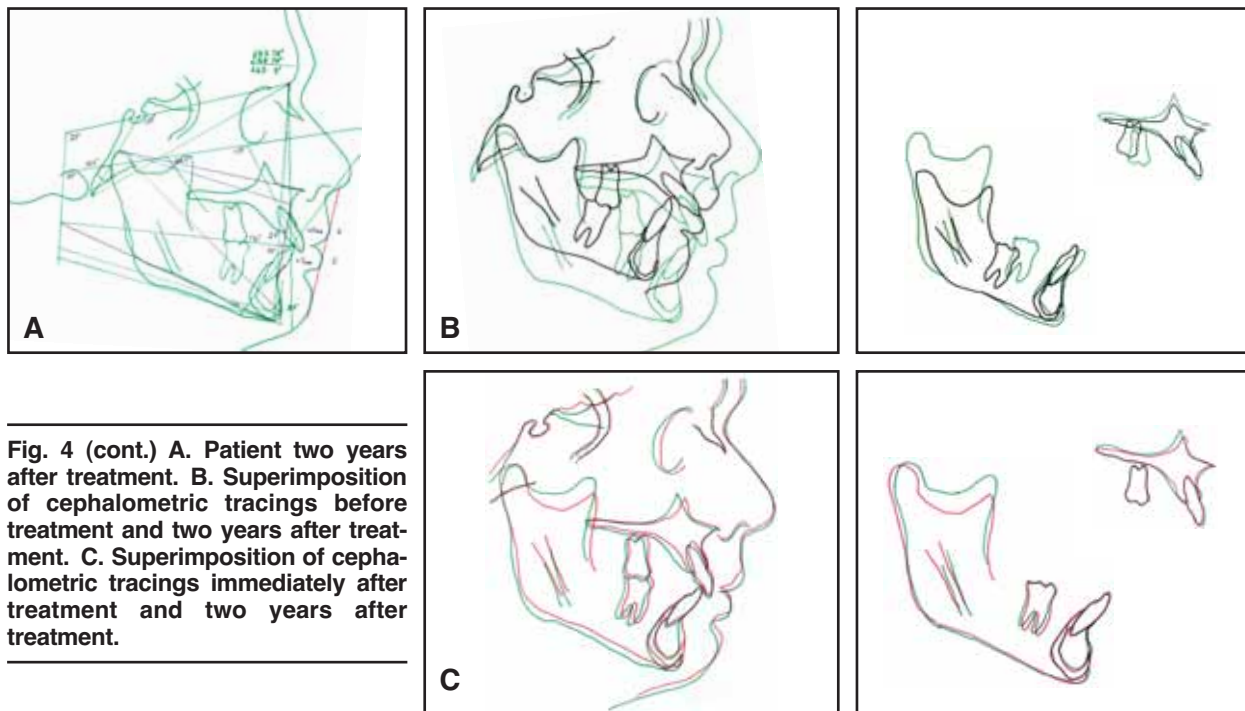


Fig. 4 (cont.) A. Patient two years after treatment. B. Superimposition of cephalometric tracings before treatment and two years after treatment. C. Superimposition of cephalometric tracings immediately after treatment and two years after treatment.

tive patient necessitated an alternative approach.

Because the patient had a rather severe skeletal and dental Class II, division 1 malocclusion, a removable orthopedic appliance was selected. After four and a half years of canine extrusion with the modified bionator, brackets were placed in the mandibular arch to complete the canine positioning. The bone level of the retrieved canine appeared normal after treatment, as did the root tip, which displayed no more “blunting” than would be seen after conventional canine movement. Although there is 2mm more labial gingival recession on the retrieved canine than on the contralateral canine, that may be

at least partially attributable to the patient’s lack of meticulous oral hygiene during treatment.

Areas where the roots could have been better paralleled include all four second premolars, the upper first molars (which were not banded or bonded), and the retrieved lower left canine. Cephalometric analysis showed that while the lower anterior teeth were proclined, the facial esthetics and functional relationships were dramatically improved. The Class II dental and skeletal relationship was resolved without any fixed appliance in the maxillary arch. It appears that the retrieved canine is completely stable and relatively healthy, and may well provide a lifetime of service.

REFERENCES

1. Mupparapu, M.: Patterns of intra-osseous transmigration and ectopic eruption of mandibular canines: A review of literature and report of nine additional cases, *Dentomaxillofac. Radiol.* 31:355-360, 2002.



Fig. 5 Patient at age 28, 11 years after retention.