

CASE REPORT

Crozat Appliance Treatment of Buccal Crossbite

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Expansion of the lower canine region after eruption of the permanent canines has long been considered unstable without permanent retention.¹ Nevertheless, various non-invasive methods of mandibular expansion, such as lip bumpers² and the Fränkel appliance,³ have proven successful. A more recent technique, distraction osteogenesis, involves a midsymphysal mandibular osteotomy followed by the placement of a fixed distraction appliance.⁴ This procedure, however, has the potential to cause infection, tooth damage, and periodontal problems, particularly in at-risk patients such as those with juvenile diabetes.⁵⁻⁷

The Crozat appliance has been used in arch development for many years with great success.^{8,9} One of the main advantages of Crozat therapy is the ability to remove the appliance

for cleaning, making it hygienic and, hence, safer periodontally. Additional advantages include its light, comfortable force levels and its adaptability to asymmetric situations. With a properly fitted crib, the appliance is extremely retentive.

The following case report shows a unique Crozat design for an asymmetrical skeletal Class II patient with a buccal crossbite.

Diagnosis

A 13-year-old male presented with the chief complaint of increased difficulty in chewing food on his left side. He had juvenile diabetes, requiring daily insulin injections. There was one occlusal composite, on the lower left first molar.

Clinical examination revealed a closed lip posture with a

normal nasal airway. The patient appeared to have a mesocephalic cranium, and his standing posture indicated that his head was bent and rotated to the right, the occlusal support side (Fig. 1). The profile showed a flat upper lip and a weak chin. He had a heavy maxillary frenum and a bilateral posterior tongue thrust on swallowing. The patient evidenced good oral hygiene and showed no signs of any periodontal problems.

His maxillary anterior teeth showed a normal gingival display, with a MEW Indicator Line of 42mm. The incisal plane was canted significantly downward to the left, with a 100% overbite of the upper left lateral incisor and only a 50% overbite of the upper right lateral incisor. In centric occlusion, there was a 6mm overjet, and the lower midline was shifted 2mm to the right. The upper left premolars were in crossbite and appeared to be overerupted. The upper left second premolar was tipped buccally, and the lower left premolars were tipped lingually. The patient had a deep curve of Spee, with minimal crowding in the lower arch and spacing in the upper.

Mounting the models in centric relation on a Whip Mix



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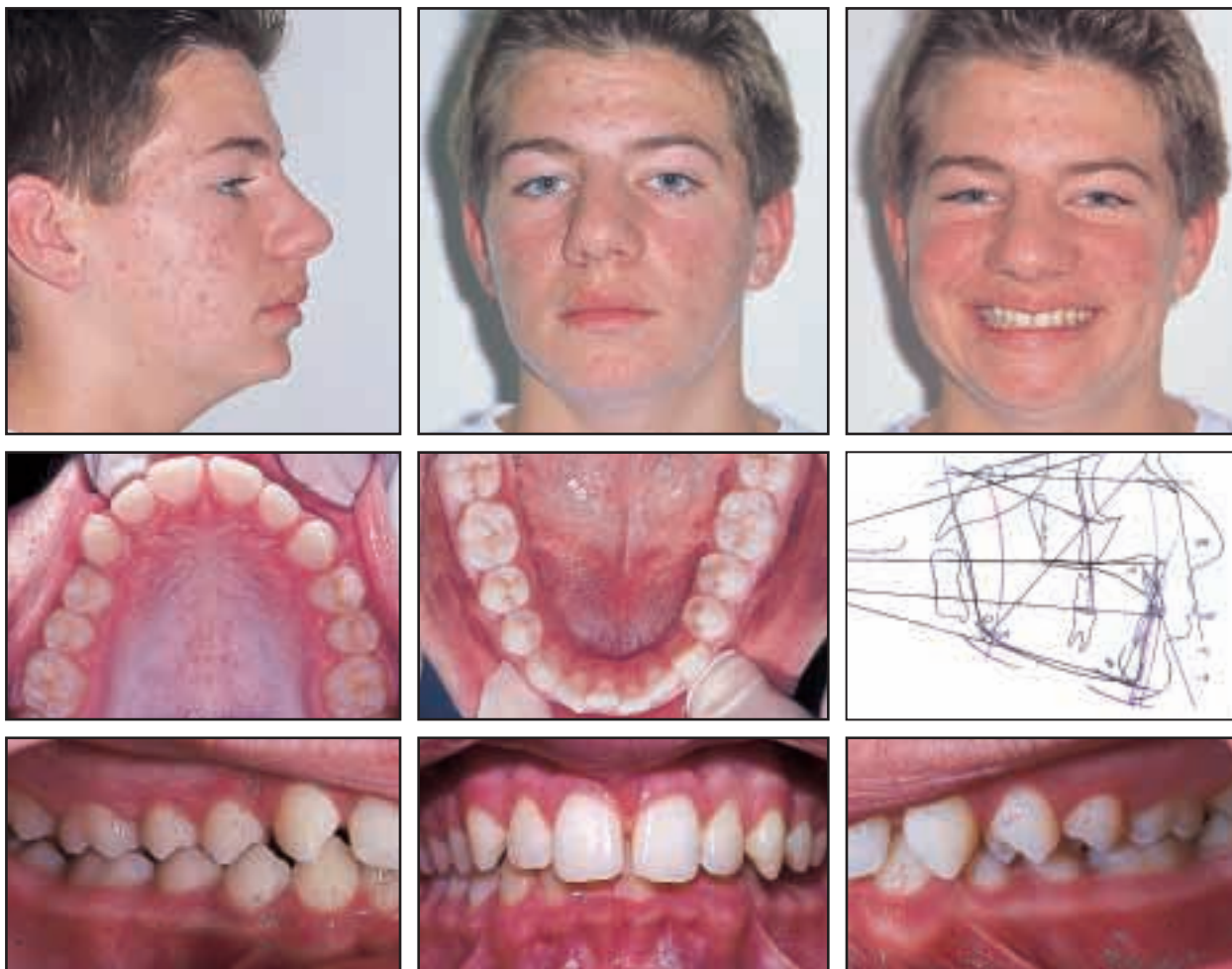


Fig. 1 13-year-old male patient with juvenile diabetes and buccal crossbite on left side before treatment.

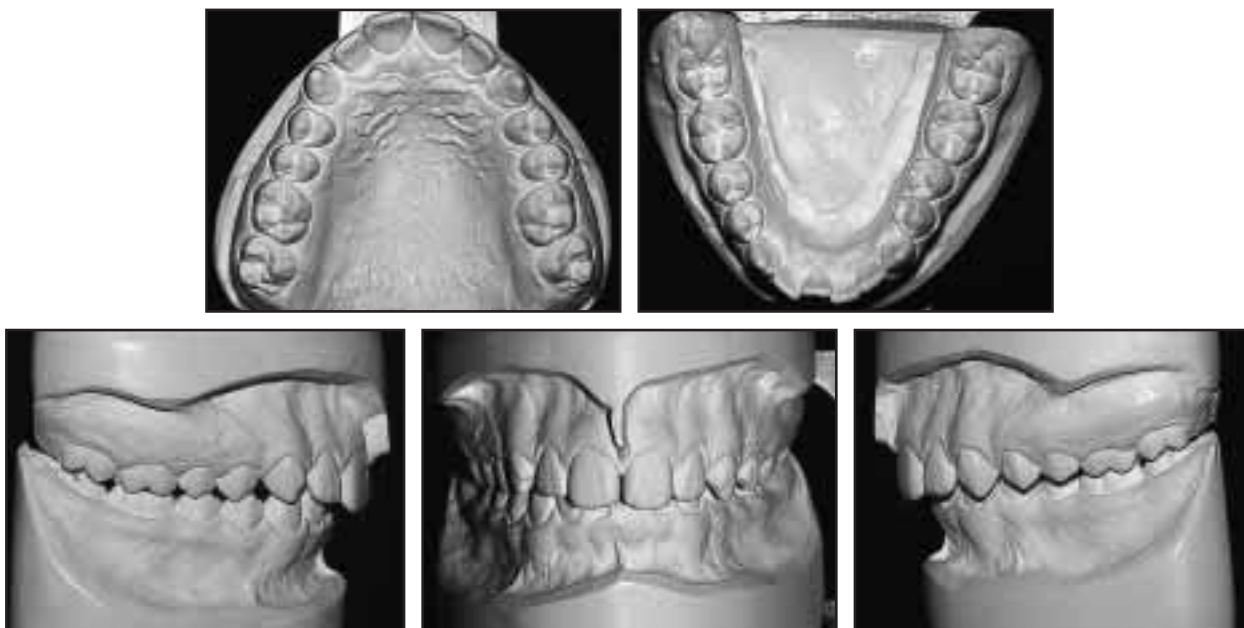


Fig. 2 Casts mounted in centric relation, showing Class II molar occlusion.

articulator* showed a CR-CO discrepancy (initial contact on the right premolars) of 1mm vertically, 1.5mm anteriorly, and 1mm to the left and a bilateral Class II molar relationship (Fig. 2). Sassouni cephalometric analysis indicated a deep-bite Class II pattern, especially when the CR-CO slide was factored in (Table 1).

Treatment Objectives

The treatment objectives for this case were to upright the lingually tipped lower left premolars to the buccal while actively tipping the upper left second premolar lingually. Bringing the teeth into proper function would help the canted occlusal plane to self-correct, and expansion would help correct the deep bite. Resolving the buccal cross-bite would also improve the CR-CO and lower midline discrepancies. The expansion in the lower premolar region would be maintained through a good cusp-fossa occlusal relationship.

The maxilla could not be retracted because of the flat upper lip. Mandibular growth would help correct the weak chin, while better mandibular posture and balanced occlusal support would improve the head posture.^{10,11} A Class I molar and canine relationship was the ideal objective. The anterior teeth were to be maintained at the same angulation for stability. A frenectomy would be considered to retain closure of the anterior

*Whip Mix Corporation, P.O. Box 17183, Louisville, KY 40217.

TABLE 1
CEPHALOMETRIC SUMMARY (TAKEN IN CO)

	Ideal	Initial	Final
UI/PP	110-113°	111°	110°
LI/MP	90-100°	96°	98°
PP/MP	25-27°	15°	16°
B to A Arc	0mm	-2mm	0mm
Wits	-2 to +2mm	+3.5mm	+2mm

diastema, and myofunctional therapy might be necessary to correct the bilateral tongue thrust.

To prevent any periodontal problems, the patient was to be treated with removable hygienic appliances as much as possible.¹² Because it would be necessary to expand the lower canine region to allow for a cuspid-rise-protected occlusion, a fixed canine-to-canine lower retainer—as hygienic as possible¹³—would be required.

Expansion with a preadjusted fixed appliance was not considered because it could not be done asymmetrically,¹⁴ and prolonged treatment with a fixed appliance could have caused periodontal problems. A passive device such as a lip bumper or Fränkel appliance would not have allowed asymmetrical expansion in the presence of a unilateral deep crossbite. Active expansion with distraction osteogenesis was ruled out due to the potential for surgical and periodontal complications, and because asymmetrical expansion of the mandibular arch would be difficult. Some type of Schwarz appliance could have been de-

signed for asymmetric active expansion, but would have been hard to manage in the lower arch.

Treatment Progress

Asymmetric Crozat appliances were fabricated, using the Martin Crescent design for optimal retention¹⁵ (Fig. 3). The lower right buccal segment was tied together for anchorage against the lower left premolars. The maxillary appliance had an active buccal arm placed against the upper left second premolar to tip it slightly lingually. A hook was placed in the upper left buccal region for connecting a cross-elastic with the hook on the lower left lingual arm, if necessary, to help correct the cross-bite. A buccal hook was placed on the right crib of the lower Crozat for connecting a Class II elastic with the hook at the end of the right buccal arm of the upper Crozat. This would help correct the midline discrepancy and the Class II molar relationship on the right side.

The patient was seen monthly so that the lower Crozat could be reactivated with light

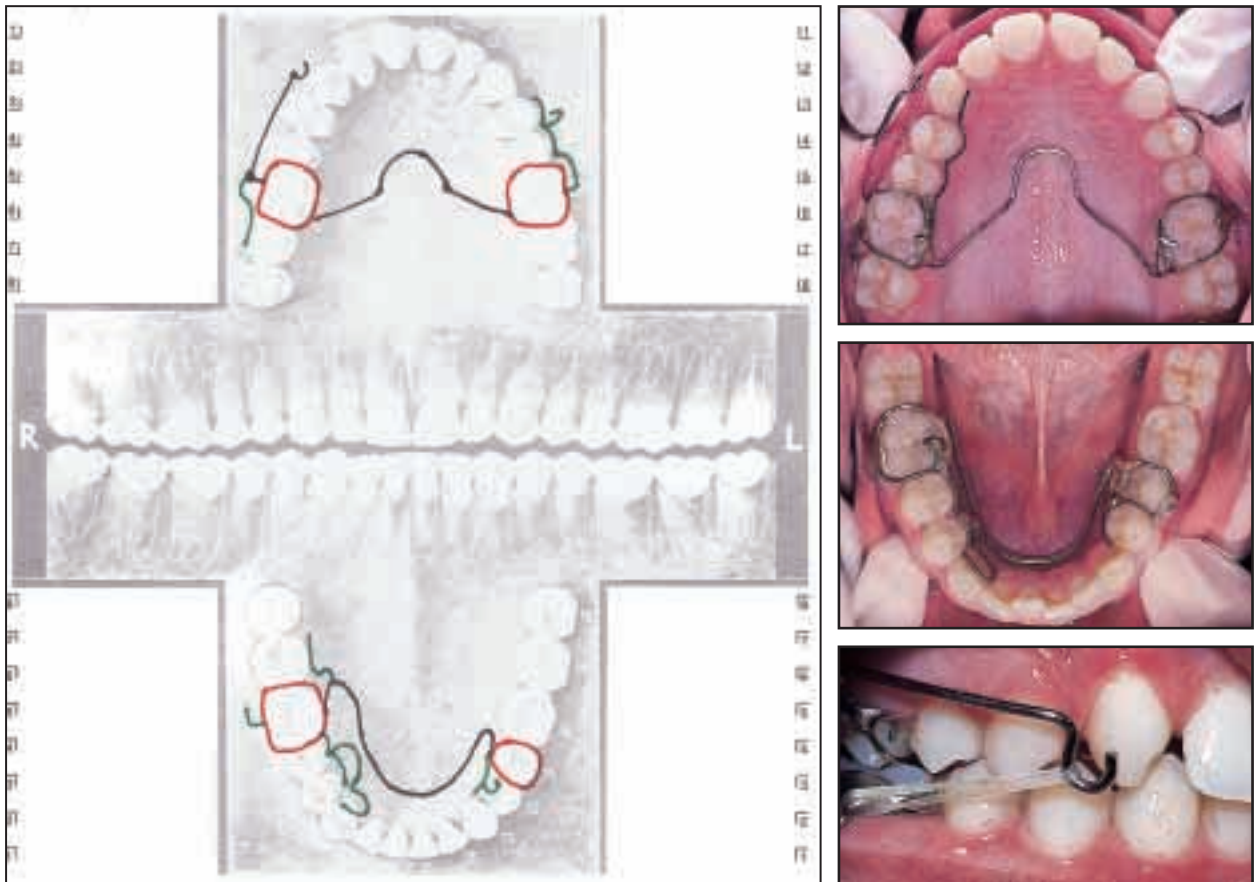


Fig. 3 Initial Crozat appliance design, using .028" (red), .036" (green), and .040" (black) Leone wires.** Note omission of lingual arm to lower left second molar. Class II elastic is attached between buccal hook on right crib of lower Crozat and hook at end of right buccal arm of upper Crozat.

expansion forces. The appliances were removed and thoroughly cleaned at each appointment, and the patient was assessed for any signs of periodontal breakdown. It was never necessary to use the cross-elastic on the left side, which would have aggravated the already canted occlusal plane. After five months of treatment, the crossbite was corrected and the midlines were coincident.

We decided to finish the case with a short phase of preadjusted fixed appliance treatment.

The Crozat appliances were removed, .022" × .028" brackets were bonded, and .016" nickel titanium archwires were placed (Fig. 4). The patient was instructed to hold his teeth together when swallowing to help eliminate the tongue-thrust habit.

Archwires progressed to .018" upper and .019" × .025" lower stainless steel, with Class II elastics used for detailing. After eight months, the fixed appliances were removed, and a removable maxillary wraparound retainer and fixed mandibular



Fig. 4 Preadjusted fixed appliances with .016" nickel titanium archwires.

**American Tooth Industries, 1200 Stellar Drive, Oxnard, CA 93033.

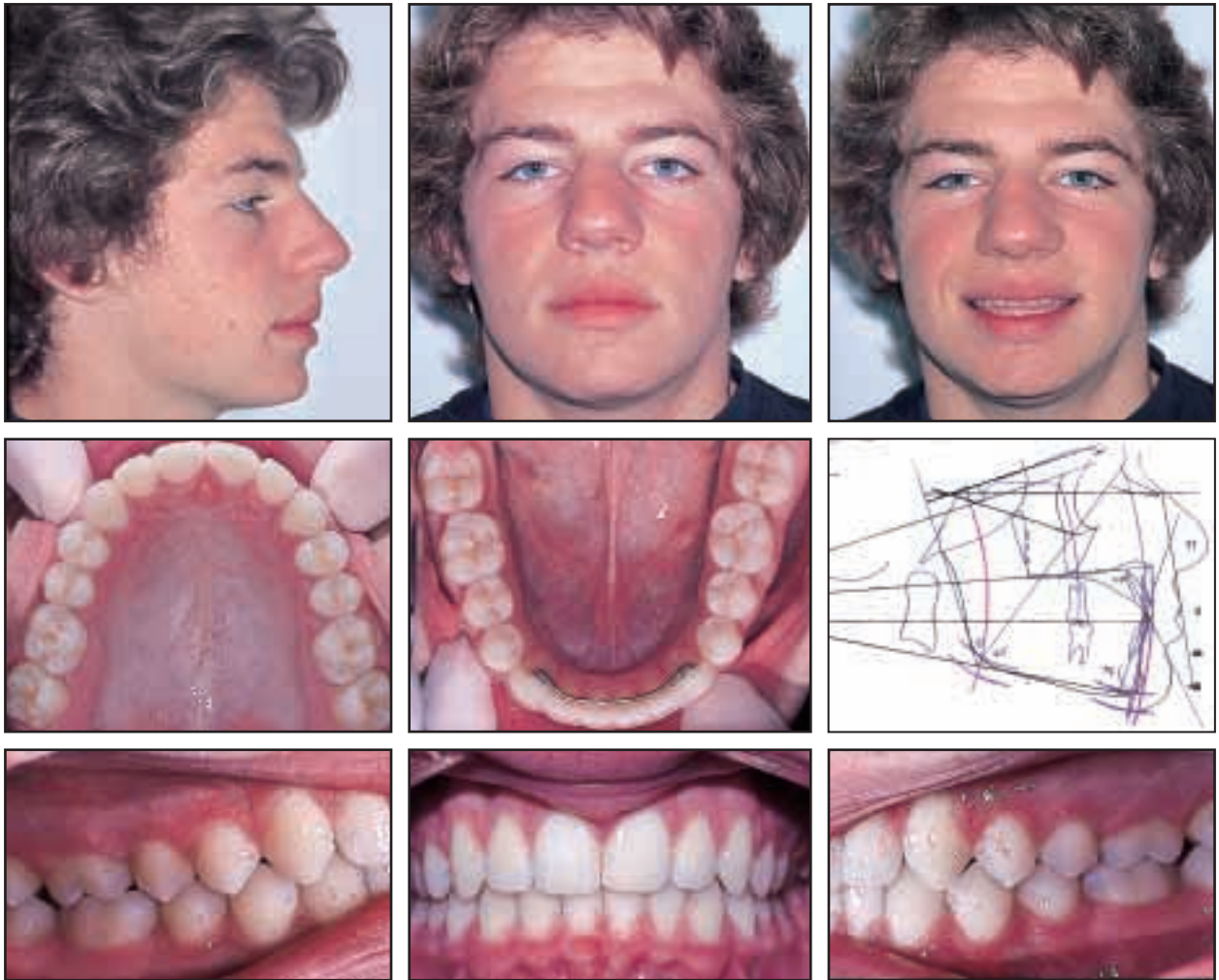


Fig. 5 Patient after 14 months of treatment.

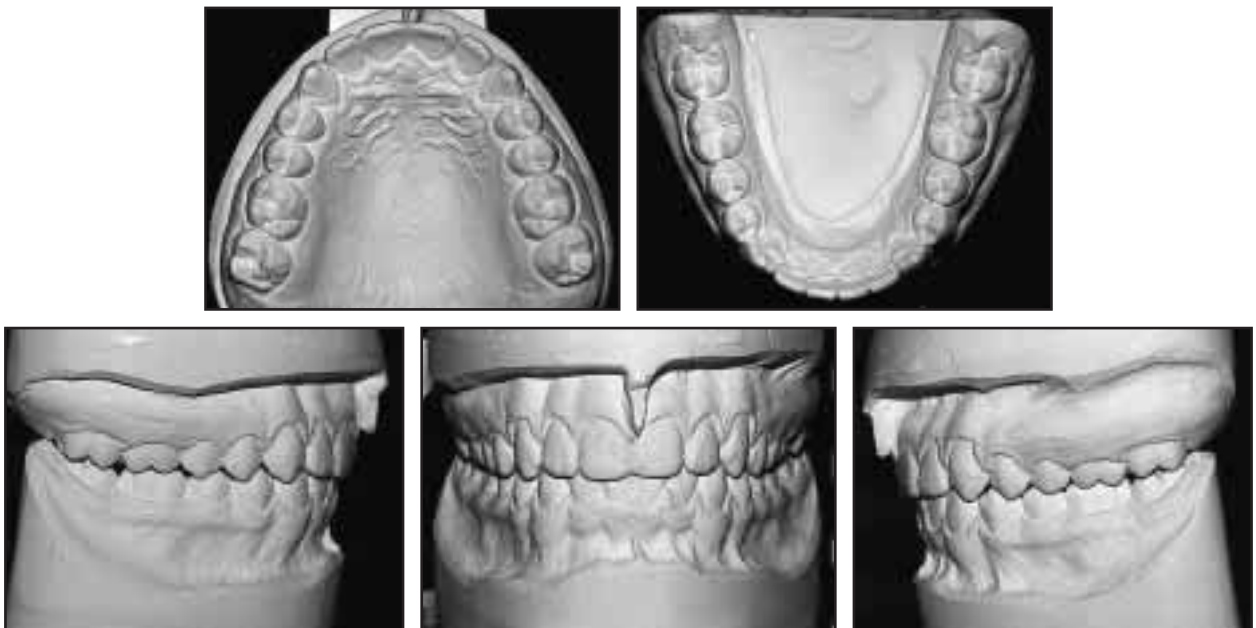


Fig. 6 Post-treatment casts mounted in centric relation.

bonded canine-to-canine retainers were delivered. The maxillary retainer was to be worn 24 hours a day for the first six months and at night only thereafter.

Treatment Results

After only 14 months of treatment, the patient exhibited an improved head posture and a more esthetic facial profile as the mandible grew forward and a stronger chin developed (Fig. 5). Oral hygiene remained excellent throughout treatment, with no evidence of any periodontal problems.

The canted incisal plane was corrected, with the overbite reduced to about 30% and the overjet to about 2mm. The midlines were coincident, and the dental arches were more symmetrical. A Class I molar and canine relationship was attained, with a cuspid-rise-protected occlusion. The CR-CO discrepancy was reduced to a .5mm anterior slide off interferences on the second molars (Fig. 6).

Cephalometric analysis showed minimal changes in the incisor angulations and a minimal increase in MPA (Table 1). The mandible advanced about 3mm due to favorable growth. There was some expansion in the lower premolar region (Table 2), but because the case was finished with a solid cusp-fossa occlusion, no relapse is expected to occur. The bonded lower lingual retainer was placed to prevent any collapse of the expanded lower canine region.¹

The patient decided not to have a frenectomy, but was

warned that the diastema might relapse slightly. There seemed to be some lateral tongue thrust remaining, although the facial musculature was much more relaxed on swallowing. The patient now reports that it is easy to chew on either side of his mouth.

Discussion

Postural improvements in head position are often seen with the correction of crossbites and improvement in occlusion.^{10,11} This may be at least partly due to the relaxation of the sternocleidomastoid muscle on the occlusal support side.

As evidenced by this patient's excellent periodontal health at the end of treatment, juvenile diabetes does not necessarily lead to periodontal breakdown during orthodontic therapy. Using Crozat appliances, oral hygiene can be easily maintained with light force levels.

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TABLE 2
ARCH WIDTHS (MM)

	Initial	Final	Change
<i>Maxillary</i>			
3-3	38.3	37.5	-0.8
4-4	41.5	41.5	0.0
5-5	46.7	45.6	-1.1
6-6	50.5	50.5	0.0
<i>Mandibular</i>			
3-3	26.0	28.5	+2.5
4-4	29.8	34.0	+4.2
5-5	36.3	39.5	+3.2
6-6	50.0	50.0	0.0

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