

## Anterior dental crossbite correction using a simple fixed appliance: case report

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### Abstract

*A fixed orthodontic appliance utilizing light continuous forces to correct an anterior crossbite is described. This appliance can serve as an alternative to other methods of anterior crossbite correction in the permanent dentition.*

One of the major responsibilities of the dental practitioner is to intercept adverse patterns of dental eruption in the child.<sup>1</sup> Among the developmental problems frequently seen in the mixed dentition is the anterior crossbite.<sup>2</sup> Crossbites of dental origin must be distinguished from those of skeletal origin.<sup>3-7</sup> In the simple anterior dental crossbite the patient should display a normal skeletal pattern, with abnormalities presenting in the axial inclination of the affected teeth only.<sup>3,4</sup> This report presents a method of treating simple, 1-tooth anterior crossbites of dental origin.

### Literature Review

The anterior dental crossbite may be the result of 1 or a combination of several etiologic factors:

1. Traumatic injuries to the primary dentition that cause a lingual displacement of the permanent tooth bud
2. An overretained primary tooth
3. A labially situated supernumerary tooth
4. A sclerosed bony or fibrous tissue barrier caused by losing a primary tooth prematurely
5. An inadequacy of arch length causing the lingual deflection of the permanent tooth during eruption
6. Detrimental habit patterns
7. A repaired cleft lip.<sup>3,5-7</sup>

Lee<sup>3</sup> outlined 4 factors to consider before selecting a treatment approach:

1. Adequate space in the arch to reposition the tooth
2. Sufficient overbite to hold the tooth in position following correction
3. An apical position of the tooth in crossbite that is the same as it would be in normal occlusion
4. A Class I occlusion.

There are many possible approaches to the treatment of a simple anterior dental crossbite. The following treatment approaches have been recommended for simple anterior dental crossbite.

**Tongue blade therapy.** A simple 1-tooth anterior dental crossbite may be corrected this way. The success and prognosis of this procedure is greatly dependent on patient cooperation and parental supervision. There is no precise control of the amount and direction of force applied.

**Lower inclined plane.** Treatment of anterior dental crossbite involving 1 or more teeth may be accomplished by using a cemented lower inclined acrylic plane. This technique has the possibility of opening the bite if worn for more than 3 weeks.<sup>3</sup>

**Stainless steel or composite crowns.** Another method is cementing a reverse anterior stainless steel crown on the lingually locked incisor at a 45° angle to the occlusal plane. This method is subject to all the disadvantages of the inclined plane method and is difficult to apply to partially erupted maxillary incisors.

**Hawley retainer with auxiliary springs.** This appliance is used frequently for minor tooth movement in pediatric dentistry. In this procedure the prognosis depends on patient cooperation and parental supervision.

**Labial and lingual arch wires.** The use of labial and/or lingual arch wires has proven successful. The disadvantage of the use of these appliances is the expense and additional training required to use them efficiently.<sup>2,3,5-9</sup>

## Case Report

An 8-year-old boy presented to the pediatric dental clinic with a parental complaint that 1 of his teeth was "growing toward the roof of his mouth." The health history and examination of the head and neck were unremarkable. There was no history of an overretained primary tooth or a supernumerary tooth.

Clinical examination revealed an early mixed dentition. All first permanent molars were in a Class I occlusion. Eight permanent incisors were erupted. The right permanent lateral incisor was in crossbite, erupted lingual to its normal position, and rotated 70° mesially. The tooth was placed tightly against the distolingual surface of the right maxillary incisor. The right primary canine was in a position 1 mm mesial to normal position. It was assumed that this canine position was due to early loss of the right primary lateral incisor. This assumption was supported further by a midline shift of 1 mm to the right. The lingual eruptive path of the lateral resulted from the position of the central incisor and canine (Fig 1).

The right lateral incisor was not erupted sufficiently for active treatment. The adjacent primary canine was removed so that the lateral might resume its normal course of eruption. The patient was recalled in 2 months to check for progress.

At the recall visit, the eruptive path of the lateral incisor was unchanged. However, enough eruption had taken place so that fixed appliance therapy could be initiated. After discussing the problem with the patient, the use of tongue blades or Hawley retainers was eliminated as a treatment option since he admitted he probably wouldn't use them. The decision

was made to use a fixed appliance that would perform the necessary correction. A fixed appliance allows a more precise control over movement of the lateral incisor, hence preventing possible damage of the lateral incisor root by the permanent canine crown.

The need for distolabial movement and rotation to arch alignment presented a difficult problem. To accomplish this compound movement, an orthodontic device was fabricated using 2 standard edgewise .022-in slot, orthodontic brackets<sup>b</sup> and a multiloop .018-in diameter Elgiloy<sup>®a</sup> wire (Figs 1, 2). Due to its close proximity to the central incisor, the facial surface of the lateral incisor presented no room for a bracket. Thus, a lingual bracket was used. Each helix used was doubled to permit the use of lighter forces over a greater distance. The patient was rescheduled to be seen at 2-week intervals.

At the next appointment, there had been a 2-mm movement to the facial surface and some rotation of the lateral incisor. The lateral incisor had moved to a position that now allowed for a bracket on the facial surface. A second multiloop wire was fabricated using a .018 Elgiloy wire (Fig 3). This design allowed for more precise control of the movement of the lateral incisor.

At the next appointment, the lateral incisor was in line with the arch form, but still displayed a slight mesial rotation. Using the same principles, a new wire was fabricated using only a single loop (Fig 4). The purpose was to continue rotation of the lateral incisor. After 2 weeks, the lateral incisor had been rotated into arch alignment (Fig 5).

Orthodontically rotated teeth show a high incidence of relapse, even after lengthy retention, due to the resilience of the gingival fibers.<sup>10</sup> To aid in prevention of relapse due to these fibers, a supracrestal

<sup>a</sup> Elgiloy — Rocky Mountain Orthodontics: Denver, CO.

<sup>b</sup> Ormco, division of Sybron Corp: Glendora, CA.

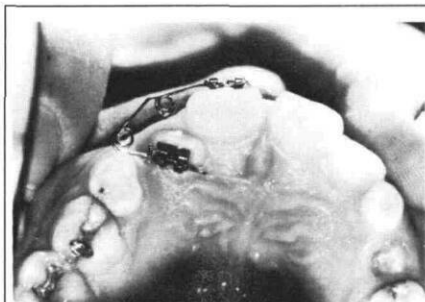


FIG 1. Pretreatment position of lateral incisor, central incisor, and cuspid at initial appliance placement.



FIG 2. Orthodontic device consisting of two .022-in slot brackets and multiloop .018-in Elgiloy wire.



FIG 3. The second multiloop wire using .018-in Elgiloy wire.

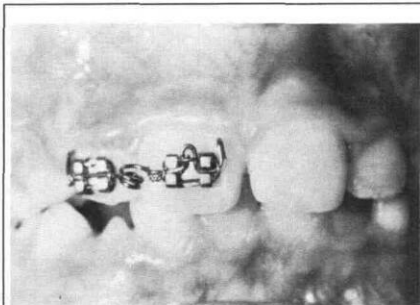


FIG 4. Single loop wire using .018-in Elgiloy wire to refine rotation.

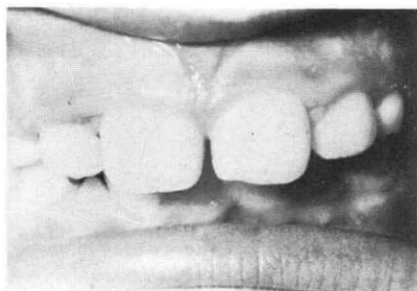


FIG 5. Posttreatment tooth position.



FIG 6. Design and activation of proposed lingualized appliance.

fibrotomy was performed by inserting a surgical blade through the depths of the gingival crevice, severing the free gingival and transseptal fibers circumferentially around the lateral incisor.<sup>11</sup> A lingual wire was bonded to the central and lateral incisors for 4 weeks to stabilize the lateral incisor during recalcification of the bone, and reattachment of the gingival fibers (Fig 6).

This type of appliance lends itself easily to a lingualized technique. A lingual appliance design to correct anterior crossbites of the type previously described is shown in Figure 6. Close adaptation to the palate is necessary in this lingual technique to avoid irritation of the tongue.

## Conclusion

Patients must be selected carefully when using this fixed orthodontic appliance. The crossbite must be a simple dental crossbite with no skeletal component. The facial profile and occlusion should be Class I. There should be adequate room in the arch for correction of the crossbite.

The appliance used for this patient served as an alternative to the use of tongue blades, inclined planes, reverse stainless steel or composite crowns, and the Hawley retainer with auxiliary springs. This technique can be used in a variety of clinical situations with only minor changes in the appliance design.

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