



By Neal D. Kravitz, DMD, MS

# The Hybrid Technique

## Nonsurgical correction of unilateral posterior crossbite in an adult using hybrid lingual and labial braces

Maxillary transverse constriction is a result of genetic, environmental, and functional influences, often resulting in the development of a posterior crossbite. The prevalence of posterior crossbite is 8% to 23% in the deciduous and mixed dentitions, with a low incidence of self-correction.<sup>1-5</sup> Children with a unilateral posterior crossbite shift their mandible during habitual occlusion (a phenomenon referred to as a functional shift) so as to position their mandible into centric occlusion. A functional shift results in asymmetric occlusion, asymmetric condylar position, and chin-point deviation, which can lead to skeletal asymmetry in adulthood if the patient is left untreated.

Nonsurgical correction of maxillary transverse constriction in the adult patient is well documented. Traditionally, orthodontists use, in conjunction with braces, either a slow palatal expander (such as a quad-helix or Arnold appliance) or a rigid rapid palatal Haas-type expander turned slowly once a week. Sutural separation in the advanced adult patient is unlikely; however, slow palatal expansion produces a combination of dental tipping and dentoalveolar bending to correct the posterior crossbite.<sup>6-8</sup> Treatment results are predictable and stable in cases of mild to moderate transverse constriction, with minimal adverse sequelae to the periodontium.<sup>6-8</sup> The greatest challenge for the adult patient is tolerating a palatal expander for a prolonged period of time.

In addition to their obvious aesthetic benefits, customized lingual braces with expanded archwires produce remarkable dentoalveolar expansion without requiring a palatal expander.



Figure 1: Pretreatment composite images.

The purpose of this case report is to review the clinical technique for nonsurgical correction of unilateral posterior crossbite in the adult patient using only a hybrid technique of maxillary customized lingual braces (Incognito<sup>®</sup> from 3M Unitek) and mandibular labial ceramic braces (Synergy Lux<sup>®</sup> from Rocky Mountain Orthodontics). In this article, the reader will learn the following: 1) proper case setup; 2) wire sequencing; and 3) elastic techniques.

### Case Report

A 30-year-old Hispanic-American female presented with a chief concern of, "I don't like my bite." Her medical history was noncontributory. Her dental history revealed prior orthodontic

treatment including four bicuspid extractions, without the use of a maxillary palatal expander.

Facial analysis revealed slight facial convexity, significant left-side chin-point deviation, and a maxillary dental midline that coincided with the facial-nasal midline. Skeletally, she presented with a mild Class III relationship due to mandibular prognathism (ANB = -0.2 degrees) and maxillary transverse constriction. Dentally, she revealed a Class III tendency malocclusion, 1 mm of overbite, and anterior and unilateral left posterior crossbite extending from the maxillary lateral incisor to the first molar. This resulted in a functional shift of the mandible to the crossbite side. In centric occlusion, the

mandibular dental midline was left of the maxillary dental midline by 3 mm (Figure 1, page 20).

I presented various treatment plans during the consultation. The patient refused surgical-assisted rapid palatal expansion and nonsurgical slow palatal expansion with a Haas-type expander. She agreed to a treatment plan of maxillary customized lingual braces and mandibular labial ceramic braces (hybrid technique) with maxillary archwire expansion, crossbite elastics, and mandibular anterior reproximation.

Our treatment objectives included the following: 1) to correct the anterior and unilateral left posterior crossbite; 2) to coincide the dental midlines, and 3) to eliminate the functional shift with some improvement in chin-point deviation. The patient understood that complete chin-point-facial symmetry could not be achieved without surgery.

## Treatment Progress

The case setup included custom fabricated lingual saddle bands on the maxillary right and left second molars and maxillary left first molar (Figure 2). The second molar bands were designed with lingual tubes and hooks. Tubes on the terminal saddle band are important to ease wire insertion and simplify wire ligation. Hooks on the tubes allow for connection of elastic chain and orthodontic elastics. The mandibular arch included labial ceramic braces extending to the second molar. All brackets were 0.018-inch slot.

I order five customized lingual wires: 0.014 CuNiTi for rotational corrections, 0.016 x 0.022 CuNiTi for leveling and aligning, 0.018 x 0.025 CuNiTi for continued leveling and transverse expansion, 0.018 x 0.025 stainless steel for transverse expansion and consolidation, and 0.0175 x 0.0175 TMA for finishing and detailing. All wires were designed with 4 mm of transverse expansion.

I advanced the maxillary lingual CuNiTi wires on average every 4 months, but not until the archwire fully inserted into the bracket slot. Further expansion was placed in the 0.018 x 0.025 stainless steel wire prior to insertion. Once both arches were in stainless steel wires, I delivered crossbite elastics.



*Figure 2: Saddle bands bond the occlusal, buccal, and palatal surfaces of the teeth, but not interproximally, and therefore do not need separation. Note the tubes and hooks on the terminal saddle bands.*



*Figure 3: Crossbite elastics in conjunction with arch expansion. Right-side triangle elastics used a chairside fabricated composite button. Left-side crossbite triangle elastics connected from the maxillary left canine to the mandibular left canine and second premolar.*

The patient wore triangle elastics (3/16" diameter, 4.5 ounces) on the crossbite side from the maxillary lingual canine bracket to the mandibular labial canine and second premolar bracket. To prevent development of a lateral open bite, she also wore triangle elastics on the noncrossbite side. At the patient's request, I bonded a chairside-fabricated composite button<sup>9</sup> on the labial surface of the maxillary right canine for easier placement of the elastics (Figure 3). After correction of the anterior crossbite, I placed box elastics from the lingual brackets of the maxillary left second premolar and first molar to the labial brackets of the mandibular left second premolar and first molar. The patient wore the elastics all day and changed them between meals.

To aid correction of the anterior crossbite, I performed mandibular anterior reproximation during the elastic phase. Mandibular spaces were consolidated in a 0.018 stainless steel wire to allow for dental retroclination.

The final finishing wires were a maxillary 0.0175 x 0.175 TMA and a mandibular 0.018 stainless steel with vertical elastics to aid settling. The patient was retained with maxillary fixed retention extending lateral incisor to lateral incisor and mandibular fixed (hygienic) retention extending canine to canine. She wore a tooth-positioner at night to stabilize and deepen the occlusion and bleach the teeth. Total treatment time from the start of mandibular bonding was 14 months, including 12 months in maxillary lingual braces (Figure 4, page 24).

## Discussion

Combining maxillary customized lingual braces and mandibular ceramic labial braces using expanded lingual wires and crossbite elastics allowed me to correct a significant unilateral posterior crossbite in a relatively short period of time with stable results. The patient achieved an acceptable occlusion with enhanced smile aesthetics and a dramatic reduction in chin-point



Figure 4: Post-treatment composite.



Figure 5: A different patient with maxillary and mandibular lingual braces and a unilateral posterior dental crossbite. Note the saddle band with laboratory-fabricated buccal button on the mandibular right first molar to receive a crossbite elastic.

deviation—without orthognathic surgery or use of an expander.

This hybrid technique offers numerous advantages to dual-arch lingual treatment: 1) it reduces laboratory expenses; 2) it enables immediate bonding of the mandibular arch during the lingual fabrication process; 3) it allows the patient to adapt to the labial braces prior to bonding the lingual braces; 4) it creates less tongue irritation; 5) it makes archwire ligation significantly easier; and 6) it simplifies placement of elastics.

Customized lingual braces produce significant dentoalveolar expansion. In this patient, I progressed to a 0.018 x 0.025 stainless steel wire to enhance transverse expansion. I needed full wire-slot engagement with the 0.018 x 0.025 CuNiTi prior to inserting the 0.018 x 0.025 stainless steel wire. To ease wire insertion through the terminal tubes, I cut the end of the wire on a bevel.

I ordered lingual saddle bands for the maxillary second molars and the maxillary left first molar to reduce bracket breakage and to withstand the forces from the crossbite elastics. The saddle bands also aided in opening the posterior occlusion. For patients receiving dual-arch lingual treatment, consider saddle bands on the mandibular molars as well, along with a buccal button to receive the crossbite elastic (Figure 5).

The elastics used were 3/16" diameter and 4.5 ounce. Heavier-force elastics (ie, 6.0 ounce) may be too thick to easily engage on the lingual brackets. Orthodontists interested in using stronger elastics should instruct their laboratory clinician to extend the length of the bracket posts on the crossbite side.

After appliance removal, our patient was retained with maxillary and mandibular fixed lingual retainers followed by a tooth positioner for 3 months, after which time the positioner was discontinued and she wore a maxillary

QCM-type Hawley retainer at night. I placed the maxillary bonded lingual retainer 1 month after debonding to allow for gingival healing and to ensure complete removal of the bonding material. The night-time Hawley retainer provided transverse stability.

In accordance with the evidence-based literature, this patient was successfully treated without orthognathic surgery. However, surgical expansion should be considered when: 1) greater than 5 mm of expansion is indicated; 2) the posterior teeth in crossbite are flared buccally; 3) the periodontium is compromised; or 4) the patient doesn't oppose orthognathic surgical correction.

In critique of the final occlusion, 0.5 mm of spacing remained between the maxillary right lateral incisor and canine. Additionally, the mandibular midline was 0.5 mm to the left of the maxillary dental midline. Further reproximation of the mandibular right canine or lateral incisor would have eliminated the mandibular anterior Bolton excess and easily addressed both details; however, our patient refused further reproximation and was eager to have her braces removed.

## Conclusion

Mild to moderate maxillary transverse constriction with associated unilateral posterior crossbite can be corrected without surgery or slow palatal expansion using only lingual braces with archwire expansion and crossbite elastics. Clinicians should consider progressing to a maxillary 0.018 x 0.025 stainless steel wire for maxillary arch expansion, and consider incorporating saddle bands to disarticulate the occlusion, ease wire insertion, and withstand heavy elastic forces. **OP**

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