

# Early dentoalveolar correction: Quick Fix for crossbites

*Drs. S. Jay Bowman and Elliot Moskowitz show how early intervention can mitigate phase II treatment*

## Early Treatment

Early orthodontic intervention with the intent of eliminating or at least reducing a second comprehensive phase of treatment has been a bone of contention for many decades.<sup>1-9</sup> Three main signs of malocclusion—crowding, Class II, and Class III—have occupied much of the debate.<sup>1-10</sup> In terms of crowding, the options are simple: more bone or less “tooth.”<sup>11</sup> Extractions are curiously an anathema to many, despite the plethora of supporting research and nearly a century of favorable results.<sup>11,12</sup> Alternatives that involve some method of arch development have not garnered the same foundation.<sup>4,7,8,11</sup>

Class II is the second-most prevalent sign presenting to a typical practice for improvement. Earlier correction for Class IIs gained momentum as the treatment of choice in the last decades of the 20th century. Corresponding research<sup>1,5,6</sup> failed to support the initial hypotheses that had spurred the push for “early is best” for the “mandibularly deficient.”

In contrast, early Class III treatments with efforts focused on protraction of the maxilla have demonstrated more long-term benefits.<sup>2,13-16</sup> In fact, early resolution of pseudo-Class III fares even better.<sup>17-21</sup>

When early dentoalveolar correction is indicated, some simple biomechanics may be employed to improve predictability, efficiency, and effectiveness. As an example, a maxillary 2 × 4 fixed appliance (e.g., Butterfly System<sup>TM22,23</sup>) with auxiliaries can be manipulated to treat either dentoalveolar Class II or III malocclusions in transitional dentition. Adding in adjunctive devices such as headgear, face mask, maxillary expanders, intermaxillary elastics, utility arches, and bite planes can increase the range of applications. It is important, however, to focus on individual patient needs that are better treated in mixed dentition. In other words, specific goals for an early phase of treatment need to be set<sup>24</sup> as comprehensive correction is not likely with an incompletely erupted permanent dentition. In addition, there is no reason to provide treatments in Phase I that can be best accomplished in a second phase<sup>9,24</sup> or by simply waiting for a single comprehensive treatment.

Early correction of pseudo Class III features many of the hallmarks of evidence-based orthodontics<sup>25</sup>; namely, combining documented long-term results (best scientific evidence)<sup>17-21</sup> with positive clinical experience.<sup>26-30</sup>

## Pseudo Class III

Differential diagnosis of pseudo Class III is an important distinction as simple dentoalveolar correction is amenable to rapid and predictable treatment in the mixed dentition.<sup>31,32</sup> Typically, a pseudo-Class III patient is readily identifiable by an anterior crossbite with associated functional anterior

## Educational aims and objectives

The aim of this article is to:  
Describe three main signs of malocclusion, particularly pseudo Class III, and provide treatment modalities to correct crossbites.

## Expected outcomes

Correctly answering the questions on page 34, worth 2 hours of CE, will demonstrate the reader can:

- Describe three main signs of pseudo Class III malocclusion and suggest treatment modalities to correct anterior crossbites
- Discuss the three main signs differentiating pseudo from skeletal Class III malocclusion and the incidence in various populations
- Discuss various methods for treatment of pseudo Class IIs



shift of the mandible (Figure 1). Although the mandible begins close to Class I skeletal relationship, it is guided



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# Continuing education



Figure 1: Eleven-year old boy with a pseudo Class III mixed dentition malocclusion, featuring an anterior crossbite and functional shift, resolved in 5 months with the Quick Fix device

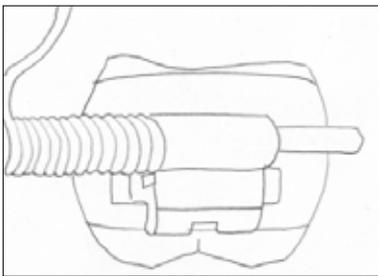


Figure 2: Incisor advancement can be achieved by compressing an open coil spring and/or an open-loop helix between the first molar and anterior teeth (e.g., bimetric wire). Sliding arch wire advancement typically requires 4 to 5 mm of additional arch wire length, extending distal to the molar or headgear tube that will “poke” a patient’s cheeks. This is problem resolved with the introduction of the Side Swipe auxiliary



Figure 3: Alternative method for advancing upper incisors by compressing a rectangular superelastic arch wire between the molars and incisors



Figure 4: Calvin S. Case’s Protruding Contour Appliance to advance the anterior teeth with the intent of providing “perfect correction of facial contours”

or shifted forward to Class III, at the first contact between incisors; otherwise, the patient would be unable to occlude on his/her posterior teeth. If the mandible is manipulated into terminal hinge axis, often the incisors contact end-to-end; indicative of a dental and not a skeletal discrepancy. Other characteristics include: an underjet, retroclined upper incisors, labially displaced lower incisors (occasionally with an associated loss of facial attached gingival and prominent roots), deficient maxillary arch perimeter, mid-face deficiency, the appearance of mandibular prognathism, but normal vertical development. The prevalence of Class III in the Chinese population involves 1 in 20 youngsters, but 50% may be characterized as pseudo-Class III.<sup>33</sup> The incidence of all types of Class III malocclusions in Caucasian and African American populations is far less frequent.

The key to early improvement of pseudo Class III is labial advancement of the maxillary incisors out of crossbite and into a normal overjet. This is easily within the realm of capabilities a 2 × 4 fixed appliance with mechanics that require no patient compliance with elastics, face masks, or removable bite planes.<sup>17-21,26-30</sup> Yet, face masks, bite planes, and palatal expanders can be added if needed.

Advancing the incisors can be accomplished using a number of different methods such as “advancing loops,”<sup>17</sup> compressed superelastic wires, and compressed coil springs (Figures 2 and 3).<sup>34</sup> The incisors are pushed labially and often benefit from permitting them to also tip facially into positive overjet; thereby, permitting the mandible to close into a Class I molar occlusion that matches the underlying Class I skeletal relationship.

Certainly, those Class III patients with short face heights and more acute mandibular plane angles respond more favorably to nonsurgical alternatives<sup>35</sup> (i.e., protraction face masks, chin caps), and pseudo Class IIIs are no exception. Consequently, a youngster with an anterior crossbite, functional shift, and deep overbite might be expected to be one of those that may best respond to this type of incisor advancement. Reducing the trauma to teeth (abnormal wear, chipping, fracture), gingiva (lower anterior mucogingival defects), and potential changes in “bone” (chronic trauma to periodontium) are the most substantial benefits from correcting anterior crossbites.<sup>17-21,26-30</sup> There are other benefits, such as increasing maxillary arch length (especially in providing space for blocked cuspids) and improvement

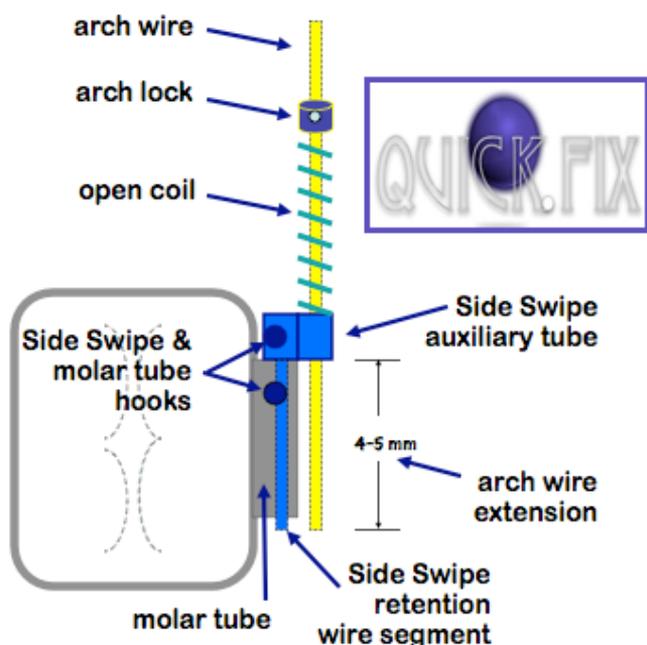


Figure 5: The Quick Fix device consists of rectangular “traveling arch wire; two arch locks; two open coil springs; and two Side Swipe auxiliary tubes that are added to a typical 2 × 4 pre-adjusted appliance in mixed dentition

in anterior esthetics, but perhaps the most understated, yet important, aspect is eliminating the functional shift of the mandible.

The anterior crossbite in pseudo Class III acts like a “functional appliance” in promoting the development of a skeletal Class III relationship. Early correction is no guarantee that a true skeletal discrepancy will not develop, but the odds appear to be shifted favorably against it.<sup>17-21</sup> In other words, the downside of a bad decision not to treat a pseudo Class III early is potential development of a more severe Class III, additional trauma, and maxillary crowding.

Workers at the University of Hong Kong<sup>17</sup> reported the results for 25 consecutively treated mixed dentition pseudo Class IIIs (featuring 8 months of treatment using a 2 × 4 appliance with “advancement loops”). All of the patients achieved a positive overjet (100% success), satisfying the specific goal of the Phase I treatment. The overjet

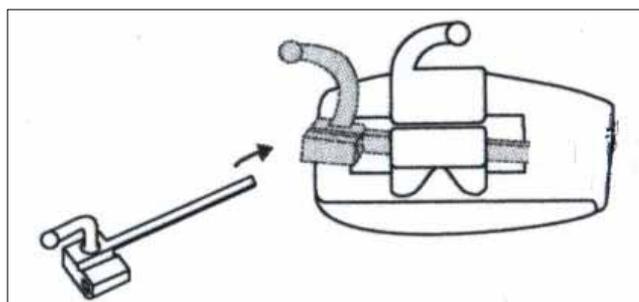


Figure 8: The first step for delivery of the Quick Fix device is insertion of the Side Swipe auxiliary



Figure 6: Completed delivery and activation of the Quick Fix device. Compression of the bilateral open coil springs (maintained by arch locks) pushes the incisors anteriorly, using the first molars as anchorage. Note the 4-5 mm of arch wire that extends posterior to the Side Swipe auxiliary tube is adjacent to the first molar tube. This extension of arch wire from the Side Swipe provides arch wire length for anterior advancement without extending distal to the molar tube and injuring the buccal mucosa



Figure 7: The Side Swipe auxiliary wire segment (.0175 × .025”) can be inserted in a bonded first molar tube or into the tube on a band

correction remained stable 5 years post-treatment. In addition, 75% of these patients were deemed by the faculty as comprehensively successful as well and did not, in their opinion, require Phase II treatment. Of the five patients that required Phase II, only one required the extraction of permanent premolars.

In a 10-year follow-up study of early correction of pseudo Class IIIs, Anderson et al<sup>21</sup> reported that cephalometric Point A (indicating the anterior position of the maxilla) had moved forward 4.5 mm, but mandibular growth was less than a twofold difference reported from reverse headgear wear. Their conclusion was that early advancement of incisors for pseudo Class IIIs: (1) provided an environment



Figure 9: The Quick Fix wire assembly includes a .017” × .025” stainless-steel arch, two universal arch locks, placed about 36 mm apart (to position them distal to the maxillary lateral incisors and permit wire seating), and two 20 mm lengths of .009” × .030” open coil spring

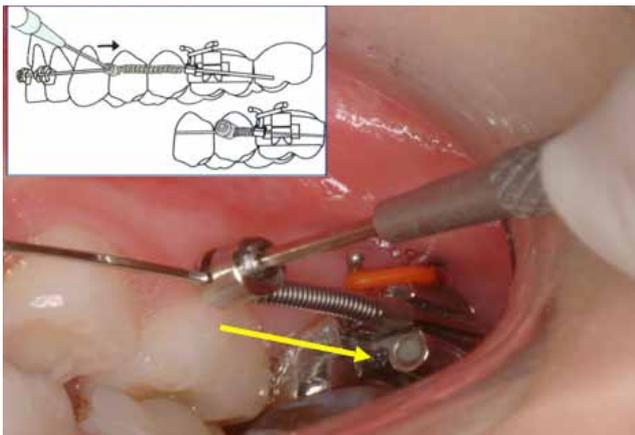


Figure 10: The arch locks are loosened and slid distally to compress the open coil springs. The locks are tightened at a position between the first and second primary molars



Figure 12: Close-up of the Side Swipe auxiliary with associated open coil spring and 4-5 mm of arch wire length to permit incisor advancement

for normal maxillary development that seemingly did not exist before; (2) eliminated anterior traumatic occlusion; (3) reduced incidence of dehiscence and gingival recession; (4) increased maxillary arch length; and (5) improved patient self-esteem (at least in the short-term).

## Developing a mechanism for advancing incisors

Calvin S. Case described his method of advancing incisors, the Protruding Contour Appliance (Figure 4),<sup>36</sup> that features a twin-wire, “e-arch” ribbon-arch advancement with banded 2 × 4. He stated that with this device, “Perfect correction of facial contours can be accomplished with... perfect certainty at any time between the ages of 10 and 18 years.” Considering the long-term results reported by the University of Hong Kong for advancement of incisors in mixed dentition for pseudo Class IIIs,<sup>21</sup> Case’s assessment was spot on. Pushing maxillary incisors out of crossbite is easily within the realm of control from a simple, fixed 2 × 4 edgewise appliance, featuring either bands or bonded tubes on the first permanent molars and orthodontic brackets on the incisors.

A variety of biomechanics can produce the anterior component of force. Placing a rectangular superelastic continuous arch with crimpable stops that are locked on the posterior portions of the wire, mesial to the first molar tubes, at an arch perimeter about 2-3 mm longer than

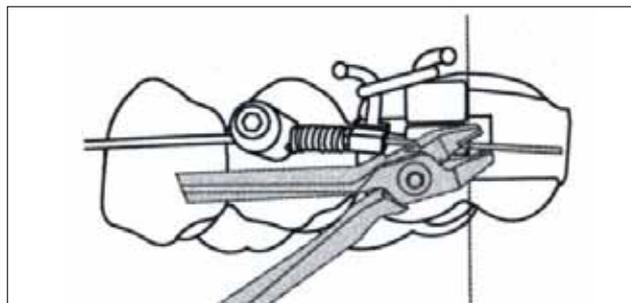


Figure 11: After insertion of the Quick Fix wire assembly and the open coil springs have been compressed using the arch locks, then a distal end-cutting pliers is used to cut the distal extension of the wire, just flush to the end of the first molar tube, not the Side Swipe auxiliary. There will still be 4-5 mm of arch wire that may travel anteriorly during advancement. The device is self-limiting, as the wire will slip out of the Side Swipe tube after 4-5 mm of advancement

that exhibited by the patient (Figure 3). When the wire is passively inserted, the anterior portion will be 2-3 mm labial to the incisor brackets. When the wire is seated and ligated into the brackets, the posterior part of the wire will “bow out” buccally, producing a reciprocal spring force to both the molars and incisors. The disadvantages of this technique are potential buccal tissue irritation from the prominent rectangular wire and frequent, incremental “re-activation” as the stops must be moved posteriorly.

An alternative is to bend “open” vertical loops (i.e., advancement loops<sup>17</sup>) in a rectangular arch wire with arch stops or Omega loops. After activation of the vertical loops, the anterior portion of the wire will be positioned 2-3 mm labial to the brackets, and when engaged, the open loops produce the advancement force to the incisors.

Another option is to place a stainless-steel rectangular wire with open coil springs compressed between the lateral incisor brackets and the first molar tubes. The coil springs are replaced with “longer” ones to continue the advancement of the incisors. The major concern with this set-up is the short distance that the arch wire can travel anteriorly before becoming dislodged from the molar tubes. Consequently, there is limited working distance of the mechanism before the wire slips out, the springs are lost, relapse ensues, and the patient experiences poking distal ends.

Each of the previous techniques can successfully produce a positive overjet for patients with anterior crossbites in the mixed dentition, yet each had some inherent drawbacks. The development of the Quick Fix device was designed to provide a simple, predictable, rapid, and efficient alternative mechanism for correction of pseudo Class IIIs.<sup>26-30</sup>

## Quick Fix device

The Quick Fix Kit™ (American Orthodontics) consists of four components (Side Swipe, open coil springs, arch locks, rectangular arch wire) that can be added to any 2 × 4 fixed appliance (banded or bonded first molars and standard or self-ligated brackets on the four incisors)(Figures 5 and 6).<sup>26-28</sup> A few months of initial alignment of the incisors with superelastic wire is required in order to insert the Quick Fix.

The key to the Quick Fix device is the Side Swipe auxiliary<sup>26-30</sup> (American Orthodontics)(Figure 7). This

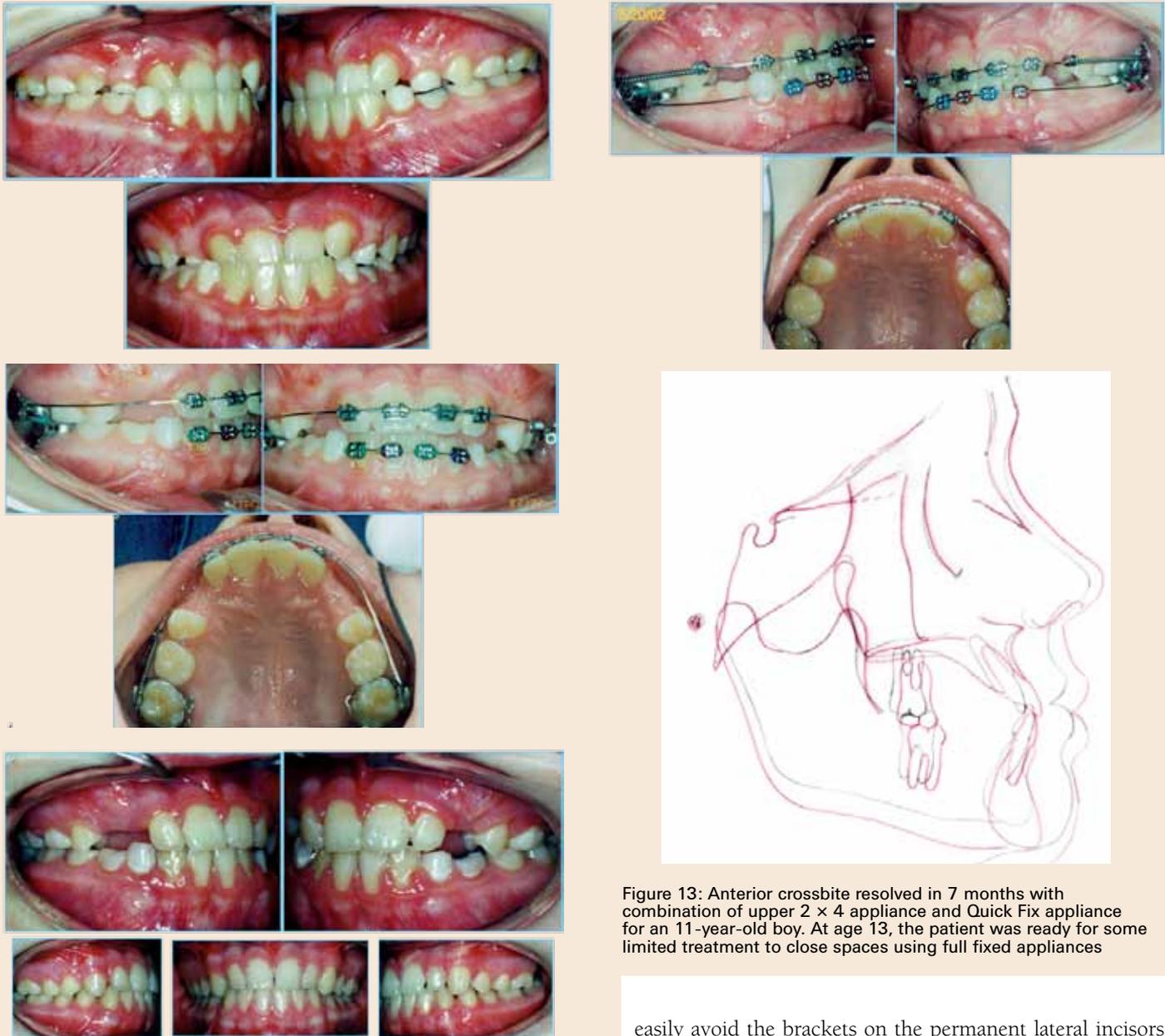


Figure 13: Anterior crossbite resolved in 7 months with combination of upper 2 × 4 appliance and Quick Fix appliance for an 11-year-old boy. At age 13, the patient was ready for some limited treatment to close spaces using full fixed appliances

auxiliary adds a small .018" × .025" closed tube anteriorly and laterally to the buccal tube on the first molar. The Side Swipe has a sectional wire that is inserted into the mesial of any first molar tube (banded or bonded) and is held in place by: (1) tying back with stainless steel or elastic ligature to the hook on the first molar tube; (2) the distal portion of the wire segment that extends out the posterior of the molar tube can be bent back; (3) the force of the coil spring will simply hold it in the tube. The first step in installing the Quick Fix device is the insertion of the Side Swipe (Figure 8).

Next, a stainless-steel arch wire (e.g., .0175" × .025" stainless steel; Natural Arch III, American Orthodontics) with two arch locks and open coil springs (Figure 9) is inserted into the tubes of the Side Swipe. Prior to insertion, the two arch locks are placed on the arch wire about 18 mm from the midline on either side (36-38 mm apart) so as to

easily avoid the brackets on the permanent lateral incisors when the arch wire is seated. Then, a 20-mm section of open coil spring is slid on the distal portions of both sides of the wire. These Quick Fix "wires" can be prepared in advance and kept in inventory for easy clinical installation.

The inserted wire with the two arch locks and coil springs is then tied into the incisor brackets, preferably with stainless-steel lacing, to avoid spaces from opening. Next, the hex wrench is used to unlock the arch locks, and they are moved distally to compress the open coil springs against the Side Swipes (Figure 10). The locks are then locked in position at about the first primary molar and can be oriented horizontally or vertically for patient comfort as desired (Figure 6).

The distal ends of the arch wire will be extended posterior to the Side Swipe tubes, lying adjacent to the molar tube, but they are also beyond the extent of the first molar tubes (Figure 11). A distal end-cutting pliers is used to cut the excess wire at the end of each molar tube, not at the Side Swipe tubes. This leaves about 4-5 mm of wire out the back of the Side Swipes to provide arch wire length to

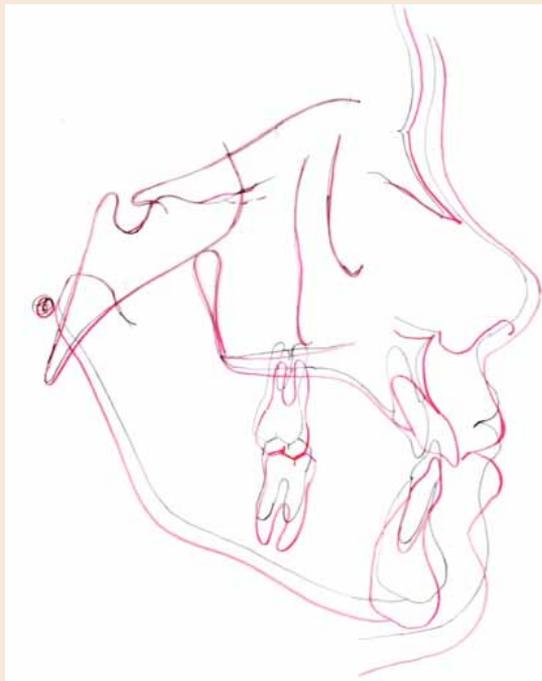


Figure 14: (Top) A 10-year-old boy with functional shift due to anterior and posterior crossbites, treated for 6 months in the transitional dentition using a combination of upper 2 × 4, MIA Quad Helix, and Quick Fix device. (Right) Superimposition demonstrates an increase in upper incisor inclination with associated improvement in upper lip support

support advancement of the incisors (Figure 12).

The patient is re-appointed every 4 weeks for assessment and re-activation. If the 4-5 mm of advancement is insufficient for a particular patient, then a new rectangular wire with associated hardware is inserted and activated. Advancement of the incisors typically requires from 2 to 4 months for a total Phase I treatment time of 6 to 9 months (Figures 1 and 13-15).<sup>26-30</sup>

### Quick Fix adjuncts

Although no “bite plane” is required with the Quick Fix, adding glass ionomer cement on the occlusal surfaces of the mandibular first molars is certainly an option to

facilitate incisor advancement. Since there are reciprocal forces at work from the open coil spring, some unintended molar distalization might be expected during the incisor advancement. The addition of a mandibular 2 × 4 appliance and Class III elastics may eliminate molar distalization and enhance the incisor advancement.

The Quick Fix may be useful in the early treatment of true Class IIIs using maxillary protraction face masks and/or fixed reverse labial bow.<sup>37</sup> While the elastic forces are applied to the maxillary dentition from the face mask, anterior crossbite correction is accomplished with the Quick Fix device. If early Class III correction involves the use of skeletal anchorage,<sup>38,39</sup> the Quick Fix can also be



Figure 15: Anterior crossbite and severe upper arch length discrepancy resolved using a combination of upper 2 × 4, MIA Quad Helix, and the Quick Fix device for 8-year-old boy

incorporated as required.

If a transverse discrepancy attends the anterior crossbite, maxillary expansion can be simultaneously addressed. For example, a maxillary quad helix<sup>40</sup> is a simple, comfortable, highly adjustable adjunct to typical 2 × 4 mechanics (Figures 14 and 15).

## Conclusions

Early correction of pseudo Class IIIs with the Quick Fix device provides a rapid, stable, versatile, effective, efficient, and predictable resolution of anterior crossbites and reduces the need and or difficulty of Phase II treatments. ■

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