



‘Short-Face’ Patients

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Introduction

Adisyn was 13 years old when her mom brought her to our office (Fig. 1). Their chief complaint was the very mild crowding of her anterior teeth.

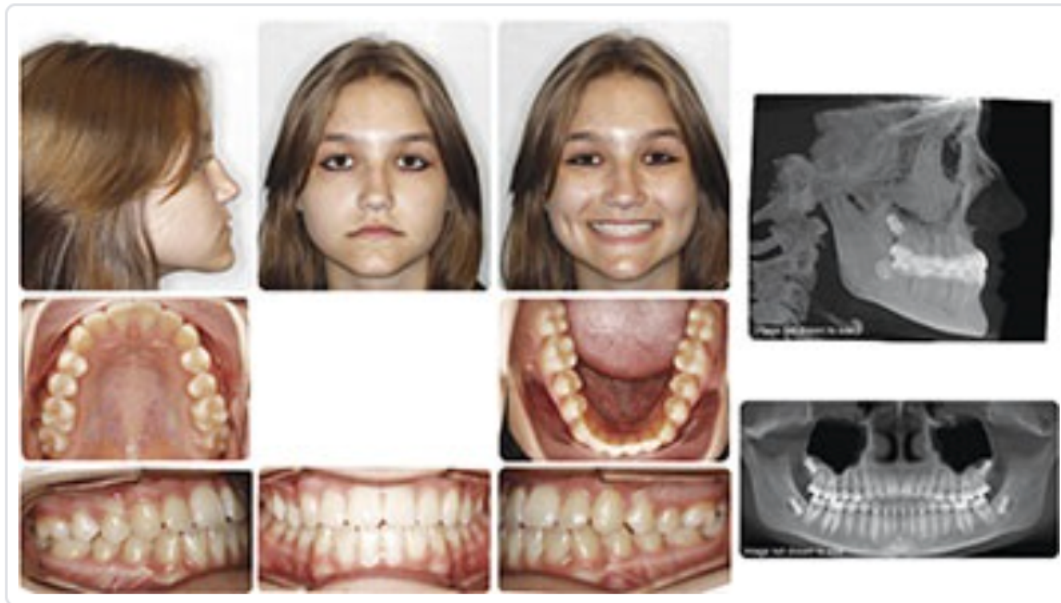


Figure 01

On its surface, if our orthodontic diagnosis and treatment plan were strictly “inside” focused, this is an exceptionally simple case—a case that could be easily managed in well under one year of treatment with braces or aligners and some limited Class III elastics or IPR. And given their simple chief complaint, they would likely have been thrilled with the result of that treatment.

This is where I’d like to take a short tangent on the distinction between orthodontists as “tooth straighteners” and orthodontic and dentofacial orthopedic specialists. The truth is that most of the general public views us as the former. When they come to our offices for treatment, they see us through that lens and often state their concerns within the same limited scope. Admittedly, it is sometimes much easier to meet them at that same level of concern and simply be tooth straighteners for them. We assume that is all the patient really wants anyway. Even if a more comprehensive diagnosis and treatment plan could pose additional benefits, we may further assume that treatment might be too complicated, expensive, lengthy or otherwise unfavorable enough to turn them off from treatment altogether. They often have no idea what is possible until we show them. This is why great effort in communicating, educating and showing patients what is possible is so vital to how we best serve them.

Case Presentation

Having treated and thoroughly documented several short-face cases, I used those records to communicate and highlight the similarities to Adisyn's presentation, visually showing the dramatic aesthetic improvement imparted to patients like her through comprehensive orthodontic treatment at our office. With a new understanding, Adisyn and her mom were no longer interested in simply straightening teeth.

Diagnostically, Adisyn showed many of the characteristic traits of short-face patients. While facially she showed excess chin prominence and a square frontal facial form, her lower third facial height measured relatively within normal limits. Her lips did not look overly compressed, and her smile window was also not noticeably short. The cephalometric X-ray, however, showed a low mandibular plane angle along with mild mandibular prognathism and associated protrusive maxillary incisors. It also showed a characteristic sweeping up in the anterior region of the occlusal plane. This slightly superior position of the maxillary anterior teeth relative to the occlusal plane is a common feature that I find in Class III patients with a tight or end-on overjet. It most often presents as decreased vertical incisor display and flat or reversed smile arc, both of which Adisyn displays. In addition to mild crowding in both arches, the intraoral photos also show a mild Class III occlusion with a shallow overbite and nearly end-on overjet.

In the exam room, my discussion prioritized improving her deficiencies in vertical incisor display and smile arc and how that would impact her smile aesthetics. I let them know there were multiple ways to improve these features, but one unique plan would also involve a facial change that I could simulate for them visually. I had Adisyn stand in front of her mom with her lips together at rest and her teeth biting down in full occlusion. I then had her mom take frontal and profile photos of her face on her own cell phone. Next, I asked Adisyn to disclude her teeth and naturally let her lower jaw roll down and back just a bit. Sometimes this takes more than a couple of tries with a patient to get the desired vertical change just right. Once that new vertical was simulated, I had Adisyn's mom take more profile and frontal facial photos. Having already briefly reviewed the records of two other short-face patients treated in our office, I asked Adisyn and her mom to swipe back and forth between the photos and describe what they noticed. They were very excited to visualize the decrease in chin prominence and the increased taper to her square frontal facial form.

Having learned from previous cases discussed, one of my main goals in establishing this new vertical position for Adisyn and then setting her occlusion to it was to do so in a manner that did not so desperately rely on compliance-driven mechanics. Not every one of my patients is a cooperator. As it turned out, Adisyn would not have achieved the same success as my other patients if her treatment had relied on extended, excellent elastic compliance. She was fairly compliant early in treatment, but that waned a little in the second half of her treatment.

The day we placed her braces (Fig. 2) was when the end goal for her new vertical lower-third facial height was established. This was done via the placement of bite turbos, which were strategically positioned on the U4s. This, in my opinion, is the best place to put them for this type of case, where both molar eruption and smile arc protection (SAP) bracket positioning are desired. Placing the bite turbos more posteriorly inhibits molar eruption. Placing them more anteriorly on the incisors prevents the SAP bracket position from expressing the relative extrusion of the upper incisors as the bracket heights are leveled in early wires. I intentionally built them large enough on the U4s to rotate her mandible down and back to the exact desired position for vertical facial change. You can see this in the photos taken immediately after the braces and bite turbos were placed (Fig. 3). My vertical goal was established. The aim was now to set the occlusion to that position by erupting all the maxillary dentition and tipping the maxillary occlusal plane clockwise to meet the mandibular occlusal plane, which was already in that position.



Figure 02



Figure 03

To erupt the molars, Adisyn wore full-time vertical elastics from upper first molars to lower first molars bilaterally. Just like in Lea's case, which we reviewed in a previous issue, caplin hooks were bonded to the lingual of all the first molars, and the elastic pattern alternated buccal/lingual to lingual/buccal to erupt the molars without altering their buccolingual inclination. The molars erupted into contact in about four months (Fig. 4). At that point, I was concerned that I might need a bit more of an increase in lower-third facial height, so I added to the bite turbos and continued with the elastics. At eight months into treatment, the molars were in occlusion, and I was satisfied with her vertical facial change, which was just a bit overcorrected.

The challenge at this point in treatment was how to keep the maxillary molars in their newly erupted position and prevent them from relapsing or intruding while also removing the bite turbos and erupting the rest of the maxillary dentition to the new vertical dimension set by the molar position. My attempt at that came in the form of absolute anchorage and auxiliary sectional mechanics. At nine months into treatment, I placed two

palatal TADs and connected them to the upper first and second molars via double TPA arms (Fig. 5a). In this manner, the maxillary molars were now fixated in their erupted position, and they would be able to maintain the clockwise rotation of the mandible and new vertical position. It is important to note that there would be some relapse or intrusion of the lower molars (which were also erupted with the vertical elastics) anticipated, so some degree of overcorrection of the upper and lower eruption before this point is prudent. In short, the maxillary first molar set our vertical change and would now become “mission control” for the other absolute extrusion mechanics.

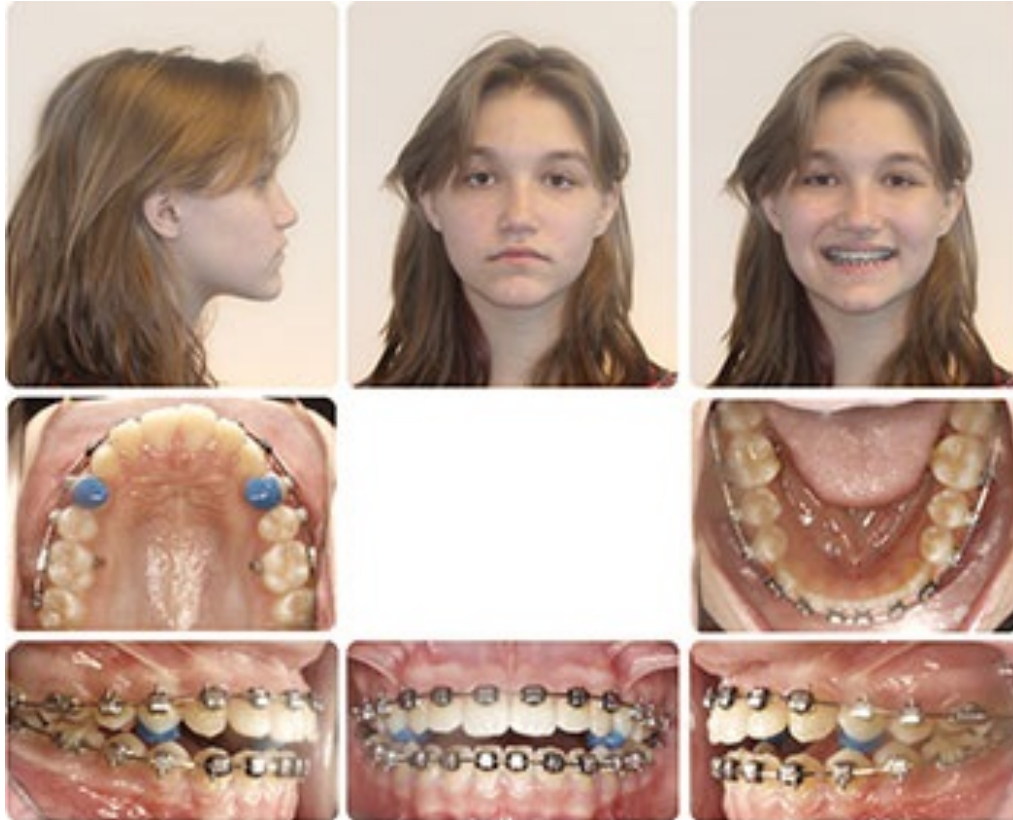


Figure 04



Figure 05

Now that the vertical change was fixated, the bite turbos were also removed and the remaining open bite from second bicuspid to second bicuspid would need to be closed. If anterior vertical elastics were used, they would have yielded eruption of both the maxillary and mandibular anterior teeth. In this manner, the maxillary anterior teeth would descend only approximately half the distance of the open bite before making contact with the simultaneously erupting lower anterior teeth. In my opinion, that would not have been enough eruption of her maxillary teeth to best descend them into their ideal vertical position within her smile. I didn't want to go from 50% vertical upper incisor display to 75% vertical incisor display—I wanted to get as close as I could to 100% VID. I wanted her full maxillary dentition to vertically fill her smile window.

To close the anterior open bite with as much maxillary eruption and as little mandibular eruption as possible, anterior elastics were not initially used at all. Instead, I repositioned her U6 molar tubes with bondable double-slot tubes (Figs. 5b and 5c). There were two specific mechanics employed by these double-slot tubes. First of all, the tubes were bonded with an approximately 30-degree tip-down anteriorly. The thought process behind this was to erupt the dentition anterior to the fixated maxillary molars to the new occlusal plane that the mandibular arch was already set to via the down-and-back rotation of the mandible. This occurred when a continuous 18 NiTi wire was placed from U6 to U6 in one of the double-tube slots. It is important to note that

the continuous archwire was not extended to the 7s because of the now-tipped bracket position on the 6s. The second mechanic employed was the use of sectional 19-by-25 TMA arms that were placed in the other U6 double-tube slot and connected to the continuous archwire mesial to the U3s. These sectional arms had a 45-degree tip-down bend mesial to the U6s so that when they were attached to the continuous archwire mesial to the U3s, they had an extrusive effect on the anterior teeth.



Figure 05a



Figure 05b

At 13 months into treatment (Fig. 6), the open bite had closed via greater eruption of the maxillary teeth. I desired slightly more anterior eruption, so I placed a reverse curve in the lower 16-by-25 stainless steel archwire and continued with activation of the sectional TMA wires.

At 19 months (Fig. 7), I removed the sectional TMA wires and cut off the TPA arms to the U6s. Double-triangle elastics were worn on both sides, as well as an anterior box elastic at night to attempt to stabilize the eruption that had occurred.



Figure 06



Figure 07

Results

Adisyn was debonded at 22 months into treatment (Figs. 8a–f). Clockwise rotation of her mandible (FMA and SN-GoGN increased 7 degrees) occurred via molar eruption with elastics. This movement achieved our macro-aesthetic (facial) goals of increased third facial height with associated decrease in chin prominence and increased taper to her now more ovoid frontal facial form. This vertical facial change was followed by TAD-fixed maxillary first molars serving as a “mission control” point to erupt all the maxillary dentition, with an emphasis on clockwise rotation of the occlusal plane. This movement achieved our mini-aesthetic (smile) goals of increasing her vertical incisor display and establishing a consonant smile arc. However, beyond just these improved anterior vertical dentition aesthetic goals, it is her full maxillary vertical display (anterior and posterior) that fills her smile and dominates her beautiful smile aesthetics. Her full maxillary dentition was extruded during this treatment.

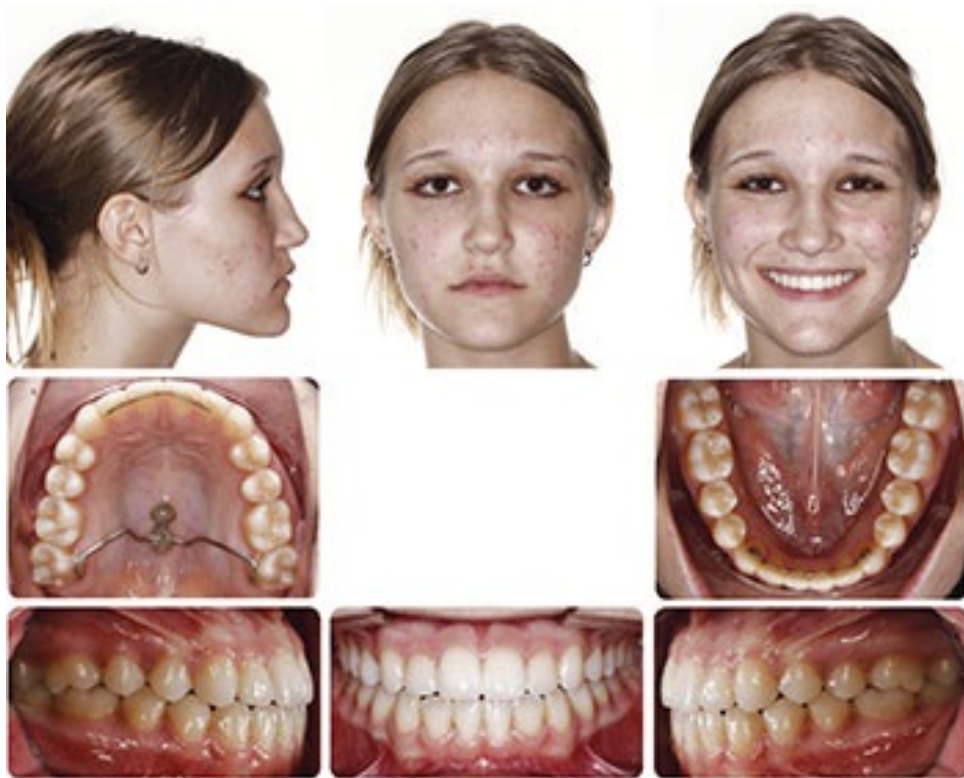


Figure 08a



Figure 08b



Figure 08c



Figure 08d



Figure 08e



Figure 08f

Regarding retention and stability, there were a few additional considerations. The upper incisors were finished in minimal overbite or contact with the lower incisors, as I didn't want the force of occlusion there to relapse or intrude the upper incisors that had extruded. Permanent retainers were placed from U2 to U2 and L3 to L3 and clear overlay retainers were given to wear at night. The patient and her mom declined my recommendation to place minimal bonded composite attachments to her anterior teeth to engage the upper clear retainer, which I felt would help support their erupted position. While not used for Adisyn, I believe this is a prudent retention tactic. The U7-to-U7 TAD bar will be left on for at least 12 months to help prevent maxillary molar relapse. Another long-term retention strategy for this type of treatment is Botox injections. The saying goes that "muscle always wins," and in short-face patients, their muscular pattern likely plays a primary role, as the natural course of aging tends to return these patients to their pretreatment vertical position. Botox injections have been used to effectively weaken the masseter muscles and show great promise for the future of how we treat our short-face patients.^{1, 2} For Adisyn, a series of Botox injections to her masseters were recommended every six months for at least two years.

Closing thoughts

As I stated at the beginning of this four-part series, the vertical dimension is one of the most important components of dentofacial aesthetics. The role that the orthodontist can play in treating the facial balance of short-face patients cannot be overstated. For many of these patients, no other medical or dental provider can more naturally and significantly impact this deficiency. I hope that the evolution of concepts and mechanics used in these cases is helpful and encourages more orthodontists to treat these special vertical cases with an outside-in mindset. The treatments can be life-changing for these patients.

I want to make one final statement. I believe the novel mechanics used in Adisyn's case represent the most effective non-surgical orthodontic treatment for pure vertical maxillary deficiency available to date. Adisyn was a mildly deficient case, but I am already applying this same protocol to several more severe vertically deficient cases. The ability of the applied system described above to both induce full maxillary dentition eruption and alter and tightly control the exact desired aesthetic pitch of the occlusal plane is unique. I believe these are the two most important factors in properly treating a vertically deficient patient and I have not seen another treatment protocol that as effectively addresses both of those issues. I hope her case moves the ball forward in how we treat these cases conceptually and mechanically, and I hope that someone reading this article will take the ball even further forward in their own iteration and application. These patients deserve it, and we are capable of giving them what they really need if we view ourselves as more than just tooth straighteners.

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