by John M. Pobanz DDS, MS

Case History and Analysis

This 18-year-old Caucasian female presented with the following chief complaint: “I want my front teeth to come together when my teeth are straight.” Upon smiling, there is 5mm of gingival display (Fig. 1). Molar canine relationships are a half-step Class II. An anterior open bite of 5mm is measured at the right maxillary lateral incisor. The overjet measurement is 4mm measured at the left central incisor. Moderate crowding is present in both arches. A constricted maxillary arch form relative to the lower arch is present resulting in buccal cusp to buccal cusp relationships extending from the second molars to the first bicuspid on both sides, a bilateral posterior crossbite tendency (Fig. 2). The skeletal relationships are mildly Class II. The mandible is posterior divergent and the lower anterior face height is larger than average. The maxilla shows posterior vertical maxillary excess (Fig. 3). However, the patient does have adequate lip competence at rest.

Treatment Sequence

Passive self-ligating brackets with standard anterior Damon torque prescription were placed. Quarter-inch, 2 oz. posterior cross elastics were used as needed from the lingual of the upper molars to the labial of the lower molars from the first archwire insertion of .014 copper NiTi. The archwire sequence of 14x25 CuNiTi, 18x25 CuNiTi, 19x25 stainless steel (SS) was followed with 10-week appointment intervals. The posterior crossbite relationships were corrected prior to advancement to 18x25 CuNiTi. Once both arches were worked to 19x25 SS, a RMO fixed/removable trans-palatal arch was inserted into the vertical lingual sheaths of the upper molars with 6mm of clearance relative to the palate. A colli-
mated CBCT view of the maxilla was captured with iCAT. A mini-screw placement simulation was performed in Anatomage software showing excellent bone density at the mid-palatal suture (Fig. 4). A 6mm TOMAS orthodontic mini-implant was inserted at the mid-palatal raphe at the mesial aspects of the first molars. A dumb-bell attachment was bent from 19x25 SS and bonded into the cross-slot of the TOMAS mini-screw with filled flowable composite (Wave, Patterson Dental). Lingual buttons were bonded to the second bicuspid and the second molars. Elastic chain force was applied from the dumb-bell attachment to the maxillary second bicuspid, and second molars in addition to the mesial extension of the RMO TPA just mesial to the first molars every four weeks for six months (Fig. 5). Upon bite closure, 19x25 TMA wires were inserted, the TPA was removed and standard techniques were used for detailing and finishing.

**Treatment Objectives**
- Non-surgical correction the posterior crossbite relationships with arch development and early and light cross elastics
- Maximize display of posterior teeth in the buccal corridors
- Avoid extrusion of anterior teeth during open bite correction
- Avoid increasing gingival display
- Intrude en masse the posterior dentition with a single TOMAS mid-palatal orthodontic mini-screw
- Finish the posterior dentition mildly out of occlusion to account for potential relapse
- Achieve ideal occlusal relationships of overbite, overjet, molar and canine relationships

**Treatment Results**
En masse intrusion of the maxillary posterior dentition required six months with anterior open bite closure being achieved with auto-rotation of the mandible (Fig. 6). Gingival display upon smiling improved to a pleasing position relative to the gingival margins of the maxillary anterior teeth with intrusion of maxillary anterior teeth with leveling of the arch and crowding resolution (Fig. 7a&b). An overbite of 2mm and overjet were established as well as canine guidance and a Class I molar and canine relationship. Display of maxillary posterior teeth in the buccal corridors was achieved in addition to a congruent smile arc relative to the contour of the lower lip. The posterior dentition was finished mildly out of occlusion to account for relapse potential. Treatment required 19 months to complete.

**Discussion**
The use of a single miniscrew is obvious in terms of cost and chances of failure relative to other techniques that require at least two miniscrews and as many as four. Miniscrew placement in the midpalatal suture combined with a bonded dumbbell attachment allows for simple symmetric application of power chain forces to each posterior segment. The density

continues on page 46
of the midpalate in adults is well established. Although placement of miniscrews in the midpalatal suture of adolescent patients is controversial, it seems that a low dose maxillary collimated CBCT view with an assessment of density is justified considering the clinical advantages.

Retention of Molar Intrusion

According to a recent publication by Baek et al., molar intrusion for anterior open bite correction has the potential to relapse 18 percent, on average, within the first year after treatment, whereas thereafter it is relatively stable. With this knowledge, it seems reasonable to consider a retention mechanism that delivers at least 100gms of intrusive force to the molars during sleep time during the first year of retention. The active vertical corrector (Allesee Orthodontic Appliances) (Fig. 8) has been shown to be successful in achieving molar intrusion for open bite correction in the mixed dentition by using repulsive magnetic forces. This appliance delivers 250gms of intrusion force prescribed for 24-hour wear except when eating. The REPEL* (Fig. 9) is a modification of the active vertical corrector designed to be worn at nighttime for the first year after orthodontic mini-screw-assisted molar intrusion for anterior open bite correction in the permanent dentition. It delivers 100gms of intrusive force with repulsive 1/4 x 1/32 inch neodymium magnets** embedded in acrylic over the first molars in vacuform retainers with acrylic buccal shields to prevent lateral displacement of the mandible during the application of intrusion forces.

Conclusions

This case demonstrates the following: Passive self-ligation and early light elastics can be effective for posterior crossbite correction and to aid in maxillary arch development. The use of a dumb-bell attachment allows for simple application of power chain for intrusion of posterior teeth from one palatal TOMAS orthodontic mini-screw. The mid-palate can be a reliable insertion site for orthodontic mini-screws especially when assessed with CBCT insertion simulation. The REPEL appliance is an intriguing idea to prevent relapse of molar intrusion during the first year of retention.

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Author’s Bio

Dr. John Pobanz owns and operates Pobanz Orthodontics in his hometown of Ogden, Utah. He holds a Masters of Science degree in oral biology with an emphasis on bone physiology. He completed his dental and orthodontic training at the University of Nebraska and is a diplomate of the American Board of Orthodontics. Dr. Pobanz delivers lectures to national audiences on topics ranging from creative practice marketing, to effective practice management and team building in addition to progressive applications of temporary anchorage devices.

References

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