Non-surgical Correction of a Class III Asymmetric Discrepancy with a Combined Approach of Mini-screw-facilitated Maxillary Dentoalveolar Protraction and Asymmetric Retraction of the Mandibular Dentition
Case History/Problem List

A 17-year-old Caucasian female presented the following chief complaint: “My bite points to the right and my teeth are crooked.” The left body of the mandible is approximately 6mm longer than the right. The overjet measures -2mm at the upper right lateral incisor. Minimal overbite of 1mm is present. Mild/moderate crowding of 5mm is present in each arch. The right molars and both second bicuspids are in posterior crossbite. There is a 7mm Class III molar and canine discrepancy on the left and a 4mm Class III molar and canine on the right. Smile arc and smile line are within normal parameters. The mandible is mildly prognathic in the profile view (Fig. 1). The skeletal relationships confirm the prognathic size and position of the mandible relative to the cranial base as well as a mildly deficient maxillary size and position in the anteroposterior plane (Fig. 2).

Treatment Objectives

- Resolve crowding.
- Correct posterior crossbites with arch development and early and light elastics.
- Maintain pleasing smile features of smile arc, medium smile line/gingival display, display of posterior teeth in the buccal corridors.
- Non-surgical correction of the Class III asymmetric discrepancy with a combined approach of mini-screw-facilitated maxillary dentoalvelar protraction and asymmetric retraction of the mandibular dentition to the left.
- Achieve ideal dental relationships of overbite, overjet, Class I molars and canines.
- Retain the dentalveolar correction.

Treatment Sequence

Passive self-ligating brackets with low torque upper incisor Damon torque prescription and standard torque lower incisor torque prescription were placed. Quarter-inch 2oz 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 insert.
tion of .014 CuNiTi. The archwire sequence of 14x25 CuNiTi, 18x25 CuNiTi, 19x25 ss was followed with 10-week appointment intervals. The posterior cross-bite relationships were corrected prior to advancement to 18x25 CuNiTi. Once both arches were worked to 19x25 ss, a fixed removable TPA was inserted into lingual sheaths of the upper molar bands modified with distal facing hooks. Two 6mm TOMAS mini-screws with bonded 19x25 ss wire traction hooks were placed 8mm anterior to the TPA corresponding in lateral position to the distal facing hooks on the TPA. Power chain activation every six weeks from the mini-screws to the TPA was delivered with the intent to mesialize the maxillary dentition (Fig. 3). A 10mm TOMAS mini-screw was placed in the buccal shelf of the mandible at the mesiobuccal of the lower left second molar. A power arm was placed on the lower arch wire mesial to the lower left canine. A medium NiTi coil 10mm in length was attached from the buccal shelf mini-screw and run to the power arm at a vertical level parallel to the archwire to apply approximately 250 grams of retraction force to asymmetrically distalize the mandibular dentition to a Class I molar and canine relationship (Figs. 4a, b & c) over a nine-month period of time with six week activation of the maxillary protraction with power chain and monitoring of the lower arch distalization. Detailing of the final occlusion was achieved with 19x25 TMA finishing wires and vertical finishing elastics. Total treatment time was 20 months.

**Treatment Results**

The maxillary dentition was protracted approximately 4mm. The mandibular dentition was retracted preferentially to the left (Fig. 5). A pleasing display of posterior teeth in the buccal corridors was achieved. Smile arc was maintained. Crossbites were corrected. Upper and lower crowding was resolved. Class I molar and canine relationships were achieved in addition to normal overbite, overjet and coincident midlines (Fig. 6). It seems that at least a portion of the initial apparent asymmetry of the mandible was due to a functional shift to the right. The final chin point deviation to the right is less severe compared to the initial frontal smiling image (Fig. 7).

**Insertion Protocol**

- TAC-20 topical anesthetic two, two-minute applications with a thin piece of gauze to prevent the gel from running under the tongue.
• Administer one half a carpule of 2% Lidocaine to anesthetize the long buccal nerve. This accessory of the inferior alveolar nerve innervates the buccal vestibule and therefore the periosteum labial to the second molar.
• Soft-tissue laser access opening to prevent movable mucosa from crawling up the shank of the pilot hole bur.
• Pilot hole drilling with a continuous careful motion with a slow-speed handpiece with the shank of the bur (TOMAS) oriented parallel to the labial surface of the second molar under copious saline irrigation to control temperature.
• 10mm TOMAS mini-screw placement with the Orthonia TAD driver (Rocky Mountain Orthodontics). This allows for placement with control of insertion torque with a digital readout and torque setting upper boundary of 10 N-cm.

Retention
Bonded wire retainers were bonded and an inter-occlusal Damon splint was delivered with a labial cut-out of Essix dual-laminate material from the lower left second molar to the lower left canine (Fig. 9). This allowed for placement of a tether of three-ply twisted .010 ligature wire to be attached to the buccal shelf mini-screw and then bonded to the labial surfaces of the lower left posterior teeth. The intent of this bonded tether and nighttime inter-occlusal splint is to prevent relapse. This will be maintained as such for one full year. Thereafter, the mini-screw and tether will be removed and the nighttime wear of the inter-occlusal splint tapered.

Discussion
Placement of a mini-screw in the mandibular buccal shelf is technique-sensitive. The mesiobuccal of the mandibular second molar is the location shown to be the best location for placement.2 At this location, the slope of the buccal shelf is less steep and there is often a better chance of placement into keratinized tissue (Fig. 8).2,3 Avoiding a more distal location on the buccal shelf limits the formation of mucosal inflammation surrounding the mini-screw head that can lead to failure. This area of the mandible has a relatively thick and dense cortical bone thickness.1 Controlling insertion torque to within 5 and 10 N-cm has been shown to increase secondary stability.1 Pilot hole drilling and use of the Orthonia Tad Insertion Driver (RMO) allows for controlled insertion within this torque range. A force application of 250-450 grams has been shown to be successful in distalizing mandibular molars as well as the mandibular arch en masse.1,4

Conclusions
This case demonstrates the following: Unilateral en masse distalization of the entire mandibular arch can be achieved with a 10mm mini-screw placed at the mesiobuccal of the mandibular second molar. A significant asymmetric Class III skeletal discrepancy can be camouflaged with en masse dentoalveolar movement of both arches.1


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.