

Bilateral Cleft Lip and Palate

Clinician: Dr. Mike Mayhew, Boone, NC
Patient: R.S.

Pretreatment Diagnosis

Class II dolichofacial female, age 22 years 11 months, presented with a bilateral cleft lip and palate, mobile premaxillary structures, anterior and posterior crossbites, narrow dental arches, severe crowding, and poor facial, dental and smile esthetics, which were secondary issues to the cleft lip and palate, resultant malocclusion and characteristic nasalized speech.



Facial/Soft Tissue/Macroesthetics

Convex profile with strong nasal projection and dorsal hump. Short chin and neck length and deficient pogonion. Long face, broad nasal tip, broad nares and poor cupid's bow anatomy with a thick maxillary lip.



Smile/Miniesthetics

Symmetrical smile with low, inadequate incisal display, recessive upper lip and hypomobile lip curtain on full smile. Upper dental midline position off to patient's right, severe crowding, narrow arches and inadequate dental display within buccal corridors.



Teeth/Microesthetics

Satisfactory tooth shade, overall dentition in good health with some restorations present, pegged maxillary left lateral incisor and a missing maxillary right lateral incisor. Gingival shape and contours reflect multiple lip and soft tissue repairs to cleft areas. The patient had had no osseous surgery. Super numerary teeth in cleft sites.



Initial

Appliances Used

Damon® 2

Quad Helix Appliance

Treatment Objectives and Plan

Attempt treatment via nonextraction therapy except for extraction of supernumerary teeth from cleft site and 3rd molars. The oral surgeon from the Department of Oral and Maxillofacial Surgery at the University of North Carolina at Chapel Hill recommended those extractions be completed at the time of the bone grafts to the cleft sites. Utilize a quad-helix appliance with wires extended anteriorly to the incisors to move the premaxilla and incisors out of crossbite. Employ passive self-ligation (Damon 2), developing arch widths to relieve crowding and improve the dental display in the buccal corridors—all in an effort to avoid exacerbation of the patient's nasalized speech. Employ elastics (e.g., Class II elastics and box elastics) in the posterior to aid posterior occlusal settling. Anticipate that the fixed appliance treatment will create adequate space to align the dentition and correct the crossbites via arch development although the crossbites and skeletal components of the malocclusion may require orthognathic surgery for correction. Bone grafts to the cleft sites will stabilize the premaxilla. After orthodontic treatment, the restorative plan includes cosmetic surgery to improve the overall facial esthetics from the effects of the cleft lip and palate. The restorative plan will optimize smile esthetics and replace missing and malformed dentition.

Damon 2 Variable Torques Employed

- U1s:** High torque (+17°)
- U2s:** High torque (+10°)
- U3s:** High torque (+7°)
- L2-2:** Standard torque (-1°)
- L3s:** High torque (+7°)

Treatment Sequence

Treatment Initiation

Initially placed brackets only in the mandible (7-7), working to move the lower incisors facially and to facilitate movement of the premaxilla facially for eventual alignment with the maxillary incisors. Placed a quad helix appliance with anterior "whip springs" to the maxillary incisors to move the premaxilla and maxillary anterior teeth facially (out of crossbite) to be able to place the maxillary anterior brackets. Once the anterior occlusion could accommodate brackets, the quad-helix appliance would be removed and followed with placement of full maxillary appliances.

25 Months

After 11 weeks, removed the quad-helix appliance and replaced braces in the maxillary arch 7-7, then followed the typical Damon archwire sequence, extending the time of the .018 x .025 Damon Optimal Force Copper Ni-Ti¹ in the maxillary arch to nearly 8 months to aid its width development. Following arch development and exposure of the supernumerary teeth, the general dentist extracted them. One of the extracted teeth was used as a prosthetic tooth for the missing UR2 with the root of the supernumerary tooth amputated, a retro-crown endodontic procedure completed and the tooth filled with a composite restorative material. The UL2 was built up for tooth size coordination with the UR2 during treatment.

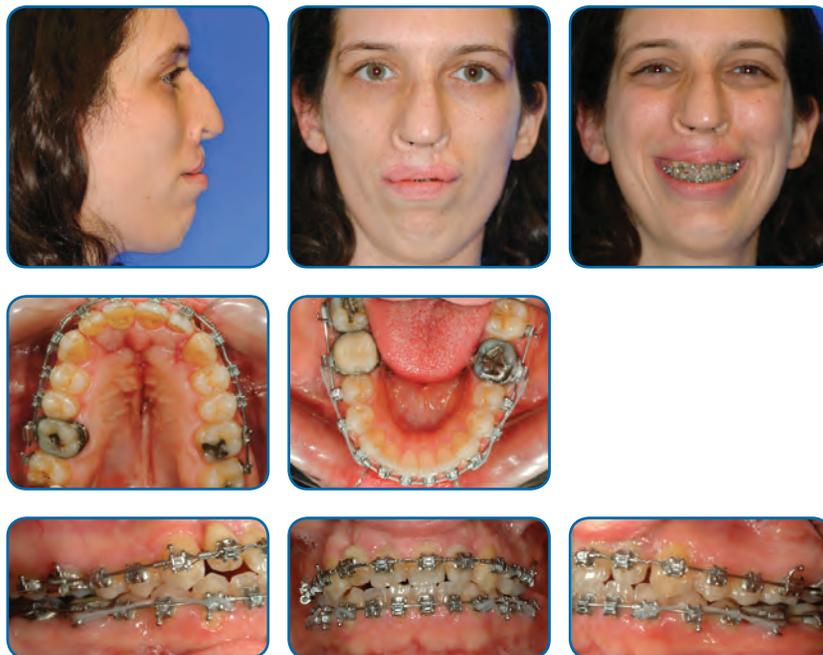


25 Months

¹All Copper Ni-Ti wire used is Damon Optimal Force Copper Ni-Ti.

29 Months

The UR1 and UL2 had inadequate bone along their root surfaces adjacent to the cleft sites and so were extracted during the maxillary arch bone grafts to stabilize the premaxilla. The extracted teeth would serve as pontics, placed on the archwire for the remainder of the treatment time. The planned advancement genioplasty was also accomplished at this time.



29 Months

30.5 Months

Final Visit, 130 weeks
15 Treatment Visits, 6 Emergency Visits

Following appliance removal, fabricated a temporary partial appliance for the maxillary arch, anticipating that the patient would be undergoing treatment for implants (UR3, UR1 and UL2). Also placed a maxillary lingual arch cemented to the U6s with a temporary retainer placed over it (for day wear only). The dentist removed the lingual arch before completing the restorations. Retention for the mandible included a .027 TMA lingual arch bonded L3-3 and a Essix™ retainer (Dentsply Raintree Essix, Bradenton, FL) employed until the delivery of a removable Hawley retainer.



30.5 Months - Fixed Appliance Treatment Complete

30.5 Months

Final Visit, 130 Weeks

15 Treatment Appointments, 6 Emergency Visits

Temporary Partial Appliance Placed

Restorative Temporaries Placed



30.5 Months Temporary Partial Appliance



30.5 Months Restorative Temporaries

Posttreatment

The patient decided to forgo implants and have a fixed bridge instead. In an effort to improve stability of the transverse development without long-term retention and with my approval, the general dentist and patient decided to fabricate the maxillary fixed bridge 5-5. The restorative care would also enhance the maxillary incisal display by making an effort to create pleasing tooth shapes and a smile arc and by elongating the crowns to compensate for the hypomobile lip curtain on full smile. The patient understood that further soft tissue nasal and lip procedures are options for her to consider at her leisure for additional improvement of her facial and smile aesthetics.



Posttreatment - Fixed Bridge Placed

Case Discussion

Accomplished all goals for functional occlusion (manipulated to coincident CR/CO) and prepared the dental arches for the patient to undergo restorative care. Achieved proper tooth inclinations and significant transverse changes in both dental arches with positive vertical and A/P changes as well.

Although the original treatment plan included maxillary orthognathic surgery to widen the maxilla, the orthodontic treatment alone was successful in fostering the arch development required. The only orthognathic surgery completed was advancement genioplasty to optimize mandibular projection and complement the facial A/P changes to improve the profile.

The patient's facial and smile esthetics would be further enhanced by planned lip and nasal plastic surgical procedures.



Initial



Final

What I Would Do Differently Today

At the time I treated this case, I had no protocol for employing an expanded .016 x .025 stainless steel archwire for lateral development. Nor did I have protocols for using occlusal buildups to disocclude the dentition. Were I to treat this case today, I would start arch width development with the Damon recommended archwire protocol through the .018 x .025 CuNi-Ti archwire and then evaluate for use of a .016 x .025 stainless steel archwire expanded approximately 1 inch on each side to facilitate the arch development. When expanding an archwire for transverse development, it is important to evaluate crown torque and to consider adding posterior lingual crown torque to avoid excessive crown tipping. I would also have created occlusal buildups on the molar teeth using Triad Gel® (Dentsply, York, PA) and Transbond™ Plus Self-Etching Primer (3M/Unitek, Monrovia, CA) that would assist in bite opening and aid in expediting the posterior and anterior crossbite corrections.

Wire Sequence Chart

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Maxillary Hardware

Mandibular Hardware

