

Nonsurgical Correction of CL II Retrognathic Mandible, TMJ and Gingival Asymmetry

Clinician: Dr. Stuart Frost, Phoenix, AZ
Patient: S.M.

Pretreatment Diagnosis

Class II, deep bite patient presented with chief complaint of jaw pain and too much maxillary gingival display on her left side. She had clicking and popping in both jaws while opening and closing her mouth and reported a pain level of 7 on a VAS scale. She had been to several orthodontists for evaluation and each said that she would need surgery to correct the gingival asymmetry.

Facial/Soft Tissue/Macroesthetics

Normal cephalic profile with a retrognathic mandible and a slightly obtuse nasolabial angle with her upper lip projecting beyond her lower lip but with a good vermillion display. Upon smiling, she had a 4 mm asymmetrical gingival display above the upper left central posteriorly.

Smile/Miniesthetics

Over 100% incisal display upon smiling, which is asymmetrical, with an asymmetrical smile arc. Narrow upper transverse width.

Teeth/Microesthetics

Asymmetrical gingival architecture. Upper centrals appear overerupted with a 100% deep bite.



Initial

Appliances Used

Damon® 3MX

VectorTAS™ Temporary Anchorage

Herbst®¹

¹Herbst is a registered trademark of Dentaaurum, Inc.

Treatment Objectives and Plan

Relieve her jaw pain, correct the Class II malocclusion and address possible anterior disc displacement through use of Herbst molar-to-molar Class II corrector, and follow the Dr. Terry Dischinger protocol. This protocol stipulates placing brackets U5-5 and L4-4 at bonding. The Herbst appliance will be in place 10-12 months. Widen the narrow transverse arch width using the Damon 3MX (D3MX) appliance.

Correct the asymmetrical gingival display using two VectorTAS miniscrews on the upper left side to intrude the upper left quadrant, placing the TADs after progressing to a .019 x .025 stainless steel archwire in the upper arch. The TADs will be in place for 6 months. Total treatment time should be approximately 24 months. Retention will employ a muscle-training splint.

Damon 3MX Variable Torques Employed

- U1s:** High torque (+17°)
- U2s:** Standard torque (+8°)
- U3s:** High torque (+7°)
- L2-2:** Standard torque (-1°)
- L3s:** High torque (+7°)

Treatment Sequence

Bonding

U/L: .013 round Damon Optimal Force Copper Ni-Ti^{®2} archwires. Delivered Herbst and advanced it 5 mm to edge to edge. Engaged wires directly into the Herbst crowns on the upper arch but the assistant inadvertently cut the wire distal to the L4s, which caused mild tipping.

U: Placed bite turbos lingually on the 1s using Mini-Molds (Ortho Arch, Schaumburg, IL) and Triad[®] Gel (Dentsply, York, PA) so that the patient would have a biting surface after the Herbst was advanced. Ligation-tied U6-6 to allow as much movement as possible in the lower arch. Placed stops mesial and distal to UR1.



Bonding

2 Weeks

Appliance check. Patient reported TMJ pain was gone and that she was feeling great.

2.25 Months

Emergency - Replaced broken lower archwire.

2.5 Months

1st Visit

U: Transitioned to .014 x .025 CuNi-Ti archwire. Maintained ligature ties U6-6 and the stops mesial and distal to UR1.

L: Maintained .013 round CuNi-Ti archwire.

U/L: Engaged wires through the tubes on the Herbst crowns, which would recover the tipping of the L4s.



2.5 Months

2.75 Months

Emergency: Removed Herbst because of patient discomfort. Took new impression to fabricate another Herbst.

4 Months

2nd Visit

U/L: Re-cemented new Herbst. Advanced left side 2 mm; right side, 1 mm.

U: Transitioned to a .018 x .025 CuNi-Ti archwire to level U6-4. Maintained stops mesial and distal to U1s. The assistant changed the U6-6 ligature ties to power chain U3-3.

L: Transitioned to .018 round CuNi-Ti archwire. The Herbst rests on the 5s, which tends to intrude these teeth; the round .018 CuNi-Ti archwire is not strong enough to preclude mesial tipping of the L6s. Unfortunately, the assistant again cut the lower archwire distal to the L4s. Engaging the wire throughout the arch would have helped in extruding the L5s. These issues will be managed as treatment progresses.



4 Months

6.5 Months

3rd Visit

U: Maintained .018 x .025 CuNi-Ti archwire and stops mesial and distal to U1s. Changed from power chain U3-3 to ligature-ties U6-6.

L: Transitioned to a .014 x .025 CuNi-Ti archwire.

7.5 Months

4th Visit

U: Transitioned to a .019 x .025 TMA archwire, placing 15° of buccal crown torque U2-2 and stops mesial and distal to UR1.

L: Maintained .014 x .025 CuNi-Ti archwire. Placed 3 mm shims to advance the Herbst edge-to-edge.

8 Months

Emergency: Addressed a poking wire.

9.5 Months

5th Visit

U/L: Removed the Herbst prematurely because it was bothering the patient. Bonded 6s, 7s and L5s. Dropped back to .014 round CuNi-Ti archwires in both arches, cutting the wires distal to 6s. Placed one stop distal to UR4 and one between the L1s. Started Quail, 3/16", 2 oz., Shorty CL II elastics (bilaterally L6 to U4, full-time). When using a Herbst, I like to overcorrect to a negative 1 mm overjet, then use elastics to maintain the occlusion. In this case, the occlusion had only reached edge-to-edge by the time we removed the Herbst so I needed to engage elastics to prevent relapse throughout the remainder of treatment.

L: Engaged a bite bumper (Elastomeric Ligature with Guard from 3M/Unitek, Monrovia, CA) on LL1 to protect the UR1.



9.5 Months

1 Week Later

Emergency: Patient called after the Herbst removal to report popping in her right joint. She had no pain so I told her not to worry.

11.25 Months

6th Visit

U/L: Transitioned to .014 x .025 CuNi-Ti archwires, running the wires back to the 7s and maintaining the elastics, advancing to Full Class II attachment and increasing size to Parrot, 5/16", 2 oz., full-time. Ligature-tied U/L3-3.

12.5 Months

7th Visit

U: Transitioned to a .019 x .025 TMA archwire, placing 15° of labial crown torque U2-2.

L: Transitioned to a .017 x .025 TMA archwire, placing 15° of lingual crown torque L2-2. Added Elastomeric Ligature with Guard to LR1 so that both upper 1s were protected. Removed all stops.

U/L: Maintained the CL II elastics and ligature ties U/L3-3.



12.5 Months

13 Months

Emergency: Rebonded LL6.

13.5 Months

8th Visit

U: Replaced the .019 x .025 TMA archwire, maintaining the 15° of labial crown torque U2-2.

L: Replaced the .017 x .025 TMA archwire, maintaining 15° of lingual crown torque L2-2.

U/L: Maintained the CL II elastics and ligature ties U/L3-3. Took interim panograph and repositioned L1s and L3.

16.5 Months

9th Visit

U: Transitioned to a .019 x .025 stainless steel archwire. Did not replace the labial crown wire torque since the TADs would tend to cause upper incisor proclination. To address the cant, placed a 6 mm TAD between the UL2 and 3 and a 8 mm TAD between the UL4 and 5. To each TAD, attached a 150 g, 10 mm spring to the miniscrew head, looping it under the archwire and back to itself. Instructed the patient to use a toothbrush and the clora hexdine provided to clean the TADs.

L: Replaced .017 x .025 TMA archwire, maintaining the 15° of lingual crown torque L2-2. Placed a stop distal to LR3.

U/L: Maintained the CL II elastics and ligature ties U/L3-3.



16.5 Months

1 Week Later

Checked TADS. They were secure and functioning properly.

17.5 Months

10th Visit

U: Maintained the .019 x .025 stainless steel archwire and TAD attachments.

L: Transitioned to a .019 x .025 TMA archwire, placing 15° of lingual crown torque L2-2.

U/L: Reduced Class II Parrot elastics to nighttime only and maintained ligature ties U/L 3-3.

17.75 Months

Emergency: Patient felt TADS were pulling asymmetrically, but there was no problem.

18.5 Months

11th Visit

U/L: Maintained archwires with 15° of lingual crown torque L2-2, TAD attachments, ligature ties U/L 3-3 and CL II elastics, increasing size to Fox, 1/4", 3.5 oz., full-time

19.5 Months

12th Visit

U: Replaced springs on TADs. Added closing springs to close space between 6s and 7s, bilaterally.

U/L: Maintained archwires with 15° of lingual crown torque L2-2 and CL II elastics.

20.25 Months

13th Visit

U: Added power chain U3-3. Replaced spring on TADs with power chain. Activated closing springs between 6s and 7s, bilaterally.

U/L: Maintained archwires with 15° of lingual crown torque L2-2 and CL II elastics.

21.5 Months

14th Visit

U: Deactivated anterior TAD attachment. Adjusted power chain to posterior TAD. Changed power chain to U7-7.

U/L: Maintained archwires with 15° of lingual crown torque L2-2 and CL II elastics.

22 Months

15th Visit

U: Repositioned UR6. Maintained power chain U7-7. Added closing spring U7-2 to close space that had opened.

L: Put step-down bend L2-2 and step-up bend LL3.

U/L: Maintained archwires with 15° of lingual crown torque L2-2 and CL II elastics, increasing to Ram, 3/16", 6 oz., full-time.

22.5 Months

16th Visit

U: Changed closing springs to UL6-3. Maintained power chain U7-7.

L: Performed IPR L2-2. Added power chain L7-7.

U/L: Maintained archwires with 15° of lingual crown torque L2-2 and CL II elastics.

23 Months

17th Visit

U: Removed TADs.

L: Performed IPR 2-2.

U/L: Maintained archwires with 15° of lingual crown torque L2-2, CL II elastics and power chain U/L 7-7. Added step-down bends L2-2.

23.75 Months

18th Visit

U: Ligature-tied U3-3.

L: Adjusted brackets L2-2 for bite purposes.

U/L: Maintained archwires with 15° of lingual crown torque L2-2, CL II elastics (reduced to nighttime only) and power chain U/L 7-7.

24.25 Months

19th Visit

U: Added 15° of buccal crown torque to U3s and maintained ligature ties U3-3.

U/L: Maintained archwires with 15° of lingual crown torque L2-2, CL II elastics and power chain U/L 7-7.

25 Months

20th Visit

U: Added step-up bend to UR1, maintained ligature ties U3-3 and checked occlusion. Added k-ties U6s over 4s to post mesial to U3 on wire.

L: Added ligature ties L3-3.

U/L: Maintained archwires with 15° of lingual crown torque L2-2, CL II elastics and power chain U/L 7-7.

25.25 Months

21st Visit

U: Added step-down bends U2-2 to enhance smile arc and a closing spring to close L6 and 7.

L: Added step-down bend to LR3.

U/L: Maintained archwires with 15° of lingual crown torque L2-2, CL II elastics, ligature-ties U/L 3-3, power chain U/L 7-7 and k-ties.

25.5 Months

22nd Visit

U/L: Maintained archwires with 15° of lingual crown torque L2-2, CL II elastics, ligature ties U/L 3-3, power chain U/L 7-7 and k-ties. Took impression for lower permanent retainer.

25.75 Months

23rd Visit

U/L: Maintained archwires with 15° of labial crown torque L2-2 (adding step-up bend UR1), CL II elastics, ligature ties U/L 3-3, power chain under wires U/L 7-7 and k-ties.

26 Months

Final Visit, 110 Weeks

23 Treatment Appointments, 5 Emergency Visits, 2 Appliance Check Visits

U/L: Removed all appliances. Shaped and polished all the teeth. Took impressions for a muscle-training Damon Retention Splint (AOA, Sturtevant, WI).

U: Bonded permanent retainer U2-2, just on the 2s, starting at the UR2, shaping the wire tooth by tooth using .016 x .022 Bond-a-Braid™ lingual retainer wire (Reliance Orthodontic Products, Itasca, IL). If the upper fixed retainer comes loose after 18 months, we rebond only if the patient originally had 3 to 4 mm of spacing pretreatment.

L: Bonded permanent retainer L3-3, bonding each tooth using an .026 stainless steel wire, forming looping bends on each end. The lower fixed retainer is to be bonded for life.



26 Months - Treatment Complete

Posttreatment

Retention Appliance Delivery

U/L: Delivered 1 mm clear Damon Retention Splint (AOA Lab, Sturtevant, WI). The Damon Retention Splint is excellent for retention of Class II cases and transverse arch development. The patient is to wear the splint full-time for the first 6 weeks and nighttime only thereafter.

Laser Contouring and Retention Checks

In the months subsequent to finishing fixed appliance treatment, performed laser contouring to correct gingival architecture: U2-2 and LR1. Two weeks after the final laser contouring, the tissue had healed and retention compliance was good only thereafter.



Laser Contouring

Posttreatment Retention

10 months

Retention compliance continues to be excellent. Space had opened between U1s. Patient wore retainers again and the space closed.



Posttreatment Retention

Case Discussion

The patient is TMJ pain-free and is thrilled with her results that corrected the excessive gingival display without surgery. Overall, I accomplished all of my treatment goals except for going over in treatment time by 2 months.

This case was my first experience using this particular type of Class II corrector so I had not developed protocols for its use, which points up the value of such documentation in light of the errors that the assistants made. This case was also my first experience using TADs for intrusion and although the TAD treatment took longer than I had anticipated (almost 7 months), using them for intrusion worked well, precluding surgery.

In analyzing the cases of Dr. Dwight Damon and the arch form that he achieves, I discovered that keeping a .019 x .025 stainless steel archwire in the patient's upper arch for six months or more is crucial to the result I hope to achieve. In this case, the stainless steel archwire remained in place for over 8 months to realize an excellent arch form. My ultimate goal is to manage cases so that I transition to the .019 x .025 stainless steel archwire at the 6-month juncture, then allow this finishing wire to work for another 6 months.

I find that taking photographs at regular junctures and using them to assess the case in the quiet of my office gives me vital information about torque, tip, tooth shape and occlusion that better informs my treatment going forward.

The gingival contouring I performed after the end of treatment further added to the esthetics of the result.

What I Would Do Differently Today

This case was a superb learning experience for me. The treatment would have been more efficient had the patient not had the Herbst issues. Since I wasn't able to overcorrect the Class II to a Class III with the Herbst appliance, I had to fight relapse throughout treatment with elastics.

Because I hadn't used low-torque brackets in the lower anteriors, I continually had to put lingual crown torque into the lower wire to overcome flaring. It also would have been beneficial to have had the +11° torque prescription for the U3s that the new Damon Q brackets offers versus the +7° of the D3MX prescription. It really goes to show how important variable torque is to our treatment.



Initial



Final

Wire Sequence Chart

Clinician: Dr. Stuart Frost, Phoenix, AZ Patient: S.M.

