

# Bi-maxillary Protrusion Treated Nonextraction

**Clinician:** Dr. Stuart Frost, Phoenix, AZ  
**Patient:** M.C.

## Pretreatment Diagnosis

Class I, bi-maxillary protrusive patient, 25 years old, presented having had prior orthodontic treatment. A current dental student, her chief concern was her flared front teeth. She was adamant about not having tooth extractions.

### Facial/Soft Tissue/Macroesthetics

Normal cephalic convex profile with an acute nasolabial angle. Her upper lip protruded beyond her lower lip with a pleasing vermillion display. Slight upper lip fullness and slight lip strain when lips were at rest.

### Smile/Miniesthetics

90% incisor display upon smiling, narrow maxillary transverse arch with upper incisor protrusion, but an adequate smile arc.

### Teeth/Microesthetics

Asymmetrical gingival architecture and triangular-shaped teeth in both arches.



Initial

## Appliance Used

Damon® 3MX

## Treatment Objectives and Plan

Treat nonextraction, eliminating the crowding by widening the arches, using Damon 3MX brackets. Employ variable torque to detorque the anterior teeth, then reshape the anteriors (upper and lower arches) so they are more pleasing in shape. Employ Dr. Tom Pitts's bracket positioning to maintain the smile arc.

## Treatment Sequence

### Bonding

**U/L:** Direct bonded 7-7, placing .014 round Damon Optimal Force Copper Ni-Ti<sup>®1</sup> archwires.

**U:** Placed a stop.

### 2.5 Months

1st Visit

**U/L:** Transitioned to .018 round CuNi-Ti archwires. See note in Case Discussion.

**U:** Maintained the stop.

### 4 Months

2nd Visit

**U:** Transitioned to a .014 x .025 CuNi-Ti archwire, maintaining the stop.

**L:** Maintained the .018 CuNi-Ti archwire. Performed slight IPR to begin reshaping triangular teeth.

### 5 Months

3rd Visit

**U:** Transitioned to a .018 x .025 CuNi-Ti archwire, maintaining the stop.

**L:** Maintained the .018 CuNi-Ti archwire. Performed additional IPR on the lower arch.

## D3MX Variable Torques Employed

**U2-2:** Standard torque, reversed (+12° to -12° for central; +8° to -8° for lateral)

**U3s:** High torque (+7°)

**L2-2:** Low torque (-6°)

**LL3:** Standard torque (0°)

**LR3:** High torque (+7°)

<sup>1</sup>All Copper Ni-Ti wire used is Damon Optimal Force Copper Ni-Ti.

## 6.5 Months

### 4th Visit

**U:** Transitioned to a .019 x .025 TMA archwire, placing 20° of lingual crown torque U2-2 and maintaining the stop.

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

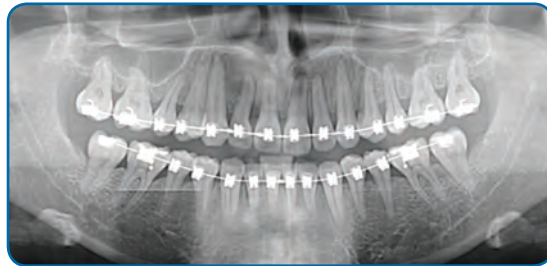
## 7.75 Months

### 5th Visit

**U/L:** Took interim panograph and repositioned U1s, UR4 and 5 and LR3. Slenderized U/L 2-2 and placed power chain 3-3.

**U:** Replaced the .019 x .025 TMA archwire, maintaining the 20° of lingual crown torque U2-2 and the stop.

**L:** Maintained the .014 x .025 CuNi-Ti archwire.



7.75 Months

## 9.25 Months

### 6th Visit

**U:** Repositioned UR1. Replaced the .019 x .025 TMA archwire, maintaining the 20° of lingual crown torque U2-2 and the stop.

**L:** Transitioned to a .017 x .025 Ni-Ti archwire pretorqued with 20° of lingual crown torque. Placed power chain L6-6.

## 10.25 Months

### 7th Visit

**U:** Transitioned to a .019 x .025 stainless steel archwire, placing 15° of lingual crown torque U2-2, widening the Damon arch form 2-4 mm in the buccal segments, bilaterally. Ligature tied U3-3 and maintained the stop. While the patient's arch width was developing adequately without widening the archwire, the added arch width will assist in uprighting the anteriors. Dr. Dwight Damon recommends that the .019 x .025 stainless steel finishing wire remain in place for six months to extract its full benefit, which was the plan for this case.

**L:** Transitioned to a .019 x .025 TMA archwire. Ligature-tied L3-3.

### 11 Months

#### 8th Visit

**U:** Slenderized and shaped incisors U3-3.  
Replaced the .019 x .025 stainless steel archwire, adding a 2nd order bend (mesial root tip) in UL1, and maintaining the 15° lingual crown torque U2-2 and ligature ties U3-3.

**L:** Maintained the .019 x .025 TMA archwire and ligature ties L3-3.

### 12 Months

#### 9th Visit

**U:** Performed IPR U2-2. Replaced the .019 x .025 stainless steel archwire, maintaining the 2nd order bend (mesial root tip) in the UL1, the 15° lingual crown torque U2-2 and ligature ties U3-3. Placed power chain U6-6 and maintained stop mesial to UL4. At this point, I'm focusing on the patient's microesthetics. The UL1 needs more extrusion and the anteriors are still flared. Even with having flipped the U2-2 brackets upside down for added lingual crown torque, widened the stainless steel archwire for anterior uprighting and added lingual crown wire torque, the anteriors will require the additional weeks of treatment to be uprighted. Because it is difficult to add torque to posted wires and since there were no major mechanics that required posts in this case, unposted wires had worked best to this point.

**L:** Maintained the .019 x .025 TMA archwire, ligature ties L3-3 and added power chain L6-6.



12 Months

### 13 Months

#### 10th Visit

**U:** Reshaped U2-2 slightly. Checked the torques and replaced the .019 x .025 stainless steel archwire, maintaining the 2nd order bend (mesial root tip) in UL1, the 15° lingual crown torque U2-2, ligature ties U3-3 and power chain U6-6.

**L:** Maintained the .019 x .025 TMA archwire, ligature ties L3-3 and power chain L6-6.

**14 Months****11th Visit**

**U:** Replaced the .019 x .025 stainless steel archwire, maintaining the 2nd order bend (mesial root tip) in UL1, the 15° lingual crown torque U2-2, ligature ties U3-3 and power chain U6-6.

**L:** Maintained the .019 x .025 TMA archwire, ligature ties L3-3 and power chain L6-6.

Taking photographs without wires in place allows me to see tooth inclinations better. Took impressions to make study models for finishing assessments. The upper incisors need further uprighting, but the spaces are closing and the buccal segments, canine to molar, are in good alignment.

**14 Months****15.25 Months****12th Visit**

**U:** Performed IPR U2-2. Replaced the .019 x .025 stainless steel archwire, maintaining the 2nd order bend (mesial root tip) in UL1, the 15° lingual crown torque U2-2 and the ligature ties U3-3. Added a step-down bend UL5 and ligated power chain to U7-7.

**L:** Maintained the .019 x .025 TMA archwire, ligature ties L3-3 and ligated power chain L7-7.

**U/L:** Started Moose 5/16", 6 oz. box elastics (bilaterally, U6 to crimped posts mesial to U3 and L3 to L6, full-time).

**15.75 Months****13th Visit**

**U:** Replaced the .019 x .025 stainless steel archwire, maintaining the 2nd order bend (mesial root tip) in UL1, the 15° lingual crown torque U2-2, ligature ties U3-3, the UL5 step-down bend and power chain U7-7.

**L:** Maintained the .019 x .025 TMA archwire, ligature ties L3-3 and power chain L7-7.

**U/L:** Maintained box elastics. Took impressions for permanent retainers.

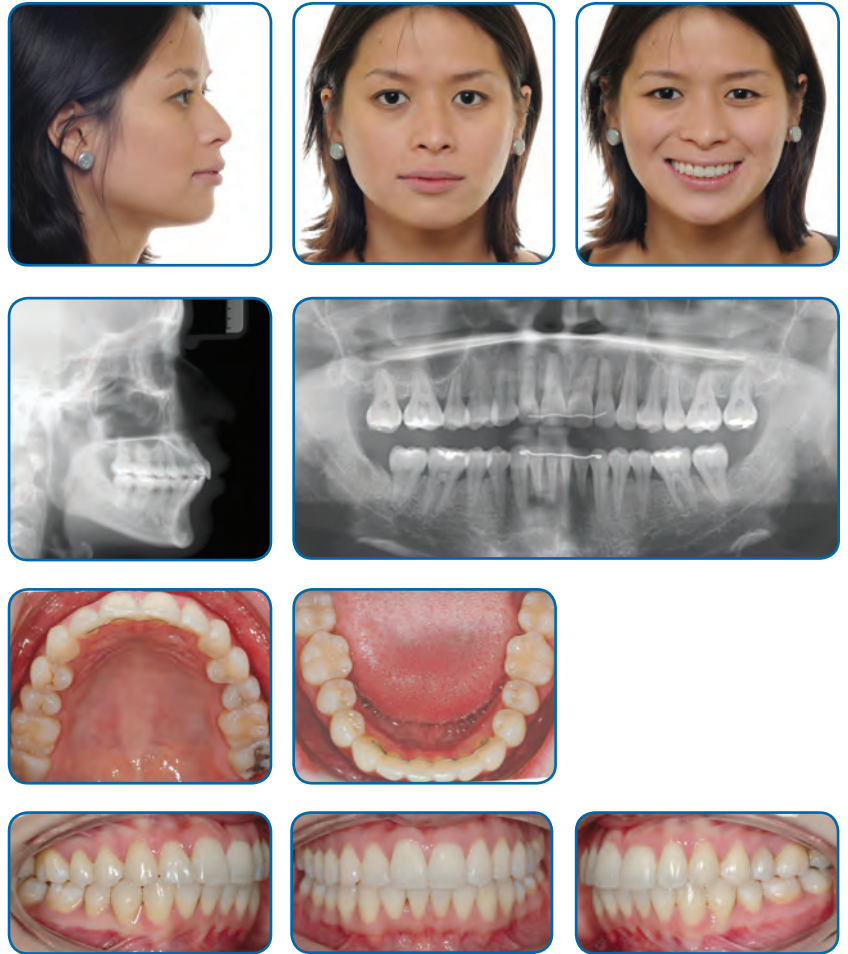
**16 Months**

Final Visit, 68 Weeks

13 Treatment Appointments

**U/L:** Removed all appliances. Shaped and polished all the teeth. Took impressions for 1 mm Essix-formed clear overlays. Patients are to wear overlays full-time for the first 6 weeks and then nighttime only thereafter. Bonded upper 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). Bonded lower retainer, every tooth, L3-3 using an .026 stainless steel wire, forming looping bends on each end. The lower fixed retainer is to be bonded for life. If the upper fixed retainer comes loose after 18 months, we rebond it if the patient originally had 3-4 mm of spacing pretreatment.

At the end of treatment, I finished shaping the U/L anteriors with a round diamond wheel, then used heavy, medium and light sandpaper discs (Shofu Dental Corporation, San Marcos, CA) on the incisal embrasures for polishing and shaping. Finally, I polished the facial surfaces with a black polishing point (Reliance Orthodontic Products, Itasca, IL). Given the time and effort it takes to complete a case, it seems only sensible to shape anteriors throughout treatment and at the end of it to heighten the quality of a good result.



16 Months - Treatment Complete

## Case Discussion

We achieved all treatment objectives and satisfied the patient's chief concern, while complying with her request for nonextraction therapy.

Determining when to transition from the round wire phase to the first rectangular wire is a decision I base on two considerations. If there is still moderate crowding in either of the arches and/or the patient is still experiencing moderate soreness, I transition from the .014 round to a .018 round CuNi-Ti archwire before transitioning into the first rectangular wire, a .014 x .025 CuNi-Ti archwire. One of the keys to the Damon optimal-force, low-friction appliance system is allowing archwires adequate time to unravel teeth in the round-wire phase. In this case, I maintained the second round archwire (a .018 CuNi-Ti) in the lower arch for 17 weeks, performing sequential IPR while transitioning through the first two rectangular archwires in the upper arch, which was much less crowded.

Repositioning brackets is also of great importance to high-quality finishes. No matter how well I think I've placed brackets at bonding, I usually find that I need to reposition a few bonds. I take an interim panograph to check for root positions six weeks after both arches have had a rectangular wire in place for several weeks, repositioning brackets accordingly, but I also check bonds at every appointment thereafter and reposition any bracket that mandates it. The little additional time that this takes is always worth it.

## What I Would Do Differently Today

Needing even lower low-torque bracket options for such cases is the reason that Dr. Dwight Damon worked with Ormco to increase the low-torque choices in the Damon Q™ (DQ) prescription. Even though I reversed the regular torque U2-2 brackets for greater lingual crown torque, I still had to add wire torque in the upper arch from the 4th visit on. On each of these visits, I would use Tweed pliers to check the degree of torque in the newly disengaged wire by holding it in the pliers parallel to the floor, then determine whether to maintain the current torque or add more (never more than 20°). I maintain the finishing torque as holding torque until the end of treatment. While it might seem that adding 20° of torque to upside-down U2 brackets already offering 12° of lingual crown torque might seem excessive, there is approximately +/-11° of wire-to-bracket play between a .019 x .025 archwire and a .022 x .028 lumen, which diminishes the applied torque by the amount of play. With the high-torque options now available with DQ, I might not have had to add wire torque, a time-consuming and inconsistent protocol.

I think this case could have had an even more pleasing esthetic result if I had extruded the upper centrals more (by repositioning the brackets more gingivally or by putting in step-down bends) for a better smile arc. I also wish I had reshaped the lower lateral incisors slightly more; otherwise, I am very happy with the result and the patient was quite delighted as well.



Initial

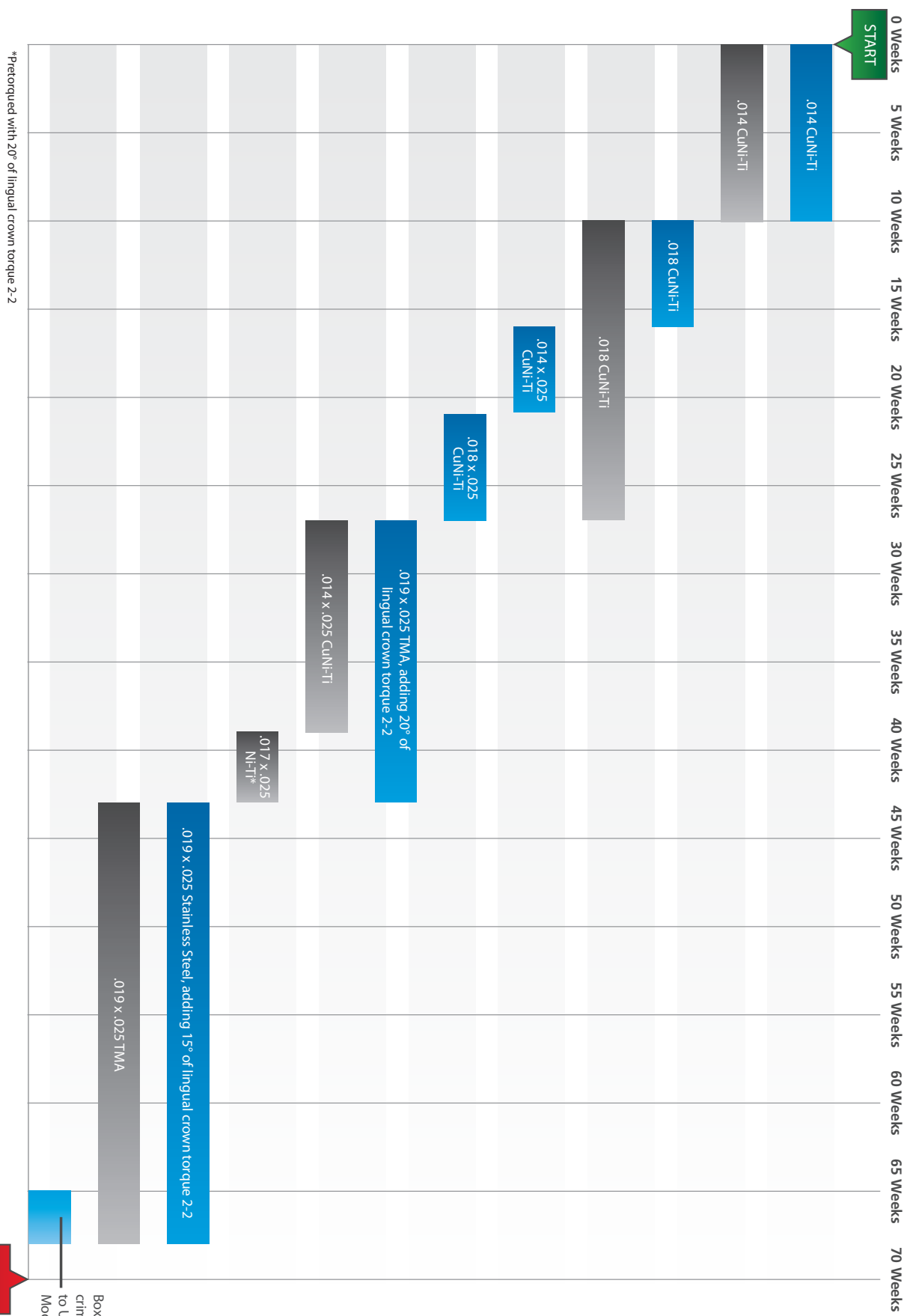


Final

# Wire Sequence Chart

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

Maxillary Hardware Mandibular Hardware



\*Pretorqued with 20° of lingual crown torque 2-2

Box elastics, U6 to crimped posts mesial to U3 and L3 to L6, Moose, 5/16", 6 oz.