Class III Mechanics

• Extractions still often indicated
• Case shown in this Module was non-extraction

Extraction Mechanics

The orbicularis oris and mentalis muscles maintain the AP (anterior-posterior) position of the anterior teeth while the crowding seeks the path of least resistance, which is into the extraction sites. This is a very significant mechanical advantage since the crowding is alleviated without any demand on posterior anchorage.

Taking advantage of these mechanics eliminates need for individual cuspid retraction. Moving the anterior teeth en masse appears to have a positive long-term periodontal impact particularly around the cuspids.

En-masse Retraction

This method of space closure involves ligating the six anterior teeth together and moving them as a unit closing the extraction site.

1. The anterior space is first consolidated via elastic C-chains (under the archwire if large spaces) on a .016 x .025 or .014 x .025 CuNi-Ti or Ni-Ti SE archwires.

2. After anterior space closure, this segment is ligated from cuspid to cuspid with .008 stainless steel ligature wire behind the archwire to prevent anterior spaces from opening.

3. Posterior spaces are closed utilizing Ni-Ti coils or Pletcher stainless steel coils on a preposted .019 x .025 Stainless Steel archwire. The coil springs are placed over the end of the archwire cut distal to the first molar while the other end is activated with ligature wire to the hook on the archwire placed mesial to the cuspids.
All space closure is performed on either SS wires (.019x.025 SS or occasionally on .018x.025 SS).

This is best accomplished with NiTi Coil springs attached at the distal end of the archwire in the molar tube. Leave about 1-2 mm length, bend the steel eyelet and attach to the posted arch wire. (65-75 grams)

- Use “medium” NiTi open coil retraction springs in children
- NiTi coils or stainless steel in adults.

Dr. Damon advocates using sliding mechanics to close spaces where extractions occur.

**Pletcher coil springs** are typically used in adult cases as well as those cases where the space desired to be closed has been evident for long periods of time (previous extraction spaces).

They are made of stainless steel, as opposed to NiTi), and are used for space closure. They are attached to the mesial hook of the posted .019 x .025 archwire and extended distal to the first molar. These deliver a greater force than Ni-Ti coils and All other mechanics are identical for space closure.
In extraction cases

- Space closure
- Space consolidation

**Space Consolidation** is the process of gathering anterior space between teeth prior to en masse retraction. Chain elastics are used from lateral to lateral or cuspid to cuspid, depending on the amount of space needed to close. If major space is present, care is given not to round trip the cuspids. In this situation, space would be closed lateral to lateral.

Only close anterior space on .014 x .025 or .016 x .025 Ni-Ti archwires in the second phase of archwire sequencing. Closing space on round archwires will cause rotations. If major anterior space is involved, the chain elastics are placed before insertion of the archwire, thus minimizing friction. Occasionally, elastic thread is utilized to control the force of the space closure. It is preferable to consolidate space distal to the cuspids prior to *en masse* retraction of the anterior segment. Space closure is easier if the forces vectors are parallel to the major mechanics posterior archwire. All rotations should have been corrected before posterior space closure.

**Space Closure**

Following anterior space consolidation in the High-Tech edgewise phase of archwire sequencing, the six anterior teeth are ligated together under the archwire with .008 stainless steel ligature wire. A pre-posted .019 x .025 Stainless Steel archwire is inserted with the hooks placed between the laterals and cuspids. Medium Ni-Ti (9 or 12 mm) springs are placed over the end of the slightly protruding archwire clipped distal of the first molars. The other end of the spring is attached to the hook on the archwire with ligature wire. The springs are usually activated approximately 2/3 of their original length.
Space Closure Caveats:

- Activate the coil spring about 3-4 mm or about 4 ounces.
- Tie the ligature around the bracket under the arch wire.
- Retie in 8-10 weeks.
- If midline is off, activate less on non affected side (“Donuts” for friction).
Space Creation is the process of altering the course of treatment by changing an extremely crowded situation into a nonextraction case. Ideally, this is performed in the late mixed dentition stage before the eruption of the cuspids.

1. A four tooth sectional .014 wire is placed in the anterior segment to align and control severe rotations.
2. Following the initial phase, a .014 x .025 or .016 x .025 Ni-Ti wire is placed with a compressed Ni-Ti coil spring extending from the lateral incisor to the first molar. Great care is given to only activating the spring approximately 1X times the width of the bracket. Too much activation will overpower the lip bumper effect of the orbicularis oris and mentalis muscles.
3. Crimpable stops are placed on either side of a central bracket to prevent the archwire from sliding.
4. The patient is reappointed at an appointment interval, usually 10 weeks, so the archwires do not have time to slide out of the first molar tube.

**NOTE:** This procedure can be performed in conjunction with Herbst® therapy by welding a wire tube to the maxillary stainless steel crown and aligning the anteriors as described above. It is also advisable to weld a long molar tube in an attempt to prevent the archwire and spring from becoming dislodged from the molar tube between appointments.
In **maximum anchorage** cases, ligate the U6s and U7s together while attaching the spring to the hook of the first molar (top image above).

In **minimum anchorage** cases, cut the wire distal to the first molar and attach the spring to the distal end of the molar tube (lower image above).
Damon Principle #8 of the 12 is to move the anterior teeth *en masse* into the available spaces. The *en masse* retraction method of space closure involves ligating the six anterior teeth together and moving them as a unit, thereby closing the extraction sites.

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2. After anterior space closure, this segment is ligated from cuspid to cuspid with .008 stainless steel ligature wire behind the archwire to prevent anterior spaces from opening.

3. Posterior spaces are closed utilizing NiTi coils or Pletcher stainless steel coils on preposted .019 x .025 stainless steel archwires. The springs are placed over the end of the archwire cut distal to the first molar while the other end is activated with ligature wire to the hook on the archwire placed mesial to the cuspids.
Consider the following torques in Class III cases:
LOW TORQUE BRACKET: +7 TORQUE

Select when:
• Centrals require extensive uprighting
• Cases requiring extensive Class II elastics (prevents loss of torque control possible by wearing elastics)
• Extreme crowding cases combined with:
  • Anterior tongue thrust
  • Thumb/finger habit
• Where extensive arch length needs to be gained and the incisors have near-normal torque angulation
LOW TORQUE BRACKET: +3 TORQUE

Select when:
- Lateral incisors require extensive uprighting
- Incisors are in lingual cross bite and will have too much torque as they are moved into position
- Cases requiring extensive Class II elastics (prevents loss of torque control possible by wearing elastics)
- Extreme crowding cases combined with:
  - Anterior tongue thrust
  - Thumb/finger habit
- Where extensive arch length needs to be gained and the incisors have near-normal torque angulation
Retention

• Three options:
  – Maxillary bonded braided wire to the 2-2s
  – Mandibular .026 SS bonded wire adapted to lower 3-3s
  – Damon Splint

Retention (three types)...

1. **Maxillary**: .016 x .022 Bond-a-Braid (Reliance) wire is bonded to the palatal surface of the four maxillary anterior teeth using Revolution (Kerr).

2. **Mandibular**: .026 round stainless steel wire adapted to the lingual surface of the six mandibular anterior teeth is bonded using Transbond (Unitek). A “landing pad” of composite is injected onto the teeth and the .026 steel wire is inserted into the pad of composite on the teeth. Once cured, a layer of Revolution (Kerr) is injected around the wire and the pad forming a “ski jump” contour or additional bond security and food deflection.

3. **Inter-arch retention**: The Damon Splint/retentive splint - typically used following Herbst® to hold the jaws in position while waiting for the full fixed appliance phase. It is also used in cases with severe posterior crossbites, lateral tongue thrusts, severe Class II’s corrected with elastics or a Herbst® with springs, or any patient with severe muscle dysfunction (Bucco-lingual coordination challenges). It is constructed of two, clear Biocryl or Essix “slip cover”, 1 mm full arch retainers bonded together with lab acrylic in the advanced position (as determined by a wax bite). The upper and lower slip covers are bonded together from the posterior molar to mesial of the upper cuspid tip leaving the anterior section open for an airway.
Return to the Class III Blackboard Module and move on to the Case Study, which involves the above gentleman’s treatment by Dr. Damon.
This was a nonextraction case and the outcome was nothing short of fantastic.