FOCUS ON TARGETED SPACE GAINING AND ITS APPLICATIONS, INCLUDING WITH RAPID PALATAL EXPANSIONS. ALSO INCLUDES RETENTION AND CLINICAL “PEARLS”

FACULTY: Joseph Ghafari, DMD.

Goals: This series of lectures should enable the resident to:
1. Learn approaches to gain, maintain, and relocate space within the arch based on increasing arch length and targeting the space needed with the use of differential connection of teeth adjacent to that location.
2. Learn applications of the space targeting method in a number of clinical situations, such as space opening associated with palatal expansion and asymmetric occlusal correction.
3. Understand the potential of sequential retraction or protraction of teeth, anchorage reinforcement, and deep bite correction in the context of problem resolution or patient non-compliance.
4. Understand practical issues related to fixed versus removable orthodontic retention.

Objectives: The resident should know:
1. Various modalities of space gaining, including the space targeting method used to:
   a. develop space in specific areas of the arch;
   b. maintain space gained with rapid palatal expansion;
   c. correct unilateral distoclusion or mesioclusion, as well as midline deviation.
2. Various modalities to retract posterior teeth (in Class II occlusion) or protract teeth (in Class III relationship), sequentially.
3. The rationale and method of differential anchorage reinforcement with round wires.
4. The rationale and method of bite opening that allows extrusion of posterior teeth, also applied for the purpose of extruding anterior teeth.
5. The rationale and methods of removable retention of orthodontic results in comparison with fixed (bonded) retention.

COURSE DURATION AND SCOPE: This course is part of the more encompassing series on
Orthodontic Methods under the wider heading of Mechanotherapy. The course is scheduled in the Spring or Summer of the first year and/or the Fall of the second year. It is given at a 2-hour session on a weekly basis for at least 5 sessions.

POLICY ON EXAMINATIONS: At least 2 biannual examinations (progress and final) are given for all courses, if a course spans the entire year. If classes terminate before the end of a semester, the final examination is given at the semi-annual examination that is closest to the end of the course, unless the course director schedules the final examination earlier. During a course, any number of progress tests or assignments may be given. Their cumulative weight in proportion to the final grade may not exceed 50%.

SLIDING MECHANICS

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ANCHORAGE

CORRECTING

THE DEEP OVERTURN

Posterior Extrusion Combined With Anterior Biteplate

REMOVABLE

RETENTION

Maxillary

Mandibular

COURSE OUTLINE

Introduction

Sliding mechanics imply the movement of single teeth, or a group of teeth, using round wires. In essence, the basic principle is a fundamental tenet of orthodontics: control of anchorage while minimizing frictional resistance in the active member of the appliance. The mechanics presented through treatment records in this series are based on using brackets with 0.022” x 0.028” slots. Proportionally smaller archwires would be used with smaller slots. The series includes the discussion of targeted space gaining in crowded arches or in association with rapid palatal expansion, asymmetric occlusal correction, sequential retraction and protraction of teeth, Anchorage for canine retraction, anchorage reinforcement, and removable retention. Many case reports will illustrate the author’s development of specific mechanics for comprehensive tooth movement and retention.
1. MEANS OF SPACE GAINING WITHIN THE DENTAL ARCH
   A. Headgear
   B. Lip activated appliances (lip bumper)
   C. Open coil spring between teeth or groups of teeth
   D. Loops with vertical and horizontal legs
   E. “Memory” or “smart” wires (e.g. nickel titanium)

2. DESCRIPTION OF SPACE TARGETING TECHNIQUE
   Based on using brackets with 0.022” x 0.028” slots. Proportionally smaller archwires used with smaller slots.
   A. Light stainless steel archwire (0.014”, at most 0.016”) bent to increase arch length (through vertical loops mesial to 1st premolars).
   B. Before engagement wire lies 1-1.5mm in front of incisor brackets (depending on amount of space to be gained and patient’s force tolerance): incisors will procline and space would develop equally among them.
   C. Space opening targeted to specific area by differential connection of groups of teeth on either side of this area.

3. PRESERVING SPACE FROM PALATAL EXPANSION
   Same principle applied with maxillary rapid expansion if space gaining indicated for tooth alignment. 
   Rationale: save entire new space developed through expansion (otherwise may close partially or completely as incisors move back to original position by stretch of septal fibers).
   Components:
   A. Brackets bonded on maxillary incisors 1 week after expansion initiated.
   B. 2 segmental nitinol wires (0.016”) inserted in central and lateral incisors, separating right and left segments.
   C. Stainless steel archwire (0.014”) with increased arch length through stops mesial to 1st premolars anticipates space increase from activation of expanding jack screw.
   d. Follow-up procedures.

4. ASYMMETRIC OCCLUSAL CORRECTION
   Unilateral tooth movement achieved with same type of mechanics modified to favor movement on the side where the canines, premolars, and molars are short of neutroclusion.
   Suitable condition:
   A. Mandibular midline off and mandibular canine, premolars and molars short of neutroclusion (cusp to cusp or end to end relationship-Class II tendency), and need forward movement to achieve a Class 1 (correction by unilateral distal movement of opposing maxillary teeth ruled out).
B. Maxillary midline off and maxillary canine, premolars and molars in Class III
relationship and require forward movement toward
neutroclusion (unilateral distal movement of corresponding
mandibular teeth discarded).

Treatment plan:
Shift teeth to one side of the arch to make midlines coincide and achieve
neutroclusion on the side lacking this relationship.

5. SEQUENTIAL MOVEMENT OF TEETH

A. Sequential retraction of teeth
Distal movement of teeth, particularly molars, premolars, and canines,
individually.
   a. After initial alignment of teeth, build up to heavier round wires
(0.018” stainless steel).
   b. Open coil spring inserted between maxillary molars. When second molar is
distalized, next maxillary archwire with (helix) mesial to maxillary 2nd molar tube to
avoid its mesial tipping (tip back adds to anchorage). On opposite side: stop bent
mesial to 1st premolar to maintain new arch length. (If both 2nd molars
distalized,
c. Retract 1st molar with coil spring between it and 2nd premolar. Class II elastics, if
used, are best hooked to maxillary 2nd and/or 1st premolar (pressure through contact
points better transmitted to more distal teeth).
   d. Retract 2nd premolar (once 1st molar adjacent to 2nd molar,
both teeth are tied together with steel ligature (or new wire inserted with stop mesial to 1st molar), and elastomeric
chain stretched to 2nd premolar to move it distally. Same mechanics
repeated when this tooth is adjacent to 1st molar to distalize 1st premolar.
   e. Retract canine after consolidating anchorage of molars and premolars with stainless steel ligature or by tying stops (vertical helices) bent mesial to 1st premolars to brackets of these teeth. After canine retraction, new archwire bent to retract incisors.
   f. Tip back may be maintained for 2nd molar to secure crown at more distal position until 1st molar and premolars (possibly canine) are retracted.
   g. Variants of method, when posterior teeth are distalized before full arch bonding: modified maxillary Nance or mandibular lingual holdings appliances.
   h. Fixed anchorage methods have advantage over initial use of removable appliances (ACCO type appliances) as relapse in a mesial direction with initial archwires is a documented risk.
B. Sequential protraction of teeth
   a. Teeth are protracted sequentially (preferably on 0.018 stainless steel archwire), maintaining arch length with posterior stops (at molar or premolar levels), while teeth moved individually forward.
   b. If most posteriorly banded teeth are 2nd molars, stops bent mesial to these teeth, and canines, premolars, and 1st molars moved forward.
   c. Then, stopless wire to protract 2nd molars against heavier anchorage from teeth anterior to them. Movement may be buttressed by interarch elastics. Class 2 elastics if mandibular teeth protracted; Class 3 elastics for maxillary teeth.

C. Anchorage reinforcement
   a. In sequential retraction or protraction of teeth, anchorage may be reinforced by adding on anchoring unit of appliance a 2nd round wire to the main archwire:0.014 wire to a 0.018 wire, when bracket slot is 0.022 x 0.028.
   b. Other combinations: 0.016 + 0.016, or 0.014 + 0.016). Tooth moved only on heavier of 2 wires. (Concept close to differential anchorage of bidimensional appliance).

REMOVABLE RETENTION

A. MAXILLARY
   1. Rationale: wrap around versus Hawley
   2. Wrap around soldered on Adam’s clasps

B. MANDIBULAR
   1. Rationale: difference between fixed and removable retainer
   2. Tooth Aligner with Premolar Extension (TAPE)
      a- components
      b- adjustment
   3. The fixed bonded 3-3: variations and applications

REFERENCES


