Seminar 5 Expectations

Diagnosis

1. What are reasons why you may want to extract in a case?
   - Correct Protrusion or Prevent Protrusion from predicted incisor advancement
   - Correct class II or III
   - Constrict an arch [lower] to correct posterior crossbite
   - Substitute a damaged tooth with a good one
   - Prevent [excess] incisor advancement into the lips, improving retention stability
   - Close an open bite

2. When might you choose extraction of 5s instead of 4s?
   - One or more 5s are damaged or missing
   - Short or severely rotated 5(s)
   - To change the anchorage in an arch, leaving more teeth in the anterior segment
   - Note: to close the ‘wedge’ is NOT a concept taught in POS since it is not supported by overlays.

3. How do you determine if a case is class I dental when the molars and cuspid give you different readings (eg. cuspid 2mm class II, molars class 1)? Why?
   - The cuspid is the most important, so the cuspid position is what the final decision is based. The cuspid position determines the amount of overjet in the anterior, a feature that the patient will notice. Cuspid are ‘king’ is the saying.

4. How do you determine if a case is protrusive (or not)? Where in IPsoft do you indicate the opinion of you and the patient?
   - The clinical examination should include a determination of protrusion or not, including the opinion of the patient. This is documented in the ‘yellow’ tab in IPsoft. The lateral cephalometric is also a source of information when determining if teeth protrusive or not. First look at the ‘picture’ to see if they are in balance with the face. The interincisal angle can give information. Less than 115 degrees is considered bimaxillary protrusive. Angles are not as good to determine position (protrusion), so the numbers upper 1 to Nasion perpendicular and upper 1 to APo and lower 1 to NA and lower 1 to Apo can be used to help determine protrusion. The concept of protrusion is abstract, so putting a number on it is dangerous.

5. The teeth are in their starting position for a reason. How does this help you determine how the muscles surrounding the teeth (including the tongue) are functioning?
   - Whatever the malocclusion is, the muscles and bone surrounding the teeth had something to creating the malocclusion. Changing the existing (mal) occlusion will by definition lead to instability. The most stable position to finish would be the starting position, which is in balance with the muscles, bone, habits of the patient. Of course that is not acceptable, the reason why you are treating the case.
For example, if a case has dental open bite, the tongue can be expected to be protruding into the space. If a patient has bimaxillary protrusion, the tongue can be considered more powerful than the lips. If a patient has teeth retracted in their face (concave), then the muscles of the lips are likely a stronger influence than the tongue.

6. Why is the level of the maxillary sinus important to determine in planning an orthodontic case?
The maxillary sinus has a lining of cortical bone, which resists tooth movement. A low sinus, with the roots of the teeth in the sinus, will be more difficult to move posterior teeth than will a case where the maxillary sinus is not touching the teeth (“high”).
   A low maxillary sinus is a contraindication for extraction of upper 5s and 6s, as the space closure is more difficult and slow.
   When moving teeth through the sinus, the IP “tipD” variation should be used.

7. What is the significance of Wits measurement in class III diagnosis and ANB in class II diagnosis?
Wits is the most important to determine how far the upper and lower jaws are out of balance. The larger the negative number, the more skeletal class III. In general, the more negative the wits, the more the patient needs orthognathic surgery (move the bones instead of the teeth). Skeletal resistance in an individual patient is determined by using range of bracket torque templates on the treatment decision dental vto. The wits measurement is NOT sensitive to changes in vertical (as is ANB).
   ANB is the most important in Class II diagnosis to determine how far the upper and lower jaws are out of balance. A larger positive ANB indicates skeletal class II (ANB>5) and cases with ANB greater than 7 were considered best treated by orthognathic surgery. Today, we use range of bracket torque templates on the treatment decision dental vto to determine the skeletal resistance, and the need for surgery.

8. Is it possible to move upper molars through a maxillary sinus? If so, how is this done?
Yes, it is possible. Molar bands get “tipD” variation to compensate for crown tipping. Then step 3 force is used 6-KH with the retraction limit of the incisors engaging the palatal cortical bone. Slower space closure of course can be expected.

9. When FMA (Frankfurt mandibular plane angle) and palatal plane both indicate skeletal open bite, then what problem can arise when extracting bicuspids to correct protrusion?
The molars (upper and lower) are expected to ‘drift’ forward into the extraction space, eliminating the ability to correct the protrusion. Measures to be taken to prevent this from happening are:
a) Delay extraction until after alignment is completed and you are ready to close the extraction space
b) Place stainless steel closed coil in the extraction space during the alignment phase
c) Place a TPA or LLA to maintain molar position
d) Use skeletal anchorage to stabilize the molars.

10. If FMA says skeletal open bite and palatal plane says skeletal average, then what do you do to resolve this conflict between double measurements? You look at the picture of the lateral ceph, asking yourself if the upper and lower jaws are divergent (skeletal open) or convergent (skeletal closed).

11. Why might you place orthodontic separators on teeth to be extracted, one week before the extractions are scheduled? The teeth will be easier to extract, the separators having loosened the teeth by the start of orthodontic tooth movement.

12. When extracting bicuspids (or molars) for an orthodontic case, what do you do different than a normal tooth extraction? Maintain the width of the cortical bone buccal and lingual. This can be done by a) not fracturing the buccal cortical plate, and by deliberately moving the tooth buccal and lingual (forcep) slowly to expand the plates before extracting.

13. How do you bond to a porcelain crown? By using either hydrofluoric acid or silane conditioner before bonding. Some may also use a microetcher to roughen or remove the glaze.

14. What are the potential problems of bonding or banding crowns and bridges? Porcelain can fracture or the crown can become uncemented with the inability to recement (eg. teeth moved, decay, fracture), and then you are blamed for the damage, being required to replace the crown for free.

15. Do teeth with previous endodontic treatment move the same as teeth without endo treatment? Yes, they should move the same. Unless of course the tooth was avulsed or otherwise traumatized, causing the need for the endodontic treatment. It is possible for endodontically treated teeth to become symptomatic when elastic or coil forces are applied.

16. explain the concept of ‘corrected records’. How this is done and WHEN it is done. A functional shift of the mandible can make for a bite that is not accurate (eg. More class II on one side than is truly there). The suspicion of a bad bite is made from a ‘screening’ frontal ceph, menton is not centered on the sagittal plane, OR by noticing that the dental asymmetry found on model measuring does NOT match
the difference in class II right vs. left seen when the patient bites. Midlines can also be a method to find bad bites when the diagnosis is being made.

Corrected records refers to ANYTHING that is done to rid the bite of functional shifts of the mandible. These can include “splints”, Leaf gauges, myomonitors, bonded composite to the molars, bonded rapid palatal expanders, or any other method to disrupt the occlusal scheme, allowing the muscles to center the mandible to the actual bite position without tooth interference.

If a significant change is noticed, then the models may be remounted in an articulator for study, and new frontal cephal and intra-oral + face photos are taken to document the change.

**Skeletal resistance**

17. What are the classification terms used for skeletal resistance and what do they mean to the type of treatment and forces used?

*Mild skeletal resistance*: Only a millimeter or two of cortical bone is in the way of obtaining the final incisor position and inclination. No change is made to mechanics.

*Moderate skeletal resistance*: 4-5mm of cortical bone is in the way of the final incisor position and inclination, as seen on the treatment decision VTO and Range of bracket torque templates referenced to the incisal edge and retraction or advancing limits. The incisor apex is in the medullary bone space. For bone remodeling, the force is reduced to less than 150 grams per side (step 2 force).

*Severe skeletal resistance*: The incisor apex is in the cortical layer of bone at the final position and intended inclination. Corticotomy is needed, or re-diagnose the case for less incisor retraction or advancement, or change the bracket for a more retroclined/proclined finish.

*Extreme skeletal resistance*: The incisor apex is outside the maxilla or mandibular symphysis at the intended final position and inclination. Corticotomy is required, or re-diagnose the case for incisor inclination and final position. Orthognathic surgery should be considered.

**More Model Measuring**

18. When moving the mesial dots of a bicuspid in model measuring to make an extraction dental VTO prediction, what does the space created represent? What does the remaining ‘red line’ in the bicuspid extraction space represent?

The space mesial to the dot represents the space available for alignment of the anterior segment and retraction of that segment if any space remains after alignment. The red line distal to the dot represents the posterior segment moving forward into the extraction space.

19. How do you use the information given of maxillary [molar] width (16-26C) and mandibular [molar] width (36-46B)? Where are the points placed?

If the upper (16-26C) is greater than the lower, then nothing is done. If the upper is smaller than the lower, then the measurements are transferred to the ‘black’ calculations tab in IPsoft to determine the amount of maxillary constriction relative to the lower.
The upper points (16C and 26C) are placed on the mesial-buccal cusp TIPS of the first molars. The lower points (36B and 46B) are placed in the buccal PITS of the lower first molars.

20. How is dental asymmetry represented on model measuring? How does the computer calculate the asymmetry right vs. left?
   In the lower, a centerline is drawn down the middle of the ‘shape of the mandible’ and then perpendiculars are created between this centerline and the mesial points of the 6,5,4,3 teeth right and left. Any difference between the right 6 and left 6 intersection (or any of the other teeth) on the centerline is calculated and the amount listed.
   In the lower, the centerline is drawn down the middle of the “upper archwire” and then perpendiculars are made the same as the lower, from the mesial points to the centerline, any difference is measured.

21. How do you rotate the archwire to adjust for a non-vertical model scan and how does this change the dental asymmetry calculations?
   Click on the archwire to turn it blue, then drag the far right point on the shape to rotate. In the upper arch, the dental asymmetry calculation is changed by rotating the “upper archwire”. In the lower arch, the “lower archwire” does nothing to change to asymmetry calculation since the calculation is made from the shape of the mandible.

Editing treatment plans

22. What is the purpose of the skill check? What should you do if the treatment plan you want to do is beyond your level of training according to the skill check?
   The skill check states what training is needed to successfully complete that type of case. The purpose is to guide the student in case selection so they do not accept cases beyond their abilities.
   If the treatment plan is beyond your training, then either choose another treatment option, change your treatment objectives, get an instructor to work with you on the case, wait to start the case, or refer the case.

23. Why is it important for the doctor to write down their ‘reasoning’ for making this treatment decision?
   So that a year or more later, when this detail is forgotten, you can see what you were thinking when you made the treatment decision. This information and experience helps in making better treatment decisions in the future.

24. Explain how you should use the “consultation key points” section of the treatment plan, even if you are competent at presenting consultations?
   Write down what you want to say to the patient and/or parent, and specifically what words you want to say. This ‘few minute’ preparation can make for more successful consultations.
25. Why is there a “vto labeling” section, since it is typical for you to review this in the downloaded treatment plan AFTER first making the dental vto predictions and making a treatment decision?
   To make sure you did not forget to consider a treatment option and to specifically tell you how to make the dental and surgical vto predictions.

26. Explain why it is important to clearly indicate the treatment decision and then represent this with a screenshot of the study model and dental vto ‘picture’.
   In the busy clinic, you need to immediately know what the treatment decision is on each case, without searching through dentalcad projects to find the one you selected a year or more ago. The study model shows the dots used to make the treatment decision picture, and thus shows the anchorage planning. All mechanics should be consistent with the dots.

**IP appliance diagnosis**

27. What is the difference between a treatment band and fitting band?
   The fitting band is only used to determine the size of the tooth, so the welder can create the treatment band. The fitting band has “mcgann eyelets” to mimic the welding of the attachments and allow easier insertion and removal. The treatment band, with the final individual patient prescription welded at the prescribed angle, also has sandblasting on the inside of the band for better retention.

28. Why is correcting a mesial inclination of an upper molar important? How is this done?
   Mesial inclination of upper molars in class II cases can cause difficulty in obtaining a solid class I fit of the bicuspid and cuspids in front of the molar. By using a “tipD” weld, the crown of the first molar is pushed back (root forward) to a more upright position, enabling a better fit of the 3-4-5 with the lower.

29. What are the 6 categories of appliance diagnosis that should be considered in every orthodontic case (when using a customized appliance)?
   Incisor torque
   Cuspid torque
   Molar buccal tubes
   Archwires
   Rotations
   Positioning

30. Why are there questions in the IP appliance tab? If you already list the appliance specs in the treatment plan, then why do you also answer the questions?
   The questions are an easy, fast, and accurate way to select the bracket prescriptions you want. The sequence represents a discipline when selecting the best individual patient appliance, considering many design features as they relate to the characteristics of the patient and the intended treatment.
The list of appliance specs in the treatment plan are NOT linked in any way to the supply depot for the IP appliance. These specs need to be duplicated in the IP appliance tab and sent for ordering to get an individual patient appliance.

31. How do you customize an appliance and what does this do to the questions? What happens if you uncheck the custom appliance?
   An appliance is “customized” (vs. computer generated) when you click on a tooth number to select a bracket from the list. When this is done, the ‘questions’ are disabled, not allowing you to use both methods to select and make changes to the appliance. For this reason, we usually answer the questions, and then customize as the last step. If you later uncheck custom appliance, any brackets that you customize are immediately ‘lost’, the computer reverting back to the computer generated (from the questions) appliance. For this reason, it is a good habit to write down what brackets you customized in the treatment plan.

32. Why do you usually select Li bracket torque for the upper incisor instead of Roth when using 19x25 archwires in a class II case? When might you choose Roth instead of Li?
   The 19x25 retraction limit of the upper Li bracket is the Roth ideal inclination, which works well for mechanics and is an esthetic inclination. In class II mechanics, the use of class II elastics need to be supported by the Li bracket on the upper. Allowing the upper incisor to retrocline to the 19x25 Roth ideal inclination often results in
   a) Edge-to-edge incisors with bite opening in the bicuspsids
   b) Mandible is forced (down and) back.
   c) Inability to obtain class I posterior finish.
   In some cases, to avoid an upper lingual corticotomy, we will accept a more retroclined upper incisor, and a less than ideal posterior finish to avoid the corticotomy surgery.

33. What does Li torque and La torque brackets mean? What does SLa or SLi mean?
   Li means “lingual root torque”, La means “labial root torque”. The bracket slot is cut so that the upper or lower incisor will be more ‘proclined’ when Li torque and rectangular wire (18x25 or 19x25 or 21x25) is applied.
   SLa and SLi are the same Labial root torque and Lingual root torque respectively, but have an 020 slot, reducing the ‘slop’ or wire spin in the bracket slot.

34. Which question in the IP Appliance tab gives you Li torque on the upper incisors?
   Question 2, retracting upper incisors

35. In the IP appliance tab, how do you get La torque on the upper incisors?
   Question 5, blocked out to the lingual
36. In the IP appliance tab, how do you get Li torque and La torque on the lower incisors?

Question 2

- [ ] maintain lower incisor in a forward position (Lingual torque 2-2)
- [ ] limit lower incisor advancement (Labial torque 2-2)

37. Explain what ‘blocked out to lingual’ means and what happens when this is checked.

Blocked out to the lingual means that that incisor is positioned to the lingual of the general archform. If you straighten the teeth, the crown of the tooth will move to the ‘straight’ position, leaving the root in the palate or lower lingual. Labial root torque is needed to move the root also to the archform. Checking blocked out to the lingual will give La torque on that tooth.

38. Why is there a question for ‘short clinical crowns’ and what changes happen when this question is checked (upper or lower)?

Short clinical crowns cannot accept the LARGE pad that is standard on IP bicuspid brackets to reduce bond failure. When checked, ‘normal’ size bracket pads are selected on the upper, and bands are selected on the lower.

39. How do you determine the best cuspid torque to use upper and lower? What are the options available to you in the IP appliance? Explain differences in metal and ceramic.

The best cuspid torque is determined by looking at other FINISHED cases where Roth, Li, Ne, or La torque was used and determining if the chosen torque was the best or not. In metal, we have all choices, Li, La, Roth, and Ne. In Ceramic, we have Roth upper and Li or Roth lower. More limited in the ceramic.

It is also important to review the archwire shape selected for the case when making the torque decision. If the archwire is constricted relative to the starting archform, then the crown will be pushed in, inclining lingual, so Li torque may be selected to keep the cuspid upright. If expanded archwires are selected, then La torque may be the best choice to keep the cuspid upright.

Li torque is generally best for bicuspid extraction mechanics.
40. What happens when you check severe bicuspid rotation in the IP appliance tab? Why is a band better than a bonded bracket for severe bicuspid rotation correction? What is the cleat used for? The bonded bracket changes to a band with a lingual cleat when you check severe rotation. A band is easier to reposition than a bonded bracket with a big bonding pad. The cleat is used to attach chain to help derotate the tooth.

41. What do you look at when selecting archwires for a bicuspid extraction case? Maintain the original archform, move the teeth between the cortical bone when closing the extraction space.

42. Why is it important to diagnose rotations and apply IP rotation brackets? How does this improve the retention experience? Rotations are fully corrected in the first alignment wire, and are often over-corrected. This allows for the rotated tooth to be in the corrected position for a long period of time while you finish the other details of the case. Circumferential fibers attached to the tooth can then have time to adapt to the new tooth position, improving the retention experience.

43. Why does the zero degree rotation feature of a straight wire appliance NOT fully correct tooth rotations? How does an orthodontist using straight wire adjust the positioning to improve the rotation correction? Zero degree would logically mean the rotations would be fully corrected, BUT this is simply not true in the clinic, so there must be an inefficiency between the bracket and archwire. When using straight wire appliances, we move the bracket ‘off center’ (mesial-distal) in the direction of the rotation, to more effectively correct rotations. More experienced clinicians even vary the adhesive thickness on rotated teeth to help get a full correction. When all else fails, the clinician needs to make 2nd order bends in the archwire to make the full correction, a very time consuming and inefficient method.

44. How do you determine when to use the IP positioning prescriptions? (average 0%, deep bite 51%, deep bite 81%, open bite 0%) Look at the dental vto prediction. If there is predicted open bite, then use open bite 0%, if there is deep bite, level the curve of spee with deep bite 51%, if there is severe deep bite, level with deep 81%, and if the overbite is normal, use average 0% that leaves a slight curve of spee. In extraction cases, we generally use 51% deep. In non extraction cases with some incisor advancement, average 0% can be found. If in doubt, level the curve of spee with deep 51%, hard to go wrong with that one.

45. When should you add [lingual] cleats to bands? When you have severe bicuspid rotations to help derotate these teeth. Also, when the lower crowns are lingual inclined, you may want cleats for posterior cross elastics to upright.
Some clinicians like the lingual cleats to help when seating and removing bands. Tongue irritation by the patient is the only drawback to doing this. If a patient complains, then you have a choice of grinding off the cleat (no fun) or placing an elastomeric tie in the cleat...so maybe next time leave it off? IN general, on adult cases, you want the appliance to be as comfortable as possible, and this gets them talking to others that you are the best.

In Straight wire days, we used chain from lingual cleats to control the unwanted mesial-lingual molar rotation when closing lower 5 and 6 spaces, but when using CIIE and UP variations, this chain is not needed, so the cleats are not needed.

46. Which molar buccal tube variations have “tipD” welds, and when do you use these?

**TipD:** 5 degree weld from horizontal to tip the crown back, root forward. Used most often on the upper 6s to get a better fit of the cuspids and to increase anchorage. Used as standard when closing upper 5 or 6 spaces to keep the roots parallel. TipD can also be found on lower 7s, used when you need more anchorage.

**UP:** 5 degree weld from horizontal. Lower molars designed to ‘upright’ mesial tipped molars. This variation is also good for class II cases where you need to open the bite. Closing lower 6 extraction spaces, this is the standard. Closing lower 5 spaces when the bite is deep.

UP Can also be used in the lower arch to reduce lower incisor advancement, but be sure to also tipback the lower 7s or the crown may not go back...and then be prepared to have marginal ridge discrepancies lower 6+7 in finishing that do not look good...what to do with these? Most will change to Roth brackets and align the marginal ridges, losing the tipback.

**CIIE:** 3 degree weld from horizontal. Standard when using class II elastics to correct class II in non extraction or extraction cases. Standard when closing lower 5 spaces with normal vertical.

47. What is the unwanted tooth movement of lower molars when class II elastics are used? How does the CIIE (or UP) bracket variation compensate for these known problems with the Roth Rx?

When using class II elastics, the lower molar crown tips forward and rotates mesial lingual. The Roth Rx has a straight weld, so the compensation on CIIE is to tip the crown back 3 degrees (5 deg UP) to prevent the mesial crown tipping. Roth Rx has an 8 degree distal offset (mesial rotation) to prevent the mesial lingual rotation, but since this is not enough, the CIIE and UP both have 12 degree mesial rotation (an extra 4 degrees) to compensate.

Note: McGann had to make injection molds to manufacture these special molar variations. Only IP has such a lower molar tube.

Other Appliances
48. How is Composite bonded to the [lower] molars used for discluding teeth for posterior crossbite correction and/or for enhancing the dental changes from differential growth?

Etch the occlusal surface, bond composite to the level of the cusp tips, preferably colored composite so you know it is there. Bonding more composite than this (higher buildup) usually falls off.

49. TPA appliances are used for what purposes?
   a) Maintain expanded upper arches (following RPE) or to expand upper arches
   b) Molar anchorage: to prevent molars from drifting mesial (in skeletal open bite cases) and to resist forces used to close extraction spaces, resulting in more of the extraction space being consumed by the anterior segment. The mesial of the molar needs to be expanded to engage the buccal cortical plate. Cases with an arch that tapers more to the anterior, the TPA will lock into the buccal cortical plate and will be more effective [than in arches that do not taper].
   c) Derotate upper molars (rotate Mesial-buccal)…this is inefficient, use an archwire
   d) To prevent molar flaring when intruding the molars (skeletal anchorage, section 3-4 concept)

50. Why should you not only ‘lock’ the double-back bend of a Goshgarian palatal bar into the sheath, but also place an elastomeric or steel ligature to secure the bar to the sheath?

Sometimes the ‘lock’ is not fully engaged by the operator, and sometimes the sheath may loosen, allowing the doubleback bend to disengage. There has been a known swallowing of a palatal bar, let it not be your patient!!

51. Explain what the Roth [straight wire] appliance was designed for and where the prescription came from. How does this vary from the Andrews “straight wire®” prescription?

Larry Andrews was the inventor of the straight wire (trademarked) appliance, released in 1974 to the specialty. The brackets had ‘pre-torqued’ and ‘in-out compensations’ that previously were bent into the archwires by orthodontists. The time savings was tremendous as the orthodontist now could treat a case in 14 hours instead of 40 hours of doctor time, increasing their patient load from 50 cases maximum per year. Staff were also now able to simply engage the archwire, relieving the orthodontist of this task, more savings, more money.

The problem with the Andrews Rx was in the cuspids, where he had multiple (tip) prescriptions for different amounts of anchorage to keep the roots parallel. The increased inventory was massive since bands were the standard at that time, bonded brackets just starting to be known.

Roth, in an attempt to make one bracket per tooth, reducing the inventory, selected extraction brackets that fit his most common cases (extract 4s, moderate anchorage, sliding mechanics), and changed the upper incisor torque from 7 degrees to 12 degrees, to make the Roth Rx. The profession adopted this instead of the Andrews
straight wire. Andrews of course is not happy about this. But do not feel too sorry for Larry, since he got $20 million for the rights to the straight wire from A company (later purchased by Ormco).

52. What is the problem(s) of using Roth cuspid brackets (upper and lower) in non-extraction cases?

**Upper cuspsids** in the Roth Rx have 4 degree “distal” rotation to compensate for the tendency for upper cuspsids to rotate distal as they are retracted. In a non extraction case, there is no need for this, AND many upper cuspsids are mesial rotated, so you have a built in under-correction of the rotation. Note: in the Roth IP, McGann removed this distal rotation from the upper 3 brackets.

There is also added distal root tip from the ‘normal’ upper cuspid tip, to compensate for closing the first bicuspid extraction space with the roots parallel. In non extraction cases you don’t want this, but McGann left this feature in the Roth IP since more upright upper cuspsids are not considered as esthetic.

**Lower cuspsids** in the Roth Rx have 2 degree distal rotation to compensate for the distal lingual rotation tendency when closing first bicuspid extraction space. There is also more distal root tip to compensate for tipping when closing the bicuspid extraction space. McGann has left these features in the Roth IP, making a separate bracket “Ne” to be used in non extraction lower arches. The Ne bracket does NOT have distal rotation unless you ask for it (DNe), has LESS distal root tip, and has more lingual crown torque (crown is more upright) than the Roth Rx, since McGann did not like the inclination of the lower cuspsids.

The problem in non extraction cases: Distal rotation when you don’t want it, Lower cuspid roots are too close to the roots of the first bicuspid, crown tips lingual excessively in the lower. SMALL details, but if you can easily get a better result by choosing another available bracket, why not do it?

53. Why is there extra distal root tip in the Roth cuspid brackets?

To parallel the roots in the extraction space, compensating for the ‘tipping’ tendency when retracting the cuspid into the extraction space.

54. Why is there “distal” rotation on Roth cuspid brackets? Note that the IP appliance 13/23 Roth brackets do NOT have this distal rotation (lower do).

To compensate for the cuspsids rotating distal-lingual as they are retracted into an extraction space. This does happen. You will first find out if you close extraction space with an elastomeric tie on the cuspsids and the tooth rotates….the reason why we use a ’distal rotation tie’ on the distal of all cuspsids in extraction cases.

**Alignment phase**

55. Explain when you should be using 012N, 014N, and 016N as alignment wires and why?

**012N**: this is the ‘standard’ as your first alignment wire. It is easy to tie in, and generates the lowest force per mm of activation, making it so the patients teeth do not hurt (very important). This wire also eliminates the need for double overties, a
time consuming and not so well understood method of ligating archwires. This wire officially lasts in the mouth about 4 months (only) before becoming permanently deformed, but many times you can leave it in for 6 months. It is most efficient (McGann) to change from 012N to 18x25N even if the teeth are not fully aligned.

This wire does NOT change the archform, so is carried in only 1 size and shape, ordered from PDS in bags of 10 and kept in your inventory. This is NOT part of the single patient order.

**014N:** generates more force per mm of activation, but lasts longer than 012N wires. This means that the patient may have a little discomfort to the teeth after the first tie-in, but the archwire lasts 6-8 months, with most cases seeing near full alignment.

014N does NOT change the archform, so is carried in only 1 size and shape, ordered from PDS in bags of 10 and kept in your inventory. This is NOT part of the single patient order.

**016N:** generates more force per mm activation, but lasts longer than 012N or 014N, up to 1 year. This archwire DOES change the archform, so you need to order this one through single patient ordering, as needed, keeping the diagnosed best archform for the case. When using 016N, you will need to occasionally use double overtie, and the archwire is NOT fully engaged into the bracket slots from the first tie-in. Instead you “progressively” reactivate the archwire into the bracket slot until full engagement is attained. Best timing for this is about 6-week reactivations. The next wire would be 18x25N to prepare the arch for 19x25ss.

56. What do you (or the assistant) do at the “retie” adjustment visit (and why?)

Check for full activation of the archwire into the bracket slot, check for loose ligature ties, check for loose bands, and check that the alignment wire has not slipped to one side with a distal end protruding out on that side. Then change the ligature ties on ONLY those teeth that need the archwire pushed further into the bracket slot or a loose tie secured.

There is NO reason to change all the steel ligature ties if they are secure and the archwire is fully engaged into the slot. Elastomeric ties need to be replaced every 4 weeks, as their properties degrade. Steel ties are preferred when 8-10 week appointment intervals are used.

57. When is an arch ready to change from a round nitie archwire to 18x25N? When is an arch ready to change from 18x25N to 19x25ss?

When the round (012N) archwire is deformed and the teeth are “almost” straight, it is time to engage 18x25N. 18x25N should be in the arch for at least 6 months to establish the alignment needed to engage 19x25ss, even if the teeth are straight.

58. Explain how to derotate a severely rotated bicuspid tooth

   a) You can simply ‘retie’ the archwire to the bracket, repositioning as needed, and it will eventually become straight.
b) You can use chain from a lingual cleat (on the band or bonded) to another lingual cleat or cross over to tie the chain to a buccal bracket.

c) Some use chain only, NOT ligating to the archwire until the tooth has “spun around”.

Mechanics

59. How should you correct a unilateral buccal crossbite of one upper 7?
TPA 6-6 and let the archwire to the 7 do the expansion, adding bonded composite can also help disclude the tooth.

60. After extracting a tooth, when should you start closing the extraction space?
Anytime. No reason to wait.

61. What is the difference of using elastics instead of preformed nitie closing coils to close extraction space?
Patients must change elastics, so the consistency of the force is not as good with elastics as with closing coils. The force of elastics is unknown, where the force of nitie closing coils has been calibrated for you to use in the clinic, giving consistent results from case to case, doctor to doctor.

62. What is wrong with class II elastics to correct class II?
The vertical components of the force, which are worse when the patient opens their mouth. There is an extrusive force on the lower molars and upper anterior teeth, tipping the occlusal plane clockwise, which is considered undesirable in the field of ortho. The mandible swinging down and back makes MORE class II and this is considered to be unstable in retention. Class II elastics are also dependent upon patient compliance.

63. explain the concept of root surface area and how this may change the anchorage
The force is spread out to all the teeth on the archwire in that segment. The more root surface in the segment, the smaller the force per unit area felt by the periodontal ligament.

There is an ‘optimal’ force where teeth will move the most efficiently. For teeth to move, they need a minimum amount of force and a tooth with more root surface area (eg. Molar) needs more minimum force than a lower incisor with less root surface area.

So a given force (eg. Step 3 210 grams per side x2= 420 grams) applied to lower 3-3 segment will move differently than Step 2 force, 150 grams per side x2 = 300 grams, applied to lower 4-4 segment that has more root surface than 3-3 segment.

64. what does the “distal end cut” represent when the incisor is moving in the round wire range
Tipping of the incisors back and molar moving forward.
65. What does the amount of ‘distal end cut’ represent when the incisor is bodily moving (at the retraction limit)

*Amount of incisor retraction (less than when tipping) and molar movement forward. Expect less distal end to cut when the incisors are bodily moving.*

66. How much distal end should you ‘expect’ to cut at an 8-week appointment interval? How about a 4 week interval?

2mm (plus) at 8 week intervals, UNLESS there is bone remodeling with only one side moving (step 2), then maybe only 1mm. 4-weeks you would expect 1mm, and I would suggest NOT cutting 1mm unless it is irritating to the patient. Wait to cut 2mm at least.

67. When should a nitie closed coil be reactivated? Why?

*Closed coils should generally be reactivated the amount of distal end cut at the appointment interval (not 1mm), especially when using step 3 activation. If a 12mm coil is not reactivated after 4mm of tooth movement, then the force changes to step 2 and the tooth movement molar and incisor changes. You want to keep the “prescribed” force, decided at the diagnosis and treatment planning stage.*

68. What happens if a patient with 12mm, step 3 coil activation does not return for their adjustment visit and 4mm of wire is extended out the distal end?

*The coil is now generating 150 grams per side, which is step 2 force. Step 2 force is different than step 3 force in tooth movement. With step 2, the molars remain stable and the incisors retract, remodeling lingual cortical bone. With step 3, the incisors do NOT remodel lingual cortical bone and the molars are moving forward.*

69. Explain what happens in a bicuspid extraction case when the patient can only come in every 6 months. When they are using elastics to close the extraction space? When the spaces are being closed by nitie closed coils?

*When using elastics, you need to be certain they have enough elastics to last them the 6 months. 100 elastics per pack, 180 days, change 2x per day, lose some, how many elastics.*

*When using nitie closed coils, use 12mm coils where possible, and activate to step 4 (if you otherwise would use step 3) to give you 6 months until the force degrades to step 2. If using step 2, there is nothing you can do, just wait for the patient to return and reactivate...but do use 12mm coils instead of 9mm since there is a longer ‘range of activation’ with a longer coil.*

70. If there is NOT enough anterior overjet (relative to posterior class II), what are the 4 problems that may happen when there are spaces to close in the upper arch?

*a) The upper molar moves forward to close the space*

*b) The molar cannot move (anchorage, maybe tpa) and the incisors cannot retract, so the space does not close*

*c) The mandible swings open and the incisors retract to edge-to-edge or even anterior crossbite.*
d) The mandible is forced back, compressing the TM joint

71. How can you increase anterior overjet?
   a) By adding [lingual root] torque to the upper incisor
   b) By tapering the upper archwire (or squaring the lower), solving “arch coordination problems”.
   c) By stripping the lower teeth

72. Explain the problems in fitting the teeth together in a solid class I occlusion when the upper incisor is allowed to detorque in a class II case. The upper incisor torque is now inconsistent with the lower, and there is a loss of anterior overjet with the posterior teeth in class II position. To get the teeth to fit together in a class I occlusion with the proper overjet you must have consistent torque upper and lower and the arches must be coordinated in size and shape upper vs. lower.

73. When you see upper and lower incisors “edge-to-edge”, what are the possible problems to look for and how do you correct these?
   a) Detorquing upper incisors: take a progress ceph to confirm with range of bracket torque templates, referring to your dental vto, and then either taper the upper archwire, add gable bend to the archwire, engage a larger rectangular wire, or change the bracket to one with more lingual root torque.
   b) Too much lower incisor tipping: take a progress ceph to confirm with range of bracket torque templates, referring to your dental vto, and then either square the lower archwire, engage a larger archwire, strip the lower incisors, or change bracket torque to one with more ‘labial’ root torque.
   c) Differential horizontal growth of the mandible. Take a progress ceph and wrist x-ray to confirm, drawing the anatomy on the start and progress ceph, and then making an A point overlay and condylion overlay to identify the growth that has taken place, checking how much was added to the dental vto. Make an adjustment based on how much more growth you may expect and then revise your dental vto, until you have a good picture again. Review model measuring dots to plan anchorage from this point forward.

74. what does the term “reduced force anchorage” mean?
   By reducing the force, the molars become more stable (do not move forward as much) in response to the force applied. The anterior segment responds (retracts) to a lower force than do the molars, so “differential anchorage” happens with the molars staying stable and the anterior teeth retracing in response to this lower applied force.

75. Lab studies have given values for Friction of approximately 100 grams per bracket sliding along an archwire. How do we know that this is NOT correct in the clinical setting? How can friction be different in the lab and in the mouth? When we apply less force than 100 grams and the teeth still move. The explanation is with the lubrication (saliva) and more important is “dithering”, the
76. Why might you see spaces between incisors after a rectangular archwire is engaged in the brackets? How can you tell this is coming when you insert the archwire?

The teeth were more retroclined than the retraction limit of the bracket and archwire combination, resulting in a twist to the tooth, the crown moving forward to make spaces. (labial crown torque is the crown moving forward, lingual root torque is the root moving lingual, both are the same change in inclination). You can know this is coming (and thus lace 2-2) when you have to ‘twist’ the rectangular archwire to engage the slot. You can also know this by the range of bracket torque template on the dental vto.

77. When do you use an anterior cross elastic? What elastic do you use for this?

An anterior cross elastic is used when the midlines are not centered upper and lower PLUS there is more cusp horizontal overjet on one side than the other PLUS the upper midline is NOT centered (if centered, then you can create an upper midline to the face discrepancy). 4oz ¼” elastic is used for this job.

78. What does a ‘gable bend distal to a KH or T loop” do to the incisors? What is the effect on the posterior teeth?

It adds intrusion and lingual root torque to the incisors and extrusion to the posterior teeth.

79. Why should you NOT use a gable bend distal to a loop when using Li upper brackets?

The gable adds to the skeletal resistance of the tooth against the palatal cortical bone. Li retraction limit is ‘enough’ torque for most applications, there is no need to add more.

80. How can you use powerpoint ‘all templates’ to determine the skeletal resistance when a 10 degree gable bend is added to the archwire?

After moving the template to the dental vto screenshot, select the template, right click, position and size and click ‘rotation’ until 10 degrees. Recheck the skeletal resistance by referencing the incisal edge and view the retraction/advancing limit relative to the cortical bone.

81. How can you move the molars forward nearly 100% (minimum anchorage) using anterior cortical bone anchorage?

Once the incisors reach the retraction limit, they must move bodily, engaging the lingual cortical bone. By applying step 3 or 4 force (210gm and above) to the anterior segment (KH loop), the cortical bone will resist resorption and the incisors will be stable…the molar then moves forward nearly 100%

82. what mechanics problems are caused by ‘deep bite”?
Premature loss of anterior overjet, causing the
a) inability to obtain class I posterior occlusion
b) possibly forcing the mandible back in your effort to get class I, leading to TMD problems.
c) Mandible swinging open, causing bite opening in the posterior with edge-to-edge incisors and a ‘finishing’ problem.

83. When should you use ‘double’ class II elastics? Explain how these might be applied to avoid problems, and what are these problems
When you are trying to advance the lower arch intentionally, and everyone is losing patience. Apply one elastic to each tooth, one to the 6, second to the 7, to prevent hypermobility of the molar from placing 2 elastics. The vertical force will be greater, so expect more bite opening as the mandible swings open, increasing the class II you are trying to correct.

Impacted cuspids
84. When unerupted upper cuspids overlap lateral incisors on the panoramic x-ray, what should you do to determine if the cuspid is in the labial or palatal position? Palpate the labial to see if you feel the cuspid “bump”. If not, then the cuspid is likely in the palate and nearly all of these are impacted.

85. What are the risks of cuspid retrieval?
Resorption of an adjacent tooth, usually a lateral incisor. The other risk is that the cuspid does not retrieve.

86. How long does it take to retrieve an impacted cuspid? 1 year is the general rule, but I have worked for 2 years on an adult cuspid and less than 6 months on others.

87. Which archwire should be used to apply the force for cuspid retrieval?
016N seems to be a good force when the interbracket distance is from 2-4. If the interbracket distance is larger (eg 2-5), then a heavier nitie would be chosen (eg. 018N or 18x25N) to apply the same force.

88. When retrieving impacted cuspids, how much force should be applied, and how do you determine how much to reactivate the archwire? when do you need to re activate?
Use 016N and judge the deflection from other cases that were successful. Once you have the first experience with the patient returning from the first activation, you will know if the force is right or not. In general, apply ‘less’ force than you think, extrusion does not need a lot of force.
You reactivate when the archwire being used to apply the force to the impacted tooth “straightens”.

89. Why use ‘pig’ molar buccal tubes for cuspid retrieval?
It is difficult to ligature tie the end of the 016N wire to the 5 bracket base with a double overtie, so the pig auxillary tube is nice to secure the end of the archwire.

90. What is a piggyback archwire and how is it secured to the brackets?
A piggyback archwire is a second archwire in the same arch. It is usually placed on the occlusal tie wings, secured to approximately every other bracket with a double overtie steel ligature tie.

91. Why is 3D imaging, when available, of importance when diagnosing a case with an impacted cuspid.
To evaluate the possibility of root resorption that you cannot see on a 2D x-ray, and to better identify the location labial-lingual.

Bone remodeling
92. Why is cortical bone considered the limiting factor in orthodontic tooth movement
Cortical bone is avascular (and no nerves either) and thus does not have the ability to support resorption and apposition, a process that needs vascularity.

93. How can you get cortical bone to remodel, extending the range of tooth movement?
Reduce the force and move the tooth bodily.

94. How can you predict that there will be the need for bone remodeling before you put the first bracket on the teeth?
By referencing the incisal edge of the range of bracket torque template to the advancing or retraction limit. You will see how this inclination and position relates to the cortical bone surrounding the tooth.

Finishing:
95. Explain the difference between using 018ss or 18x25N as finishing wires
018ss is used when you want to make wire bends, and there is some risk of incisor detorquing since there is no ‘retraction limit’. 18x25N has a retraction limit, slightly more retroclined than 19x25, and is used when you prefer repositioning brackets to wire bending. Some wire bending is possible in 18x25N after it has been in the mouth for a few months.

96. Which intra-oral finishing plier should be used between lower incisors for the initial bend? What size plier can be used between brackets 6-3? 6-7? What is the 1mm finishing plier used for?
Between lower incisors: 1/4mm (or risk debonding a bracket)
Between brackets 3-6: 1/2mm
Between molars 6-7 with larger interbracket distance = 3/4mm
1mm plier is used to ‘enlarge’ existing bends without consuming interbracket distance
97. How do you enlarge an existing “step” finishing bend without removing the archwire.

By selecting the next size plier and sliding back and forth on the archwire to ‘feel’ the existing bend, you squeeze to ‘reform’ the bend to the new size. If you have already enlarged the bend to 1mm, then you can either make another bend in the interbracket distance or you have to reposition the bracket.

98. What are archwire bends used to correct?

Bracket positioning error and variations in tooth anatomy from patient to patient. Bends may also be needed to get the desired occlusion and anterior esthetics.

99. Can intra-oral finishing pliers be used on 18x25N to make step up/down/in/out bends? Explain

The initial archwire will not generally ‘hold’ the bend after it is made, but after the archwire has been in the mouth for 2-4 months, the properties change and it will hold the bend. The intra-oral finishing pliers are made to make bends in 018 wire, which is the ‘up/down’ of 18x25N. The ‘in-out’ 025 side will give an incomplete bend with these pliers, but is not bad.

100. Can intra-oral finishing pliers be used on 18x25N to make second order bends (tip root distal or mesial OR rotate distal out/in or mesial out/in)? Explain

No, they are not designed for this, although many try. There are errors created in the original arch shape or planes when you try to do this. It is best to remove the archwire to make 2nd order bends (or simply reposition the bracket or change Rx, since these bends are usually not found to be effective in the end analysis).

Practice Management

101. Why is it more efficient to schedule patients at 8-week appointment intervals instead of 4-weeks during the alignment and mechanics stages?

You can see twice the patients or work ½ as hard on an 8 week schedule than 4 week. Especially with 18x25N in the alignment stage, the tooth movement is not ready yet at 4-weeks to reactivate. You will ‘over-activate’ the wire, applying too much force to the system, slowing tooth movement. Nitie closed coils are long acting and there is no reason to see the patient every 4 weeks. Class II elastics in the mechanics stage usually have not made the correction in 4 weeks so you simply are encouraging the patient and give them more elastics.

It has been calculated that a patient visit where you do nothing, costs about $25

102. What are the problems that may occur by scheduling patients too frequently (eg. 2 weeks)?

Teeth will move slower and the patient will experience more pain from the over-activation of the appliance.

103. Explain why teeth do NOT move faster when scheduling patients for more frequent adjustment visits.
The forces at the periodontal ligament compress the tooth against the bone, shutting down vascularity and cellular exchange for resorption and apposition. The body then activates the “rear resorption” system to relieve the excess force. This is often noticed at about 3 weeks of no tooth movement (and pain) and then all of a sudden the teeth start moving again.

104. Describe the 1-minute adjustment for the doctor
   With hands in the pocket,
   Evaluate (where the patient is right now in treatment, and progress)
   Create excitement
   Praise the staff (so you don’t have to do the work)
   What to do next time
   When is next visit

105. How can you reduce the doctor time of rebonding and recementing bands?
   Train the assistant to recondition the bracket or band for reuse, train the assistant to prepare the tooth, then you the doctor simply places the bracket on the tooth in the new position, or does the final seat to the band.

106. How can you reduce the doctor time of repositioning brackets and making archwire bends?
   Indirect bonding for better bracket positioning.