Uppers From Mars, Lowers From Venus
Clarifying Overdentures

M. Nader Sharifi, D.D.S., M.S.
Chicago Dental Society Midwinter Meeting
Chicago, IL
February 22, 2018
About Your Speaker:

M. Nader Sharifi, D.D.S., M.S. holds a certificate in prosthodontics and a masters degree in biomaterials from Northwestern University. He received his dental education at the University of Illinois. He has presented numerous topics on implant dentistry since his graduation. His presentations on restorative dentistry and patient care have earned him recognition from esteemed study groups, societies and associations nationwide. Dr. Sharifi is a former assistant professor at Northwestern University and former on-call consultant for Nobel Biocare.

Dr. Sharifi currently maintains a full-time private practice of adult general dentistry in Chicago’s downtown loop. As a five day a week wet gloved dentist, he is interested in ensuring time saving and cost effective care. In 1996 he was named to the American Dental Associations Speakers Bureau and in 2007 Chicago Dental Society honored him with the Gordon Christenson Distinguished Lecturer Award. He has also been honored with Fellowship in the American College of Dentists and Membership in the American Academy of Restorative Dentistry.

If you would like, you may find additional information regarding other courses and additional handouts on his website at www.DrSharifi.com. If you have interest in the live denture course where CORE provides the patient send an email with questions to LiveDentureCourse@DrSharifi.com. Please feel free to direct any other questions or comments you may have to Dr. Sharifi’s personal Email address at MNSDDSMS@AOL.com.

About this handout: This handout isn’t meant to follow along slide for slide to the program today. It does somewhat, but this is more meant to be a resource in the future as you encounter these cases. This handout is written in such a manner that it can be used as a step-by-step guide when treating removable cases in your office.
A. Class I
1. Mandibular bone measures 21 mm or more at the smallest measurement on a panorex radiograph.
2. Angle Class I jaw classification.
3. Well shaped arch form (U shaped)
4. High, well rounded ridges. Changes are Underlined
B. Class II
1. Mandibular bone measures 16 - 20 mm at the smallest measurement on a panorex radiograph.
2. Angle Class I jaw classification.
3. Well shaped arch form (U shaped)
4. High or low, well rounded ridges.
5. Muscles that have limited influence on stability.
6. Mild systemic or psychological modifiers.
C. Class III
1. Mandibular bone measures 11 - 15 mm at the smallest measurement on a panorex radiograph.
2. Angle Class I, II or III jaw classification.
3. Challenged arch form (V or Square shaped).
4. Low, well rounded ridges or basal bone.
5. Muscles that compromise stability.
6. Moderate systemic or psychological modifiers.
7. TMD, xerostomia, or hyperglossitis.
D. Class IV
1. Mandibular bone measures less than 10 mm at the smallest measurement on a panorex radiograph.
2. Angle Class I, II or III jaw classification.
3. Challenged arch form (O shaped).
4. Ridges resorbed to basal bone.
5. Muscles that compromise stability.
6. Moderate systemic or psychological modifiers.
8. Maxillary-mandibular incoordination (Parkinson’s)
Patient Name_______________________________ Date________________

**Prosthetic Findings**

**Maxillary Arch:** U Shaped_____ V Shaped_______ O Shaped____ Square Shaped____

Ridges: High_____ Low _______ Post-extraction_____ Knife-edged_____ Basal bone____

Hard Palate: Deep_______ Shallow _______ Medium______ Soft Palate Class___________

Tuberosities (R)______(L)______ Torus______ Attached Mucosa_____%

Frenum: Anterior______(R)_______(L)______ Teeth _____________________________

**Mandibular Arch:** U Shaped_____ V Shaped_______ O Shaped____ Square Shaped____

Ridges: High_____ Low _______ Post-extraction_____ Knife-edged_____ Basal bone____

Lateral Throat Form Class______ Torus__________ Attached Mucosa_____%

Buccal Shelf: Large_______ Medium_________ Small_______

Frenum: Anterior______(R)_______(L)______ Teeth _____________________________

**Tongue:** Position_________________________ Movement___________________________

Saliva Consistency_________________________ Amount___________________________

**Jaw Classification:** Class I____ Class II_______ Class III_______

**Existing Prosthesis:** ________________________________ Pt.’s Opinion:

Retention: Good____ Adequate_______ Poor____

Stability: Good____ Adequate_______ Poor____

Support: Good____ Adequate_______ Poor____

Esthetics: Good____ Adequate_______ Poor____

Phonetics: Good____ Adequate_______ Poor____

Occlusion: Good____ Adequate_______ Poor____

**Facial Shape:** Square____ Square-tapering____ Ovoid____ Triangular____ Round____

Profile: Flat_______ Rounded_________ Inverted____________

Coloring: Hair_______ Eyes_________ Complexion____________

© 2017 M. Nader Sharifi, D.D.S., M.S.    Page 3
Course Outline: Overdentures

I. Course Synopsis
   A. What Are Overdentures
   B. Why Offer Overdentures
   C. Three Denture Steps for Success
   D. Treatment Planning Overdenture Locations and Implant Type
   E. Implant Supported Fixed Bridge for the Lower Arch
   F. Clinical Steps for Overdentures

II. Terminology – We realize that Anatomy is Very Important
   A. Retention – Influenced by Adaptation, Anatomy
   B. Stability – Influenced by Anatomy and Limitations of Existing Prosthesis
   C. Support – Influenced by Anatomy and Limitations of Existing Prosthesis

III. Definition of an Overdenture
   A. Conventional Denture – Removable, supported & stabilized entirely by mucosa.
   B. Implant Retained Overdenture – A patient removable prosthesis that receives retention and limited stability from retained roots [natural or man-made (implants)]. Support should come from the hard and soft tissue of the denture bearing mucosa, not just the natural or man-made roots.
      1. Typically fewer implants – concentrated in the anterior
   C. Implant Supported Overdenture – Patient Removable Fixed Bridge – A prosthesis that is fixed in place with attachments and locks, yet is removable by the patient for hygiene access. The natural or man-made roots provide all retention, stability and support – just like a fixed bridge. The denture bearing mucosa provides no support what so ever.
      1. Requires more implants – positioned posteriorly for A-P Spread
   D. Fixed Bridge – Hybrid Prosthesis, Fixed-Detachable, Patti Bridge, Profile Prosthesis, or All-On-Four all the same thing – a dentist removable fixed bridge. The patient cannot remove this option.
      1. Implant Position Eliminates the Need for Grafting
      2. Avoidance of Grafting reduces cost and reaches more patients
      3. Simplifies a complex treatment option increasing profitability
      4. Standardized technique replaces teeth same day they are lost
      5. High success, esthetics and hygiene access

IV. Why do we do overdentures?
   A. Less bone loss
   B. Improved chewing function: Bars & Balls > Magnets > F/F Dentures
   C. Improved patient satisfaction
   D. Intermediate restoration before complete edentulism

V. How Do We Make Overdentures? Make Good Dentures
   A. Three Main Steps: A well extended and well adapted denture with poor occlusion has no chance to succeed, but even a poorly extended denture with ideal centric and good occlusion can be successful.
   B. Impression Techniques
   C. Records – Centric Record Is Most Important Step
   D. Occlusal Design

VI. What Makes a Good Denture:
   A. The Big Three: Retention, Support and Stability – Stability is Key
   B. Next Two: Esthetics and Phonetics
   C. Main One: Occlusion – Excellent Occlusion overcomes poor borders.
VII. Occlusal Design – This is the difference maker.

A. Neurocentric Flat Plane Occlusion
1. Flat Plane Teeth Throughout Mouth.
2. Indications – Very poor bone, poor muscle control
3. Controlled in Set-up on the Articulator.
   a) Mandibular incisors, cuspids, premolars and molars are all on same plane.
   b) Maxillary posterior teeth are set to have appropriate contact and overjet.
   c) Anterior open bite, can have overjet, NO overbite.

B. Balanced Occlusion
1. Bilateral Working and Balancing Side Contacts
2. Cusp Form Teeth Throughout Mouth
3. Indications – Esthetics and Chewing Efficiency
4. Controlled in Set-up on the Articulator.
   a) Maxillary incisors, cuspids, premolars and first molar mesial cusps all on same plane.
   b) Cusps then rise to shallow Curve of Spee.
   c) All mandibular teeth interdigitate tightly.
   d) Anterior open bite, can have overjet and overbite.

C. Lingualized Occlusion
1. Bilateral Working and Balancing Side Contacts
2. Cusp Form Teeth in Maxilla, Flatter Plane in Mandible
3. Indications – Esthetics with poor bone remaining or One arch is natural, the other removable partial or complete.
4. Controlled in Set-up on the Articulator.
   a) Maxillary incisors, cuspids, premolars and first molar mesial cusps all on same plane.
   b) Cusps then rise to shallow Curve of Spee.
   c) Mandibular posterior teeth have central groove contact to palatal cusps of the maxilla.
   d) No posterior contact of maxillary buccal cusps.
   e) Anterior open bite. If lowers are 0° – no overbite.
5. Lingualized Options – Ivoclar OrthoLingual; Myerson Lingual Integration; Vita Physiodens; Dentsply 33°/22°; 22°/10° or 10°/0°

VIII. Delivery of Occlusion:

A. Occlusal Adjustment has one lab and three clinical steps: Eliminate Processing Errors; Balance Centric Prematurities; Obliterate Buccal Interferences; Smooth Out Eccentrics

B. Request lab eliminate processing error but don’t over adjust so we can finalize clinically

C. Use Occlusal Indicator Wax to Refine and Eliminate centric prematurities.
   1. Tap, tap, tap, squeeze with 80% pressure.
   2. Adjust central groove of lower arch to equalize palatal cusp contacts throughout
   3. If set up is lingualized occlusion, eliminate buccal contacts.
   4. As multiple adjustments are made, buccal cusp contact increases
   5. Ready to Move On…Prosthesis has equal retention with and without wax

D. Obliterate Buccal Interferences – With Lingualized Occlusion
1. Bite and Grind Side-to-Side Using Blue/Blue Ardent Articulating Paper
2. Obliterate Buccal Cusp Contacts
   a) Adjust Lower for Premolars to Preserve Esthetics in Upper
   b) Adjust Upper for Molars to Preserve Function from Lower

E. Eccentric Occlusion – Visualize, Ask, Mark, Read and Adjust
1. Use horseshoe red/black articulating paper to eliminate hitches and smooth out working and balancing side contacts in group function.
   a) Visualize hitches by watching slide from side to side – Quiet Upper
   b) Ask patient if hitch is on left or right (could be balancing side issue); Ask patient if hitch is in front or back
   c) Mark with articulating paper (single color is okay, red for eccentrics and blue for centrics is ideal)
   d) Read to see if there is a steep cusp tip that is the lone contact in the expected area of interference. Strongly consider making one adjustment at a time to confirm an improvement before overadjusting a denture.
   e) When the upper is quiet in side-to-side movement the occlusion is refined

F. Balanced Occlusion – To help reduce confusion, complete one side of one arch each time the case is marked with paper. Can also adjust contralateral balancing. Then check other side and back again. Twice as many adjustments as with Lingualized occlusion.
   1. Red to upper – right working only, Black to upper – centric only – adjust upper.
   2. Red to upper – left working only, Black to upper – centric only – adjust upper.
   3. Red to lower – right working only, Black to upper – centric only – adjust lower.
   4. Red to lower – left working only – adjust lower. Repeat PRN.

G. Centric Relation – the use of an intra-oral tracing device significantly decreases the need for occlusal adjustments – and remounts – at delivery.

IX. Completely Edentulous Patient Impression Techniques
   A. Initial Impressions
      1. Irreversible Hydrocolloid (Alginate)
         a) Canned Alginate – As good as anything else.
         b) Syringable Alginate – System 1 meant for initial imp. only
   B. Final Impressions
      1. Rubber Base with Green Stick Compound
         a) Break 2/3 stick of compound and drop in water bath
         b) Mold tempered stick to each area of the tray
         c) Retemper in the water bath and seat in the mouth
         d) Border Molding Upper – Can keep adding
            (1) Upper Right – pull cheek down and back
            (2) Upper Left – pull cheek down and back
            (3) Upper Anterior – smile really big, blow a kiss
            (4) Posterior – open wide, move side to side
         e) Border Molding Lower – Can keep adding
            (1) Lower Right – pull cheek up and back
            (2) Lower Left – pull cheek up and back
            (3) Lower Anterior – smile, blow a kiss
            (4) Lingual Left & Right – oppose pressure
         f) Impression Making – Trim border molding; add adhesive
            (1) Wash with light body impression material
            (2) Repeat all border molding steps two times
      2. Polyvinyl Siloxanes with Fast-Set Bite Registration Border Mold
         a) Border Molding Sections – Bite Registration Material
            (1) Whole Right Side – Inject into the vestibule
            (2) Whole Left Side – Inject into the vestibule
            (3) Posterior – Inject onto the impression tray
         b) Impression Making – Trim border molding; add adhesive
            (1) Wash with light body material
3. Polyvinyl Siloxanes with Stock Tray Technique – Dentsply DVD
   a) Use Massad Trays from Dentsply
      (1) Heat and Trim as Needed to “Customize” to Arch
   b) Create Tissue Stops with Heavy Body Material
      (1) Support Tray Position Artificially
   c) Border Molding ENTIRE ARCH: Heavy Body Material
      (1) Inject onto the impression tray
      (2) Have Patient Hold Cheek Retractors
      (3) Trim Border Mold material and Tray as Needed
      (4) This step often needs to be repeated
   d) Impression Making: Light or Medium Bodied Materials

C. Hydrocast Reline Technique
1. System 1 irreversible hydrocolloid impression – fabricate baseplates and wax rims; records, mount, set teeth and wax trial
2. Process denture and have lab complete a selective grind, then fabricate a Hydrocast Jig, break-out and hollow grind intaglio
3. At delivery appointment, fill denture with Microseal and seat in lubricated Hydrocast Jig for at least 10 minutes; trim material 2 mm from flanges (I do this the morning of the delivery appointment)
4. Adjust centric occlusion intra-orally with occlusal indicator wax. Also soak lubricated Hydrocast jigs in “wet” water.
5. Line dentures with Hydrocast functional impression material dip into “wet” water and seat in Hydrocast jigs. Soak for ten minutes in “wet” water – lightly trim excess
6. Seat in patient’s mouth and read – out loud – for 10 minutes; gross trim buccal excess; patient wears for 24 hours (eating and sleeping)
7. Next day, drop off and pour cast and send to lab for a reline.
   a) Impression material does not set up – it must be poured.
8. If adjustments are necessary, mark with wax pencil, adjust acrylic with a bur (adjustments would only be necessary if acrylic stuck out of the Hydrocast). Mix fresh Hydrocast and repeat steps 6 & 7
   a) If patient wears dentures for second 24 hour period then next morning is just to drop off dentures – no chair time necessary
      (1) Pour dentures over lunch hour & ship to lab for reline
9. Re-deliver dentures – Remove undercuts, recheck occlusion

D. Cast Fabrication
1. Boxing and Pouring
   a) Mix Pumice/Mounting Stone at a 60/40 ratio
   b) Most Ideal: 40% corn starch, 30% pumice & mounting stone
   c) Insert Impression, Allow to Set; Trim on model trimmer
   d) Apply Boxing Wax, Rubber Band and Pour Stone
2. Ideal Cast Landmarks – ensure land area for finishing dentures

X. Getting Wax Records to the CR Step – Wax Rims and Record Collection
A. Wax Rim Fabrication – Use auxiliaries or the lab.
1. Alma Gauge – Excellent Starting Point
   a) Measure old denture and add estimates to length
   b) Male horizontal 7-9 mm; Female horizontal 8-11 mm
   c) Use “Papilla-meter” for Vertical

B. Maxillary Wax Rim – Use first.
1. Anterior Contour – Profile esthetics, use your fingers for cuspids.
2. Anterior Vertical Height – Use fricatives as the starting point. If the patient has an “airy” sound to fricatives, we need to add wax. If there is a “poppy” sound, then we need to remove wax. As soon as the fricative sounds are clear, we can now check for esthetics. We can get clear fricatives through about 3-5 mm of vertical height variation, therefore use incisal edge show as the final esthetic determinate for anterior vertical height. Know that women show more incisal edge at rest than men and we all show less as we age.

C. Maxillary Horizontal
   1. Intrapupillary Line – Side to side plane.
   2. Fox Plane (Dentsply) – We use the Fox Plane to get the incisal edge position to be level from the right to the left. If you use the patient’s eyes as the guide, have the patient stand and support the Fox Plane with their thumbs. Evaluate the eyes and the Fox Plane to ensure parallelism. Make changes as needed.
   3. Ala-Tragus Line – Anterior to posterior plane. Once the intra-pupillary line has been leveled, use the Ala of the nose and the Tragus of the ear to level the plane from the front to the back. Since the tragus can be up to 15 mm long, this line can vary significantly. Evaluate the plane from the facial view to confirm that the lower lip creates a pleasurable smile line with the upper arch wax rim.
   4. Buccal Corridor – Once the occlusal plane has been completed, add or remove wax from the buccal corridor for esthetics of a wide arch compared to a narrow arch. This is strictly esthetic.

D. Mandibular Wax Rim
   1. Anterior Contour – Very difficult because the mandibular arch resorbes facially. This tends to be a thin area on the denture, check the profile to see if there is a concavity below the lower lip.
   2. Anterior Vertical Height – Sibilant sounds are the final determining factor, but I start with the first premolar area being approximately the level of the lower lip at rest (not during speech). Again, remember that the lower arch resorbes facially so the lower anterior teeth are rarely placed very facial to the crest of the ridge.
   3. Earl Pound – “Let “S” be your guide.” Using sibilant sounds, add wax to the lower anterior vertical height until it appears as though the incisors are touching, but are not. Consider placing denture teeth in the wax rims for difficult patients. I keep the posterior as an open bite to allow the use of the Coble Balancer for CR records.

F. Post Dam – Compensates for processing shrinkage.
   1. Functional – Pressure with impression material.
   2. Visual – Reflect light to extension of baseplate, if a shadow exists when patient says “aah” then the baseplate is overextended on the vibrating line, trim till no shadow. Done at the records appointment

XI. Centric Relation – the use of an intra-oral tracing device significantly decreases the need for occlusal adjustments – and remounts – at delivery.

A. First of all, we really don’t need to make our CR record at VDO.
B. The maxillary and mandibular wax rims have been finalized to the incisal edge positions based on esthetics and phonetics. This differs from VDO by the amount of overbite utilized. CR record is taken once the upper and lower wax rims have been finalized to the closest speaking space. This is not VDO. It is closer to VDO than the freeway space. Once CR is made and mounted, the incisal pin is CLOSED to allow overbite – that is VDO.
C. CR Methods:
1. Patient closure on own – Fully edentulous pts. are fairly repeatable
2. Tongue to top, back roof of mouth – Retracts jaw.
   a) Email me for better instructions than from any manufacturer.
   b) Polyvinyl Siloxanes – Can make two bites, one for confirmation.
      (1) Cut Notches in Both Arches
   c) Protrusive – Edge to edge for condylar inclination
5. Facebow – Necessary. This is a full mouth rehab.
   a) Use dentate fork with bite registration materials

XII. Tooth Selection
   A. Mold Guides – Dentsply Facial shield breaks down the mold guides to useable resources by determining tooth shape and size.
      1. Tooth Shape Matches Facial Shape.
      2. Tooth Size Proportional to Facial Size.
   B. Mold Guide – Ivoclar Intra-Nasal Measurement does same for Blue Line
   C. Tooth Form – Rounded versus square incisal edges.
   D. Materials – All materials are hardened.
      1. Hardened Composite – May be soft inside.
      2. Hardened Acrylic – Excellent wear characteristics.
      3. Porcelain – Only F/F – Hardest material in the mouth
         a) What’s the opposing arch? Porcelain only opposes porcelain
   E. Esthetic Requirements – Porcelain no longer necessary, but is still better
   F. Poor Combinations – Porcelain anteriors, acrylic posteriors.

XIII. Cost Analysis of Quality Complete Dentures
   A. Expect about 5 hours with Hydrocast
   B. Expect 4.5 hours with Rubber Base or PVS Impressions
      1. Compare to your office 3-Unit Fixed Bridge
         a) Time for 3-Unit, Cost for 3-Unit is likely less in your office
      2. Why charge more to replace one tooth than to replace all the teeth?
      3. Your office demographics support your 3-unit bridge fee…
         a) Create a full/full complete denture fee similar, if not more.

XIV. F/F Case Completion - Start to Finish Step-By-Step on Page 18 in Handout

XV. Treatment Planning – Evaluate Overdenture cases just as complete denture cases.
Use Completely Edentulous Classification as a guide (see page 2) Use Prosthetic Finding (page 3).
   A. Record Collection begins with a review of history – Medical, Dental,
      Understand the Patient’s Chief Complaint and their Desires
      1. Prosthetic Findings (see page 3) for Anatomic Limitations
   B. Extra-Oral Exam – First patient contact is outside the mouth
      1. Oral Cancer Screening and TMD Evaluation
   C. Radiographic Survey
      1. Panoramic, Periapicals as needed; iCAT, Cone Beam Surveys
   D. Evaluation of Hard Tissues – Positive is helpful, Negative hurts with regard to Retention, Stability and Support
   E. Evaluation of Soft Tissues
   F. Evaluation of Teeth
1. Existing & Necessary Restorations; Periodontal Status

G. Evaluation of Existing Prosthesis

XVI. Bone Preservation – Ensuring time for our prostheses.
A. Primary Support Areas – Must be taken advantage of
B. Secondary Stress Bearing Areas – Must not be over stressed
   1. Maxillary:
      a) Primary – Hard Palate, Tuberosities
      b) Secondary – Residual Ridge from 1st molar to 1st molar
   2. Mandibular:
      a) Primary – Buccal Shelf (that’s it folks, gotta cover it!)
      b) Secondary – Residual Ridge from 1st molar to 1st molar
C. Primary Stabilizing Area – Lateral Throat Form in Mandible

XVII. Overdenture Attachment Selection
A. Retention – Bars > Balls, ERA, Locator > Magnets
B. Maintenance – Balls, ERA, Locator > Bars
C. Bars – Rotational or Non-Rotational
   1. Rotational Bars allow forces to be transferred to mucosa
   2. Non-Rotational Bars support the occlusal load without sharing
   3. Both bars can be made resilient, but it’s not desired with Non-Rotational bars since they don’t share load with mucosa
   4. Clips are 10 mm or more wide, need solder joints on either side so need 12 to 14 mm from implant edge to implant edge (for surgeons: 16 to 18 mm center-to-center), but the total bar length should be less than 26 mm due to strength issues
D. Implant and Root Attachments – To be considered a resilient attachment, it must provide vertical movement between 0.3 mm and 0.6 mm
   1. Locator – Rotational: Will be a Fulcrum Point in OD
      2. Ideal at corners (canines and 2nd molars)
         a) Manufacturer mislabels rotation as resiliency since it moves
   2. ERA – Resilient: Great for implants, not as great with teeth
      a) Required inside corners (especially premolars)
   3. Preci Clix – Tiny ball with great retention, Challenging to Pick Up
   3. Implant Manufacturer Balls – Each are proprietary – ask
      a) Nobel Biocare Ball (new smaller ball) no vertical resiliency so the implants will be loaded vertically
      b) Nobel Biocare Ball (old larger ball) had blue spacer to preserve vertical resiliency & get more mucosal support
   4. OSO Balls – Non-Resilient
   5. Bredent Ball – Resilient, for use over retained natural tooth roots
E. Teeth No Attachment – Occlusal Access Filling Materials
   1. Amalgam, Composite, or Glass Ionomer – fulcrum points
   2. Gold Copings – fulcrum points
   3. Magnets – Intimate contact attachment which requires symmetry and contralateral balance; they aren’t resilient attachments.
XVIII. Overdenture Implant Abutment Position Selection – Canine areas are most common due to favorable anterior fulcrum points (except for “V” shaped arches, then use the lateral incisor spot). Combining canines & first premolars can work – otherwise avoid premolars. Second molars are also very desirable due to favorable posterior fulcrum points. Symmetry helps, unilateral hurts.

A. Mandibular Arch Overdentures
1. One Implant – Centered in the Sympsyis
   a) Needs to be a rotational attachment – trailer hitch Bredent or Preci Clix
2. Two Implants – Can be bar clip (more ideal, more expensive, more challenging). Can be Locators or ERA to reduce all that.
   a) Posterior ridge height provides lateral stability
   b) No Cantilevers on two implant bars
3. Four Implants – all splinted, but clip in anterior only, cantilever ERA attachments off the back
   a) Three Points of Contact: Across the Clip, ERA, ERA
   b) Four Individual Attachments can create a fulcrum point
4. Three Implants – Triangulated Design is Non-Favorable
   a) Consider Unsplinted, Posterior ERAs, Anterior Locator
   b) Consider Using a Bar Across the Front of the Two Posterior Implants and behind the One Anterior Implant with Clips Parallel to Condyles.
5. Two Teeth – Locator, Magnet Copings, Non-attachment filling material, ERA with Black attachments only – avoid cantilevers
6. More Than Two Teeth – Careful about fulcrum points

B. Maxillary Arch
1. Two Implants is under designed in maxilla due to soft bone
2. Four Implants – all splinted, but clip in anterior only, cantilever ERA attachments off the back
   a) Three Points of Contact: Across the Clip, ERA, ERA
   b) Four Individual Attachments can create a fulcrum point
3. Implant Supported Overdenture – Multiple Implants, Widely Dispersed, Providing Posterior Support for Bar Overdenture without Movement
4. Two Teeth – Locator, Magnet Copings, Non-attachment filling material, ERA with Black attachments only, but, hey, upper dentures work great – spend the money and effort in the lower
5. More Than Two Teeth – Careful about fulcrum points – select two canines and/or two second molars and make a telescopic denture!

C. Fixed Bridge Requirements – for Patti Bridge, All-On-Four, etc
1. Four implants – All-On-Four with Excellent Documented Success
2. Maximized A-P spread (anterior to posterior implant distance)
3. Minimized Cantilever
4. Longer Implants (Mandible: at least 13 mm; maxilla: 15 mm)

XIX. Overall Overdenture Attachment Conclusions
A. Non-Resilient Attachments – AVOID PREMOLAR LOCATIONS
B. Resilient Attachments can be placed anywhere, but should still provide rotation - across a fulcrum line - parallel to the condyles
C. Bars – Rotational or Non-Rotational
   1. Rotational Bars allow forces to be transferred to mucosa
   2. Non-Rotational Bars for Patient Removable Fixed Bridges
D. Implant and Root Attachments –
1. Locator – Rotational: Great for Corners (canines and second molars)
2. ERA – Resilient: Best Inside Corners (premolars)
3. Implant Manufacturer Balls – Each are proprietary – ask
   a) Nobel Biocare Ball (new smaller ball) not resilient
   b) Preci-Clix Balls – Non-Resilient, Very Small, Very Retentive
   c) Bredent Ball – Resilient, for use over retained roots

XX. Prosthesis Options
A. Mandibular Arch
   1. Conventional Denture
   2. Implant Retained Overdenture
   3. Implant Supported Overdenture
      a) Patient Removable Fixed Bridge
   4. Fixed Bridge

B. Maxillary Arch
   1. Conventional Denture
   2. Implant Retained Overdenture (covers palate)
   3. Implant Supported Overdenture
      a) Patient Removable Fixed Bridge
   4. Fixed Bridge
F/F Case Completion (not overdentures) - Start to Finish

B. Initial Exam & Models
   1. Prosthetic Findings Sheet (page 3 of handout)
      a) Identify Anatomic Limitations (things we won’t likely change)
      b) Evaluate Existing Prosthesis: Retention, Stability, Support and Esthetics, Phonetics, Occlusion
         (1) Are Patient Complaints/Existing Conditions Correlating?
   2. Use American College of Prosthodontists Classification System (page 2)
   3. System 1 Irreversible Hydrocolloid

C. Final Impression if Rubber Base or PVS (skip this step with Hydrocast)
   1. Border Mold Custom Tray with Compound or PVS
   2. Trim Border Mold then Wash with Rubber Base or PVS

D. Records – Wax Rims, Tooth Selection, Facebow, Centric
   1. Earl Pound – Fricatives and Sibilants for Closest Speaking Space
   2. Intra-Oral Tracing Device for CR (2) and Protrusive
   3. Tooth Selection

E. Wax Trial – Confirm Esthetics and Bite
   1. Ensure Anterior Open Bite – Allows for Anterior Characterization
   2. Confirm Shim Stock Holds intra-orally same as Articulator
   3. Evaluate for Smooth Side-to-Side Eccentric Movements
   4. Patient Evaluates for Size, Shape, Shade and Position
      a) Last Chance to Make Changes without a Charge

F. Microseal and Hydrocast – Use the Hydrocast Jig
   1. Microseal on Jig before Patients
   2. Check Occlusion – Centric with Wax, Eccentric with Paper
   3. Hydrocast – Jigs for 10’ then Read for 10’, Trim Gross Excess

G. 24 Hour –Adjustment and Cast Fabrication (repeat or extend)
   1. This could also be scheduled at 48 hours

H. Re-delivery – Occlusal Indicator Wax, Horseshoe for Balance
   1. Centric should be very close, but ensure it is excellent
   2. Refine the eccentric contacts

I. One Week Post Delivery Adjustment
   1. Expect occlusal adjustments for sore spots more than acrylic
   2. Use Pressure Indicating Paste from Mizzy when checking acrylic
      a) Vertical dab, apply PIP to entire intaglio surface, seat and have patient chew up and down on cotton rolls while you move them around the arch – adjust for pressure areas.
      b) Crestal Marks – Check centric prematurities with wax
      c) Non-crestal Ridge Marks – Check eccentrics with paper
   3. Oral Hygiene Instruction
   4. Recall – annual oral cancer screening exams & occlusal adjustment
Clinical Fabrication of an Overdenture – Three Different Techniques

1. Pick Up Attachments in Processed Base then Process Denture
2. Impress Implants in Final Impression for Denture
3. Retro-Fit Existing Denture

1. Pick Up Attachments in Processed Base (my preferred technique)
   A. Advantages – Essentially Making a Denture, Only One Final Impression, Easiest Pick Up of Attachment, Most Natural Final Impression
   B. Disadvantages – Processed Base with Extra Clinical Step or labwork vs Requires Metal Substructure - Cost of Frame and Extra Clinical Step
   C. Clinical Step-By-Step for ERAs, Locators
      a) Make a Denture – Only to Wax Trial
         (1) Duplicate Wax Up for Surgical Stent
      b) Place Implants, Relieve Existing Denture for Osseointegration
         (1) Don’t relieve support area over the buccal shelf
         (2) Reline denture with tissue conditioner
      c) Expose Implants, Reline Denture Over Healing Abutments
         (1) Measure and Order appropriate implant abutments and Processing Males with metal housing
      d) Final Lower Denture Impression With Implants
         (1) Add 30 minutes to conventional impression time
         (2) Seat abutments and torque to recommended level
         (3) Snap Black ERA male and housing onto abutment (Locator)
         (4) confirm custom tray fits properly over abutment height
         (5) Border mold the custom tray as usual
         (6) Remove wax spacer, trim border mold, add adhesive
         (7) Make final wash impression right over the black males
         (8) Remove impression – pouring master cast to create a stone “replica” of the black male and housing
         (9) Reline provisional denture over new abutment
         (10) Order processed base (or framework) with a solid collar to fit up and around black male. If you use a framework keep lattice work throughout the arch with good tissue stops in the central incisor, canine and second molar regions.
      e) Attachment Pick Up
         (1) Seat black male and housing on abutments. Seat processed base (or framework) and adjust to ensure the base or the frame doesn't bind anywhere.
         (2) With one hand, gently hold the processed base in place (too much or too little pressure can cause difficulties). With the other hand, inject denture repair acrylic to lute the base or frame to the metal housings. Allow to set for 5 minutes, cool exothermic reaction at 3 minutes with water.
         (3) Send the processed base (or framework) with the two Processing males luted to the lab for a wax rim.
         (4) Have the lab grind off the black ERA male stone “replicas” to allow the frame to seat again now that the actual ERA black males have been picked up clinically. They need to ensure the frame still seats properly.
         (5) The lab will fabricate a wax rim directly over the baseplate
         (6) Realistically you could do these last two lab steps and continue the wax records visit in your office in one visit.
      f) Wax Records – Use Intra-Oral Tracing Device for CR
(1) Complete wax records standardized for complete dentures
(2) Select Teeth and Posterior Occlusal Design
(3) The lab will mount the case and set the denture teeth

g) Wax Trial Appointment
(1) Process Denture
(2) The lab will need to block out INSIDE and around the ERA male housings. Otherwise they will process conventionally.
(3) Black ERA males should be removed and white males seated

h) Deliver Denture
i) Cost is a conventional denture plus implant parts plus a processed base or a lab fabricated framework that varies greatly for two or four implant cases plus two hours extra chairtime
j) May be as high as 3 or 4X conventional denture fee. The end.

2. Impress Implants In Final Denture – Best for Bar/Clip Dentures

A. Advantages - Essentially Making a Denture, Only One Final Impression, Lab Processes Attachments, No Intra-Oral Pickup
B. Disadvantages – Implants Complicate Difficult Lower Denture Impression, Need To Provisionalize Over Abutments
C. Clinical Step-By-Step for Bar/Clip Denture
   a) Make a Denture – Only to Wax Trial
      (1) Duplicate Wax Up for Surgical Stent
   b) Place Implants, Relieve Denture for Osseointegration
      (1) Don’t relieve support area over the buccal shelf
   c) Expose Implants, Reline Denture Over Abutments
   d) Final Lower Denture Impression With Implants
      (1) Add 30 minutes to conventional impression time
      (2) Order implant replicas from abutment manufacture
      (3) Make an initial impression with abutments in place
      (4) Fabricate a custom tray with internal wax spacer
      (5) Seat impression copings (Nobel Biocare users: select snap-fit closed-tray impression copings)
      (6) Border mold the custom tray as usual
      (7) Remove wax spacer, trim border mold, add adhesive
      (8) Make final wash impression, seat replicas, pour
   e) Wax Records – Use Intra-Oral Tracing Device for CR
      (1) Select Teeth and Posterior Occlusal Design
   f) Wax Trial & Index Abutments - Index adds 30 minutes
      (1) Can Use Original Opposing Upper Arch Wax Trial
      (2) Make an Index of the abutments for all bar cases.
      (3) Seat Individual Index Copings using Gold Cylinders
      (4) Lute Index with GC Pattern Resin (Not Duralay)
      (5) Remove Index and Connect Abutment Replicas
      (6) Immediately Pour Index with Mounting Stone
   g) Detour to Make Framework
      (1) Lab Makes a Moulage of Wax Up – Scans model & Wax Up
      (2) Fabricates Procera Frame to Fit Under Wax Up
      (a) Frames Must Be Tried in
      (b) Add 30 minutes for trial of framework
   h) Process Denture Over Bar (Also works for Balls, ERA, etc.)
   i) Deliver Denture Add 30’ to conventional delivery time
j) Cost is a conventional denture plus implant parts plus a lab fabricated framework that varies greatly for two or four implant cases plus two hours extra chairtime

k) May be as high as 3 or 4X conventional denture fee. The end.

3. Retro-Fit Existing Denture – Great for Balls, ERAs, Locators

A. Advantages - Essentially Making a Denture, Single Set of Dentures Throughout, Can Retro-Fit Recent Difficult Case

B. Disadvantages – Must Pick Up Attachments Intra-Orally

C. Clinical Step-By-Step

a) An existing denture has been processed and delivered
   (1) Duplicate Denture for Surgical Stent

b) Place Implants, Relieve Denture for Osseointegration
   (1) Don’t relieve support area over the buccal shelf

c) Expose Implants, Soft Line Denture Over Abutments
   (1) Use of soft liner appointments can be billed PRN

d) Pick Up Attachments – Give Yourself an Hour
   (1) Relieve Denture Over Attachments – Intaglio bite registration helps
      (a) Both ERA & Locator use Black Males for Pick Up
      (b) Both Should be picked up with a metal housing
   (2) Drill an access hole from the facial and lingual on each side
   (3) Ensure Denture Seats Completely with and without the black male attachments in the mouth – Use PIP or Fit Checker
   (4) Remove Black Male and Block out any undercuts under them with UltraDent Block Out Putty – make sure the retentive groove is exposed to be picked up.
   (5) Mix Acrylic – GC Trad: Ideal (BisAcryl resin alternative)
   (6) Load disposable syringe with mixed acrylic
   (7) Seat Dentures and have the patient bite with gentle biting pressure. Too much pressure leads to tissues being depressed, too little and the attachments won’t engage.
   (8) Inject disposable syringe with Trad acrylic into buccal holes and back fill.
   (9) Allow to FULLY Set – Exothermic begins about 3 minutes, rinse to cool
   (10) Remove Dentures at about 5 minutes from injection of acrylic
   (11) Add Acrylic Around the Attachments if Needed to Fill Voids
   (12) The Black Males must be drilled out with the appropriate trephine drill and replaced with the colored male.
      (a) Place trephine into straight handpiece and drill around center of black male. Drill to remove center.
      (b) Use old curette to remove remaining rim of black male
      (c) Place colored male on seating tool and snap into place.
   (13) Seat Denture and confirm Retention

e) Cost is a conventional denture plus implant parts plus a pick up procedure (one hour extra chairtime)

f) Easily covered in conventional fee times two (doubled)
   (1) Since this is an existing denture, the fee will actually be about the conventional denture fee or two times a conventional denture fee for a new denture. The end.

Wow, that was a lot! I hope it helps.
Textbooks:
1. Branemark PI, Zarb GA, Albrektsson T: 
   **Tissue Integrated Prostheses.** Quintessence Publishing Co., 
   Inc. Chicago, IL 1985.
2. Beumer J, et al. Editor: 
   **Fundamentals of Implant Dentistry, Volume I: Prosthodontic 
3. Feine JC, Carlsson GE: 
   **Implant Overdentures: The Standard of Care for Edentulous Patients.** 
4. Hayakawa I: 
   **Principles and Practices of Complete Dentures – Creating the Mental Image of a Denture.** 
5. Johnson DL and Stratton RJ: 
6. Sharifi MN: 
   **Essential Dental Handbook: Chapter on Removable Prosthodontics.** Edited by Edwab RJ, 
   Penn Well Publishing Co., Tulsa, OK 2002. Call 800-752-9764 (10% Coupon: DOAE05)

Journal Articles:
1. Atwood D: Clinical, cephalometric and densitometric study of reduction of residual ridges. 
   Int J Prost 1988; 1:159-64.
   partial denture with a spring loaded plunger attachment and I-bar retainer. J Prosthet Dent 
5. Browning JD, Meadors LW, Eck JX: Movement of three removable partial denture clasp 
7. Burns DR, Ward JE: A review of attachments for removable partial denture design: Part 2 - 
   of intracoronal attachments with clasp distal-extension removable partial dentures. J Prosthet 
10. Chow TW, Clark RK, Clarke DA: Improved designs for removable partial dentures in 
    Kennedy Class IV cases. Quintessence Int. 1988; 19:797-800.
12. Curtis T, Langer Y, Curtis D, Carpenter R: Occlusal considerations for partially or completely 
    edentulous skeleton class II patients. Part I: Background information. J Prosthet Dent 
15. Feingold GM, Grant AA, Johnson W: Abutment tooth and base movement with attachment 
16. Feingold GM, Grant AA, Johnson W: The effect of partial denture design on abutment tooth 
    1959; 9:962.
19. Hochman N, Yaniv O: Comparative clinical evaluation of RPDs made from impressions with different materials. 
20. Hosman HJ: The influence of clasp design of distal extension RPDs on the periodontium of the abutment teeth. 
22. Kelly E: Changes caused by a mandibular removable partial denture opposing a maxillary complete denture. J Prosthet 
    Dent 1972; 27:140.
23. Ko SH, McDowell GC, Kotowicz WE: Photoelastic stress analysis of mandibular removable partial dentures with mesial 
Product List

**Blue Dolphin Products** – Papilla Meter, Wax Spatulas, Bunsen Burner. 800-448-8855

**Brassler** – NSK Lab Handpiece, Acrylic Adjustment Burs, Ultra Denture Polishers. 800-841-4522

**Dentsply** – Fox plane, Aquasil Impression Material, Aquasil Impression Trays, Portrait, Trublend & Porcelain Denture Teeth, Alma Gauge, Trubyte Tooth Indicator, Vitallium Clasp Adjuster (N001960)
Dentsply Prosthetic 800-786-0085

**Kettenbach** – Panasil Impression Material, Futar Bite Registration Material. 877-532-2123.

**Panadent** – PCH Articulator, Kois Occlusal Analyser (Fox Plane). Panadent 800-368-9777.

**Ivoclar** – Blue Line, Postaris and Phonare Denture Teeth, System 1 and System 2 Impression Material and Impression Trays, Stratus 2000 Articulator, Smile Design Kit. 800-533-6825

**Kerr** – Permalastic Rubber Base Impression Material, Pink Baseplate Wax, Occlusal Indicator Wax, Green Stick Compound. 800-537-7123

**Bosworth Dental** – New Truliner (chairside relining material). 708-679-3400

**GC America** – Unifast TRAD (repair acrylic). 800-323-7063

**Lee Mark Dental** – Coble Balancer, Massad Balancer, Lessman Wax Knife, Wax Spatulas, Electric Waxer, Water Bath for Compound. 866-533-6275

**Miscellaneous Products:**
2. Attachments - **VKS** vertical or horizontal attachment. **Bredent USA**, Miami, FL; 800-328-3965.
3. Attachments - **ERA** attachment & **EZ Pick Up with Light Cure Varnish** to pick up attachments. **SternGold**. 800-243-9942
4. Attachments – **Preci Clix**. **Preat Corp.**, 800-232-7732
5. Attachments – **Locator**. **Zest Anchor**, 800-262-2310
8. Functional Impression Material - **Hydrocast**. **Sultan Chemists**; 800-842-8844.
13. **Wonderfill** – Impression Boxing Putty. **Dental Creations**. 254-772-4661