Restoring Severe Anterior Wear Cases; A Step by step Process

Friday, February 6, 2015

Glenn E. DuPont, D.D.S.
The presence of worn dentition, especially worn anterior teeth, presents us with one of our greatest challenges. Our goal is to create an atraumatic, comfortable, stable occlusion and still be able to achieve optimal esthetics for that patient.

Some of my observations in the past 31 years in treating these kinds of wear problems have resulted in a number of observations.

- It is very helpful to precisely adhere to the rules of programmed treatment planning applied in the correct sequence.
- Worn teeth may or may not have deflective interferences.
- Wear usually does not cause a loss of vertical dimension of occlusion. The vertical dimension can usually be slightly increased with comfort and stability.
- Posterior teeth cannot wear from attrition in an ideal occlusion. This must involve a stable, repeatable, centric relation starting point combined with anterior guidance in harmony with the muscles and immediate posterior disclusion in every excursion.
- Do not steepen or restrict the envelope of function. A shallow envelope of function seems to provide a lessening of muscle activity and a more stable result. This needs to be combined with a shallow Curve of Spee and Curve of Wilson in order to provide posterior disclusion. Attritional wear occurs when the teeth are in the way.
PROGRAM TREATMENT PLANNING

1. **EVALUATE EACH REQUIREMENT** for stability in proper sequence. Start with requirement #1 and solve any problems with providing a holding contact for every tooth or substituting for the missing contact or eliminating the need.

2. **PROVIDE** for unfulfilled requirements if indicated by:
   
   A. RESHAPING
   B. REPOSITIONING
   C. RESTORING
   D. SURGERY
   E. ANY COMBINATION of the above.

3. **SUBSTITUTE** for unfulfilled requirements if they cannot be provided logically by:
   
   A. APPLIANCES
   B. PARTIAL DENTURE PALATAL BARS
   C. PATIENT HABIT PATTERNS (must evaluate carefully)

4. **ELIMINATE the NEED by**:
   
   A. SPLINTING

5. **AFTER** planning for the first requirement of stability is satisfied, work out a plan for solving any problems related to the second requirement, then the third, etc…
# THE FUNCTIONAL-ESTHETIC ANALYSIS

**Are the TM Joints stable and healthy?**

Can they comfortably accept maximal load testing?

<table>
<thead>
<tr>
<th>Yes/No</th>
<th>Treatment Options</th>
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<tr>
<td></td>
<td>If 'Yes' proceed with checklist.</td>
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<td>If 'No' treat joint first.</td>
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## 5 Requirements for Occlusal Stability

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<th>Requirement</th>
<th>Treatment Options</th>
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<tr>
<td>When in centric relation are there stable stops on all teeth or a substitute?</td>
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<tr>
<td>Is the anterior guidance in harmony with the envelope of function? (CR contact to incisal edges)</td>
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<tr>
<td>Is there immediate disclusion of the posterior teeth in protrusion?</td>
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<td>Do all the posterior teeth on the balancing side disclude during excursion toward the midline?</td>
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<tr>
<td>Do all teeth on the working side disclude with the anterior guidance?</td>
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*Group function may be indicated in cases of a compromised working side cusp or implant in the cuspid site.*

## 6 Elements of Global Esthetics

<table>
<thead>
<tr>
<th>Element</th>
<th>Treatment Options</th>
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<tbody>
<tr>
<td>Does the patient have an acceptable maxillo-mandibular relationship in centric relation (Face, Airway, Bite)?</td>
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<td>Is the embrasure between the centrals parallel with the midline and perpendicular to the occlusal plane?</td>
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<tr>
<td>Is the lower posterior occlusal plane in harmony with the lower incisal plane?</td>
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<tr>
<td>Are the vertical and horizontal edge positions of the maxillary central incisors related to the inner vermilion border (wet/dry line) of the lower lip?</td>
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<td>Is the buccal corridor (transverse relationship) within normal limits?</td>
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<td>Is the display of gingiva acceptable when smiling?</td>
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## 6 Macro Esthetic Goals

<table>
<thead>
<tr>
<th>Goal</th>
<th>Treatment Options</th>
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<tbody>
<tr>
<td>Is the gingival architecture appropriate and balanced?</td>
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<tr>
<td>Are teeth 6-11 in proper proportion and contra-lateral balance?</td>
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<tr>
<td>Is the width-to-length ratio of the central incisors 75-85%?</td>
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<tr>
<td>Is the papillary position acceptable (without black triangles)?</td>
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<tr>
<td>Are the axial inclinations of the anterior teeth acceptable esthetically?</td>
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<tr>
<td>Is the depth of the incisal embrasures appropriate and do they graduate from anterior to posterior?</td>
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**Treatment options:** Reshape, Reposition, Restore, Reposition a boney segment

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Treatment Planning – Model/Photographic Flow Sheet

Step One: Choose condylar position
(based on restorative TMJ-Occlusal Examination)

a.) Maximum intercuspation
b.) Centric Relation
c.) Treatment Position

Note: if case is an MI case, models should be mounted in Maximum intercuspation, if Centric Relation, models should be mounted in CR, and if a treatment position is used, models should be mounted for study in this position.

Step Two: Go tooth by tooth: with casts, restorative chart, periodontal probings and photos, mark hopeless teeth, questionable teeth, and teeth that need to be restored (crowned or onlayed) due to weakness or breakdown.

Step Three: Evaluate maxillary, mandibular occlusal plane, facial asymmetries, and skeletal abnormalities: use photographs (full face, profile, and smile shots) and mounted casts.

Step Four: Choose vertical and horizontal position of mandibular incisal edge (wax or reposition teeth into ideal position - casts and photos as reference)

a.) Acceptable
b.) Unacceptable

If “unacceptable” refer to 4 treatment options:
1. Reductive reshaping (equilibration)
2. Reposition teeth (orthodontics)
3. Restore (additive reshaping)
4. Reposition bone (orthognathic surgery)

Step Five: Choose vertical and horizontal position of maxillary incisal edge (utilize photos: rest, ”e” position, smile from 3 views, full face, profile smile, and tipped down smile - this is a Key Step when cosmetic dentistry is driving the case.) Wax or reposition teeth to establish ideal esthetic vertical and horizontal incisal edge position.

a.) Acceptable
b.) Unacceptable

If “unacceptable” refer to 4 treatment options:
1. Reductive reshaping (equilibration)
2. Reposition teeth (orthodontics)
3. Restore (additive reshaping)
4. Reposition bone (orthognathic surgery)

Step Six: Choose vertical dimension of occlusion
Procedure:
• Unlock the centric relation lock and slide the cast together into maximum intercuspation.
• Drop the anterior guide pin down to contact the table on the front of the articulator and secure that in position.
• Now place the cast back into CR and lock into place.
• Close the cast together to contact the first tooth contact and observe the distance of separation between the pin and table. THIS IS THE AMOUNT OF ROOM AVAILABLE FOR REDUCTION TO RETURN TO VERTICAL DIMENSION OF OCCLUSION. DECIDE ON VERTICAL DIMENSION OF OCCLUSION YOU WISH TO WORK AT.

Choose:
• **Reductive reshaping** (Equilibrate casts back to original vertical)
• **Additive reshaping** (adding to posterior teeth in restorative process, can be helpful when adding length to max anteriors. This will maintain a shallow anterior guidance. Remember that lengthening anterior teeth will often steepen the guidance and infringe on the envelope of function. Look for evidence of horizontal parafunction (anterior wear) on photographs and casts)

If “unacceptable” refer to 4 treatment options:
  1. Reductive reshaping (equilibration)
  2. Reposition teeth (orthodontics)
  3. Restore (additive reshaping)
  4. Reposition bone (orthognathic surgery)
  5.

*Note:* rarely you may need to open the pin further than the first point of contact in CR for prosthetic convenience. These cases are usually full mouth rehabilitations and will require time for the occlusion to “settle” – long term provisional restorations may be indicated.

**Step Seven: Provide equal intensity stops**
If reductive equilibration is the choice: Equilibrate all premature interfering contacts to return the pin to contact with the anterior guide table and to establish uniform CR stops all the way around the arch, INCLUDING the anterior teeth (Note: the only time we do not provide stops on the incisors is when they are not contacting and stable in maximum intercuspation). If additive equilibration is the choice: Wax the posterior teeth (one arch or both arches) to provide uniform anterior and posterior stops.

If “unacceptable” refer to 4 treatment options:
  1. Reductive reshaping (equilibration)
  2. Reposition teeth (orthodontics)
  3. Restore (additive reshaping)
  4. Reposition bone (orthognathic surgery)

*Note:* We should now have uniform centric relation stops with a good cusp fossa relationship on each posterior tooth and a stable holding contact on each anterior tooth. If consider sawing and moving the tooth, or waxing to restore teeth. Be sure to create ideal lower anterior incisal edge position (step four), as well as ideal maxillary anterior lingual contour-through shaping, or waxing.
Step Eight: Eliminate balancing and working interferences

- By unlocking the CR lock and guiding the cast in left, right and protrusive excursions, marking with a red ribbon.
- Lock cast back in CR and mark with a black ribbon to read your CR stops which have been previously established.
- Now eliminate all RED skid marks that do not directly super-impose over black centric relation stops which you have established on all posterior teeth.
- What remains should be only centric relation stops posteriorly and red guiding marks on anterior teeth (lines on the front, dots in back).

If “unacceptable” refer to 4 treatment options:
1. Reductive reshaping (equilibration)
2. Reposition teeth (orthodontics)
3. Restore (additive reshaping)
4. Reposition bone (orthognathic surgery)

Step Nine: Harmonize anterior guidance

- Now harmonize the anterior guidance to establish a smooth gliding movement of the casts left, right and protrusive. It is desirable to share this movement with as many teeth as possible.
- Consider waxing up teeth in order to create an ideal anterior guidance being careful not to STEEPEN THE ENVELOPE OF FUNCTION.
- Be sure the anterior guidance is not too steep and Envelope of Function is not constricted.
- Consider cross-over and other habits as revealed by wear facets.

Step Ten: Final functional-esthetic check

- Once anterior guidance has been harmonized, recheck for any balancing, working, or protrusive interferences and eliminate them. Smooth anterior movements.
- Make changes necessary changes to gingival plane, to establish ideal crown length from incisal edge to free gingival margin. Every tooth visible in a full smile should be considered.
- Consider width changes of anterior teeth to idealize golden proportion and width/length ratio.
- Wax incisal embrasure depth to align with shape the patient desires.

Since we want to visual the final product, we are able to decide, through model work and photo analysis, if we can successfully complete the case through equilibration, tooth repositioning (orthodontics), restorative dentistry, or orthognathic surgery. Regardless of treatment option, our goal is always to do the LEAST amount of dentistry to provide the patient with the requirements of occlusal stability, and satisfy the elective esthetic wants of the patient.

WIDIOM
Treatment Sequencing

Phase I Treatment

- Eliminate pain and/or abscesses
- Emergency concerns of patient
- Initial scaling and root planning
- Home care instructions
- Caries control
- Splint therapy

Re-evaluate (endo, oral surgery, patient motivation, ready for stage II)
Refer to specialists for evaluation to get the "whole picture"
Second consultation if needed.

Phase II Treatment

- Splint therapy
- Equilibration
- Referral to specialists for treatment (ortho, O.S., perio, endo)
- Provisional restorations

Re-evaluate to be sure TMJ, perio, ortho, etc…. Completely satisfactory and all is ready for Phase III

Discuss final esthetic considerations

Re-evaluate to be sure provisionals are approved by doctor and patient

Phase III Treatment

Restorative Dentistry

1. Mandibular anteriors
2. Maxillary anteriors
3. Mandibular posteriors
4. Maxillary posteriors
10 Keys to Exceptional Mandibular Anterior Teeth (Provisionals and Porcelain)

1. Determine incisal edge position horizontally
   - Arch of Closure
   - C.R.
2. Determine incisal edge position vertically
   - Plane of occlusion
   - V.D.O.
3. Contour incisal 1/3 of facial surface
   - Flat
   - Triangular light reflection
4. Contour gingival 1/3 of facial surface
   - Slightly rounded
5. Establish leading edge
   - Definite line angle
   - Slight angle anteriorly
6. Contour lingual surfaces
   - Incisal edge width (1.0-1.5mm)
   - Concave
7. Check "S" sounds
   - Adjusts either upper lingual or lower incisal position vertically or horizontally
8. Contour embrasures
   - Facial
   - Incisal -very small
   - Gingival
   - Lingual - almost none
9. Check marginal fit and emergence contour
10. Texture and polish
    - Do not over-pumice
12 Keys to Exceptional Maxillary Anterior Teeth (Provisionals and Porcelain)

1. Refine lower incisal edge position first
   - Function and esthetics (see previous page)
2. Establish ideal centric contact
   - Definite stop on cingulum
3. Contour cervical 1/3 of facial surfaces in line with alveolus
   - Don't over bulk
4. Determine incisal edge position horizontally
   - Tuck incisal 1/3 lingually for lip closure
5. Determine incisal edge vertical length
   - Follow lower lip and unify posterior teeth
   - Rest position 1-3mm of tooth display
   - Vig and Brundo study:
     - Age 30: Max. = 3mm, Man. = 5mm
     - Age 70: Max. = 0mm, Man. = 3mm
6. Check "F" and "V" position of incisal edge
   - At or lingual to vermillion border
   - Speak softly
7. Adjust envelope of function
   - Long centric
   - Concave linguals
   - Check fremitus
8. Check "S" sounds
   - Adjust either upper lingual or lower incisal position vertically or horizontally
9. Check cingulum area
   - Definite stop
   - Patient perception not too bulky
10. Evaluate marginal fit and emergence contour
11. Contour all embrasures
    - Gingival
    - Tarnow and Magner 1992
      - Contact-to-bone:
        - ≤5mm = 100% gingival fill
        - 6mm = 75% gingival fill
        - 7mm = 56% gingival fill
      - Facial
      - Incisal deep and very level
12. Texture and polish
    - Do not over-pumice
MAKING THE CUSTOMIZED ANTERIOR GUIDE TABLE

In the operatory on the patient:

1. After the anterior guidance has been perfected in the mouth on natural teeth or on provisionals, take upper and lower impressions. Pour the casts in hard stone. These are the Approved Provisional Models (APM).
2. Take photos of provisionals. These are the Approved Provisional Photos (APP).
3. Make centric relation bite records and face bow registration.

In the laboratory:

1. Mount the casts on a semi-adjustable articulator. If all or most of one arch is being completed set the condylar paths at 20° horizontal and 15° lateral with no immediate sides left. Close casts to anterior contacts. (Condylar paths may also be set by protrusive and lateral check bite.)
2. Raise the anterior guide pin about 2mm. If adjustable guide table is used, flatten to 0°. Place a thin layer of Vaseline on the pin and on the anterior teeth of the casts.
3. Cover the guide table with the Triad light cured material and working now rather rapidly, close the casts to centric contact. The guide pin will indent the material. Use fingers to shape and pat down the material as you go to be able to see clearly that the pin is in contact with the material at all times.
4. Slide the casts into end-to-end relationship in protrusive. Be sure to stop exactly where the labial surfaces of upper and lower central incisors are in alignment. Maintain contact of lower incisors with lingual surfaces of upper teeth through the protrusive path. This guides pin to form the protrusive path in the acrylic.
5. Guide casts through lateral excursions stopping when labial surfaces of upper and lower cuspids line-up. Make similar movements between the protrusive and straight lateral paths to complete the full range of anterior guidance.
6. Use a curing light to polymerize the material and then verify the accuracy of the customized anterior guide table. Make sure neither the guide pin nor the anterior teeth lose contact in excursions. If necessary, adjust by selective grinding or adding.
## Upper Anterior, Full Crown Restorations

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<th>Patient name</th>
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- **Item checkoff list**
  - New study cast of approved upper provisionals. Be sure to capture full extension of palate, ridges, and flanges.
  - Face-bow of approved provisional restorations – **not** the preps. **Please face-bow mount upper cast in office** to avoid distortion in shipment.
  - New cast of opposing arch. Be sure to capture full extension of ridges and flanges.
  - Full series of photographs of provisionals without retractor/s. Take pictures with patient sitting upright or standing, **not** in the dental chair, to capture the correct plane of occlusion. **These pictures are important.** We need this information to evaluate the occlusal plane, front-to-back progression, smile line, mid-line, and overall esthetics, before beginning case.
  - Master impressions of upper arch with custom tray. Be sure to include full extension of palate, and full alveolar ridge contours.
  - Bite of upper anterior preps in **maximum intercuspal**.
  - Mounted casts of originals to be used as reference for surface texture, lustre and characterization.
  - Detailed instructions for shading, including pictures of preps (if all ceramic) and photos with shade guides.
  - Written detailed instructions with description of work.

*see BVDL photo communication guide*
Lower Anterior, Full Crown Restorations

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<th>Item Checkoff List</th>
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*see BVDL photo communication guide
Full Lower Reconstruction

Patient name ____________________________________________

☑ Item checkoff list

☐ New study cast of upper arch. Be sure to capture full extension of palate, ridges, and flanges.

☐ Face-bow of upper arch. Please face-bow mount upper cast in office to avoid distortion in shipment.

☐ New lower study cast of approved provisionals. Be sure to capture full extension of ridges and flanges.

☐ CR/MI bite #1 – of lower provisionals against upper opposing.

☐ Full series of photographs of provisionals without retractors*. Take pictures with patient sitting upright or standing, not in the dental chair, to capture the correct plane of occlusion. These pictures are important. We need this information to evaluate the occlusal plane, front-to-back progression, smile line, mid-line, and overall esthetics, before beginning case. Be sure to include a photo of the teeth apart, showing the lower anterior incisal plane.

☐ Master impressions of lower arch with custom tray. Be sure to include full extension of alveolar ridge contours.

☐ CR/MI bite #2 – of lower posterior preps with anterior provisionals in place. This bite will be used to mount the lower working cast against the upper cast, in CR, at the correct OVD.

☐ Casts of originals to be used as reference for surface texture, lustre, and characterization.

☐ Detailed instructions for shading, including pictures of preps (if all ceramic) and photos with shade guides.

☐ Written detailed instructions with description of work.

*see BVOL photo communication guide
## Full Upper Reconstruction

**Patient name**

- **Item checklist list**
  - New study casts of approved provisionals. Be sure to capture full extension of palate, ridges, and flanges.
  - Face-bow of approved provisional restorations – *not* the preps. Please face-bow mount upper cast in office to avoid distortion in shipment.
  - New study cast of lower arch. Be sure to capture full extension of ridges and flanges.
  - **CR/MI bite** – of upper provisionals against lower opposing.
  - Full series of photographs of provisionals without retractors*. Take pictures with patient sitting upright or standing, *not* in the dental chair, to capture the correct plane of occlusion. *These pictures are important.* We need this information to evaluate the occlusal plane, front-to-back progression, smile line, mid-line, and overall aesthetics, before beginning case.
  - Master impressions of upper arch with custom tray. Be sure to include full extension of palate and alveolar ridge contours.
  - **CR/MI bite** – of upper posterior preps, one side at a time, with anterior provisionals in place. This bite will be used to mount the upper working cast against the lower casts, in CR, at the correct OVD.
  - Casts of originals to be used as reference for surface texture, lustre and characterization.
  - Detailed instructions for shading, including pictures of preps (if all ceramic) and photos with shade guides.
  - Written detailed instructions with description of work.

*see BVDL photo communication guide*
Full Upper & Lower Reconstruction

Patient name

☑ Item checkoff list

☐ New study casts of approved provisionals, both upper & lower. Be sure to capture full extension of palate, ridges, and flanges.

☐ New face-bow of approved provisional restorations – not the preps. This is necessary because both arches have been changed. Please face-bow mount upper cast in office to avoid distortion in shipment.

☐ CR/MI bite #1 – of upper & lower provisionals in MI. CR should equal MI at this point.

☐ Full series of photographs of provisionals without retractor*. Take pictures with patient sitting upright or standing, not in the dental chair, to capture the correct plane of occlusion. These pictures are important. We need this information to evaluate the occlusal plane, front-to-back progression, smile line, mid-line, and overall esthetics, before beginning case.

☐ Master impressions of both arches with custom trays. Be sure to include full extension of palate, and full alveolar ridge contours.

☐ CR/MI bite #2 – of upper provisionals against lower posterior preparations, one side at a time, teeth together. Anterior provisionals should be in place to provide a stop for the correct OVD. This bite will be used to mount the lower working cast at the correct OVD.

☐ CR/MI bite #3 – of upper posterior preps against lower posterior preps, one side at a time, with anterior provisionals together. This bite will be used to mount the upper working cast against the lower working casts, in CR, at the correct OVD.

☐ Mounted casts of originals to be used as reference for surface texture, lustra and characterization.

☐ Detailed instructions for shading, including pictures of preps (if all ceramic) and photos with shade guides.

☐ Written detailed instructions with description of work.

*see BvDL photo communication guide
Personal Motivation Analysis

Professionally... “What are you doing?”

Spiritually... “Why do you do what you do?”

Physically... “How will you have the health and energy to keep doing what you do?”

Relationally... “Who are the people who support you in doing what you do?”

*If you don’t have time to do something right the first time, when will you find the time to do it over again?* (P. K. Thomas)