Occlusal disease: the silent destroyer

By Van B. Haywood, DMD, and William (Bill) Bachand, DDS

Occlusal disease is the third member of the triad of factors that cause tooth loss; the other two factors are tooth decay and periodontal disease. While occlusal disease is not a problem for everyone, for those that have it, the consequences can be devastating.

Identifying occlusal problems should be an important part of the initial dental exam. Patients may or not present with specific complaints related to occlusion, but it is still critical to record any findings. Areas to focus on include the health of the temporomandibular joint and the muscles, as well as the teeth. Occlusal disease can manifest itself with pathological consequences in any or all of these areas. For example, the TMJ may exhibit a limited range of motion, pain or popping and clicking on opening or closing; the muscles of mastication may also exhibit tenderness to palpation or may restrict mandibular function; and the teeth may exhibit abnormal signs of occlusal wear, abfractions, cracks or fractures. Unless there are significant fractures or pain present, many patients are unaware of any of these problems. Some problems are caused or aggravated by occlusal discrepancies, parafunctional habits such as clenching or bruxing, or both. These habits often occur while the patient is sleeping and totally unaware of the habit or the damage. It is important to document the findings during the exam and then educate the patient about them and the potential outcome if the damage goes untreated.

Here are some recommendations for occlusal disease evaluation:

1 Check the joint first. Does it click and pop or does it open quietly? How wide can the patient open his mouth? Does his jaw deviate to one side or open straight?

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2 Check the teeth in maximum intercuspation (MI). Do the anterior teeth touch, especially the canines? Do the posterior teeth touch on both sides?

3 Look for wear facets on the anterior and posterior teeth. When the patient grinds side to side, do the anterior teeth guide the jaw or do you see posterior teeth in contact?

4 Are there any gingival notches on the facial surfaces of the teeth, with or without sensitivity, caries or excessive tooth loss?

5 Is there is a difference in the tooth contacts when the joint is in centric relation compared with MI?

6 Are there any working and nonworking posterior interferences on the teeth as they move from their MI?

7 Does the patient have a history of headaches, muscle pain or tired jaws. Does he know if he grinds his teeth at night (or has someone told him)?

8 Has anyone told the patient he snores? Does he wake up several times at night and go to the bathroom or wake up tired? Have the patient say "ah" and see if the uvula is visible. Does he have a long soft palate?

9 Do you see any cracked marginal ridges or fractured restorations? How does the occlusion relate to those areas?

10 Does the patient bite his cheek or tongue often? Does he have adequate horizontal or vertical overlap of the teeth?

Once the patient has been made aware of his occlusal condition, you can discuss treatment options. Treatment possibilities range from doing nothing, to conservative reversible treatment, to definitive occlusal therapy, to extensive alterations to the occlusion "Doing nothing" is truly a misnomer, because in fact you are doing the most important part of any therapy — diagnosing the problem and educating the patient as to the extent of the problem and the prognosis. Then the patient can determine how far to proceed with further treatment. Often, the patient's signs and symptoms will dictate the treatment to which he agrees.

The next level of treatment would involve conservative reversible treatment such as an occlusal splint. The treatment does not cure the patient of anything, but it does limit any further damage to the teeth and can relieve the level of stress placed on the joints and musculature. Then, definitive occlusal therapy can include a limited or complete occlusal adjustment (equilibration) designed to eliminate harmful excursive contacts and maximize occlusal efficiency. Finally, extensive alterations to the occlusion may require restorations fabricated to the new occlusal scheme. All of these options serve to benefit the patient as you halt or retard the progression of occlusal disease. ✦

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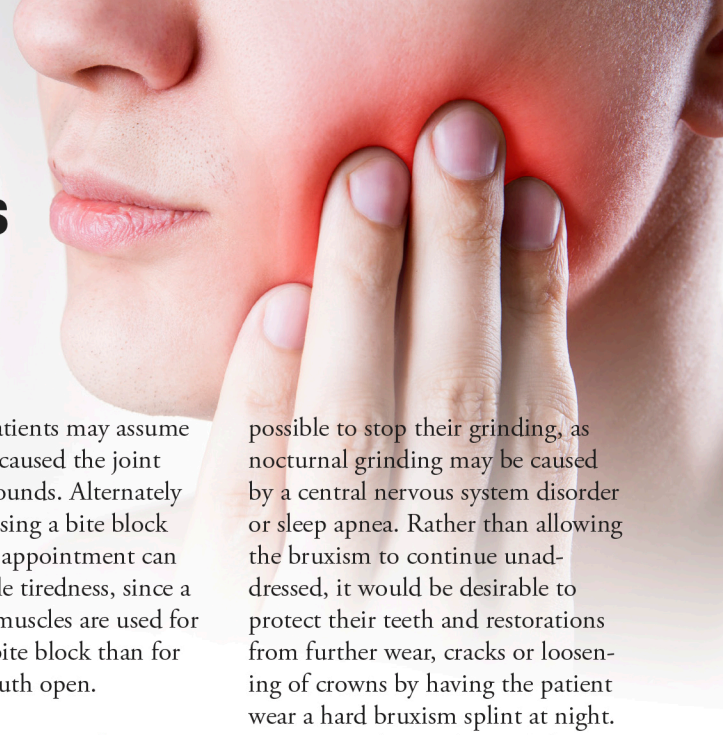

Natural teeth problems from occlusion issues

By Van B. Haywood, DMD

Over time, patients may develop occlusal problems that are related to wear on their teeth or changing oral conditions. These changing oral conditions could include loss of teeth and changes in restorations. Sometimes the removal of tooth contacts or interferences on a tooth or restoration can be just as noticeable as the addition of contacts or interferences. These findings may be signs or symptoms that teeth need occlusal adjustments:

1 Premolars are mobile or molars are cracking. If the canines do not touch in maximum intercuspation, then the patient cannot have canine guidance—the appropriate guidance that protects the posterior teeth. Lack of canine guidance means some other weaker tooth will be responsible for guiding the mandible and be subject to occlusal trauma. The trauma on that tooth may result in tooth fracture, mobility, noncarious cervical lesions (abfractions) or cracks.

2 Patients complain that long appointments make their temporomandibular joints pop. TMJ sounds such as clicking and popping are generally not treated or addressed unless there is also pain. Some patients are not aware their joint makes these sounds. However, clicking and popping are often more pronounced when the jaw muscles are tired, causing the jaw and disk to not move in harmony. If you don't identify the baseline status of a joint that clicks or pops in the initial examination, patients may assume your treatment caused the joint problems and sounds. Alternately using and not using a bite block throughout the appointment can help with muscle tiredness, since a different set of muscles are used for closing on the bite block than for holding the mouth open.

3 You observe excessive posterior enamel wear and facets in places that the teeth do not normally touch. When posterior teeth contact in excursive (lateral and protrusive) movements as demonstrated by wear facets, the teeth in contact send signals to the brain as if there is food between the teeth, which causes more muscles to be active. This activity can result in headaches, excessive wear, abfractions or fracture of the tooth and restoration. Marking the teeth with two colors of articulating paper can help determine small interferences that need adjustment. Generally, having the patient grind around in all excursive movements on red paper, followed by closing into maximum intercuspation on blue paper can help identify inappropriate excursive contacts (marked in red) from normal MI contacts (overmarked in blue) on the posterior teeth. If you see any excursive contacts on the posterior teeth marked in red, those contacts should be removed by an occlusal adjustment.

4 Patients have worn the molars into dentin and have sensitivity. If patients grind their teeth (bruxism) at night, it may not be possible to stop their grinding, as nocturnal grinding may be caused by a central nervous system disorder or sleep apnea. Rather than allowing the bruxism to continue unaddressed, it would be desirable to protect their teeth and restorations from further wear, cracks or loosening of crowns by having the patient wear a hard bruxism splint at night. Patients need to understand that a splint is a much more cost-effective treatment for tooth wear or fracture than continually placing or replacing crowns.

5 Patients complain about biting their cheeks or tongues. Often the patients do not have adequate horizontal or vertical overlap of the teeth to push the cheeks or tongue away from the occlusal contacts. This problem can reoccur over time as teeth wear down owing to grinding. Reshaping the teeth on the buccal aspect of the mandibular teeth or the lingual aspect of the maxillary teeth to move the occlusal contacts away from the edges of the teeth can eliminate or reduce that problem. In addition, altering the buccal surface contour of the maxillary tooth by adding a composite restoration bonded to the unprepared surface of the tooth will provide more horizontal overlap by pushing out the tissue. If an excessive contour is needed to displace the tissue, patients should demonstrate that they know how to properly position and use a toothbrush to clean the area below the thicker restoration. A bruxism splint

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for night wear can also allow the muscles to rest so that they operate more smoothly during the day with less accidental biting of the cheek or tongue.

6 Patients have sensitive teeth with cracked marginal ridges, which seems OK clinically and radiographically. Caries progresses easily through cracks with no visible radiographic indications until the lesions are very large. Sometimes an exploratory "caries biopsy" may be indicated to remove the fractures and determine if caries is present, based on discolorations showing at the fracture sites. This type of exploration also allows clinicians to determine the extent of the cracks and whether or not the teeth may have vertical root fractures. Cracks may extend into the pulp, resulting in pulpal death that requires endodontic therapy. Before endodontic therapy is prescribed, the pulp chamber floor should be carefully explored for possible cracks, as cracks generally indicate removal of the teeth, while clean chamber floors indicate a reasonable prognosis for tooth survival after endodontic therapy and placement of a crown. Removal of fractures and adjusting the occlusion are the preferable to placing a crown over a crack that has not received some initial exploration.

7 Patients are wearing down their lower anterior teeth. Recently, obstructive sleep apnea has been related to bruxism, since sleep bruxism moves the jaw and helps open the airway. This nocturnal grinding can be observed in both children and in adults. Dentists should consider referring patients to physicians for a sleep study to determine if they have sleep apnea. While the use of continuous positive air pressure (CPAP) with a mask is the criterion standard for treatment of sleep apnea, dentists can also use oral appliance therapy for patients with mild to moderate cases. These appliances worn while sleeping advance the mandible and open the airway. Even if patients use CPAP, a bruxism splint can help with both opening the airway and avoiding further grinding and tooth damage. As well-used items, teeth need to be monitored for changes in their occlusal conditions that can result in their early demise or that can indicate other health problems that need to be addressed.

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Restorative dentistry and occlusal harmony

By Van B. Haywood, DMD

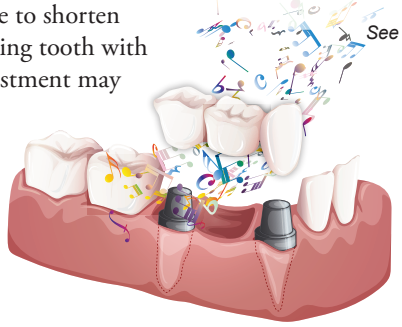
Restorative dentistry is built on a foundation of solid occlusion. If the occlusion is not addressed, then no matter how good the margins or shade match are on a restoration, the patient will ultimately "chew it up and spit it out."

Here are some insights about the impact of occlusion on restorative dentistry:

Your new restoration was fine when the patient left the office, but it is high in occlusion the next day. After a routine dental appointment for a restoration, patients who have tight, tired muscles from grinding or clenching may not be able to close completely. They will close on their front teeth, but due to the spastic contraction of the muscles from excessive use, the condyle does not seat completely, and the back teeth are out of occlusion. It may take several hours or days for the muscles to relax and allow complete closure. At the beginning of the restorative appointment, observe or mark the occlusion on the most posterior remaining teeth. If the patient cannot reproduce that point of contact after being open for a time, you must ensure that the new restoration is out of occlusion as much as the most posterior contact, or it will be high when the muscles finally return to their normal function the next day. Often, you have to bring the patient back for an adjustment.

The patient says the bite feels off on the new restoration. After drying the teeth, have the patient grind his or her teeth on a light-colored articulating paper such as red. Then air-dry the teeth and have the patient tap into maximum intercuspation (MI) on a different-colored articulating paper such as blue. On examination, there should be blue dots on all the teeth and blue dots with red lines only on the anterior teeth. If you see any red lines on the posterior teeth or if the blue dots are larger than one millimeter, you have working and non-working interferences that need to be removed to change the bite sensation and avoid increased muscle activity, tooth wear or headaches.

Explaining to patients that restoring one broken tooth often requires adjusting two teeth. Often a tooth with a crack is caused by the opposing tooth, which needs some adjustment to eliminate a "plunger cusp" before restoring a fractured area on a tooth. Failure to shorten and reshape the opposing tooth with a limited occlusal adjustment may shorten the life of the new restoration on the fractured tooth.



Your ceramic crowns always seem high in occlusion. Crowns should be seated completely, especially zirconia ceramic crowns, to avoid grinding on the occlusal surfaces and fracturing or grinding through the ceramic. Seating is best accomplished using a disclosing medium, which is the same thickness as the final cement and basically takes an impression of the fit of the crown at the point of seating. Time spent seating the crown completely using this technique will be rewarded by excellent occlusion with minimal adjustment.

Crowns that were once good now have notches at the margins. Gingival notches may be related to heavy forces on the teeth causing tooth flexure. Restoration of these areas is best done with resin modified glass ionomers rather than composite resin. However, the cause of the notches must be identified and treated, or the restorations will fail in the same manner as the tooth.

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HARMONY

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tions are placed that interfere with this slide path. Evaluate the slide path from CR to MI, in addition to the MI contacts and lateral movements, when placing restorations.

Some crowns seem to work great while others have to continually be adjusted. The choice of which articulators to use for indirect procedures is based on the occlusal scheme of the patient. If the tooth being restored does not involve any functional guidance, then a quadrant or triple tray impression is appropriate. If the tooth being restored is involved in functional guidance, then a semi-adjustable articulator should be considered. Adjusting the patient's occlusion before the crown is placed will also help.

Using splints to adjust the occlusion when they come from the lab is too frustrating. Bruxism splints are best constructed if the interocclusal record (bite) is taken at the desired vertical dimension of the splint in centric relation (CR). Using this recording of the vertical dimension of the final splint technique does not require a semi-adjustable articulator, since there are no "arch of closure" issues, and there will be minimal occlusal adjustments.

The patient complains the new restoration does not feel right. If there is a difference between CR and MI, then you should determine whether it is beneficial or possible to make them coincide before the new restoration is placed. If it is not, you should make certain no restora-

You have just placed a posterior composite which the patient says still feels high, but there is no contact on the restoration. Your teeth can detect the thickness of a human hair, less than 40 microns. Sometimes the bonding agent has traveled into an occlusal contact area but cannot be seen. A slow speed latch-type round bur will cut composite, but not damage enamel. Run the slow speed bur over the occlusal contacts on the tooth, removing the bonding agent and remark. The occlusal contacts should still be present, but the patient should feel fine with the bonding agent removed.

All of these areas are occlusal issues that are made visible in the restorative outcomes. Addressing or recognizing them can lead to a much more satisfied patient.

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CLINICAL OCCLUSAL ANALYSIS INFORMATION

Patient: _____ Date: _____

TMD SCREENING EXAM

Range of motion (mm)	**Joint sounds**	**Mandibular deviation or deflection during opening**
___ maximum interincisal opening ___ maximum stretch opening ___ maximum right lateral movement ___ maximum left lateral movement ___ maximum protrusive movement *If maximum opening <40 mm or passive stretch >3mm, consider TMD EXAM*	___ Yes ___ R ___ L ___ Asymptomatic ___ Symptomatic *(Complete TMD EXAM)* *____ADDWR or ____Eminence Click* ___ No	___Yes *_____deviation R L* *_____deflection R L* ___No

CLINICAL OCCLUSAL ANALYSIS

CR not = MI; Initial CR contact(s)

1 2 3 4 5 6 7 8 / 9 10 11 12 13 14 15 16
32 31 30 29 28 27 26 25 / 24 23 22 21 20 19 18 17

__ CR not = MI
Direction of slide __straight __L __R
Slide ____mm
Vertical component ____mm
Horizontal component ____mm

Anterior attrition
___ Slight
___ Moderate
___ Severe

Posterior attrition
___ Slight
___ Moderate
___ Severe

MI contacts

1 2 3 4 5 6 7 8 / 9 10 11 12 13 14 15 16
32 31 30 29 28 27 26 25 / 24 23 22 21 20 19 18 17

__ CR = MI
__ Repeatable MI

Anterior Horizontal Overlap in MI
___ Minimal (0-1mm)
___ Moderate (1-3mm)
___ Large (>3mm)

Right excursive guidance from MI

1 2 3 4 5 6 7 8 / 9 10 11 12 13 14 15 16
32 31 30 29 28 27 26 25 / 24 23 22 21 20 19 18 17

__ Anterior guidance
__ Group function
__ Non-working contact

Anterior Vertical Overlap in MI
___ Minimal (0-1mm)
___ Moderate (1-3mm)
___ Large (>3mm)

Left excursive guidance from MI

1 2 3 4 5 6 7 8 / 9 10 11 12 13 14 15 16
32 31 30 29 28 27 26 25 / 24 23 22 21 20 19 18 17

__ Anterior guidance
__ Group function
__ Non-working contact

Occlusal trauma (mobility)
Teeth #s _____

Occlusal trauma (fremitus)
Teeth #s _____

Protrusive excursive guidance from MI

1 2 3 4 5 6 7 8 / 9 10 11 12 13 14 15 16
32 31 30 29 28 27 26 25 / 24 23 22 21 20 19 18 17

__ Anterior guidance
__ Posterior interference

Occlusal trauma (abfraction)
Teeth #s _____

DIAGNOSTIC SUMMARY AND TREATMENT PLAN CONSIDERATIONS

I. Occlusal treatment indicated ___Yes ___No

___ (COA) Trial adjustment of *mounted casts to evaluate potential for occlusal adjustment; followed by intraoral adjustment

___ (LOA) Intra-oral adjustment w/o mounted casts to ___produce stable MI, ___ correct occlusal plane, or ___eliminate undesirable contacts (___W, ___NW, ___P interferences)

___ New casts required after occlusal adjustment

II. *Mounted diagnostic casts indicated ___Yes ___No Position for diagnostic mounting ___CR ___MI

___ Mounting for occlusal treatment (COA, splint)

___ Mounting for treatment planning, diagnostic wax-up, or restorative treatment

III. Articulation method for restorative treatment

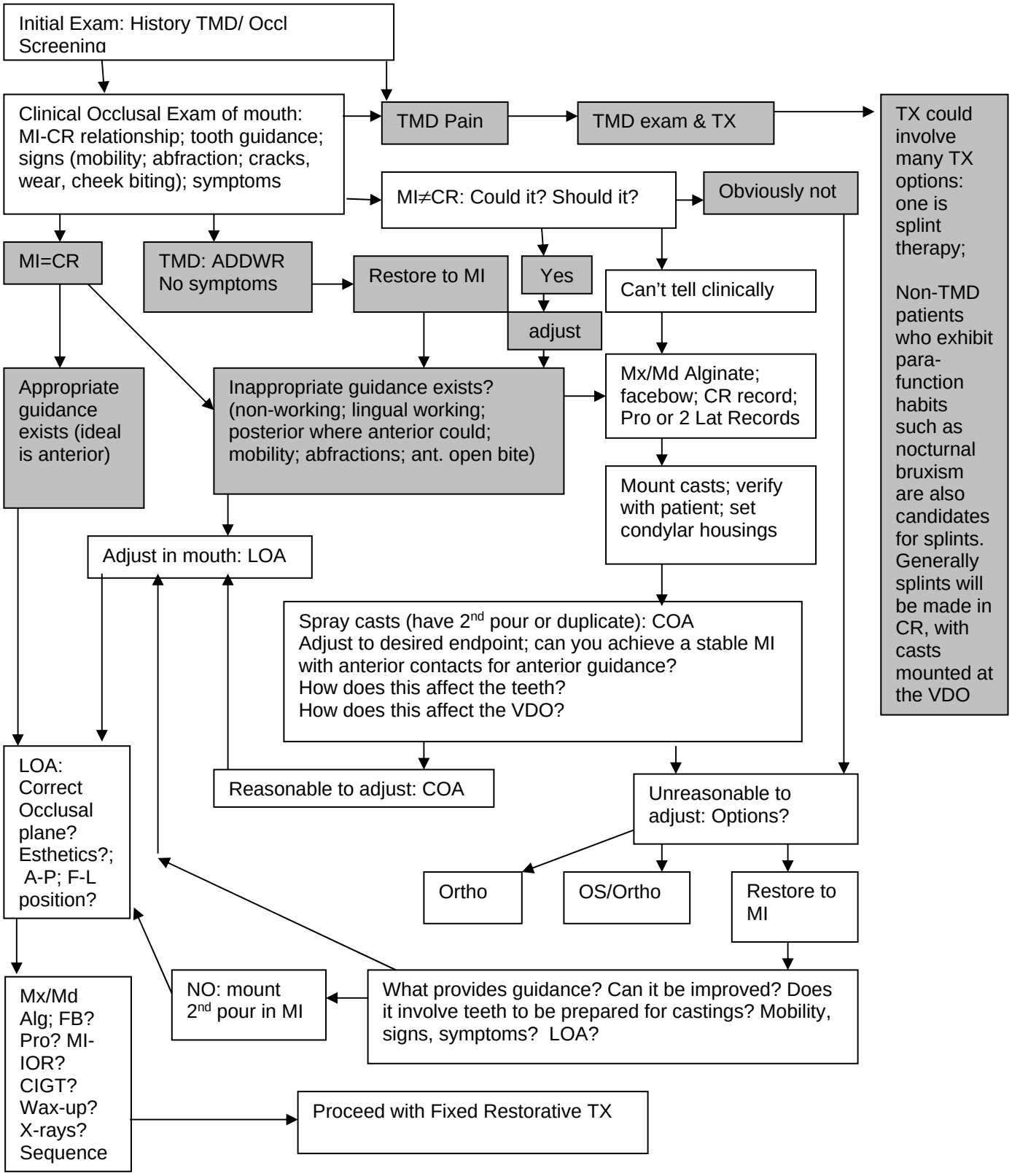
___ *Semi-adjustable articulator (Whip Mix) ___ Hinge articulator w/ full arch casts ___ Quadrant technique

* *Maxillary cast mounted with facebow on semi-adjustable articulator, eccentric record(s) used to set articulator guidance*

Comments:

Occlusal Considerations prior to Restorative Treatment

VBH13



Fabrication of Immediate Direct Thermoplastic Whitening Trays

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Tray Fabrication, Step by Step

Figure 1—The Dual Tray System consists of an outer blue tray to carry the white inner tray to the mouth.

Figure 2—The tray assembly is softened in hot water with a waving motion until the blue tray becomes flexible.

Figure 3—The softer inner white tray is adapted to the outer blue tray before insertion in the mouth.

Figure 4—After seating the tray system, custom adapt the tray by squeezing on the facial and lingual surfaces of the teeth, beginning at the midline and working posteriorly.

Figure 5—Ask the patient to create a vacuum with suction and lightly bite into the tray system.

Figure 6—Test the fit of the tray by reseating it while it cools. If loose, press and vacuum more; if tight, continue to seat and reseat to stretch.

Figure 7—Once the tray is cooled, remove it from the mouth, and remove the inner white tray.

Figure 8—Discard the outer blue tray, evaluate and adjust the edges and occlusion, and the patient is ready to begin whitening.

1. Heat 10 oz to 12 oz of water in a microwave oven on "high" (for approximately 1.5 minutes). The water should feel hot, but tolerable to a gloved finger.
2. Submerge the tray assembly into the heated water while shaking it to remove any bubbles trapped between the trays (Figures 1 and 2).
3. Slowly move the tray assembly in the water by the handle until the handle becomes very flexible. A slight loss of shape will be noticed as the horseshoe collapses when the tray is sufficiently softened.
4. Remove the tray assembly from the water and make sure both components are well adapted together. Use your finger to slightly flatten and flare the anterior and posterior segments of the tray to prevent the tray from folding on itself, and to adjust for the length of the incisors (Figure 3).
5. Center the tray assembly over the anterior teeth so the facial surfaces of the central incisors will be covered by the inner white tray.
6. Adapt the tray intraorally. Press firmly on the facial and lingual aspects of the tray assembly with the index finger and thumb of both hands. Begin at the midline and work posteriorly (Figure 4).
7. Remove your hands and ask the patient to purse his or her lips around the tray assembly and try to "suck the water out of the tray" while pressing with the tongue on the palate. Repeat this exercise three to four times (Figure 5).
8. With lips still together in suction, have the patient bite lightly a few times.
9. Pump the tray assembly off and back on without completely removing it. As it cools, the tray will shrink. If the tray does not feel tight, continue adapting it by squeezing on the sides, or by having the patient continue the pursing/sucking exercise. If the tray is too tight, continue seating and unseating. This pumping action can stretch the tray as it cools and may be repeated as many times as needed (Figure 6).
10. When the patient no longer feels any heat in the tray assembly, remove it from the mouth and separate the white insert from the blue tray holder. The white insert is the custom-fitted tray that will be used for whitening (Figure 7).
11. Evaluate the white tray intraorally for adaptation or sharp edges. Areas that are rough should be reheated by dipping that portion only in the hot water (for about 5 seconds). The flexible tray is then repositioned and smoothed by rubbing it with gloved fingers.
12. Evaluate the occlusion. Occasionally, the trays can create a prematurity in the posterior segment. To adjust the occlusion, dip the posterior portion of the white tray into the remaining hot water until softened, reposition it in the mouth, and have the patient lightly close together into maximum intercuspation. The unsoftened anterior portion of the tray will help prevent overclosing. Repeat this process until a stable occlusion is achieved.
13. If a major amount of tray material in the gingival area must be removed, this can be done with sharp, sturdy scissors, or with an acrylic bur in a slow-speed handpiece. However, in the authors' experience, smoothing by reheating with warm water and applying finger pressure leaves a better finish (Figure 8).

Continued

At-home whitening using a custom tray to apply a carbamide peroxide solution is gaining increasing popularity around the world. New innovations continue to make the treatment more accessible. One such innovation involves a tray fabrication system that does not require an alginate impression, but still provides the dentist and patient with the advantages of a custom-fitted tray. A recently introduced, directly formed thermoplastic tray (Dual Tray System, ArchTek Inc.) consists of a disposable outer tray holder, which is used to carry an inner treatment tray to the mouth for adaptation (Figure 1).[1]

Characteristics of the System

The immediate thermoplastic tray system provides a number of advantages. First, there is no need for an alginate impression. This benefits both the patient and dentist. Generally, the thermoplastic tray can be fabricated in approximately the time it takes to make a quality impression. Another advantage is that the patient can begin whitening the same day as the diagnosis appointment.

The patient does not have to deal with an unpleasant procedure and the dentist saves valuable chairtime and laboratory expense.

There are some limitations to the tray system. Patients with unusual arch sizes or shapes, or patients with limited access, may not be good candidates for this tray. The mandibular arch is also more difficult to fit because of the tongue and access for molding. Additionally, patients who wish to wear the tray during the day may not like the conspicuousness of its white color.

There are several indications for this tray system, in addition to the typical at-home whitening patient. For patients who have whitened their teeth with conventional whitening trays, this thermoplastic tray system can be used as a touch-up option when postwhitening restorative work renders the original trays unusable. Also, the system is indicated for young patients in the mixed dentition stage, for whom a more conventional tray is short-lived as a result of the changing nature of their dentition. In the highly-motivated patient, this tray can be used to initiate whitening while a conventional custom tray is being fabricated. In addition to its use as a whitening tray, this tray system could provide an immediate splint for a patient who suffers from temporomandibular disorder, or serve as a carrier for various medicaments in the treatment for tooth sensitivity[2] or caries. ○

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Clinical Occlusal Analysis & TMD Screening Exam

Dr. Van B. Haywood 09

TMD Screening:

Range of Motion (ROM) measurements
-Maximum opening
-Passive Stretch
TMJ Function
-Joint Sounds
-Deviations

Range of Motion

If maximum opening <40 mm
or maximum stretch opening >3mm
consider TMD problem

Range of excursive movements (Protrusive, or Rt & Lt lateral)
Normal population range = 8-17 mm
Restricted movement = less than 8 mm; consider joint problem

Identifying joint sounds

Feel angle of mandible while patient opens and closes
Ask patient if they hear a noise
Use a stethoscope to listen
OPTIONS: one click, two clicks, popping, grating, crackling, etc.

ADDWR

"Anterior displaced disk with reduction" (goes on and off the disk)
"Clicks" on opening and closing
No true CR exists, since condyle is posteriorly "off the disk"
These patients are mounted in MI, even if there is an "apparent CR-MI difference". However still evaluate first prematurity in most retruded position

Other option for "click" is an eminence click at max opening

Why do we deprogram?

Neutralizing Muscle Engrams:

Muscle Engrams: Adaptive closing protective reflexes present when there is a difference between CR and IP.
Once an efficient chewing pattern that minimizes damage to any structure is found, it is learned and repeated. This learned pattern is called a muscle engram

Deprograming:

Teeth apart for > 5 minutes with cotton…Lose proprioception until contact again…
Keeps teeth from telling muscles where to move jaw so as to avoid premature contact.
Returns with few seconds of contact, so must not allow teeth to contact until CR information gathered.

Deprogramming

Neutralization of engrams to allow for evaluation or adjustment of the occlusion, and to make interocclusal records

Deprogram with the "Leaf Gauge"

By trial and error, determine "X", the number of leaves where the patient can just barely feel a posterior tooth touch
-Add one more leaf = (X+1) Initially patient feels no posterior contact
-Have patient squeeze for 10-30 seconds, then relax.
-Patient feels new contact - 15 to 20 seconds
-Patient advises dentist when this occurs
-Add another leaf, repeat procedure
-Repeat with X+2, X+3,…X+n
-Keep adding leaves until patient closes, squeezes, relaxes for 3-5 minutes without feeling any posterior tooth contact
-Mandible is deprogrammed

Manipulation Options:

1. Terminal Hinge Arcing Technique: Gently grab the maxillary arch with the left hand. Place the right hand at the chin so the thumb is inside the mouth on the facial of the incisors and the index and middle fingers are under the chin.
2. Leaf Gauge (as in deprogramming)
3. "Romance the mandible"
A verbal-motor sequence
Prevent the patient's teeth from contacting
"Open and close";
"Move your jaw out" (forward and backward)
"Move your jaw in" – gentle pressure
Repeat – When you feel the mandible is in CR, have the patient close and identify first contact
Squeeze, look for a slide. Repeat the process.
Verify initial contact with articulating paper

4. Bi Manual manipulation (brace head)
Thumbs contact at chin while last three fingers are on angle of mandible; pressure down on chin and up on fingers rotates condyle into correct location in fossae.
DO NOT force the patient to close; remove hand pressure when resistance is felt, then continue

Reasons for Clinical Occlusal Analysis

1. Crowns are planned
2. Signs of pathology exist on teeth: cracks, abfractions, fractures, mobility, severe wear
3. Symptoms of dysfunction recorded in the history & screening: muscle pain (headache), sensitive teeth, chipped teeth
4. Patient complaints: cheek or lip biting, food packing (mobile teeth), headache

Occlusion form: two parts;

-Top part (Analysis) gathers data
-Bottom part (Summary) records diagnosis and treatment plans:
1. Is an occlusal treatment indicated? LOA or COA?
2. Are mounted diagnostic casts indicated? CR or MI?
3. What type of articulator will be needed if restorative work is indicated?

Determination of when to mount, either before or after LOA or COA
Determination of where to mount CR(CO) or MI
Diagnosis of further treatment
New casts and mounting

Why anterior guidance better than group function?
Less muscle activity
Less influenced by stress
Body builder vs swimmer muscles

What treatments might this occlusal exam suggest:
Splint (muscle pain; tooth wear)
Adjust bite (Equilibration) to protect teeth
Change habits (clenching, diet, gum)

Additional questions
1. If I have a click, can it be "fixed"?
-No, unless in 1-2 weeks after trauma
2. If you can't fix something, why would you identify it?
-Lessen impact
-Avoid habits that aggravate
-Baseline data of how enter practice
-Eliminate concern of patient for other disease

Areas often missed in Occlusion
-No anterior contact, but have late range anterior guidance; = group
-When CR does not equal MI and first prematurity is on tooth to be crowned
-Working and non-working contacts hidden in large MI contacts
-Unstable MI may be improved by closing vertical or adjusting CR = MI

Proper Articulation Marks
Dry teeth
-wipe with gauze
-blow air
Manipulate into CR
Mark first contact (CO) with articulating paper
Analyze and record contact(s)

If CR(CO) = MI, mark contacts by circling the pair in contact

Evaluate presence of a slide

Whether CR(CO) =
MI or not, mark all MI contacts by circling the pairs in contact
This aids in determining if casts are correctly mounted later

Mark contacts in excursions
Either ____Anterior guidance
Or ____Group function
With or without
____Non-working contact

Armamentarium
Articulating paper (Bausch red and blue)
2x2 Gauze & Cotton rolls
Leaf gauge
Air/water syringe
Operator sitting down
Patient reclining 45 degrees back

Tooth Considerations:
1. Evaluate the wear of the teeth
2. Evaluate the Anterior Horizontal Overlap
3. Evaluate the Anterior Vertical Overlap

Evaluate Occlusal Trauma
Definitions:
Mobility: Movement of a tooth when the patient grinds in excursive movement: class I, II, or III
Fremitus – A vibration perceptible on palpation when the teeth come into contact in MI.
Abfraction: non-carious cervical lesion due to tooth flexure

LOA on mounted casts
If exam cannot determine Tx, mount original casts of patient in CR using FB and CR-IOR.
Set HCG with IOR
Duplicate casts with alginate or Putty/toothpicks
Cross mount duplicate casts
Adjust duplicate casts to determine amount of tooth structure lost and VDO loss

Ways to Verify the mounted casts are correct

Does the 2nd CR IOR match the mounting of the first?
Does the Clinical Occlusal Analysis Form list the same first prematurity?

Ultimate test is to compare the patient with the mounted casts

Comparing Patient to Mounted Casts
Bring patient and mounted casts to clinic…
First premature contact the same?
Amount of space between non-contacting teeth the same?
Articulator can slide from CO to MI the same as the mouth does?

To Preserve the Facebow for the mounting of the duplicate casts
-Use direct FB from mouth on second duplicated Mx cast
-Take FB from articulator on mounted Mx cast to mount duplicate Mx cast
-Seat CR record from clinic on duplicate mandibular cast to mount duplicate Maxillary cast
-Take CR record from mounted Mx-Md casts to seat on mandibular cast to mount duplicate Mx

Parameters for Esthetic Success: Splints

Dr. Van B. Haywood 09

We need a predictable, consistent method that generates a splint that is easy to fabricate, easy to seat clinically, has retention and does not require lots of chair-side adjustments

Typical Splint Technique

Casts are mounted on articulator in either Maximum Intercuspation or Centric Relation
The articulator is opened in a vertical dimension to allow for the thickness of the splint
The Splint is fabricated
The Splint is returned to the mouth for insertion and adjustment

Questions to ask...

What type of articulator to use?
What position to mount the patient?
What type of material to fabricate?
How to insert clinically?
How to adjust clinically?
What other options are there when cost or time is an issue?

Splint fabrication options:

How do you mount it?
1. Semi-adjustable articulator
-FB mounted Max.
-Man. IOR
-HCG set with Pro IOR
2. Hinge articulator
-Man. IOR
3. No articulator
-Max cast only
-Occlusion formed in mouth with Acrylic resin or Composite

What position do you mount?

Maximum intercuspation?
After patient open for five minutes would lose proprioception and drop back into CO
Difficult to adjust since patient cannot repeatably close to mark
Centric Relation?
Requires manipulation and IOR
Easiest to adjust and where patient sleeps

Bimanual Manipulation

If the patient has anterior teeth and a reasonable occlusal scheme, a “leaf gauge” can be used

Problem with articulator opening

Arch of closure still may not be accurate if mount in CO on semi-adjustable and open VDO for splint
Even less chance of accuracy if on hinge
Better option may be to use leaf gauge to open to desired VDO of final splint, and make IOR at that vertical (on either articulator, but no longer need semi)

What are options for materials?

Laboratory fabricated, heat-processed clear acrylic
Vacuum-formed base with acrylic occlusal (soft insert?)
Cold-cured acrylic totally for base and occlusal surface (soft insert added?)
Vacuum-formed base with composite occlusal
Thermoplastic techniques

Laboratory Processed Splint:

Best but needs articulator
Heat processed
Requires two casts
Lab blocks out undercuts after survey cast
May use ball clasps for easier adjustment
Process clear like denture sequence
Acrylic resin on vacuum formed base
Two casts mounted on articulator in CR

Vacuum formed base

Resin for occlusal surfaces
Trimmed to flat posterior and ramp anterior
Trim sheet resin to outline
Use separating disk.
Make initial cut from distal to distal edges, across palatal/lingual.
Keep distal of most posterior teeth covered with resin!

Splint returned to dentist

Flat posterior with ramped anterior
No depressions for cusp tips
Smooth edges
Smooth junction of occlusal material to splint material contacting soft tissue

How to insert clinically?

1st: Seat Splint to Maxillary arch
No Rock
-Occlude, Fit Checker
-Poor cast/ undercut
-May have to reline entire splint to fit
Retention
-Reduce long walls
-Add to short walls

2nd: Adjust splint to Mandibular arch
Visual inspection
Amount of adjustment needed
Articulating paper
Achieve one MI contact per tooth
Shim Stock
Decision to grind all, or add to a few

3rd: Adjust Excursive Movements
Have stable MI with all teeth having 1 contact
Have patient grind around on Red
Have patient tap in CR on blue
No Posterior red
Smooth anterior guidance
Blue with red tail
No spaces

Splint Options

Articulator
-Semi-adjustable & FB
-Hinge

Two casts: IOR in CR

Intra-oral
One cast: No IOR

Boil & Form

Archtek boil and form splint
also good for acute TMD emergency splint www.archtekinc.com

Summary

-Protection of the anterior restorations often should involve a splint, especially for bruxers
-A simple hinge or no articulator at all can be used to fabricate a splint if principles are clear.
-Taking the IOR at the VDO planned for the splint minimizes “arch of closure” errors in all cases
-A thermoplastic interim splint may determine for the patient if they can wear a processed splint, or if they are still bruxing (also for acute TMD)

Indications for Impression/Articulation type

Dr. Van B. Haywood 09

Full arch impression mounted on semi-adjustable articulator:

1. Functional movements reproduced in prepared tooth
2. Disrupted occlusal plane to be corrected
3. Removable partial or complete denture to be fabricated
4. Minimal vertical stops on preparation side
5. Significant lateral movement of condyles (Bennett)
6. Esthetic balance between sides important

Limitations of semi-adjustable articulator:

1. Articulator is most accurate with IP to CR relationships, the closer to tooth contact the interocclusal record is made. Protrusive excursive records produce a more shallow condylar setting than lateral records. Only lateral records capture immediate or progressive sideshift.
2. Cannot easily set the condylar housing with lateral excursive interocclusal records if centric relation does not equal maximum intercuspation, and the teeth will be restored in maximum intercuspation. Protrusive records do not record lateral mandibular movements.
3. Cannot set condylar housing with lateral excursive interocclusal records if non-painful reciprocal click (anteriorly displaced disk with reduction) is present and most retruded position is not coincident with maximum intercuspation. However, indicated protrusive records do not record immediate or progressive sideshift of mandible.
4. When minimal occlusal stability exists due to many missing teeth, mounting requires baseplate and occlusion rim. If the tooth to be crowned (such as in a non-survey crown for an RPD) is not involved in function, and more accurate MI position may be obtained using a quadrant technique to take advantage of the posterior determinants of occlusion (condylar support).

Importance of facebow:

1. Anterior esthetics (inclination of central incisors when viewed from a lateral position)
2. Plane of occlusion in complete dentures
3. Arch of closure if altering VDO

If Correctly-located occlusal contacts disoclude in functional excursions, then only an IP (MI) articulator relationship is necessary (simple hinge):

Full arch impression mounted on hinge articulator (Stephen articulator; Whipmix as hinge):

1. Removable partial denture with reasonable occlusal stability
2. Any crown or FPD not involved in function with reasonable occlusal stability
3. Esthetics/occlusal plane of other side important

Quadrant impression and bite registration/impression of opposing arch:

1. Patient access problematic due to tooth position, tongue, saliva, gagging, or opening.
2. Conservation of materials
3. Minimal changes to occlusal scheme
4. Reciprocal click as above
5. No occlusal stability on the unprepared side

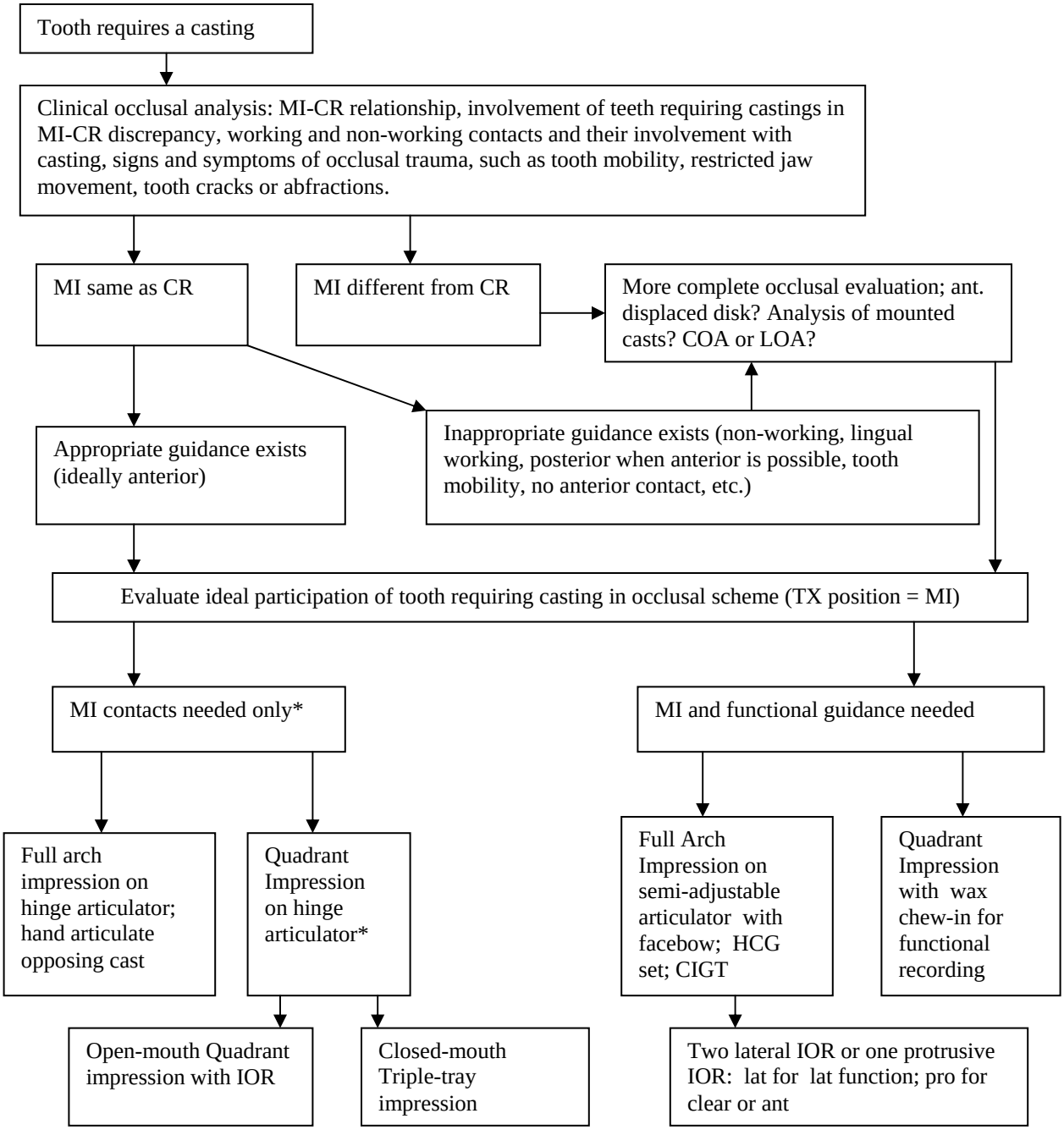
Technique: in addition to traditional Quadrant PVS impression

1. IOR taken with sideless tray and PVS bite registration paste (take two to confirm MI closure)
2. Pour impression and generate working cast using Pindex; trim die
3. Seat IOR on working cast, lute in place; pour opposing side; mount, then separate

Triple tray impression:

1. Gagging patient
2. Conserves materials and time
3. May be limited by impression materials types to use: laboratory procedure more complex
4. Cannot use Pindex die system; do not know if have bubbles on margins until mounted

Determination of the correct impression type, articulation method, and inter-occlusal registration for a casting VBH 98



*To use a quadrant technique on a hinge, it must be determined that PROPERLY LOCATED MI OCCLUSAL CONTACTS WILL DISOCCLUDE IN LATERAL FUNCTIONAL MOVEMENTS. This determination may be achieved through the following:

1. Correct occlusal contacts exist pre-operatively (naturally or via occlusal adjustment), and disocclude correctly.
2. Diagnostic casts are mounted on an articulator and a diagnostic wax-up demonstrates disocclusion.
3. A provisional restoration fabricated in the mouth can be altered to serve as a diagnostic wax-up to demonstrate disocclusion.

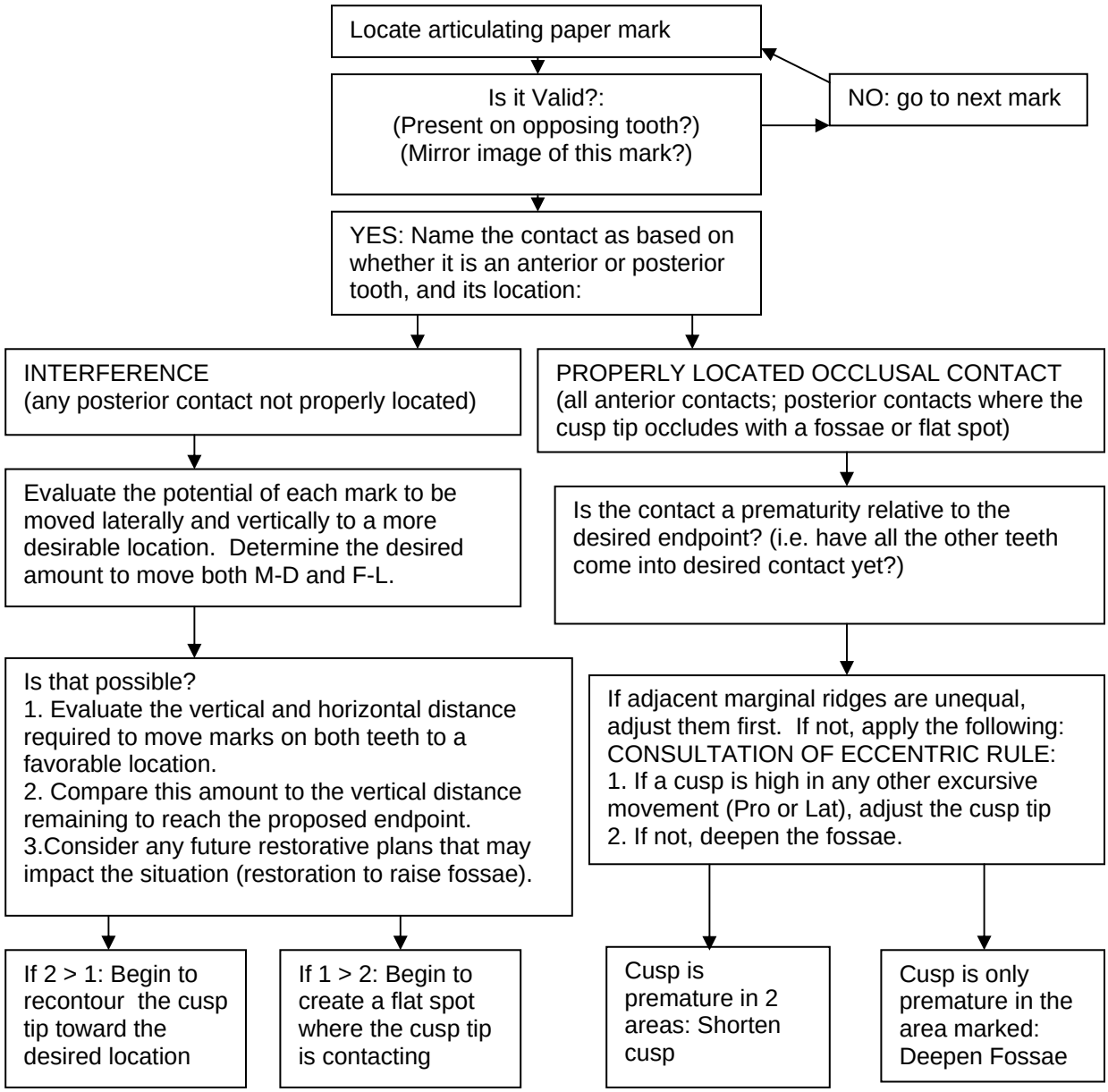
PROCESS FOR ADJUSTING AND EQUILIBRATING DENTITION FROM CO TO EQUAL MI VBH2011

1.Decide upon the intended endpoint of the adjustment from adjusted casts or clinical observation. This is a good distribution of stable, appropriately-located occlusal contacts on all available teeth, with anterior guidance in lateral movements, and no working or non-working contacts on posterior teeth. If working contacts exist, do not have contacts on inner inclines of mandibular lingual cusps or on the corresponding maxillary outer inclines of the lingual cusps.

2.Once the adjustment begins, do not allow the patient to close into maximum intercuspation (MI). Place a cotton roll or finger between the teeth when the patient needs to rest or swallow.

3.Dry the teeth with 2X2 gauze and air syringe, and mark with articulating paper. Use the cotton roll, leaf gauge, or bi-manual technique to manipulate. Start with articulating paper for large interferences, using Bausch red/blue paper, then shimstock.

4.Start at the same place in the arch, and work systematically, evaluating all marks before remarking.



Complete this process with all existing marks, then clean the teeth and re-mark. Continue with articulating paper until you have good locations on the teeth, a good distribution in the arches, and the proposed or a reasonable endpoint. Then use shimstock to verify contacts and adjust timing: Posteriors hold; Anteriors drag. Once MI(IP)=CR(CO), adjust lateral and protrusive movements. Do not grind on an MI (IP) contact (may mark function in red, then mark MI(IP) in blue), and watch for non-working interferences. Polish as needed (use of OS1 football carbide bur eliminates polishing need).

Patient Instructions: 1) Expect to feel tired. 2) Do not continue to tap teeth together rest of day. 3) wait 2-3 days to decide if something feels high, 4) may need a touch-up later as joint and teeth become accustomed to the new “bite” or as muscles relax more.