#### RESD 5044 OCCLUSION TMD

#### SPRING 2024

#### CLASS DAYS and TIME: Wednesday's, 9:15 a.m. – 12:00 p.m.

#### CLASSROOM: Room 4190, COCHR

COURSE FACULTY: Edward F. Wright, DDS, MS

**OFFICE LOCATION and HOURS:** Room 3.592U, Dental. Office hours vary based on teaching and clinical schedule. Appointments can be made via telephone or email.

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#### **READ THIS DOCUMENT CAREFULLY - YOU ARE RESPONSIBLE FOR ITS CONTENTS.**

#### **COURSE DESCRIPTION AND OBJECTIVES**

The didactic portion of this course will educate the residents for TMD screening, jaw position to use for the interocclusal record and adjusting an occlusal appliance, and procedures for inserting and adjusting the appliance. It will also educate the residence to provide a limited or full mouth occlusal equilibration.

The clinical portion will involve residents making impressions and interocclusal records on their partners, waxing their appliances, sending these to a laboratory for processing, and inserting them on their partners. Residents will learn to palpate the masticatory and cervical musculature in addition to the TMJs. Residents will learn and practice to use various techniques for identifying occlusal interferences and use the "Rule of Thirds."

Optional projects will be offered to the residents that will need to be performed outside the hours of the course. These projects may include additional reading on occlusal equilibration and equilibrating mounted casts with a predetermined CR-MI slide. After completion of these projects, they will be discussed with the entire class during classroom hours.

#### Pre-requisites - NA

Semester credit hours – 12 Contact Hours, 0.5 Semester Credit Hours

By the end of this course, each student should be able to:

- Identify patients with significant TMD
- Identify patients predisposed to developing TMD and may become symptomatic during periodontal treatment.
- Independently have a stabilization appliance fabricated by the lab and adjust its occlusion when requested by their periodontic faculty.
- Independently adjust minor occlusal interferences when requested by their periodontic faculty.

#### COURSE ORGANIZATION

#### **Course Goals:**

The goals of this course are to build a foundation for students' knowledge and skills relating to TMD assessment, occlusal therapy, equilibration procedures, and occlusal appliance therapy.

#### **Course Objectives:**

Upon successful completion of this course, the student should be able to:

- 1. Perform a TMD screening examination
- 2. Understand when an occlusal discrepancy may be beyond the limitations of minor occlusal equilibration.
- 3. Perform a limited occlusal equilibration
- 4. Obtain a centric relation interocclusal record
- 5. Insert and adjust a maxillary stabilization appliance

<u>Materials</u> – Each resident should bring to Clinic: Recently made maxillary and mandibular casts of your teeth, Blu Mousse (or Genie), a leaf gauge, and Removable Work Authorization (laboratory prescription form). The supplies we will need are: one water bath, Blu Mousse with mixing guns and tips for each resident, occlusal indicating wax, shim stock, Accufilm, 2 articulating forceps for each resident, and a leaf gauge for each resident

<u>Computer Access</u> – No computer access is needed for this course except for obtaining the course materials and, if desired, following the PowerPoint slides as they are discussed by the instructor.

**<u>Reading Assignments</u>** – Students must read the course manual prior to each class session.

#### List of Topics

TMD assessment Occlusal therapy Equilibration procedures Occlusal appliance therapy Interocclusal record Working with dental laboratories Physical variables Insertion Management

**ATTENDANCE** Class attendance is required and excused absences will be determined by the Program Director.

#### **Missed Examination Policy**

There are no examinations.

#### **Remediation Program**

If a student is having difficulty in this course, it will be discussed with the Program Director

**TEXTBOOKS** No textbooks are needed for this rotation, but you will be required to read the course manual prior to each session.

**Recommended:** Manual of Temporomandibular Disorders by Edward F. Wright, and Functional Occlusion: From TMJ to Smile by Design by Peter Dawson.

#### **GRADING POLICIES AND EXAMINATION PROCEDURES**

Students will receive a "Satisfactory" or "Unsatisfactory" grade for this course. There will be no written or practical examination and the grade will be subjectively determined by the student's attendance, performance, and attitude.

<u>Grading System</u> – (include a grading scale used to determine final grades, see example below) SATISFACTORY/UNSATISFACTORY

#### **REQUESTS FOR ACCOMODATIONS FOR DISABILITIES**

In accordance with policy 4.2.3, Request for Accommodation Under the ADA and the ADA Amendments Act of 2008 (ADAAA), any student requesting accommodation submits the appropriate request for accommodation under the American with Disabilities Act (ADA). Students submit **Student/Resident Request for Accommodation Under the Americans with Disabilities Act (ADA)**, form ADA-100, to his/her appropriate Associate Dean of their School and a copy to the ADA Coordinator. Additional information may be obtained at <a href="http://uthscsa.edu/eeo/request.asp">http://uthscsa.edu/eeo/request.asp</a>

#### **Course Values Component**

Your professional development will be monitored throughout this course. If changes are needed, they will be discussed with you and progress monitored throughout over the length of the course.

#### ACADEMIC INTEGRITY AND PROFESSIONALISM

Any student who commits an act of academic dishonesty is subject to discipline as prescribed by the UT System Rules and Regulations of the Board of Regents. Academic dishonesty includes, but is not limited to, cheating, plagiarism, collusion, the submission for credit of any work or materials that are attributable in whole or in part to another person, taking an exam for another person, signing attendance sheets for another student, and any act designed to give unfair advantage to a student or the attempt to commit such an act. Additional information may be obtained at <a href="http://catalog.uthscsa.edu/generalinformation/generalacademicpolicies/academicdishonestypolicy/">http://catalog.uthscsa.edu/generalinformation/generalacademicpolicies/academicdishonestypolicy/</a>

The values and ethics of the GSBS and UT Health San Antonio are based upon honesty, integrity, and mutual respect between all students, staff, and faculty. These values and ethics are applied to all endeavors that are related to activities performed by all members of the GSBS community. This includes any assignments, presentations, projects, and/or exams completed in this course. All students commit to not receiving or giving any aid on the completion of their work in this course including the use of AI text generators. If you are unsure how this might pertain to this course, please contact the course director before submission of any assigned work.

#### TITLE IX AT UTHSCSA

#### **Title IX Defined:**

Title of the Education Amendments of 1972 is a federal law that prohibits sex discrimination in education. It reads "no person in the United States shall, on the basis of sex, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any education program or activity receiving Federal financial assistance."

#### University of Texas Health Science Center San Antonio's Commitment:

University of Texas Health Science Center San Antonio (UTHSCSA) is committed to maintaining a learning environment that is free from discriminatory conduct based on gender. As required by Title IX, UTHSCSA does not discriminate on the basis of sex in its education programs and activities, and it encourages any student, faculty, or staff member who thinks that he or she has been subjected to sex discrimination, sexual harassment (including sexual violence) or sexual misconduct to immediately report the incident to the Title IX Director.

In an emergency, victims of sexual abuse should call 911. For non-emergencies, they may contact UPD at 210-567-2800. Additional information may be obtained at <a href="http://students.uthscsa.edu/titleix/">http://students.uthscsa.edu/titleix/</a>

#### **EMAIL POLICY**

Students are welcome to email the course director as desired

#### USE OF RECORDING DEVICES

Any recording device is welcome to be used

#### **ELECTRONIC DEVICES**

Students are welcome to use whatever electronic devices they find will enhance their learning of this material.

## Session 1; Presentation

### **TMD** Assessment

<b>TMD Signs or Symptoms Assessment</b> – From this information, you may decide the patient should be treated for TMD symptoms prior to dental treatment and/or use additional techniques to minimize TMD sign or symptom aggravation during dental treatment. You may desire to use the "TMD Evaluation" to obtain more specific TMD information.					
		YES	NO		
1.	Does the patient have difficulty or pain when opening his/her mouth wide?				
2.	Does the patient have difficulty or pain when chewing, talking, etc.?				
3.	Does the patient's mandible get "stuck", "lock", or "go out"?				
4.	Is the patient aware of noises in his/her TMJs?				
5.	Do the patient's masticatory muscles regularly feel stiff, tight, or tired?				
6.	Does the patient often have pain in or about the ears, temples, or cheeks?				
7.	Does the patient have frequent headaches?				
8.	Is the patient aware of recent changes in his/her bite?				
9.	Has the patient been treated for unexplained facial pain or a TMD problem?				

#### **Opening Range of Motion:** mm

This measurement should include the overlap of the anterior teeth; minimum of normal is approximately 40 mm.

#### **Palpation Tenderness:**

Circle + if tender and - if not tender to palpation

Right	Left
+ -	+ -
+ -	+ -
+ -	+ -
+ -	+ -
	Right         +       -         +       -         +       -         +       -         +       -         +       -

#### Goals

Identify patients with significant TMD Identify patients predisposed to developing TMD

#### Significant TMD Symptoms Can Occur

During Dental Therapy Causing interruption of therapy Postoperatively, due to Dental procedures Coincidental

#### **Events Patients Related to Their TMD Onset**

61% No reason

- 17% Stressful situation
- 4% Orthodontic treatment
- 4% Trauma
- 3% Other dental procedures
- 3% Motor vehicle accident

#### Questionnaire

- 1. Does the patient have difficulty or pain when opening his/her mouth wide?
- 2. Does the patient have difficulty or pain when chewing, talking, etc.?
- 3. Does the patient's mandible get "stuck", "lock", or "go out"?



4.Is the patient aware of noises in his/her TMJs?

5.Do the patient's masticatory muscles regularly feel stiff, tight, or tired?

6.Does the patient often have pain in or about the ears, temples, or cheeks?



- 7.Does the patient have frequent headaches?
- 8.Is the patient aware of recent changes in his/her bite?
- 9.Has the patient been treated for unexplained facial pain or a TMD problem?

#### **Opening Range of Motion**

40 mm is considered to be minimum for a normal opening (including anterior tooth overlap)

#### **Masticatory Palpations**

Temporalis muscle TMJ Masseter muscle Lateral pterygoid area

### **Occlusal Appliance Therapy**

#### **Interocclusal Record**

#### **Possible Mandibular Positions on Appliance**

Centric relation Neutral position Anterior positions Without cuspal indentations With cuspal indentations

#### **Centric Relation**

Most musculoskeletally stable position Very reproducible position If patient has TMJ arthralgia, may cause exacerbation of pain If patient has articular irregularities, may cause TMJ arthralgia If patient has disc displacement with reduction with intermittent locking, may cause TMJ to lock

#### **Anterior to Centric Relation**

Provides appliance that only occludes on most posterior tooth or teeth when patient retrudes Occlusal interference

Do not recommend using this registration for stabilization appliances



Centric Relation Bilateral manipulation Leaf gauge

#### Leaf Gauge Interocclusal Record

Available at Dispensary



#### Many items can disengage the teeth (deprogram)

Cotton rolls, tongue depressors Wax Acrylic Prefabricate (Best-Bite) Chairside fabricated (Lucia Jig, etc.)

Leaf gauge

Allows incremental spacing between teeth

Leaf gauge

Seats the condyles firmly into the anterior-superior position Stretches the lateral pterygoid muscles Provides incremental spacing for the desired vertical space Can provide CR Many protocols If patient is symptom free at end of the procedure, the patient should have been in CR. Adjust

If patient is symptom free at end of the procedure, the patient should have been in CR. Adjust the number of leaves to desired interdental space.





#### **Neutral Position**

Head tilted back and tongue on roof of the mouth and back



#### **Neutral Position**

Condyles are not firmly seated Not as reproducible as CR If patient has TMJ arthralgia, does not load condyle into inflamed tissue If patient has articular irregularities, allows interarticular space for smooth movements If patient has intermittent TMJ disc displacement without reduction, I have not had a patient "lock" using this technique

#### **Recommend using**

CR position when patient has Healthy TMJ Neutral position when patient has TMJ arthralgia TMJ palpation discomfort Discomfort in CR

TMJ noise (relative) Recent history of intermittent TMJ disc displacement without reduction

#### **Obtaining CR or Neutral Position Interocclusal Records**

Position mandible in CR or neutral position Adjust number of leaves so the space between patient's first contact is 2½ to 3 mm If Pt has arthralgia or propensity to lock, ask to lightly close Inject Blu Mousse or ask patient to bite into wax





#### If not using leaf gauge:

For CR: manipulate mandible so condyles are firmly seated in the anterior-superior position For Neutral position: patient tilts head back and tongue on roof of the mouth and back Remember anterior teeth overlap where there is 2½ to 3 mm between the patient's first contact Warm wax

Fold wax in fourths and trim

Make wax registration at previous overlap





#### Isn't 2<sup>1</sup>/<sub>2</sub> to 3 mm too thick?

Thicker Appliances

Less risk of appliance perforation

Especially relevant if provider is not experienced in obtaining desired mandibular position

More effective for treating TMD

Muscle theory

TMJ theory

Clinical trial – Manns, A., Miralles, R., Santander, H. and Valdivia, J. Influence of the vertical dimension in the treatment of myofascial pain-dysfunction syndrome. J Prosthet Dent 1983;50:700-9.

Thinner Appliances

Less obtrusive

Better initial patient acceptance

#### Working with Dental Laboratory

Great variation in price (\$100-150 in San Antonio), quality, occlusal design, and appliances they provide. Recom providing specific guidelines and give feedback until lab consistently provides what want.

#### Universal laboratory instructions

Adjust incisal pin so

minimal occlusal thickness is 2<sup>1</sup>/<sub>2</sub> to 3 mm

Fabricate appliance so

Non-supporting posterior cusps are out of contact

Occlusal surface is flat without cuspal indentations

Facial surface is scalloped and occlusal line angles are rounded

Anterior guidance and canine rise provide 1 mm separation in posterior

1 mm thick flanges

## Session 1; Clinic

#### Make and trim an appropriate interocclusal record

Complete laboratory prescription (see next page) and give to Removable Laboratory (on 2nd floor) with casts and interocclusal record.

As time permits:

Practice obtaining CR and neutral positions Palpate masticatory and cervical structures

### **Laboratory Prescription**

Trim your casts, remove any bubbles from the occlusal surfaces or anywhere else that might interfere with the casts fitting into the interocclusal record.

Complete laboratory prescription as below.

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			Baseplate/O	cclusion Rim		C	>
			Articulate Ca	ast		C	>
Clasping			Set-up			C	>
Tooth # Type Clasp Degree un	dercut		Wax up			C	>
			Surgical Tra	y / Implant De	enture	C	>
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### Masticatory and Cervical Palpations

**Recommended force:** Up to 1 kg (2.2 pounds) on temporalis and masseter muscles and up to 0.5 kg (1.1 pounds) on other masticatory muscles.

Anterior Region of the Temporalis Muscle	Bilaterally palpate approximately 1.5 inches behind the eye canthus and 0.5 inch above the zygomatic arch.
ТМЈ	Two regions of the TMJ need to be palpated bilaterally, and any of these can be tender without tenderness of the others. A common mistake is not having the patient open sufficiently to adequately palpate the TMJ. (1) Ask the patient to open approximately 20 mm and palpate the condyle's lateral pole with up to 0.5 kg (1.1 pounds) of force. (2) Palpate just anterior to the tragus and palpate in a circular manner around the condyle with up to 1 kg (2.2 pounds) of force.
Masseter Muscle	Bilaterally palpate the center of the masseter muscle. If the practitioner is unsure of the muscle's extent, ask the patient to clench and its extent can easily be felt.
Lateral Pterygoid Area	Slide the fifth digit along the lateral side of the maxillary alveolar ridge to the most posterior region of the vestibule (the location for the posterior superior alveolar injection). Palpate by pressing superior, medial and distal. If tenderness is observed, referred pain may be generated by applying heavier sustained pressure.
Medial Pterygoid Muscle	Slide the index finger a little posterior to the traditional insertion site for an inferior alveolar injection, until you feel muscle, and press laterally. If the patient gags, the finger is too posterior. If tenderness is observed, referred pain may be generated by applying heavier sustained pressure.
Splenius Capitis Muscle	This muscle is located in the depression just posterior to the sternocleidomastoid muscle along the base of the skull. Find the firm nodules within this muscle along the skull base. Palpate approximately 1 inch below the skull so these nodules are compressed up against the skull base. Press to patient tolerance and hold for approximately 5 seconds, attempting to generate referred pain. The head is stabilized during palpation by placing the palm of the other hand above the forehead.
Trapezius Muscle	Find the firm nodules within this muscle along the base of the skull. Palpate in a similar manner as with the splenius capitis muscle.

### Session 2; Presentation

#### **Occlusal Therapy**

#### Overview

- 1. Examples of applying occlusal principals
- 2. Examples of limited occlusal adjustment
- Adjusting occlusion so MI occurs in CR Rule of Thirds Applying principals to limited occlusal adjustments

#### Examples of applying occlusal principals

You know the principals, you just need to see them applied

#### "I keep packing food between my last upper left two teeth"

His dentist attempted to fix problem by placing filling #14-DO to tighten and broaden the contact between the teeth.

Provided no benefit

Clinical exam

No caries or defective teeth noted Contact between #14&15 strong and broad Perio pockets WNL except 5-6 mm in area of food impaction No B-L mobility of teeth noted MI contacts are even among all posterior teeth CR contact is limited to mesial incline on distal #15

#### Treatment

Remove CR contact on mesial incline of #15

Accentuate triangular fossae on #14-D and 15-M and ensure marginal ridges are even

#### "Since my dentist crowned my upper right tooth, my teeth on the left side rub and hurt"

Tooth #4 was the only tooth contacting in Rt laterotrusion, so crown fabricated to distribute laterotrusive forces to more teeth on the Rt side.

Clinical exam

No caries or defective teeth noted Perio pockets WNL MI contacts even among all posterior teeth Rt laterotrusive contacts are very light and distributed among teeth 3, 4, 5, and 6 Lt mediotrusive (balancing) contacts very heavy on 14 and 15 Balancing interferences

Treatment

Remove Lt mediotrusive (balancing) contacts on #14 and 15 Ensure Rt laterotrusive contacts are evenly distributed among teeth 3, 4, 5, and 6 or adjust for another acceptable occlusal scheme

Occlusion is comfortable for patient

#### My commonly observed occlusal complaints

Pt bites too hard on one side Pt says new bridge too high, but Pt does not not occlude on it in MI Tooth pain moving around, i.e., Placed anterior crowns Crowns became painful, reduced occlusion Pain moved to #2 & 31, adjusted occlusion Pain moved to #12 & 21, adjusted occlusion, and pain moved again

#### **My Approach**

Rule out pathology Caries Periodontal disease Incomplete tooth fracture Apical pathology If pain, assume due to local source Keeping in mind pain may be due to or contributed by other sources Sinusitis Referred pain from masticatory muscles, TMJ, cervical muscles, etc.

#### **Evaluate Occlusal Contacts**

Occlusal Indicator Wax

Can observe which teeth occlude

In CR

How identified heavy contact #15 in 1st example

In excursive movements

How observed balancing contacts in 2nd example

In MI

Identify whether Pt does bite harder on one side Identify whether new bridge is too high Could be high in different jaw position

When patient chews on wax

Can mark heavy contacts

Use black wax pencil to mark heavy contacts, remove wax, and adjust black marks

Can remove wax and evaluate further

Can show patient occlusion

Crs #18 and 31 were never adjusted for CR

High Tech Occlusal Analysis T-Scan III

#### Should I reduce the heavy CR contacts on his 2nd molars?

Signs and symptoms from heavy occlusion Tooth sore Tooth sensitive to cold and/or sweets Tooth has fremitus Tooth is mobile My experience with mobile teeth Tooth has localized periodontal problem Tooth has incomplete fracture Radiograph shows widened PDL Occlusal Assessment No signs or symptoms of heavy occlusion Occlusion WNL (functional, stable, and comfortable) Treatment Since he has no signs or symptoms, recommend not adjusting 2nd molars Word to the wise When placing a crown, always adjust it in CR, as well as, MI and excursive movements

#### Examples of limited occlusal adjustment where will maintain occlusion in MI

May first want to adjust MI contacts

Mark MI contacts in black

Adjust so MI contacts are evenly distributed among posterior teeth

To adjust excursive contacts Mark excursive contacts in red Ask patient to close in MI Mark MI contacts in black Places them on top of the red contacts Decide how can reduce excursive marks (red) without reducing the MI contacts

If remove MI contacts, tooth may supraerupt

Adjusting single balancing interference Should maintain MI contact, so tooth will not move May find best to adjust maxillary or mandibular tooth

#### Adjusting protrusive interference

Try to find and maintain MI contact May find best to adjust maxillary or mandibular too #31 may only contact in protrusive May want Pt wear splint at night to prevent supraeru Mesial may impact food and want to extract #31





#### If you choose to change MI so occurs when in CR

May perform through Selective grinding Restorative procedures Orthodontics Orthognathic surgery Some combination of these "Rule of thirds" aids with determining most appropriate treatment

#### **Rule of Thirds**

Mount casts in CR Divided each inner incline of posterior supporting cusp into 3 equal parts



A: If centric cusp touches the third closest to the central groove, will probably not perforate enamel when providing occlusal adjustment.

B: If centric cusp touches the middle third, will probably perforate enamel when providing occlusal adjustment, so fixed prosthodontics is probably treatment of choice.

C: If centric cusp touches the third closest to the cusp tip, patient will probably need orthodontic therapy to treat malocclusion.

Must also consider this in mesiodistal aspect

#### Where to Selectively Grind

Avoid adjusting cusp tips or will have flat dentition

When choice between supporting and nonfunctional (guiding) cusps

Reduce nonfunctional cusp

When choice is between 2 supporting cusps

Will generally split the reduction between them

When have restoration

You may choose to only reduce the opposing tooth for fear of perforating or weakening the restoration May choose to replace the restoration

When a tooth disrupts the occlusal plane curvature

You may choose to restore curvature

Ensure prevent relapse, i.e., provide occlusal contact, etc.

Teeth #3 and 31 supraerupted

Should they be reduced to blend with the occlusal plane curvature? Need to stabilize Implants #2 and 30
Fixed partial denture #29-31
Wear maxillary or mandibular splint at night



#### If desire to use selective grinding to make MI occur when in CR

First perform selective grinding on casts Mount casts in CR

Spray paint casts Adjust casts as recommended above Evaluate findings

Adjust casts until pin returns to table Vertical dimension in CR is now the same as MI

Mandible more retruded

Often lose anterior tooth coupling Provides immediate disocclusion of posterior teeth May reestablish with restorations or orthodontic treatment Once restore anterior tooth coupling, will need to appropriately adjust excursive movements

Reasons to first adjust casts

See where and how much will reduce Decide how to handle existing restorations and occlusal plane problems Predict which teeth will need restorations In a TMD study 1/3 of patients who received full mouth equilibration had sustained sensitivity See what happens with anterior teeth Will anterior coupling be maintained or need to be reestablished? Will mandibular anterior teeth now impinge on palatal tissue? Show casts to patient

You may expose dentine so it wears away

Other selective grinding considerations If tooth mobile or has fremitus Stabilize when marking it PDL rebound effect Scheduling sequence I adjust the teeth without water spray Greater visibility Able to determine dentin exposure

#### **Optimum Occlusion**

All posterior contacts should hold shim stock with same amount of force Canines to canines should allow shim stock to pull through with minimum resistance

#### **Occlusion on Implants**

Implant against natural tooth Light to no occlusal contact Implant against splint Very light to no occlusal contact on implant Implant within splint As laboratory to relieve internal surface around implant

## Session 2; Clinic

Practice obtaining CR and neutral positions Palpate masticatory and cervical structures Identify interferences using: Accufilm Occlusal Indicator Wax Shim stock Evaluate malocclusion severities using Rule of Thirds

### Session 3; Optional Reading Assignment

#### Inserting, Adjusting, and Relining Occlusal Appliances

Revised from: Wright EF. Manual of Temporomandibular Disorders. 3<sup>rd</sup> ed. Ames, IA, Wiley-Blackwell Publishing Co, 2014.

It is common for me to hear new patients report that they previously received an appliance that was too tight, causing them pain, so they stopped wearing it. Delivering a well-adjusted appliance is challenging.

After I complete my appliance adjustments, I ask the patient to insert the appliance, tell me if the posterior occlusion is hitting as evenly as possible, and whether he or she knows of anything that I can do to make the appliance better. Sometimes there is a minor problem that may annoy the patient, which I am unaware of, i.e., a rough spot on the lingual flange, a rough excursive movement, excessive bulk, a tendency for the appliance to cause gagging, etc. Some of these may cause patients to "play" with the annoyance, which could cause or aggravate TMD symptoms.

#### **Internal Adjustments**

The laboratory does not survey to determine the flange length that will provide the correct amount of undercut. Therefore, the appliance is waxed to err with excess undercut and the appliance will probably not seat until a portion of the undercut is relieved.

When the Impak appliance warms to the temperature of the waterbath, it is pliable, and when it cools to the temperature of the oral cavity, it is hard. Set the waterbath to the highest temperature available (generally 160°) and place the appliance in the water for 1 minute. If the appliance is still on the cast, place both in the warmed water for 1 minute, remove the appliance from the cast, and return the appliance to the warmed water for an additional 30 seconds. While in the warmed water, the appliance should become somewhat pliable.

Insert the appliance over your patient's teeth; repeatedly seat and remove it from the teeth (not from mouth). As the appliance cools to the temperature of the patient's mouth, it will become quite firm, but not as hard as an acrylic appliance. This technique will enable the appliance to compensate for minor errors in its fit, will reduce the interproximal undercuts, and generally provides an ideal degree of retention. During this procedure, manipulate the mandible to the position you plan to use for adjusting the appliance's occlusion and ask the patient to squeeze a little onto appliance; this will help to adapt the occlusal surface to better occlude with opposing teeth.

If the appliance still feels tight, it can be reheated/adapted as above or the intaglio surface can be adjusted with an acrylic bur. To adjust the intaglio surface, place a piece of Accufilm (the black color best marks an appliance) between the appliance and the teeth, in the area of the tightness, firmly seat and remove the appliance.

Accufilm marks should appear on the appliance's intaglio surface indicating the locations in which the appliance most forcefully contacts the teeth. Repeatedly remove these marks until the appliance fits comfortably. For discomfort from the soft tissue, I use pressure indicator paste or spray.

Once the appliance fits comfortably, check its retention. The appliance should have a similar degree of retention as a removable partial denture. The retention should not be so strong that your partner has unwarranted difficulty removing it, but be sufficient so your partner cannot dislodge it with his or her tongue.

#### **External Adjustments**

If the appliance stimulates the gag reflex, reduce the appliance at the earliest time possible. The degree of reduction is a balance between making the appliance too fragile and making it comfortable; it has to be acceptably comfortable or your patient will not wear it. Clinical experience has shown that mandibular appliances tend to stimulate the gag reflex less, but some patients find less gagging with a maxillary appliance.

Any lingual portion of the appliance has been observed to elicit a patient's gag reflex. Unless your patient directs you to reduce certain areas, first thin the posterior lingual flange so it is one-half to one millimeter thick. If this is not satisfactory, shorten the lingual flange as needed. If necessary, I will cut the posterior lingual portion so it only overlaps the lingual cusp tips by one millimeter and the anterior lingual flange to the cervical margins of the anterior teeth.

Once the appliance fits comfortable and has appropriate retention, adjust the occlusion on the appliance. The appliance's occlusion is adjusted utilizing the traditional gnathological principles used by dentists for many years.

If the patient plans to wear an orthodontic retainer or partial denture opposing the appliance, adjust the appliance with it in place. This ensures the appliance is not occluding too hard on any structure.

The appliance's occlusal surface should be flat, so the anterior teeth can smoothly slide along the appliance surface from the centric position and provide immediate disocclusion of the posterior teeth. If the occlusal surface has cuspal indentations, as the mandible begins to move in an excursive direction, the cusp tip may bump the indentation's edge, disrupting this smooth flow.

Have your patient insert and remove the appliance for each adjustment. This ensures your patient is able to insert the appliance, ensures the appliance does not have too much retention, frees you to do other things (*e.g.* pick up the articulating forceps while he or she seats the appliance), and avoids you catching the cheek during insertion (you would not be aware that the cheek is caught and just continue to push on the appliance).

Mark the opposing tooth contacts on the appliance with two sheets of Accufilm in the articulating forceps, using black to mark the centric contacts. I hold the forceps at a slight angle in the mouth so the patient is able to mark the third molar as well as the central incisor at the same time (Figure 1).



I find if the anterior teeth are marked independently (Figure 2), the patient tends to protrude the mandible for these markings.

#### Figure 2



With the mandible in the desired position and the Accufilm in place, ask the patient to close and squeeze on the appliance. As the patient performs this, you need to ensure he or she does not deviate from his or her normal closing arch. Some patients shift their mandible to the side that is being marked. If this occurs, I ask the patient to "tap straight up and down with your jaw in the center." If the patient is unable to stop shifting his or her mandible, I will simultaneously place Accufilm on both sides of the appliance, which usually eliminates this problem. It is also important that the patient does not have his or her head tilted to the side when the appliance is marked; this causes the mandible to shift to the side and the markings will also be incorrectly positioned.

It is important to realize that only the supporting cusps should provide the centric contacts from the opposing posterior teeth. Therefore, the maxillary appliance occludes with the mandibular buccal cusps, whereas the mandibular appliance occludes with the maxillary lingual cusps. The guiding cusps should never touch the

appliance, except if a tooth is rotated to the degree that the supporting cusp cannot harmoniously occlude with the appliance. Then I will attempt to occlude the guiding cusp with the appliance.

To enhance the appliance adjustment, I adjust the centric marks with the acrylic bur's flat side rather than its point (Figures 3 and 4). This helps to provide a flat occlusal surface and reduces the probability of posterior excursive interferences.

#### Figure 3

#### Figure 4





As I repeatedly mark and adjust the appliance, I slowly develop even centric marks from the opposing posterior teeth. I want at least one contact from each posterior tooth, unless the tooth is malposed, *e.g.*, not within the arch's occlusal plane and does not occlude with the opposing dentition. The centric marks from the anterior teeth should be light or no mark in comparison with the posterior marks. The canine marks may be in harmony with the marks from the anterior or posterior teeth.

The appliance should allow the patient to easily slide into excursive positions, therefore I adjust the appliance so it has minimal disocclusion of the posterior teeth. For efficiency, as I adjust the anterior centric contacts, I generally also adjust the angle of the anterior guidance ramp so it is only about five degrees steeper than the appliance's occlusal plane (Figure 5).



The amount of acrylic I remove with each adjustment varies with how much I want to reduce each contact. This changes with the number of centric marks obtained and how far the other cusp tips are from occluding with the appliance. If only one or two contacts are marking the appliance and the other cusp tips are a sufficient distance from marking, I reduce each mark several times the amount that it takes to remove the Accufilm mark; this more rapidly allows the other cusp tips to come into contact. When I have most of the cusp tips marking and the other cusp tips are close to marking, I will usually grind just enough to remove each Accufilm mark plus a little extra on the heavier marks. When all of the desired cusp tips are marking and I am attempting to create uniform centric marks, I only lighten the heavier marks by about fifty percent. With experience, these various degrees of adjustments become second nature.

Occasionally patients have less biting strength on one side of their mouth and will consistently create Accufilm marks lighter on that side. As you attempt to develop uniform bilateral marks of equal intensity, generally the appliance is inadvertently adjusted so the weaker side hits harder than the stronger side. Therefore, as I near completion of adjusting the centric contacts, periodically I ask the patient to close on the appliance (without Accufilm in the mouth) and tell me whether the left or right side hits first or harder. I adjust the appliance so the patient feels that both sides hit evenly and each side of the appliance has marks of equal intensity independent of the other side.

Since crowns supported by dental implants do not have periodontal ligaments, they do not compress when patients clench on them. If the implant is a single tooth, I make the contact so it is just out of occlusion, because there is no fear that these teeth will extrude. If there are more crowns supported by dental implants, I try to determine the best occlusal scheme and adjust the appliance accordingly.

Once I have obtained the desired centric contacts (Figure 6), I begin adjusting the excursive movements. As the patient slides the mandible into the excursive positions, I first observe the amount the posterior teeth disocclude. This gives me a feel for how much and in which direction(s) I will need to lower the anterior guidance.



I place two sheets of red Accufilm in the patient's mouth as previously described and ask the patient to grind his or her teeth side to side, and forward and backward; I do this for both sides of the mouth. I then place the black Accufilm in the patient's mouth and ask the patient to close and squeeze on the appliance to remark the centric contacts. This provides the appliance with black centric contacts on top of the red excursive marks.

I repeatedly adjust the posterior portion of the appliance so no red posterior excursive marks are produced and the amount of disocclusion between the closest posterior contact and the appliance is only one-half to one millimeter. I prefer to have the anterior guidance distributed among as many anterior teeth as possible (Figure 7). Some practitioners prefer to have the anterior guidance provided only by the canines, which is also an acceptable technique.



Clinical experience has demonstrated the appliance's occlusion should be well adjusted to provide its maximal effect. It has been observed that TMD patients referred to me with a poorly adjusted appliance, sometimes obtain considerable TMD symptom improvement from improving its occlusion.

Sometimes during the appliance adjustments, I perforate the appliance. These perforations are generally over the cusp tips of teeth underlying the appliance, so perforations would rarely compromise the appliance's ability to support the occlusal contacts of the opposing teeth, and would not have a detrimental effect on the appliance's efficacy. If I perforate the appliance, I always show the perforation to the patient, otherwise he or she may think the appliance is breaking. Once I explain that the perforations are not a concern and the appliance would need to be thicker for it to not have them, I have never had a patient request I thicken the appliance to eliminate them.

Once the appliance's occlusion is adjusted and the markings demonstrate the portion of the occlusal surface that is needed to support the opposing teeth, thin the facial and lingual flanges to approximately 1 mm and contour the sides of the appliance. Clinically it appears most patients only need about seven millimeters for anterior guidance, so I remove any unnecessary portion of the guidance ramp. Clinically it appears most patients prefer to have the appliance's occlusal surface line angles rounded so they have a similar occlusal gingival curvature to the teeth they cover. In some cases an occlusal contact may be near the appliance's line angle, so this portion of the appliance may only be able to have minimal contouring. I thin the flanges and the portions that overlay the side of the teeth so they are approximately one millimeter thick. If the appliance will only be worn at night, the practitioner may desire to leave these thicker so there is less chance of fracturing the appliance. The external surface needs to flow smoothly and have a relatively smooth surface, otherwise patients tend to "play" with areas of disharmony.

If the appliance will be worn during the day, patients generally prefer a mandibular appliance with the lingual surface as thin as possible. I make the entire lingual of the mandibular appliance one millimeter thick and carry the flange below the tongue's resting position so patients do not continually rub across its border as they speak. If the patient has mandibular tori, I trim the lingual flange so it blends into the superior portion of the tori.

After I have completed my appliance adjustments, I ask the patient to insert the appliance, tell me if the posterior occlusion hits as evenly as possible, and whether he or she knows of anything that I can do to make the appliance better. Sometimes there is a minor problem that may annoy the patient, which I am unaware about, *i.e.*, a rough spot on the lingual flange, a rough excursive movement, excessive bulk, a tendency for the appliance to cause gagging, etc. Some of these may cause patients to "play" with the annoyance, which could lead to aggravating their TMD symptoms.

Clinical experience has shown that it is not necessary to provide the patient with a highly polished occlusal appliance. I smooth the sides and edges along the occlusal surface with coarse pumice. I do not pumice the occlusal portion where the opposing teeth mark, for fear that I may disrupt the occlusal patterns. I have found there is no need to escalate to finer polishing agents and I have never had a patient request that the appliance's surface be more highly polished.

## Session 3; Presentation

#### **Stabilization Appliance Physical Variables**

Many physical choices to make when selecting an appliance Section covers

Full or partial coverage Maxillary or mandibular Hard, soft, or intermediate material Thick or thin Appliance or wire retention

#### **Full or Partial Coverage**

Full Coverage

Covers all of the teeth in arch Reduces probability of teeth moving Recommended except in rare situations

Partial Coverage

May cause covered teeth to intrude and/or non-covered teeth to extrude May not be as effective as full-coverage appliances

Several prefabricated appliances on the market, e.g., NTI, etc.

May similarly induce tooth movement, not as effective as a full-coverage appliance, and some are aspirated.

Enables dentist to avoid specific areas of mouth for situations as uprighting mandibular molar

Nociceptive Trigeminal Inhibition (NTI) Appliance Marketed for TMD and headaches Associated with occlusal changes Not as effective as stabilization appliance

#### Maxillary or Mandibular

Both appliances

Can provide virtually a perfect gnathologic occlusion Have comparable efficacy

Mandibular appliances

Generally cause less speech interference and less visible when speaking So preferable for patient who is to wear appliance during the day Maxillary appliances

Stabilize maxillary anterior teeth and prevent flaring of these teeth

Provide maxillary appliance for patients with

Periodontal disease or compromised bone support of these teeth

Forceful protrusive habit out of concern mandibular appliance may cause similar flaring Appliances will not wear opposing teeth

Appliances can bridge over edentulous areas and provide posterior edentulous extensions Consider fabricating for arch that would provide the greatest occlusal stability

As a Periodontist

You will often work with patients who are prone to flaring of the anterior teeth Hence you will almost exclusively want to use a maxillary appliance Since there is a learning curve to making and adjusting mandibular appliances, I recommend you only make maxillary appliances

#### Hard, Intermediate, or Soft Material

Hard and intermediate appliances Provide precise occlusal marks, allowing very accurate adjustment of appliance Can be fabricated so captures occlusal discrepancies, e.g., crossbite

Many bond with self-curing acrylic, enabling practitioners to modify appliance

#### Hard appliances

Ivocap Cured under pressure Enterra (Eclipse) Light cured acrylic, fabricated by laboratory Interra Light cured acrylic, fabricated intraorally and chairside Acrylic Strength and wear varies with type of acrylic

Intermediate appliances

More comfortable for the supporting teeth then hard appliances Flexes to compensate for minor errors Internal surface adjustments rarely needed Three major categories Vinyl, hybrid, dual laminate thermoplastic materials

Vinyl materials

Do not bond with self-curing acrylic

So not able to reline or repair with self-curing acrylic

Recommended for patients allergic to methyl or ethyl methacrylate

Common trade names are Valplast and Flexite

Hybrid materials

Become flexible in hot water

Bond with acrylic

Can be fabricated so acrylic covers the majority of the appliance's occluding surface, helping to resist appliance wear from heavy parafunctional activity Common trade names are ClearSplint, Ultraflex, Remedeze, and Bruxeze Dual laminate thermoplastic materials

Formed over cast so internal layer is soft material and external layer is hard material over which acrylic is added to provide occlusal contacts

Appliance needs to be about 1 mm thicker to accommodate for soft layer

Soft appliances

Fabricated from a soft thermoplastic sheet (athletic mouthguard material) Recommend 0.15-inch (3.8-mm) or 4.0-mm thick material to provide the greatest thickness for adjusting occlusion As with acrylic appliances, the occlusion on must be meticulously adjusted

Most studies find adjusted soft and acrylic appliances provide similar TMD symptom improvement

#### Thick or Thin

A study found appliances 8 mm thick were more effective in reducing TMD symptoms than thinner appliances Suggests appliances may be thicker than the freeway space without causing a problem Suggests the additional 1 mm needed for dual laminate appliances should not be a problem Recommend appliance thickness be between 1 and 4 mm

#### **Appliance or Wire Retention**

Either can provide acceptable retention, decision is generally practitioner's preference Appliance retention should be similar to that of a partial denture Appliance with insufficient retention may aggravate TMD symptoms

Retention should not be evaluated until appliance fully seats and fits comfortably

If too tight adjust wire or reduce retentive acrylic area If too loose, adjust wire or if able, reline appliance's internal surface as described in "Appliance Adjustments" Section

Recommend asking laboratory

Once the casts have been mounted, to adjust articulator's pin so closest opposing posterior tooth contact is 3 mm

Obtain appliance engaging buccal embrasures of posterior teeth

### **Appliance Adjustments**

#### **Internal Adjustments**

"Internal Adjustments" and "Internal Reline" primarily pertain to appliances fabricated with a hard inner surface

If appliance does not insert with moderate amount of force Generally restricted by flange labial to anterior teeth Shorten length to 1 to 1<sup>1</sup>/<sub>2</sub> mm

Mark tight internal areas with Accufilm

In area of restriction, place Accufilm (black marks best) between appliance and teeth Firmly seat and remove appliance Adjust nonretentive areas and interproximal fins (formed by the occlusal or incisal embrasures)

Adjust conservatively and become more aggressive with successive adjustments Retentive areas may also need adjusted

If does not seat after 5 to 10 adjustments

Remove ¼ mm of buccal and lingual acrylic so appliance not tight Reline internal surface to obtain retention

If appliance rocks

Determine location of fulcrum Seat appliance over Accufilm at fulcrum Aggressively adjust fulcrum Once appliance fully seats, determine whether excessively tight or loose If tight Continue to adjust with Accufilm If loose Reline internal surface

#### **Internal Reline**

Remove internal Accufilm marks prior to relining Reline entire internal surface or generally have an internal gap

Moisten internal surface with monomer Place 1 mm mixed acrylic over internal surface

Ask patient to swish with mouthwash

To decrease ability to taste the monomer Place appliance in mouth and have patient seat appliance by biting to place with mandible in desired position After 90 seconds, dislodge and reinsert

Continue to dislodge and reinsert every 30 seconds until acrylic reaches its final set

Remove from mouth Patient will want to swish with mouthwash Trim excess acrylic

#### **External Adjustments**

If needed, reduce for gagging

Any lingual acrylic can be trigger Ask patient if can identify the trigger location Can reduce posterior lingual flange thickness so ½ to 1 mm Can shorten posterior lingual flange so only overlaps lingual cusp by 1 mm Can shorten anterior lingual flange to cervical margins

If patient plans to wear an orthodontic retainer or partial denture opposing the appliance Adjust appliance with it in place If cuspal indentations present Remove them while adjusting appliance Patient to insert and remove appliance with each adjustment Helps prevent cheek being caught and injured Gives practitioner time to prepare for next step

Use black Accufilm to mark centric contacts

Position articulating forceps so anterior and posterior teeth mark at same time (left figure)

Patients tend to protrude when mark anterior teeth (right figure)

As patient taps on Accufilm

Ensure mandible does not deviate

Adjust appliance more efficiently by

Using acrylic bur's flat side rather than its point

Adjust so have at least one centric contact from each posterior tooth Unless opposing tooth malposed

Posterior centric contacts should only be from supporting cusps Maxillary appliance contacts from mandibular buccal cusps Mandibular appliance contacts from maxillary lingual cusps

Centric marks from

Anterior teeth should be light or none, in comparison with posterior marks Canines may be in harmony with anterior or posterior teeth

Implant supported crowns

Anterior crowns should not mark and posterior crowns should mark very lightly or not at all While adjusting appliance

Observe distance cusp tips are from occluding with appliance Suggests whether better to add acrylic or reduce contacts

Suggests how much should reduce contacts

Once obtained desired centric contacts, ask patient how can make it more even

One side may be hitting harder than other

Certain contacts may be noticeably hitting harder

Prior to adjusting excursive movements

Observe amount of posterior disocclusion with these movements

Demonstrates degree guiding areas need reduced

Desire <sup>1</sup>/<sub>2</sub> to 1 mm posterior disocclusion

Mark excursive movements with red Accufilm and place black centric marks on top of red marks

Adjust so excursive movements distributed among as many anterior teeth as possible and no contacts in posterior

If patient to wear during day

Refine with patient in sitting position

Thin flanges so 1 mm thick and course pumice only flanges and line angles With appliance seated, ask patient how appliance can be improved

#### **External Reline**

May add acrylic

To obtain single contact, to segment of occlusal surface, or to entire occlusal surface To obtain single contact

Add drop of monomer and cone of mixed acrylic

Ask patient to close and tap on appliance

Place in warm water to cure faster

Mark cuspal indentation with pencil Reduce acrylic so pencil mark lightens by 50% Refine occlusion with Accufilm

Can similarly add acrylic to a segment of occlusal surface

Can add acrylic on entire occlusal surface

Moisten occlusal surface with monomer Add approximate amount of mixed acrylic Seat appliance Ask patient to close to desired vertical Place in warm water to cure faster Mark cuspal indentation with pencil Reduce acrylic so equally lighten pencil marks Refine occlusion with Accufilm

#### **Appliance Repair**

Intraoral technique Bevel fractured margins Seat appliance to check separation and remove

> Moisten beveled edges with monomer and add mixed acrylic to each half Seat appliance and ask patient to bite on it To ensure completely seated Join halves of mixed acrylic and after 2 to 3 minutes dislodge and reinsert Continue to dislodge and reinsert every 30 seconds until acrylic reaches its final set

Smooth and course pumice

#### **Appliance Examples**

Chosen to demonstrate various procedures for fabricating stabilization appliances

Hopefully will increase your awareness of different and increase your flexibility to use various techniques May change your primary appliance preference

#### **Maxillary Acrylic Stabilization Appliance**

Maxillary and mandibular casts and interocclusal record sent to laboratory

#### **Single Appointment Technique**

Adapt Interra around teeth Lightly occlude into Interra Partially light cure appliance Remove from mouth Support internal region Light cure Adjust occlusion

Centric marks from

#### Esthetic Hard Thermoplastic Stabilization Appliance

Only mandibular cast needed Lingual undercuts blocked out 2 mm thermoplastic sheet formed over mandibular cast

Adjust shell to patient's mandibular teeth Add self-cured acrylic to posterior occlusal surfaces

Manipulate mandible into desired position Ask patient to close into soft acrylic until teeth first touch hard material Adjust appliance with Accufilm in centric and excursive positions

Provides excellent daytime appliance Very esthetic and patient can speak normal while wearing it

#### **Impak Stabilization Appliance**

Material extended into interproximal undercuts Will flex out during heating/fitting process

Place splint in hot water bath or the equivalent for 1 minute

Heat causes material to become pliable Degree will vary with powder to liquid ratio Recommend laboratory use 20 g powder & 5 ml liquid Place onto patient's teeth Repeatedly seat and remove from teeth (not from mouth)

Manipulate mandible and ask patient to squeeze slightly onto appliance Will tend to compress high occlusal contacts, so easier to adjust appliance As appliance cools to mouth temperature, it retains new shape Compensates for cast minor errors Generally provides ideal retention Adjust appliance with Accufilm in centric and excursive positions

#### **Dual Laminate Thermoplastic Stabilization Appliance**

Soft internal layer Hard occlusal layer

2.5 mm dual Laminate sheet formed over mandibular cast Acrylic added to occlusal surface and occlusion adjusted

#### Soft Thermoplastic Stabilization Appliance

Only mandibular cast needed Warm and form 0.15-inch (3.8 mm) soft thermoplastic sheet over mandibular cast Adjust so comfortable on mandibular arch Warm occlusal surface with torch Ask patient to close into soften material until provides adequate occlusal indentations

Adjust appliance with acrylic bur and articulating paper so obtain even contacts If occlusion is not adequately adjusted, studies suggest few patients will obtain TMD symptom improvement

Polish with chloroform

#### **Over-the-counter Appliances**

Sold for TMD symptoms or athletic mouthpieces TMD patients have mixed results May cause occlusal changes Recommend patients not use these for TMD

#### **Appliance Management**

Appliance adjustment Adjust completely at delivery or sequentially Provide "Occlusal Appliance Care Instructions" handout (Appendix 4) Wear pattern Will vary with symptoms Short-term awake habit breaking appliance May be specific times, e.g., when driving car

Return to office Will vary with adjustment technique and symptom severity If patient removes appliance during sleep, may stop if Tighten a loose appliance Loosen a tight appliance Perfect the appliance's occlusion Thin a bulky appliance Not all TMD patients obtain symptom improvement from appliance

Patients warned about this in TMD Self-management Therapies handout (Appendix 3)

#### If did not obtain anticipated TMD benefit, consider

Reevaluating for non-TMD condition Taking panoramic radiograph That pain may be due to sleep apnea Adjusting appliance to a different mandibular position Fabricating soft appliance opposing this appliance Prescribing 2-300 mg gabapentin h.s. Whether patient meets criteria for anterior positioning appliance (Chapter 13)

#### Follow-up

Generally for several months then annually TMD tends to be cyclic, so patients should wear appliance in spite being symptom free without it When appliance needs replaced and no longer needed An appropriate time to discontinue it

## Session 3; Clinic

Residents will insert appliance on their partners

## Session 4; Clinic

The other residents will insert appliance on their partners



Feel free to copy all manual appendices, alter them, and paste them onto stationary with your letterhead.

Appendix 1

## **Referral Criteria for Hygienists**

#### Consider referring patient for TMD evaluation when patient has:

Pain in area of masticatory muscles or TMJs Muscle stiffness within masticatory system TMJ catching or locking New or developing: Posterior open bite Anterior open bite Shift in mandibular midline Frequent headaches Limited mandibular range of motion Less than 40 mm opening, including overlap Less than 7 mm right or left lateral Less than 6 mm protrusive

#### Consider referring patient for stabilization appliance when patient has:

Excessive tooth wear Mobile teeth History of fracturing teeth Nighttime grinding that bothers bed partner Appendix 2

## **TMJ Disc Displacements**



### **Preventing TMD Aggravation from Dental Treatment**

- Make appointments for when the patient's symptoms are minimal, e.g., in accordance with the patient's daily pain variation, when the patient anticipates there will be less stress in his or her life, etc.
- Request that the patient ask for stretching breaks whenever he or she begins to feel the jaw stiffen
- Request that the patient massage his or her masseter and temporalis muscles with a pressure slightly greater than what is needed to produce pain, whenever these muscles begin to feel sore
- Use a bite block if the patient finds this beneficial
  - The patient does not bite on it, but just rests his or her teeth on it
- Balance all forces applied to the mandible with the other hand
- Use premedication and/or postoperative medications, as the patient desires
  - Most patients find 800 mg ibuprofen, t.i.d. adequate
    - It may be beneficial to start 1 or 2 days before the appointment
  - If ibuprofen is inadequate and the pain is primarily from the TMJ, recommend the patient take Aleve or prescribe 500 mg naproxen, 1 tablet b.i.d. starting 1 or 2 days before the appointment
  - If ibuprofen is inadequate and the pain is primarily from the muscles, prescribe a muscle relaxant (e.g., 5 mg diazepam)
    - It may be beneficial to start the night before the appointment
- Use nitrous oxide-oxygen inhalation during dental appointments
  - This should help to keep the masticatory muscles relaxed, hence help to decrease the TMD symptoms during and after the dental treatment

### Stabilization Appliance Alternatives for TMD Patients who Need Multiple Restorations

- Can provide the patient with a temporary appliance (e.g., soft appliance), until the teeth are restored
- Can restore the teeth on the arch that needs the least treatment, fabricate an appliance for this arch, and adjust the appliance's occlusal surface as the opposing restorations are placed
- Can pharmaceutically manage the patient's TMD symptom until a temporary or long-term stabilization appliance can be provided, e.g. 5 mg Flexeril 1-2 tabs h.s.

## **TMD Self-Management Therapies**

Your dentist determined you have a temporomandibular disorder that is often referred to as TMD. The "T" in TMD stands for the temple, "M" for the mandible or jaw, and "D" for a disorder within this complex. This disorder is usually due to an overuse of this system.

We use this system for many activities (talking, eating, yawning, laughing) and, when we are not engaged in these, we need to allow our jaw muscles and joints to relax. Many people have developed behaviors that do not permit their muscles or joints to relax for a sufficient amount of time. The following will help instruct you on how to reduce the TMD pain you are having:

- 1. Massage your painful muscles, as you find this beneficial. Use your index, middle, and ring fingers in a rolling motion over your skin with a pressure slightly greater than what is needed to produce your pain.
  - a. When massaging the masseter muscle (jaw muscle), some patients prefer to simultaneously place their thumb inside their mouths and apply a counterforce with it. This works best if the right hand is used to massage the left masseter muscle and the left hand is used to massage the right masseter muscle.
  - b. Some patients find it beneficial to locate and knead the most painful portion of the muscle for approximately 1 minute. Be careful not to hurt yourself by massaging your muscles too aggressively.
- 2. Apply heat, cold, or a combination of heat and cold to the painful areas. Use whichever provides you with the greatest amount of relief; most patients prefer heat.
  - a. Use heat for 20 minutes two or four times each day. Some patients prefer to use moist heat, whereas others find dry heat just as effective and less of a hassle. Moist heat can be obtained by wetting a thin washcloth with very warm water. The washcloth can then be kept warm by wrapping it around a hot water bottle or placing it against a heating pad separated by a piece of plastic wrap.
  - b. Apply cold until you first feel some numbness and then remove it (this usually takes about 10 minutes). Patients tend to obtain cold by taking a bag of frozen corn or peas, breaking up any large chunks inside the bag, and wrapping it with a towel.
  - c. Use the combination of heat and cold two to four times each day. Apply heat to the painful area for approximately 5 minutes (less if it aggravates your pain). Then apply cold.
- 3. Eat soft foods like casseroles, canned fruits, soups, eggs, oatmeal, and yogurt. Do not chew gum or eat hard foods (e.g., raw carrots) or chewy foods (e.g., caramels, steak, and bagels). Cut other foods into small pieces, evenly divide the food on both sides of your mouth, and chew on both sides. Take smaller bites and chew slower.

#### Appendix 4, cont.

- 4. Avoid caffeine because it stimulates your muscles to contract and hold tension. Caffeine or caffeine-like drugs are found in coffee, tea, most sodas (especially energy beverages), and chocolate. Decaffeinated coffee also has some caffeine, whereas Sanka has none.
- 5. Your teeth should never touch except lightly when you swallow or speak. Closely monitor yourself for a clenching or grinding behavior. People often clench their teeth when they are irritated, drive a car, use a computer, or concentrate. Learn to keep your jaw muscles relaxed, teeth separated, and tongue resting on the roof or floor of your mouth.
- 6. Set aside time once or twice a day to relax and drain the tension from your jaw and neck. Patients often benefit from simple relaxation techniques such as sitting in a quiet room while listening to soothing music, taking a warm shower or bath, and slow deep breathing. Once you have learned to relax and drain the tension from your jaw and neck, continually monitor these. Whenever tension is observed, release it.
- 7. Observe for and avoid additional behaviors that put unnecessary strain on your jaw muscles and joints. Some behaviors include, but are not limited to, resting your teeth together; tapping your teeth together; resting your jaw on your hand; biting your cheeks, lips, fingernails, cuticles, or any other objects you may put in your mouth; pushing your tongue against your teeth; and holding your jaw in an uncomfortable or tense position.
- 8. Posture appears to play a role in TMD symptoms. Try to maintain good head, neck, and shoulder posture. You may find that a small pillow or rolled towel supporting your lower back may be helpful. Ensure you maintain good posture when using a computer and avoid poor postural behaviors such as cradling the telephone against your shoulder.
- 9. Your sleep posture is also important. Avoid positions that strain your neck or jaw, such as stomach sleeping. If you sleep on your side, keep your neck and jaw aligned. Getting a restful night of sleep is important. Do not keep your cell phone or computer where you are tempted to look at them during the night.
- 10. Restrain from opening your mouth wide, such as yawning, yelling, or prolonged dental procedures.
- 11. Use topical Voltaren Arthritis Pain or Aspercreme Creme over the affected area four times a day as beneficial. Or take anti-inflammatory and pain-reducing medications, such as Aleve, ibuprofen, Tylenol, and aspirin, to reduce joint and muscle pain. Avoid those with caffeine, for example, Anacin, Excedrin, or Vanquish.

There is no cure for TMD, and you may need to follow these instructions for the rest of your life. Your dentist may suggest other therapies in addition to these instructions. No single therapy has been shown to be totally effective for TMD, and a percentage of patients receiving therapies report no symptom improvement (i.e., 10–20% of patients receiving occlusal appliances report no improvement).

## **Stabilization Appliance Laboratory Instructions**

#### Maxillary or Mandibular Impak Stabilization Appliance

Please:

1. Debubble the cast(s) and block out (a) deep grooves on and between the teeth and (b) all undercuts, with the exception of no blockout in the buccal embrasures of the posterior teeth. After mounting casts, adjust the incisal pin so the appliance's minimum occlusal thickness is 3 mm.

2. Extend the flanges so that (a) the facial extent is carried 2 mm below the interproximal contact for the anterior and posterior teeth and (b) the lingual portion extends \_\_ mm (5 mm for maxillary and 10 mm for mandibular) from the gingival margin, keeping it short of the vestibule and tori.

3. Fabricate the occlusal surface so the surface is flat without cuspal indentations, the nonsupporting posterior cusps are not in contact, the protrusive and canine guidances provide minimal posterior disocclusion ( $\frac{1}{2}$  to 1 mm), and the occlusal line angles are rounded. Please make the facial flange so it is 1 mm thick and flows with the contours of the teeth and make the lingual flange so it is only 1 mm thick. Thank you.

## Maxillary or Mandibular 0.15-inch Soft Thermoplastic Appliance or Dual Laminate Thermoplastic Appliance

Please debubble cast(s) and do not block out undercuts. Extend the flanges so that (a) the facial extent is carried to the gingival margin and (b) the lingual portion extends \_\_\_ mm (5 mm for maxillary and 10 mm for mandibular) from the gingival margin, keeping it short of the vestibule and tori.

For the dual laminate thermoplastic appliance, once the dual laminate material is on the articulator, adjust the incisal pin so the closest opposing tooth is 1 mm from the occlusal surface, enabling the thickness of the added acrylic to be 1 mm or more. Please add acrylic to the occlusal surface so the occlusal surface is flat without cuspal indentations, the nonsupporting posterior cusps are not in contact, the protrusive and canine guidances provide minimal posterior disocclusion ( $\frac{1}{2}$  to 1 mm), and the occlusal line angles are rounded. Thank you.

#### Appendix 5, cont.

#### **Maxillary or Mandibular 2-mm Hard Thermoplastic Appliance or Acrylic Stabilization Appliance** Please:

1. Debubble the cast(s) and block out (a) deep grooves on and between the teeth and (b) all undercuts, with the exception of no blockout in the buccal embrasures of the posterior teeth.

2. Extend the acrylic so that (a) the buccal extent is carried ½ mm below the height of contour for the posterior teeth, (b) the labial extent is carried only 1 to 1½ mm beyond the incisal edge of the anterior teeth, and (c) the lingual portion extends \_\_ mm (5 mm for maxillary and 10 mm for mandibular) from the gingival margin, keeping it short of the vestibule and tori.

3. For the acrylic stabilization appliance, adjust the incisal pin so the appliance's minimum occlusal thickness is 3 mm. Fabricate the occlusal surface so the surface is flat without cuspal indentations, the nonsupporting posterior cusps are not in contact, the protrusive and canine guidances provide minimal posterior disocclusion ( $\frac{1}{2}$  to 1 mm), and the occlusal line angles are rounded. Please make the facial acrylic so it is 1 mm thick and flows with the contours of the teeth and make the lingual flange so it is only 1 mm thick. Thank you.

Appendix 6

## **Occlusal Appliance Care Instructions**

The appliance is designed to protect and stabilize your jaw muscles and joints. It should help you feel more comfortable and allow healing to occur. To obtain its maximum benefit, use it in the following manner:

1. Do not bite down on your appliance. The appliance is to help you realize when you are clenching and help you break this habit. YOUR TEETH SHOULD NEVER TOUCH THE APPLIANCE! Constantly monitor your jaw position and remember to keep your tongue up and your teeth off of the appliance.

2. Most patients need to gradually increase the amount of time they wear their appliance until they reach their recommended wear schedule. Occasionally the appliance may cause a temporary increase in jaw tension or joint noises; a slower increase in wear time may be necessary. If your appliance hurts your teeth or gums, leave it out and come back to have it adjusted.

3. Do not wear your appliance when you eat.

4. Clean the inside and outside of your appliance at least daily with your toothbrush and toothpaste. It can be soaked with a denture cleaner solution to help clean it.

5. When you are <u>not</u> wearing your appliance:

- a) be careful where you place it, because it is very fragile
- b) do not let it lay around, dogs and cats enjoy chewing on them
- c) do not leave it in a warm place (i.e. inside your car on warm day), or it may warp.
- d) if your appliance will be out of your mouth for more than 8 hours, store it in a moist environment.

You can place it with a few drops of water in a zip-lock bag or margarine tub.

6. Some patients find their appliance causes them to salivate, while others find it causes them to have a dry mouth. This is generally only a temporary situation.

7. When you take your appliance out, your jaw may take a few seconds to adjust back to the way your teeth normally fit together.

8. Always take your appliance to your dental appointments, especially to the initial appointments where we will be refining your appliance.

This advice should help you optimize the benefit you can obtain from your appliance and maintain your oral health.

## **Locating Providers to Refer TMD Patients**

### TMD Dentists

The American Dental Association does not recognize TMD or orofacial pain as a dental specialty, so dentists are not permitted to advertise themselves as a "specialist" in this area. To find a dentist with TMD expertise near your office, go to www.abop.net, select the "Diplomate Directory", select United States, and then your state.

### **Physical Therapists**

**For Treating Neck Pain:** Go to website www.apta.org/ (American Physical Therapy Association). Click the heading "For the Public," click the link "Find a PT" located at the top of the page. Enter your zip code and select the expertise orthopedics. Select a physical therapist with the letters "OCS" or "MTC" after his or her name.

"OCS" stands for Board Certified Orthopedic Clinical Specialist and "MTC" stands for Manual Therapy Certification. Physical therapists with either of these specialties should be good at treating the neck region.

**For Treating TMD Pain:** There are two certification programs for physical therapist with expertise in treating TMD patients, there are not many physical therapists with either certification, and a prerequisite is that they already have OCS or MTC. One certification is Certified Cervical and Temporomandibular Therapists (CCTT) and therapists with this certification are listed on the Physical Therapy Board of Craniofacial & Cervical Therapeutics website (www.ptbcct.org). The other certification is Certification in Cranio-Facial (CFC) and therapists with this certification are listed on the University of St. Augustine website (http://www.usa.edu/). The names and addresses of these therapists are easily obtained by placing the certification title in an internet search engine and clicking the selection for the organization.

# Occlusion and TMD RESD 5044

## Spring 2024

### Session 1: January 17, 9:15-12 am; room 4190

#### **Assignment:**

Bring to Clinic: Recently made maxillary and mandibular casts of your teeth, Blu Mousse (or Genie), a leaf gauge, and Removable Work Authorization (laboratory prescription form).

#### **Presentation:**

#### (Occlusion and TMD Session 1.pptx)

TMD Assessment Occlusal Appliance Therapy Interocclusal record Working with dental laboratories

#### **Clinic:**

Make and trim an appropriate interocclusal record Complete laboratory prescription and give Gold Window casts (in basement) with interocclusal record and laboratory prescription. As time permits:

Practice obtaining CR and neutral positions Palpate masticatory and cervical structures

### Session 2: February 7 , 9:15-12 am; room 4190

#### Assignment:

Bring to Clinic: Accufilm, articulating paper holder, occlusal indicator wax, and shim stock.

#### **Presentation:**

#### (Occlusion and TMD Session 2.pptx)

Occlusal therapy

Discuss occlusal appliance insertion Discuss equilibration procedures

#### **Clinic:**

Practice obtaining CR and neutral positions Palpate masticatory and cervical structures Identify interferences using: Accufilm Occlusal Indicator Wax Shim stock Evaluate malocclusion severities using Rule of Thirds

### Session 3: February 14, 9:15-12 am; room 4190

#### Assignment:

1. Watch the movie of how to insert and adjust splint (must be on VPN). On the internet (must be on VPN), go to the Dental School Intranet, select Dental School Streaming Server, select Stabilization Appliance and Facebow, and select Stabilization Appliance

 If desired, read: "Inserting, Adjusting, and Relining Occlusal Appliances" in manual
 Bring to Clinic: Your appliance from the Removable Laboratory, hot water bath, Accufilm, straight slow-speed handpiece, two articulating paper forceps, and acrylic bur.

#### Presentation:(Occlusion and TMD Session 3.pptx)

Occlusal Appliance Therapy, continued Stabilization Appliance Physical Variables Adjustments for Acrylic Appliances Appliance Examples Appliance Management

#### **Clinic:**

2 residents will insert appliance on their partners

### Session 4: February 21, 9:15-12 am; room 4190

#### Assignment:

Bring to Clinic: Your appliance from the Removable Laboratory, hot water bath, Accufilm, straight slow-speed handpiece, two articulating paper forceps, and acrylic bur.

### **Clinic:**

Remaining resident will insert appliance on their partner