

# Facial Problem Questionnaire



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Name \_\_\_\_\_ Age \_\_\_\_\_

Date \_\_\_\_\_ Referred by \_\_\_\_\_

Referring Dr.'s Phone # and Email: \_\_\_\_\_

Please do not write in this space.

Date \_\_\_\_\_

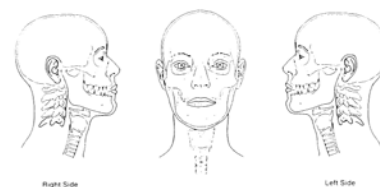
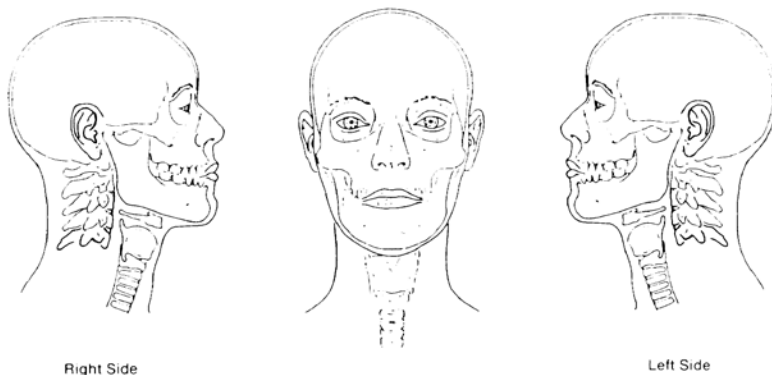
1. Which of the following do you have (circle all that apply)

Headaches    Neck Pain    Jaw pain    Ear Pain  
Facial Pain    Bite Problems    Damaged teeth    Sleep Problem  
Other \_\_\_\_\_

2. How many days a month are you pain free? \_\_\_\_\_

If pain free, go to next page.

If Pain, Please shade in where your pain is located:



How long have you had this pain? \_\_\_\_\_

Is the pain constant? \_\_\_\_\_

Is the pain (circle all that apply)    Aching    Burning  
Stabbing    Sharp    Dull    Other \_\_\_\_\_

Is the pain worse in the (circle all that apply)

Morning    Afternoon    Evening    Night

What makes the pain better? \_\_\_\_\_

What makes the pain worse? \_\_\_\_\_

How severe is your pain? Please make a mark along the line below:

No Pain | \_\_\_\_\_ | Worst Pain Ever

What medication do you take or have you previously taken for your pain?

MEDICATION

DOSE

FREQUENCY

_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

Please do not write in this space

Yes No

3. Any discomfort when you chew? Y N
- Which side do you favor chewing on ? R L Use Both
- Is it difficult or painful to swallow? Y N
- Any discomfort when you move your jaw? Y N
- Any discomfort upon chewing hard foods like carrots? Y N
- Do your jaw muscles get tired from chewing? Y N
- Does it hurt to open wide? Y N
- Which side of your jaw makes a clicking/popping noise? R L neither
- Which side of your jaw makes other noises? R L neither
- What Noises? \_\_\_\_\_
- When did you first notice the noises or clicking? \_\_\_\_\_
- Have you noticed any changes in noises or clicking? Y N
- Explain: \_\_\_\_\_
4. Have you ever not been able to open your jaw all the way? Y N
- Have you ever had to wiggle your jaw to get it open? Y N
- Has your jaw ever been stuck open and you could not close it? Y N
- When did this first happen? \_\_\_\_\_ Last happen? \_\_\_\_\_
5. Has your speech changed? Y N
- Have you noticed a change in the way your teeth come together? Y N
- Have you noticed your teeth shifting? Y N
- Has the shape of your face changed? Y N
- Has your chin shifted to one side of your face? Y N
- When did you notice any of the above changes? \_\_\_\_\_
6. Do you have a hyper-sensitive bite? Y N
- Is your bite uncomfortable? Y N
- When you close your jaw, do you have to search for
- a comfortable position for your teeth to fit? Y N

Chew  
Swallow  
Speak  
Open/Close

Healthy  
Damaged  
Active breakdown  
Adapting  
Adapted

Favorable  
Unfavorable

TMJ Move

Structurally Stable

Mech Stable

Occl

7. Are your teeth sore or sensitive? Y N  
 Do you clench your teeth? Y N  
 Do you grind your teeth? Y N  
 Do you grind or clench during the day or night? Day Night Both Neither  
 When did you start clenching or grinding? \_\_\_\_\_

8. Do you have a dentist who you see for routine care and cleanings? Y N  
 Please list : \_\_\_\_\_ Last Visit: \_\_\_\_\_

Which of the following dental procedures have you had (please circle):

Fillings Orthodontics Root Canal Dentures  
 Crowns Bridges Bite Adjustment

If you had braces, how many times were you in braces? \_\_\_\_\_

How old were you when you got braces? \_\_\_\_\_

How old were you when you were done? \_\_\_\_\_

Have you ever had a tooth extracted? Y N

Have you ever split or broken a tooth? Y N

Do you feel there is any connection between the dental work you have had done  
 and the problems you are having? Y N

9. Have you ever injured or sustained any form of trauma or whiplash to your:  
 (circle all that apply) Jaw Head Neck None of these  
 (If any past trauma, please complete the trauma questionnaire)

Have you ever had stitches to your chin? Y N

Do you feel there is any connection between the trauma  
 you have had and the problems you are having? Y N

10. Do you get headaches? Y N How often? \_\_\_\_\_  
 How long do they last? \_\_\_\_\_  
 Where does it ache? \_\_\_\_\_

11. Have you had any changes in your vision? Y N  
 Do you get visual disturbances along with headaches? Y N  
 When was the last time you had your eyes checked? \_\_\_\_\_  
 Do you have problems with your ears? Y N  
 Dizziness? Y N Ringing? Y N  
 Hearing? Y N Other? \_\_\_\_\_  
 Have you noticed any lumps in your face, throat or neck? Y N  
 Do you have any sinus problems? Y N  
 Explain: \_\_\_\_\_

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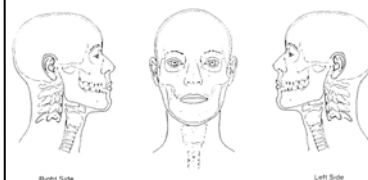
Parafunction

PDHx

Ortho

Trauma

HeadA



ENT

12.	Do you have trouble sleeping?	Y	N	
	Do you feel rested when you wake up?	Y	N	
	How many hours do you sleep?	_____		
	How long does it take you to fall asleep?	_____		
	How many times do you awaken during the night?	_____		
	In which position do you sleep:	Back	Side	Stomach
	Do you take any medications to help you sleep?	Y	N	
	Please List: _____			
	Rate your overall daily energy level:	Low	Less than Before	Normal High
	Do you snore?	Y	N	
	Do you have a sleep partner?	Y	N	
	Does your sleep partner snore?	Y	N	
	Do you sleep in a different room as your partner?	Y	N	Sometimes
	Do you have any trouble breathing during sleep?	Y	N	
	Have you ever woken up gasping or choking?	Y	N	
	Do you consider yourself under a lot of stress?	Y	N	
	Do you worry?	Y	N	
	Do you ever get depressed?	Y	N	
	How often?	_____		
	Have you ever had a stomach problem?	Y	N	
	Ulcers?	Y	N	
	Rate the nutrition of your diet:	Excellent	Good	Could be better Poor
	Do you use vitamin supplements?	Y	N	
	Do you exercise?	Y	N	
	Do you currently use (circle):	Caffeine	Tobacco products	Alcohol

Please do not write in this space

Sleep  
Airway

Social Hx  
Wake to Sleep

Diet  
Fitness

13. Tiredness: How likely are you to dose off in the following situations? Use the following scale to chose the most appropriate number for each situation:

- 0 = no chance of dozing
- 1 = slight chance of dozing
- 2 = moderate chance of dozing
- 3 = high chance of dozing

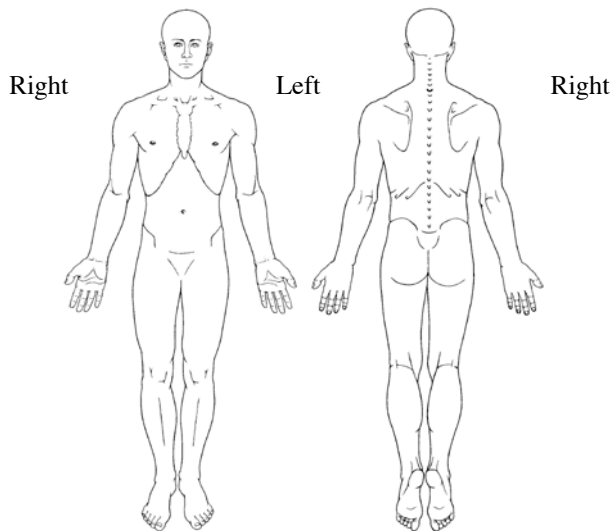
Situation

Sitting and reading	_____
Watching TV	_____
Sitting inactive in a public place (e.g. a theater or meeting)	_____
As a passenger in a car for an hour without a break	_____
Lying down to rest in the afternoon when circumstances permit	_____
Sitting and talking to someone	_____
Sitting quietly after lunch without alcohol	_____
In a car, while stopped for a few minutes in traffic	_____

14. Do you have or have you had arthritis? Y N  
 Does anyone related to you have arthritis? Y N  
 Are your fingers sore or stiff? Y N  
 Any dry skin patches past or present? Y N  
 Any skin rashes past or present? Y N  
 Have you been treated for any other painful condition  
 in the last three years other than your present problem? Y N

Explain \_\_\_\_\_

On the diagram below please indicate any other areas that are painful:



15. Have you had any prior treatment for TMJ problems? Y N  
 Appliance/Splint? Y N When? \_\_\_\_\_ Did it help? Y N  
 Night guard? Y N When? \_\_\_\_\_ Did it help? Y N  
 Bite adjustment? Y N When? \_\_\_\_\_ Did it help? Y N  
 Orthodontics? Y N When? \_\_\_\_\_ Did it help? Y N  
 Other \_\_\_\_\_

16. Please list, in chronological order, health care providers  
 you have seen for the problem you are presenting with today:

<u>Date</u>	<u>Doctor or provider</u>	<u>Treatment</u>	<u>Did it help?</u>
_____	_____	_____	Y N
_____	_____	_____	Y N
_____	_____	_____	Y N
_____	_____	_____	Y N
_____	_____	_____	Y N
_____	_____	_____	Y N

Please do not write in this space

Fam Hx

Look for Other

Prior Tx

17. Describe the problem (s) in your own words:

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How have these problems affected your life? Does it keep you from doing anything that you want to do? (work, play, chores, eating, talking)

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What would you like to accomplish with treatment here?

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## 18. What has Changed and When:

So that I may have a better understanding of your problem, please list in chronological order with date estimates all the changes and/or defining moments of your problem.

(Examples are: fell down stairs, left TMJ clicking started, clicking stopped, teeth shifted, headaches increased, headaches stopped, left ear pain.)

Date Estimate

Change that Occurred

[illegible]

19. Is there anything else that I should know about?

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20. So that I can better understand your pain, please complete the following:

What does your pain feel like? Some of the words below describe your present pain.

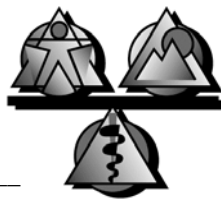
Circle all the words that describe it.

Flickering	Jumping	Pricking	Sharp	Pinching
Quivering	Flashing	Boring	Cutting	Pressing
Pulsing	Shooting	Drilling	Lacerating	Gnawing
Throbbing		Stabbing		Cramping
Beating		Lancinating		Crushing
Pounding				
Tugging	Hot	Tingling	Dull	Tender
Pulling	Burning	Itchy	Sore	Taut
Wrenching	Scalding	Smarting	Hurting	Rasping
Searing	Stinging	Aching	Splitting	
			Heavy	
Tiring	Sickening	Fearful	Punishing	Wretched
Exhausting	Suffocating	Frightful	Grueling	Blinding
		Terrifying	Cruel	
		Vicious		
Annoying	Spreading	Tight	Cool	Nagging
Troublesome	Radiating	Numb	Cold	Nauseating
Miserable	Penetrating	Drawn	Freezing	Agonizing
Intense	Piercing	Squeezing		Dreadful
Unbearable		Tearing		Torturing

21. I have completed all 7 pages to the best of my knowledge and I personally have filled in each blank.

_____	_____
signature	date

# TRAUMA QUESTIONNAIRE



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4000 Mitchellville Rd., 330B  
Bowie, Maryland, 20716

Name \_\_\_\_\_ Date \_\_\_\_\_

301-805-9400  
drdroter@mac.com

## PLEASE ANSWER ALL QUESTIONS

I. Date of Trauma \_\_\_\_\_

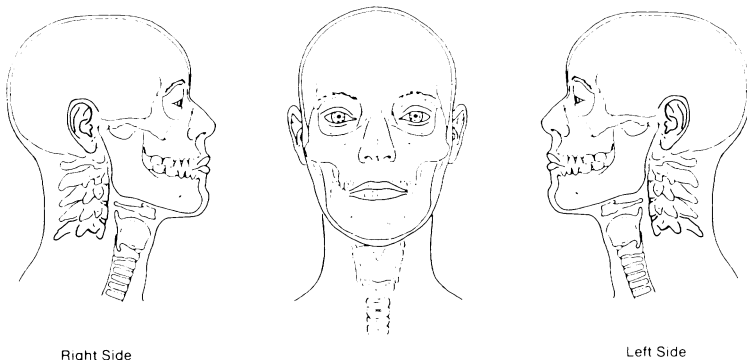
Was your trauma from (circle one)

Auto accident    Fight    Fall    Sports Injury    Other

How did the trauma happen? \_\_\_\_\_

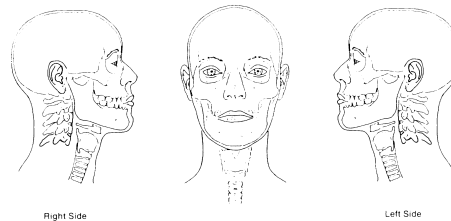
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

On the diagram below draw an arrow to indicate the location



Please do not write in this space.

## Trauma



II. During the trauma, did you strike your (circle all that apply)

Skull    Nose    Chin    Lower jaw    Neck    Chest

Other \_\_\_\_\_

Did you have whiplash?    Y    N

Which of the following did you have as a result of the accident?

Cuts    Abrasions    Bruises    Bleeding from the mouth

Bleeding from the nose    Bleeding from the ears

III. Were you knocked out?    Y    N    How long ? \_\_\_\_\_

What was your first memory after the trauma? \_\_\_\_\_

\_\_\_\_\_

IV. Immediately post-trauma, were you treated (circle all that apply)

Emergency room    Doctor's office    Other \_\_\_\_\_

Name of facility \_\_\_\_\_

When were you first seen for evaluation after the trauma? \_\_\_\_\_



Please do not write in this space.

V. What Hurt after the trauma? \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

VI. List all doctors who have treated you for this  
trauma and explain what they had done:  
Emergency physician, Family Doctor , Physical therapist, Chiropractor,  
Dentist, Oral Surgeon, Neurologist, Psychologist  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

VII. Did you have X-rays of the (circle all that apply)  
Face Neck Skull Other \_\_\_\_\_  
Did you have a CT scan? Y N  
Did you have a MRI scan? Y N  
What other tests did you have? \_\_\_\_\_  
\_\_\_\_\_

VIII. Who do you feel is at fault for your trauma? \_\_\_\_\_  
\_\_\_\_\_  
Explain \_\_\_\_\_  
\_\_\_\_\_

IX. Is your pain getting (circle one) Worse Better Unchanged

X. Do you have an attorney representing you? Y N  
Your attorney's name \_\_\_\_\_

XI. I have completed the above to the best of my knowledge and I  
personally have filled in each blank in my own writing.

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Date

## C.T. Scan of the Temporomandibular Joint

- Spiral CT- (No Contrast) (revised 5/09)

\_\_\_\_\_ date

Please evaluate \_\_\_\_\_

Significant History: ☐ See Exam Form

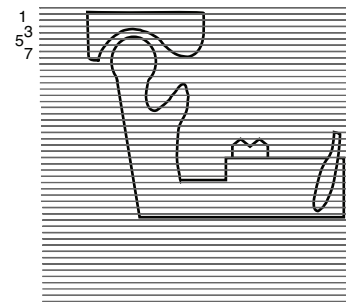
<input type="checkbox"/> Facial Pain	784.0
<input type="checkbox"/> Avascular Necrosis	526.4
<input type="checkbox"/> Osteoarthritis	715.2

- Do not take scan if not able to send DICOM images to me.
- Must be a spiral CT scanner, 16 or 64 slice. Do not show the head holder in any images.

1. Please review the "Patient Instructions" with the patient before starting the scan.

2. Axial C.T.

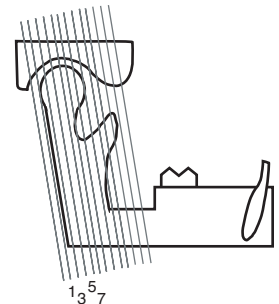
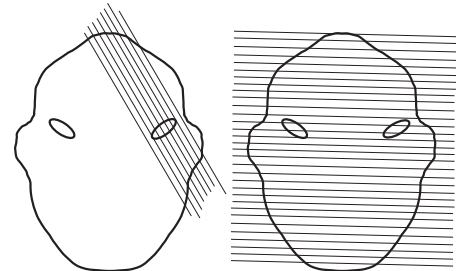
Head stabilization to prevent movement, pads on zygoma  
Superior-Inferior  
Bone Algorithm/ No contrast  
Teeth together. If patient has Dr. Droter's appliance, that is to be worn.  
1mm slices or less. The smaller the better.  
Start 5 mm superior to the roof of the TMJ fossa and  
continue down to include the hyoid bone and C4  
Be sure to capture the tip of the chin and the back of the Occipital Bone



3. Reconstruct Coronal and Corrected Sagittal Views off of the Axial Scan  
1mm slice thickness or less

☐ If Checked: Direct Coronal C.T.

Head stabilization, 2/3 weight on zygoma, 1/3 on chin  
Force on chin is superior not posterior  
Teeth together. If patient has Dr. Droter's appliance, that is to be worn.  
Bone Algorithm/ No contrast  
PA, both right and left TMJ in same slice.  
1mm slices or less. The smaller the better.  
Start behind auditory canal and continue past the crest of the eminence.  
This usually takes about 25 slices  
Align slices so they are parallel with the posterior ramus



4. Printed images not acceptable. Must be Dicom digital images.  
Do not take the scan if you can not send DICOM images.

5. Please be sure to have the radiologist read "Notes to the Radiologist" for what I need in the report.

THANK YOU

# MRI Scan of the Temporomandibular Joint

\_\_\_\_\_ date

Please evaluate \_\_\_\_\_

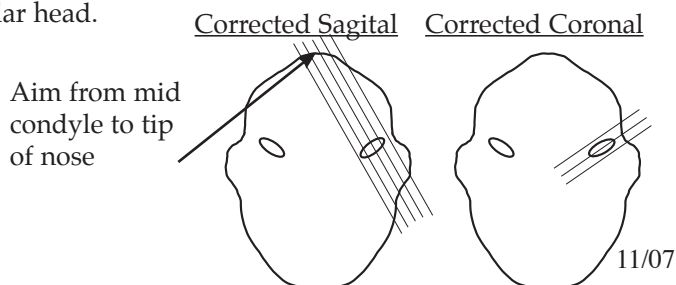
Significant History: ☐ See Exam Form

<input type="checkbox"/> Facial Pain	784.0
<input type="checkbox"/> Avascular Necrosis	526.4
<input type="checkbox"/> Osteoarthritis	715.2

- Printed images not acceptable. Must be DICOM Digital Images
- Do not do scan if not able to do DICOM Digital Images
- Use TMJ coils. Use 1.5 Tesla magnet. Do not use an open MRI. Do not use a short flip angle.
- Show orientation views
- Closed views are with teeth together.
- Use a roll of tape (3M Transpore Tape 1 inch wide) for the open view. The roll is two inches in diameter. Have patient open as wide as they can comfortably and place the tape roll as far back as possible with the flat side toward the teeth. They should be biting into the tape with their back molars on both sides.
- Copy DICOM images to a CD and give to patient or mail to me FedEx.
- ☐ Patient has wax index to wear on teeth to stabilize jaw for closed view.
- ☐ Patient has appliance that is to be in for all closed views.
- ☐ Gave Rx for \_\_\_\_\_. They will take it 1 hour before scan.
- ☐ Patient to get braces off molars before scan. No orthodontic wire in place.

1. T1, mouth closed, corrected sagittal projection, right and left TMJ.  
8 or more views: lateral, medial, 4 cuts through condylar head.
2. T2 scan mouth closed, corrected sagittal projection, right and left TMJ.  
8 or more views: lateral, medial, 4 cuts through condylar head.
3. STIR (T1 inversion recovery) corrected sagittal projection, right and left TMJ.  
8 or more views: lateral, medial, 4 cuts through condylar head.
4. Proton Density, mouth closed, corrected sagittal projection, right and left TMJ.  
8 or more views: lateral, medial, 4 cuts through condylar head.
5. Proton Density, mouth closed, corrected coronal projection, right and left TMJ.  
8 or more views: in front of condylar head, through condylar head, behind condylar head.  
Be sure to get at least one slice medial, and one slice lateral to condylar head.
6. Proton Density, mouth open fully, corrected sagittal projection, right and left TMJ.  
8 or more views: lateral, medial, 4 cuts through condylar head.  
Use roll of tape for open view as described above.  
Take this view last.

Thank You



## Patient Information for MRI and CT Scans

1. ***Hold Still:*** The quality of the pictures is dependent on how still you can remain during the scan. Holding completely still for several minutes is very difficult and will take some determination.
2. ***Be comfortable. Say something if not:*** If you are not comfortable with how the technician has placed you, speak out before the scan starts. Do not allow the scan to start until you are comfortable.
3. ***Teeth together:*** The CT and MRI scans will be done with your teeth comfortably together. One of the MRI scans is done with the mouth in the open position. One of the CT scans is done with you laying on your stomach with your head bent back so you are looking ahead. Make sure that your teeth are together and the lower jaw is not shoved forward or back.
4. ***Be Careful Swallowing.*** When you swallow, your jaw can move. After the technician positions you on the table, they have a fair amount of set up to do before they take the actual scan. When it is time to hold still they will let you know. Do not move your jaw if you have to swallow when they are taking the scan
5. ***Ask.*** If you have any questions or concerns please ask.
6. ***Take CD:*** After your appointment they will give you a CD with the scans on it. You will need to bring the CD with you to your consultation appointment. If you are able to drop the CD off before your appointment, that would be helpful.

THANK YOU

# CT and MRI Scans of the TMJ

## Notes to the Radiologist

Please rule out:

Osteoarthritis, avascular necrosis, osteochondritis dissecans, marrow edema, synovitis, cystic degeneration, cancer

CT Scan- Normal

Cortex intact- No cysts, no hypercalcifications

Intermedullary bone has a good pattern

Normal Size and shape of right and left condyle (70% condyle to fossa)

Non congruent ovoid shape of condyle with respect to fossa

No flat areas

CR Load Zone- Right and Left Condyles load on superior medial condyle

Closest bone distance between the condyle and fossa is at superior medial articular surface

Right and Left Condyles are centered medial-laterally. The Mandible sits centered under the skull base

The inferior border and angle of the mandible on the right and left are equidistant to the fossa

Right and left Condyle are centered in fossa in sagittal axial, and coronal views

The joint space indicates adequate room for a disc

No lesions or tumors in the TMJ and surrounding areas

MRI- Normal

Disc is in a proper position on both the medial and lateral pole

If not; Off both medial and lateral? Where is it? Size of disc?

Recaptures? Does Disc move in open view (Adhesed?)

PseudoDisc formation (fibrosis)?

Cortex intact- No cysts, No areas indicative of either sclerotic or necrotic bone

Normal Size and shape of right and left condyle (70% condyle to fossa)

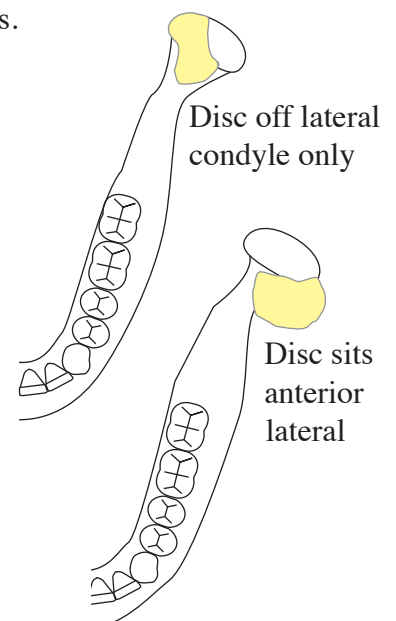
Non congruent ovoid shape of condyle with respect to fossa

No flat areas, No lipping

Right and Left Condyles are centered anterior-posteriorly in fossa

No edema in the joint, synovial tissue or bone marrow on the T2 and STIR images.

No lesions or tumors in the TMJ and surrounding areas



## 8 Key Questions for Specific TMD Diagnosis and Treatment

Patient's Chief Concern (CC):

1. Is there temporomandibular joint damage that needs to be treated?
2. Are the muscles associated with the TMJ sore and or dysfunctional?
3. Is there Occlusal Disharmony with the Maxilla, Temporal bone, Mandible and muscles?
4. Is there cervical damage or misalignment that needs treated (including muscles)?
5. Is there parafunction that needs to be managed?
6. Are there any whole body, systemic issues affecting health, comfort, or the ability to heal?
7. Are there any other sources of pain or dysfunction?
8. Are any of the above affecting quality of life? (Symptoms)

.....  
Past Treatments:

# TMD Clinical Summary

Name

Date:

ii CC:

TMJ Damage need Tx?	Observations Diff Dx Plan
---------------------	---------------------------------

TMJ Muscles	Observations Diff Dx Plan
-------------	---------------------------------

Occlusion: Maxilla, Temporal, Mandible
--

Cervical
----------

Parafunction
--------------

Whole Body Issues Other Pain Sources
---

Affects Quality Life Past Tx
---------------------------------

Form I currently use in Mac Practice software to write dx letter.  
I chose what is appropriate, cut out rest, turn text color to black.



<<Todays\_Date>>

**Diagnosis/ Appointment Schedule**

John R. Droter, DDS  
301-805-9400  
[drjr@mac.com](mailto:drjr@mac.com)

<<Pat\_FirstName>> <<Pat\_LastName>>

Age

Referred By

ii- Patient's Chief Concern (CC):

### Summary:

### Health Status of the Key Regions

1. Is there temporomandibular joint damage that needs to be treated?

TMJ Piper Disc Classification:

TMJ is Damaged: Actively breaking down, Adapting, Favorably Adapted, Unfavorably Adapted

TMJ is Healthy

Comfort: Good Painful

TMJ Palpation: Slight/ Moderate/ Severe Soreness Comfortable

TMJ Load: Slight/ Moderate/ Severe Soreness Comfortable

Chewing Ability: Good Compromised due to TMJ damage, TMJ pain, and Malocclusion

Difficulty chewing hard foods

Movement: Good Limited, Dysfunctional

ROM:

TMJ Motion: Smooth, Good Velocity, Guarded motion opening/closing Dysfunctional

Sounds Stethoscope:

Sounds Doppler:

JVA: No Vibrations Simple Click Complex Click Scratch Wobble Slight Moderate

Severe

Chewing Ability: Good Compromised due to TMJ damage and Malocclusion

Difficulty chewing hard foods

Mechanical Stability: Stable/ Unstable/ Probably Stable/ Not sure

D-PAS Test: No increase in pain, No difference in pain, Pain increased

Deep Temporalis: Slight/ Moderate/ Severe Soreness Comfortable

JVA: No Vibrations Simple Click Complex Click Scratch Wobble Slight Moderate

Severe

Structural Stability: Stable/ Unstable/ Probably Stable/ Not sure

CT Scan Cortex Intact not intact hypercalcified cystic degeneration

MRI Scan T2/STIR: No edema of retrodiscal tissue or bone marrow  
Inflamed Retrodiscal Tissue Bone Marrow Edema Intracapsular edema

2. Are the muscles associated with the TMJ sore and or dysfunctional?

TMJ Muscles: Slight/ Moderate/ Severe Soreness Comfortable  
Slight/ Moderate/ Severe Disharmony in motion Good Harmony in motion  
Chewing Ability: Good Compromised due to Muscle pain and Malocclusion

3. Is there Occlusal Disharmony with the Maxilla, Temporal bone, Mandible and muscles?

Occlusal Harmony with joint, bone and muscles  
Functional Malocclusion, well adapted  
Slight / Moderate / Severe Dysfunctional Malocclusion  
Pathological Malocclusion  
Slight / Moderate / Severe Worn/Damaged Teeth  
Chewing Ability: Good Compromised due to TMJ damage and Malocclusion  
Difficulty chewing hard foods  
Malocclusion caused by TMJ damage  
CR≠MaxIC mm (Centric Relation does not equal Maximal Intercuspation)

4. Is there cervical damage or misalignment that needs treated (including muscles)?

Neck Muscles: Slight/ Moderate/ Severe Soreness Comfortable  
Need to evaluate cervical alignment

5. Is there parafunction that needs to be managed?

Parafunction: none/ slight/ moderate/ severe  
No clinical signs of parafunctional grinding or clenching  
Sleep Grinding, Awake Grinding  
Sleep Clenching, Awake Clenching  
Tongue bracing  
Clenching may be from neck instability

6. Are there any whole body, systemic issues affecting health, comfort, or the ability to heal?

Whole Body Health good/ fair/ questionable/ poor/ questionable  
Energy Level: good/ fair/ questionable/ poor/ questionable  
Sleep: good/ fair/ poor  
Airway: good/ fair/ questionable/ poor  
Dental health: Teeth good/ fair/ poor  
Perio good/ fair/ poor  
Nutrition: good/ fair/ poor/ Not able to chew hard foods , Soft foods only  
Systemic diseases: none/ RhA/ connective tissue disease/ fibromyalgia/ Lyme  
Standing Posture: good/ fair/ poor Marginal, could be improved, may be neck related

Walking posture: good/ fair/ poor      Marginal, could be improved  
Pain tolerance: good/ fair/ poor      Worry, Stress management: good/ fair/ poor  
Heart Rate Variability: Good Parasympathetic Control      Poor, Sympathetic Dominance  
Skin Health: good fair marginal fragile frail stressed

7. Any other sources of pain or dysfunction?

Other possible sources of pain do not appear present: Sinus, Dental, Ear, Neuralgia, CRPS, Dystonia are all wnl

8. Are any of the above affecting quality of life?

Inability to effectively chew.  
Avoiding healthier foods due to lack of chewing ability.  
Mental clarity affected due to pain.  
Brain fog, decrease in ability to concentrate.  
Daily fatigue due to pain.  
Daily fatigue due to lack of quality sleep.

Previous Treatments attempted:

Medications:  
Doctors seen: Neurologist, DDS, Oral surgeons, Medical Primary, ER  
Physical Therapy  
TMJ Surgery  
Splint therapy  
Orthodontics  
Occlusal adjustments  
Conservative treatment: Soft Diet, Muscle relaxants

.....  
.....

**Restorative Planning**

Function

Occlusion

Perio

Caries

Structure

Esthetics

Dental Restorations

Other:

Exam Notes:

**Observations:**

**Problem List**

**Favorable List**

**Possible Explanation**

**Differential Diagnosis**

**Working Diagnosis**

and Codes

The above conditions are medical, and treatment of these conditions are medically necessary to restore and maintain quality of life.

**Prognosis:** Good/Fair. Multiple problems with pain lasting more than 3 weeks can be challenging.

**Treatment Options**

Problem:

- 1.
- or 2.
- or 3.

Problem:

- 1.
- or 2.
- or 3.

Problem:

- 1.
- or 2.
- or 3.

**Co Therapist**

Referred by

Continue periodic dental cleanings with your current dentist.

.....  
...  
.....  
...  
.....  
...

<<Pat\_FirstName>> <<Pat\_LastName>>  
Appointment Schedule

Black Type = needs done   Green Type = Done  
Orange Type = No longer needed   Red Type= Important

Goal of Treatment:

Limitations/Obstacles:

..... **Prior to or During Phase 1**

..... **Phase 1**

..... **Possible Phase 2**

..... **Necessary but not Urgent**

..... **Optional, but beneficial**

..... **Possible Treatment Needed**

.....

**Case Complete- estimate time of treatment is**

## Future Dental needs:

Continue periodic dental cleanings with your current dentist.

Dr Droter should be consulted prior to any future dental work that will change your bite.

Future Dental Care:

Periodontal Maintenance by Dr.

Occlusal (bite) Harmony Maintenance by Dr. Droter, Yearly Reevaluation

No limitations or restrictions on future dental work

## Recommended Treatment:

Droter

Non-Surgical TMJ Rehabilitation / Appliance Therapy

Dr. Mark Schwartz

Evaluation for Atlas/Neck Alignment

Country Life Multivitamin: Daily Total One with iron. Take 2 capsules

Enzymatic Therapy Glucosamine 500mg. Take 3 capsules

Country Life Buffered Vitamin C Time Release with 100mg bioflavonoids. Take 2 tablets

Natural Calm Magnesium Citrate, Raspberry-Lemon. Take 1 or 2 teaspoons dissolved in water  
2 hours prior to sleep

Blood test to verify Liver and Kidney Functions- CMP

Anti-Inflammatory medications

Meloxicam 15mg, once a day

Doxycycline 20mg, twice a day

Diagnostic test for clenching, bruxing, joint stability, occlusal muscle disharmony:

D-PAS appliance

Brux checker

sleep airway screening

datpas/bruxpas may resolve morning locking

Occlusal adjust

Wear Brux guard for sleep

**Verification of understanding your disease and treatment options:**

The above treatment recommendations have been explained to me. I have been informed of my dental condition, treatment options, benefits, risks and possible consequences of treatment as recommended, limited treatment or no treatment. My questions have all been answered.

It has been explained to me that as treatment is undertaken and proceeds, modifications of the above treatment plan and estimate may be necessary. Any treatment modification is to be discussed with me at the earliest convenient time.

This fee estimates are valid for one year.

---

Signature

---

Date

**Informed Consent:**

I agree to the above treatment recommendations and wish to proceed.

---

Signature

---

Date

**Financial Agreement:**

---

Signature

---

Date



# Restorative Treatment Planning

## Behavioral

- What kind of patient has a dis-ease?
- Roles in Life. Hats they wear
- How Disease/Treatment affects family
- Limiting Factors- Time, \$, determination
- Ability to heal/ Mental-Physical connection
- Patient's Goals/ Benefit of Tx

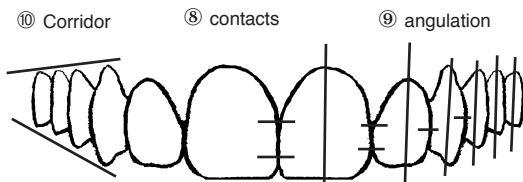
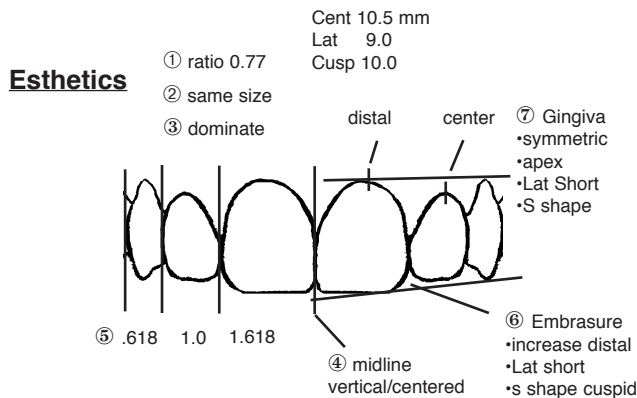
How can I Assist/ Educate/ Inspire?  
Give Strokes

## TMJ/ Neck/ Sleep/ Health/Obstacles

- TMJ Damage needs Tx? D-PAS test  
CT scan cortex, CR Load Zone
- Comfortable TMJ Muscles
- Occlusal Muscle Harmony- CR= MaxIC, D-PAS test
- Comfortable Neck Muscles
- Parafunction- Grinding, Clenching
- Whole Body Health- Energy, Sleep, Systemic Ds  
Nutrition, Posture, Water, Exercise

## Esthetics

- Position Max Centrals in face
- Incisal edge showing, Lip length, Maxilla position  
Show edge 3-4mm young, 0mm age 60  
Lip 20-24mm, moves 6-8mm  
Wear?- Central 10.5mm, Lateral 9, Cuspid 10
- Smile follows lower lip curve  
Position lateal, cuspid, posterior-Max Occl Plane
- Gingiva: Papilla heights, necks of teeth covered  
CEJ alignment
- Excess ging display: VME, Short lip, hypermobile lip,  
Altered pasive eruption, Excessive eruption
- Whole face: Occl plane level, Chin centered, 1/3s =
- Facial Profile: chin retro?, Maxilla retro?
- Lower Anterior: level edges, Pitch and bevel
- Color of teeth



## Structural

- R/C
- Post, Cores
- Fillings- replace
- Strengthen weak teeth

## Function

Form Follows Function

Goofed up Function= Goofed up Form.....

- Camouflage, Hide
- Decide where, what to compromise
- Set Condylar Guidance: Prot and Lat
- Level and Align Mand Ant to Max Ant in Protrusive  
- Solid, Stable Flat
- Set Cuspid height: Level?
- Smooth Crossover. No drop off
- Curve of Spee level
- Clear 1st Bi
- LD Pankey's 3 rules  
- All teeth hit even, back more than front  
- Squeeze, no deflections  
- Anterior Guidance

## Biology

### Perio and Caries

- All Areas Cleansable
- Patient Cleans all areas
- Forces centered over teeth/alveolus

### Perio

- Adequate bone support
- Tooth Position in alveolus
- Gingival esthetics
- Biological Width  
-Margin 2.5mm from bone  
-Solid tooth 1.5mm ferrel  
-Prep 3.5mm min: 1.5 tooth + 2mm core

### Caries

Caries Rate  
Saliva Flow

Restorative Needs Summary

Name

Date

ii CC:

Behavioral/ Life

TMJ/ Neck/ Sleep/ Health/Obsticles

Esthetics

Function

Structural

Biology



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## An Orthopaedic Approach to the Diagnosis and Treatment of Disorders of the Temporomandibular Joint

John R. Droter, DDS



Problems involving the temporomandibular joint (TMJ) have been termed temporomandibular disorders (TMD). Patients with many different disorders are included under the umbrella designation of TMD. It is important to emphasize that TMD is not one disease with one treatment. A lack of a more definitive diagnostic scheme, especially in published research, has led to confusion in terms of therapeutic approach.<sup>1</sup> Patients who have TMD may or may not have damage to joint structures. Clarification of this issue—healthy joint or damaged joint—will be a major step forward in clarifying the clinical management of TMJ problems.

If after evaluating a patient with a painful knee the physician offers the working diagnosis of "knee disorder," one would question the sensitivity of the diagnostic approach. In dentistry, patients routinely present with a previous diagnosis of "TMJ" or "TMD." Telling a patient that he or she has "TMD" is equivalent to a physician telling a patient he or she has "knee disorder." TMJ and TMD are not accurate orthopaedic diagnoses, and clinicians should not use them.

This article will discuss approaches to development of a more specific diagnostic scheme for TMJ disorders.

### BASIC ORTHOPAEDIC PRINCIPLES

A joint is 2 bones joined together to allow movement between those bones. Joints are classified as being of 5 types:<sup>2</sup>

- (1) syndesmosis: a joint in which 2 bones are bound together by fibrous tissue only.
- (2) synchondrosis: a joint in which 2 bones are joined together by cartilage.
- (3) synostosis: a joint that has become obliterated by bony union.
- (4) symphysis: a joint in which the 2 opposing surfaces are covered by hyaline cartilage and joined by fibrocartilage and strong fibrous tissue.
- (5) synovial: a joint in which the 2 opposing surfaces are covered by cartilage (hyaline or fibrocartilage) and joined peripherally by a fibrous tissue capsule enclosing the joint cavity, which contains synovial fluid. Synovial joints allow a greater degree of movement than the other joints but at the expense of providing less stability. Synovial joints have a specialized tissue, the synovium, that produces synovial fluid, which provides lubrication and nutrition to the inner joint tissues.

The TMJ is a synovial joint and is susceptible to the same disease processes as any other synovial joint in the human body. The current standard in orthopaedic medicine is to determine if damage exists to a joint before treatment is rendered.<sup>2</sup> If damage to a joint is suspected, the next step is to determine the nature and extent of the injury. The hard tissues are evaluated by radiographic imaging, observing the joint in more than one direction; 3 or more radiographic views are preferred. Two radiographic views offset at 90° are the minimum standard for any joint.<sup>2-4</sup> The plane of the views varies by joint.

Therefore, utilizing only panoramic and transcranial radiographs for evaluation of the TMJ is below the medical standard, since these films provide only one plane of view.

Radiographic techniques to view a damaged TMJ include plain radiography, panoramic radiography, computerized tomography (CT), tomography, fluoroscopy, and magnetic resonance imaging (MRI). CT with reconstruction in multiple planes is currently the best technique for viewing the bones of the TMJ. If CT is not available, tomograms or conventional radiographs in 3 views are adequate (submentovertex, corrected sagittal, and corrected coronal), but much detail is lost. The soft tissues are best evaluated with MRI. The medical standard is to utilize MRI if meniscal damage is suspected.<sup>3</sup> A useful MRI protocol for diagnosing TMJ damage would include T1 open and closed corrected sagittal views, T2 and proton density closed corrected sagittal views, and T1 corrected coronal views.<sup>5</sup> MRI scans basically show water and fat in tissue. A T1 image shows more fat than water, whereas a T2 image shows more water than fat. A T2 is useful in identifying inflammation and edema. A proton density image is between a T1 and a T2 and is useful in visualizing the disc of the TMJ. The results of the CT and MRI, in addition to the history and clinical findings, will allow the clinician to develop a specific diagnosis for the damaged joint.

CT and MRI scans are needed to determine the nature and extent of the damage. There are 6 anatomical structures to evaluate for damage: ligaments, disc, articular cartilage, synovium, cortical bone, and cancellous bone/marrow. For example, damage to the synovium and cartilage in a joint is known as osteoarthritis (OA) in orthopaedic medicine. Damage to the bone marrow by compromised condylar blood perfusion resulting in marrow necrosis is known as avascular necrosis (AVN). Both OA and AVN will eventually lead to damage to the cortical bone but are very different disease processes. Determining health, or damage to specific structures, will allow

one to be more specific as to the disease process. This will allow for specificity of treatment.

## ANATOMY AND PATHOLOGY OF THE TMJ: ARRIVING AT A SPECIFIC DIAGNOSIS

Following is a description of the anatomical components of the TMJ.

### Ligaments

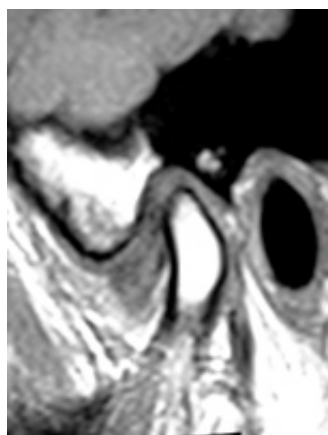
Ligaments are bundles of connective tissue that join the 2 bones of the joint. They are composed of collagen and elastin in a 4:1 ratio.<sup>4</sup> When damaged, ligaments can be stretched, partially torn, or completely torn. In health they serve to hold the joint together when it is not loaded and to define the end points of movement. The TMJ is the only joint in the body in which one of its end points of movement (closing) is solid (teeth). When a joint is loaded, the ligaments play a secondary role in joint stability. Of greater importance to joint stability when the joint is loaded is the shape of the joint surfaces, the shape of the disc, and the position of the muscles.<sup>4</sup> In synovial joints with discs, ligaments join the disc to the bones and help hold the disc in position when it is not loaded. Under loading, it is the disc shape that stabilizes the disc. A patient cannot have a displaced disc without damage to the discal ligaments. On MRI scans disc position is used to gauge the amount of damage to ligaments. A partially displaced disc will have less damage to the discal ligaments than a fully displaced disc.

### Disc

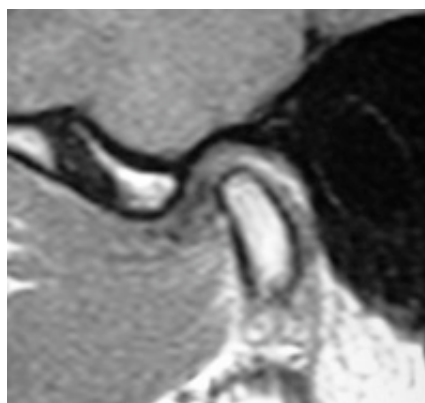
The disc of the TMJ consists of fibrocartilage.<sup>4,6</sup> The TMJ is the only joint in the body that rotates, slides, and pivots.<sup>7</sup> Fibrocartilage is more flexible than cartilage, allowing it to conform to both the condyle and eminence during these 3 condylar movements.<sup>6</sup> When damaged, the disc can be displaced, adhered, atrophied, or perforated. Displacement can occur in any direction, including toward the anterior, anterior medial, anterior lateral, direct medial, and direct lateral. Posterior dislocations are rare but have been reported.<sup>8</sup> Discs may become damaged from chronic or acute trauma.<sup>9</sup> Discs may be either partially or fully displaced and may or may not recapture upon opening. A nonreducing displaced disc over time will atrophy and become deformed. A large nonreducing displaced disc is indicative of a more recent injury versus a small atrophic disc.

A classification scheme for displacement of the disc as seen on MRI has been developed by Piper.<sup>10</sup> Piper's disc classification scheme is a modification of a classification scheme by Tasaki and Westesson.<sup>8</sup> Both are based on MRI interpretation, both identify disc displacements as partial or complete, and both identify in which direction the disc is displaced. While Tasaki and Westesson have 9 categories based on direction of disc displacement, Piper has 5 categories, with several subcategories, based on severity of disc and ligament damage. A Piper Class I has no damage to the disc or discal ligaments while a Piper Class V will have the most. What is not addressed by Tasaki and Westesson, but is by Piper, is whether or not the disc reduces. Also addressed in the Piper classification scheme are joints in which there is bone-to-bone contact (Table).

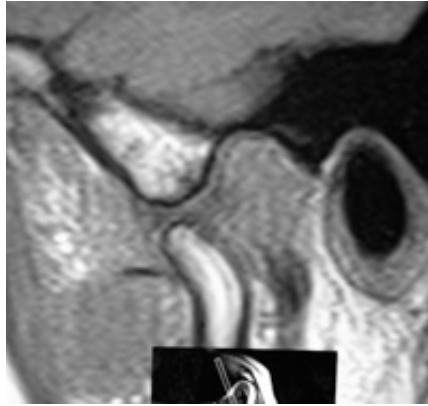
A Piper I classification indicates that the disc is normal and the ligaments are attached and do not display pathology. Piper II indicates that the disc is in a normal position, but the ligaments are stretched or torn. Piper III indicates that the disc is partially displaced off the condyle; the direction of the displacement is added. Piper IV indicates that the disc is completely displaced with retrodiscal tissue interposed between the condyle and the eminence; the direction of the displacement is indicated. Piper V indicates that there is no longer any tissue between the condyle and the eminence. In Piper III and IV, subclass "a" indicates that the disc recaptures; "b" indicates that it does not. In Piper V, subclass "a" indicates that the bone is in active osteoarthritic breakdown; "b" indicates that the bone has become eburnated (end-stage osteo-arthritis).



**Figure 1.** MRI T1 corrected sagittal closed, lateral pole, Piper IVa- anterior lateral. Notice how the majority of the disc is seen in this view indicating an anterior lateral displacement.



**Figure 2.** Same joint, more medial view than Figure 1. MRI T1 corrected sagittal closed, medial pole, Piper IVa—anterior lateral.



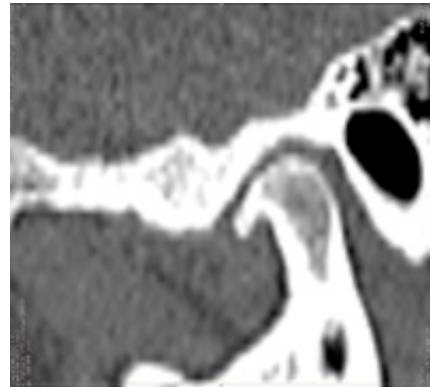
**Figure 3.** Same joint as Figures 1 and 2 —open view. MRI T1 corrected sagittal open, midcondyle, Piper IVa- anterior lateral.

As examples, a Piper IIIb-anterior medial indicates a partially displaced disc off the lateral pole of the condyle. The disc is displaced in an anteriomedial direction. The medial portion of the condyle is still covered by the disc. Upon opening, the disc does not recapture on the lateral pole. A Piper IVa anterior lateral indicates the disc is completely off both the lateral and medial poles and sits anterior lateral to the condyle. Upon opening the disc is recaptured (Figures 1 to 3).

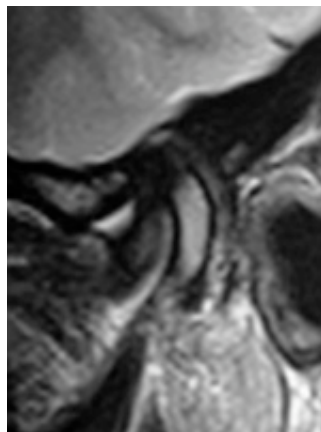
#### Articular Cartilage



**Figure 4.** CT corrected sagittal reconstruction. Good size and shape of condyle. MRI indicated Piper I.



**Figure 5.** CT corrected sagittal reconstruction. Moderate OA with cyst on superior aspect. MRI indicated Piper V.



**Figure 6.** MRI T2 corrected sagittal closed, Piper IVa. Note effusion (white area) in anterior superior joint space.

Fibrocartilage covers the articular surface of the condyle and the articular surface of the eminence. The disc is composed of this fibrocartilage.<sup>4</sup> Being resilient, it will act as a shock absorber for longitudinal force. It consists of living chondrocytes, collagen,

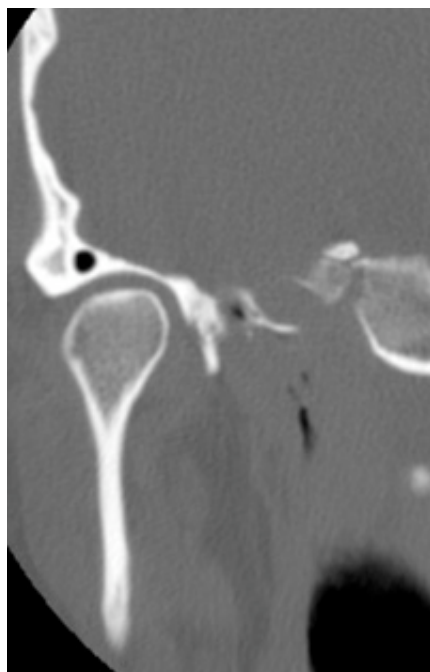
proteoglycans, and water. The chondrocytes produce the collagen and proteoglycans. Collagen is the major structural protein of cartilage. The proteoglycans attract and hold the aqueous component, which is 80% by weight. Covering the cartilage is a layer of surface-active phospholipids (SAPL).<sup>9</sup> The interaction of the SAPL and lubricin, a glycoprotein added to synovial fluid by synovial cells, keeps the 2 joint surfaces from actually contacting during normal loading by maintaining a fluid layer between the surfaces. This results in a very low coefficient of friction. A healthy joint's coefficient of friction is one fifth that of ice sliding against ice.<sup>2</sup> Cartilage can be damaged by compression or tearing, and the result can be fibrillation, necrosis, proliferation, or adhesion.<sup>2</sup> Once cartilage is damaged, there will be an increase in friction and an increase in wear of the joint. Cartilage covering the bone is not easily seen with either MRI or CT scans. It is not until the damage has progressed to the subchondral bone that it is radiographically evident (Figures 4 and 5). On MRI T2 images, inflammation to the synovial tissue or joint effusions are clues that the cartilage is breaking down (Figure 6).

### Synovium

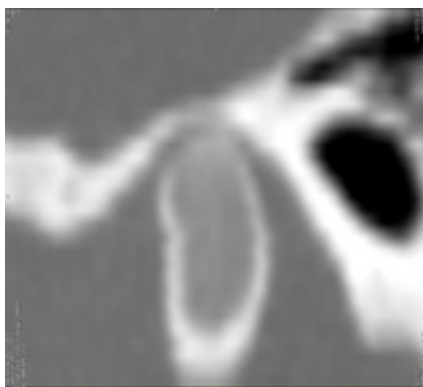
There are no blood vessels in a healthy joint. The synovium is the tissue that provides nutrition and lubrication to the internal aspect of the joint. Synovial tissue lines the inner walls of the joint and produces a filtrate of blood. Synovial cells in the synovial tissue then contribute to the plasma by adding lubricin and hyalu-ronic acid and removing fibrinogen.<sup>2</sup> Movement of the joint distributes the synovial fluid, which is critical to health of the cartilage. A significant decrease in synovial fluid flow into the joint or a decrease in the movement of the joint will lead to cartilage damage.

When damaged, the synovium can be inflamed or fibrosed and display proliferation or adhesions. When a disc is displaced, the condyle will rest on the retrodiscal tissue and a portion of the synovium, preventing it from functioning. The synovium and retrodiscal tissue usually will become fibrosed and form what has been termed a pseudo disc.<sup>2</sup> A significant percentage of synovium is lost when a disc is displaced, thereby compromising the health of the cartilage. If a disc is displaced and the condyle is sitting on the synovium, it can be inferred that the synovium is damaged.

### Cortical Bone

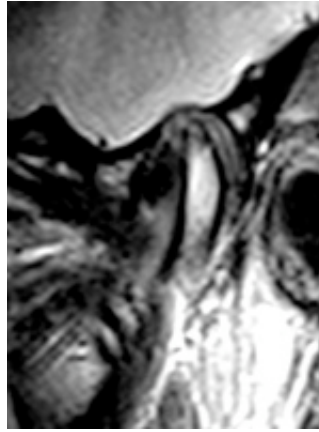


**Figure 7.** CT coronal view, normal size and shape. Note intact cortical bone shell around the cancellous bone. Slight hypercalcification is seen superiorly.



**Figure 8.** CT corrected sagittal reconstruction. Good size and shape of condyle. Condylar position in fossa indicates disc is displaced. There is no room for a disc. MRI indicated Piper IVa.





**Figure 9.** MRI T2 corrected sagittal closed, Piper IVb. Marrow edema is seen in the condyle. Compare this to the marrow in Figure 6. The unevenness of the marrow signal indicates that the superior portion of the marrow has necrosed. The cortex eventually collapsed post surgery (discectomy).

Bone is a calcified living matrix that is composed of 70% inorganic material (mineral), 25% organic matrix and cells, and 5% water. The cells are osteocytes, osteoblasts, and osteoclasts. The organic matrix is primarily composed of collagen, and the mineral component is primarily hydroxyapatite. Blood vessels and nerves are also present. Cortical bone, the dense outer shell, covers the inner multichannelled cancellous bone (Figure 7). When damaged, bone can experience osteolysis, necrosis, hypercalcification, adaptation (modified shape), atrophy, and hypertrophy.<sup>2,4</sup> The blood supply to the cortical bone is derived from the periosteum on the outside of the bone and from the marrow on the inside. Periosteum terminates at the periphery of a joint and does not continue into the joint to cover the subchondral bone. This means that cortical bone underneath cartilage (subchondral bone) has a limited blood supply dependent on the marrow. CT scans are best for determining the health of the cortical bone. A normal condyle should have a noncongruent oval shape with respect to the fossa with no flattening or lipping. Flattening, lipping, and cysts are signs of OA. On a corrected sagittal view, midcondyle should be approximately 70% of the size of the fossa. The cortex should be intact with no cyst and no hypercalcification present. The condyle should be centered in the fossa anterior-posteriorly with room for the disc noted on the CT (Figure 4). If there is no room for a disc, it is likely displaced and can be verified on the MRI scan (Figure 8).

### **Cancellous Bone/Marrow**

Cancellous bone is inside the outer shell of cortical bone. It consists of thin trabeculae of bone with bone marrow filling the multichannelled spaces. Bone marrow consists of blood vessels, nerve fibers, fat cells, and hemopoietic tissue. Hemopoietic cells (mainly in the spine, shoulder, and pelvis of adults) produce red blood cells, white blood cells, and platelets.<sup>2</sup>

The vascular supply of the mandibular bone is derived from the inferior alveolar artery centrally and from penetration of arteries and veins through the periosteum peripherally. Since periosteum does not continue into a joint, the superior portion of the condylar head does not have this collateral vascularity into its marrow. The penetrating vessels into the marrow end at the joint periphery. Vessels at the level of the joint periphery (the last opportunity to enter the marrow) come from the anterior medial, posterior medial,

and posterior lateral directions.<sup>11,12</sup> A disruption of this vascularity will lead to a decrease in condylar marrow blood perfusion. Decreased blood perfusion into the marrow will lead to hypoxia, edema, and/or necrosis. An anteriorly displaced disc that results in a distalization of the condyle in the fossa will exert pressure in the areas of the blood supply to the condylar head. It can be suggested that AVN, which occurs in the TMJ condyle, is a result of both pressure on the anterior tissues by the disc and pressure on the posterior tissues by the distalization of the condyle.<sup>13</sup> The resultant compromised condylar perfusion is what may lead to hypoxia, edema, and necrosis. The T2 images of the MRI scan are used to detect marrow edema and marrow necrosis. Healthy marrow will produce a low-intensity signal on the T2 image, inflamed marrow will produce a high-intensity signal, and necrotic bone will produce no signal (Figure 9).

### **A PROPOSED ORTHOPAEDIC DIAGNOSIS OF TMJ DISORDERS**

A proposed approach to orthopaedic diagnosis of disorders of the TMJ consists of 3 phases:

#### **Phase 1**

(1) History of the problem.

(2) Physical examination:

•joint palpation

- muscle palpation
- movement analysis of joint under both unloaded and loaded conditions
- analysis of muscle coordination of joint movement
- auscultation
- Doppler auscultation<sup>14</sup>
- joint vibration analysis (Bioresearch).<sup>15</sup>

(3) Develop differential diagnosis.

The TMJ is suspected of being either healthy or damaged. If damaged, then go to phase 2.

#### Phase 2

(4) Radiological imaging:

- CT scans with axial and coronal views of the TMJ. (If CT scans are not available, plain radiographs should be taken [at least 2 views 90° to each other, 3 views are preferred].)
- Multiplanar reconstruction of the sagittal view, MRI: (a) T1 open and closed corrected sagittal views, T1 corrected coronal views; (b) T2 and proton density corrected sagittal views.

(5) Radiographic interpretation:

- What is damaged—ligaments, disc, articular cartilage, synovium, cortical bone, and/or cancellous bone/marrow.

(6) Refine differential diagnosis.

#### Phase 3

(7) More detailed history:

- Collect and evaluate previous records.

(8) Repeat physical evaluation of the TMJ (see phase 1):

- Correlate with MRI and CT scans.

(9) Comprehensive dental exam:

- teeth—full-mouth radiographs
- periodontal examination
- occlusal analysis: mounted study models.

(10) Photographs.

(11) Diagnostic tests:

- diagnostic blocks
- blood tests.

(12) Analysis of above data to develop a working diagnosis.

If a joint is damaged, adequate radiographic imaging (at least 2 views 90° to each other) is required. After the clinician has determined that specific anatomic structures may be damaged (in the first phase of the diagnostic work-up), CT and/or MRI scans should be ordered if the clinician has access to such imaging. Obtaining CT or MRI scans early in the diagnostic process will provide valuable information. CT and MRI allow assessment of the health of each of the 6 anatomic components. The clinician is seeking to determine not only what structure(s) is (are) damaged, but also the type and extent of damage and whether the pathologic process is still ongoing. Phase 3 of the exam process can then confirm clinically what was found radiographically.

**Table. Diagnostic Summation for Temporomandibular Disorders.**

#### **Disc/Ligaments**

Piper I Normal disc and ligaments

Piper II Normal disc position; ligaments torn or stretched

Piper IIIa Partial displacement of the disc, reduces on opening; ligaments torn or stretched



Piper IIIb Partial displacement of the disc, nonreducing on opening; ligaments torn or stretched  
 Piper IVa Full displacement of disc, reduces on opening; ligaments torn or stretched  
 Piper IVb Full displacement of disc, nonreducing on opening; ligaments torn or stretched  
 Piper Va Bone-to-bone contact; active degeneration  
 Piper Vb Bone-to-bone contact; bone has become eburnated

#### **Synovial Damage**

- 1 Healthy synovium
- 2 Reversible damage (inflammation)
- 3 Mild irreversible damage
- 4 Moderate irreversible damage—cartilage cells will die
- 5 Severe damage—all cartilage cells will die

#### **Cartilage Damage**

- 1 Healthy cartilage
- 2 Reversible damage to cartilage
- 3 Mild irreversible damage—flattening of condyle is seen
- 4 Moderate flattening and lipping—cysts may be present
- 5 End-stage osteoarthritis

#### **Cortical Bone (Condyle)**

- 1 Cortex intact—good condylar size and shape
- 2 Reversible early changes to cortical bone
- 3 Mild irreversible damage—changes to the shape of the condyle are seen
- 4 Moderate irreversible damage—bone loss is evident, altered size and shape
- 5 Severe damage to the cortical bone—altered size and shape

#### **Bone Marrow**

- 1 Healthy marrow
- 2 Reversible damage—blood perfusion is compromised, but not to the point of necrosis
- 3 Early necrosis present—may or may not lead to collapse of condylar cortex
- 4 Moderate damage—marrow necrosis present, collapse of the cortex highly likely
- 5 Severe damage—marrow necrosis present, collapse of the cortex imminent or has occurred

#### **Mechanical Stability**

- 1 Normal—shape and position of condyle/disc/fossa provide stability under load
- 2 Reversible damage—slight joint flexure under load
- 3 Mild irreversible changes to the shape of the condyle/disc/fossa—will subluxate under load
- 4 Moderate irreversible changes to the shape of the condyle/disc/fossa—will subluxate under load
- 5 Severe irreversible changes to the shape of the condyle/disc/fossa—will not tolerate load

#### **Structural Stability (Condyle/Fossa)**

- 1 Excellent prognosis—condylar/fossa bone is stable, occlusion will be stable
- 2 Good prognosis—there is a slight risk of future bone loss
- 3 Fair prognosis—bone loss has already occurred, slight risk of ongoing bone loss
- 4 Guarded prognosis—bone loss has already occurred, moderate risk of ongoing bone loss
- 5 Poor prognosis—bone loss of condyle/fossa will continue with changes in occlusion

#### **Muscle/CNS Function**

- 1 Smooth, harmonious muscle function
- 2 Slight tremors, hesitation in muscle movement
- 3 Mild muscle splinting and slight disharmonious muscle movements
- 4 Moderate muscle splinting and disharmonious muscle movements
- 5 Severe muscle splinting and disharmonious muscle movements

#### **Occlusion (Teeth)**

- 1 Normal healthy occlusion—centric relation is equal to maximal intercuspation
- 2 Slight malocclusion, nonpathologic—centric relation is not equal to maximal intercuspation
- 3 Mild pathological malocclusion—damage to teeth, periodontium, TMJ structure and/or muscle occurs as a result of the occlusion
- 4 Moderate pathological malocclusion
- 5 Severe pathological malocclusion

After all 3 phases of the diagnostic process, each area can be rated on a scale of 1 to 5, with 1 being healthy and 5 being the most damaged (Table). Also included in this rating is an estimate of joint structural and mechanical stability, the condition of muscles of mastication, and the status of the occlusion. From this information, a working diagnosis is made. The more common ortho-paedic diagnoses associated with the TMJ are as follows: physical damage to ligaments, disc subluxation, osteoarthritis, hypercalcification of bone, adaptive remodeling of bone, synovitis, joint effusion, marrow edema, avascular necrosis, joint adhesions, and fibrous ankylosis. Certain orthopaedic textbooks<sup>2,4</sup> are excellent references. The TMJ will undergo the same disease processes as other synovial joints.

Example: A single patient with a clicking joint may present with the following:

- (1) right TMJ disc subluxation—Piper 4a, anterior lateral, large disc (size, mass)
- (2) synovitis
- (3) joint effusion
- (4) partial loss of synovial tissue secondary to disc subluxation
- (5) early OA (active), secondary to synovial damage and load changes to the TMJ
- (6) slight malocclusion secondary to change in condylar position from disc subluxation.

Treatments can be customized for the specific problems uncovered in the diagnostic process.

## Conclusion

Not all patients labeled with TMD will have clearly identified damage to the structures of the TMJ. If a joint is damaged, the clinician should determine which structures are damaged (ligaments, disc, articular cartilage, synovium, cortical bone, and cancellous bone/marrow). To obtain a diagnosis 2 radiographic views of a damaged joint, 90° to each other, are the minimal medical standard of care. If meniscal damage is suspected, a MRI scan is required. CT scans combined with MRI scans are ideal to fully evaluate the condition of the TMJ. The clinician should determine not only what is damaged, but also the type and extent of damage. By utilizing the information provided by the CT and MRI scans, a more accurate diagnosis can be obtained. Specific orthopaedic diagnoses for damaged joints will help clinicians who treat these patients provide specific treatments and there-by improve prognosis and treatment outcomes.

## References

1. National Institutes of Health Technology Assessment Conference on Management of Temporomandibular Disorders. Bethesda, Maryland, April 29-May 1, 1996. Proceedings. Oral Surg Oral Med Oral Pathol Oral Radiol Endod. 1997;83:49-183.
2. Salter RB. Textbook of Disorders and Injuries of the Musculoskeletal System. 3rd ed. Baltimore, Md: Lippincott Williams & Wilkins; 1999: 17-18,61,72,19,35-37,22-23,39,31-35,14.
3. American Academy of Orthopaedic Surgeons. Essentials of Musculoskeletal Imaging. Rosemont, Ill: American Academy of Orthopaedic Surgeons; 2003: 5,15.
4. Ruddy S, Harris ED Jr, Sledge CB. Kelly's Textbook of Rheumatology. 6th ed. Philadelphia, Pa: WB Saunders; 2001:622,8,13,1653.
5. Gibbs SJ, Simmons HC 3rd. A protocol for magnetic resonance imaging of the temporomandibular joints. Cranio. 1998;16:236-241.
6. Mahan PE, Alling CC. Facial Pain. 3rd ed. Philadelphia, Pa: Lea & Febiger; 1991:198.
7. Okeson JP. Management of Temporomandibular Disorders and Occlusion. 3rd ed. St Louis, Mo: CV Mosby; 1993;4:91-108.
8. Tasaki MM, Westesson PL, Isberg AM, et al. Classification and prevalence of temporomandibular joint disk displacement in patients and symptom-free volunteers. Am J Orthod Dentofacial Orthop. 1996;109:249-262.
9. Nitzan DW. The process of lubrication impairment and its involvement in temporomandibular joint disc displacement: a theoretical concept. J Oral Maxillofac Surg. 2001;59:36-45.
10. Piper MA. Piper classification of TMJ disorders. TMJ Surgery.com Web site. Available at: <http://www.piperclinic.com/classifi.htm>. Accessed October 1, 2005.
11. Merida Velasco JR. Vascular canals. A model for the mandibular condyle growth [in Spanish]. An R Acad Nac Med (Madr). 2002;119(1):41-50.
12. Standring S, ed. Gray's Anatomy. 39th ed. New York, NY: Elsevier Churchill Livingstone; 2005:97-100.
13. Larheim TA, Westesson PL, Hicks DG, et al. Osteonecrosis of the temporomandibular joint: correlation of magnetic resonance imaging and histology. J Oral Maxillofac Surg. 1999;57:888-898.
14. Davidson SL. Doppler auscultation: an aid in temporomandibular joint diagnosis. J Craniomandib Disord. 1988;2:128-132.
15. Ishigaki S, Bessette RW, Maruyama T. Diagnostic accuracy of TMJ vibration analysis for internal derangement and/or degenerative joint disease. Cranio. 1994;12:241-245.

**Dr. Droter** maintains a private practice in Bowie, Md, with an emphasis on treating patients with disorders of the temporomandibular joint and restoring severely damaged dentition. He is a visiting faculty member at Children's Hospital in Washington, DC, teaching temporomandibular disorders to the orthodontic residents. He can be reached at [jrdroter@mac.com](mailto:jrdroter@mac.com) or by visiting [jdroter.com](http://jdroter.com).

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Continuing Education Test No. 71.2

After reading this article, the individual will learn:

- the anatomical structures of the temporomandibular joint that are subject to damage, and
- an orthopaedic approach to diagnosing temporomandibular disorders.

**1. The TMJ is what type of joint?**

- a. synchondrosis
- b. syndesmosis
- c. synovial
- d. synostosis

**2. Soft tissues of the TMJ are best evaluated using \_\_\_\_.**

- a. plain radiographs
- b. panoramic radiographs
- c. CT scans
- d. MRI

**3. The TMJ is the only joint in the body that \_\_\_\_.**

- a. rotates
- b. slides
- c. pivots
- d. all of the above

**4. The tissue that provides nutrition and lubrication to the internal aspect of the TMJ is \_\_\_\_.**

- a. cartilage
- b. fibrocartilage
- c. synovium
- d. lubricin

**5. The minimum standard for radiographically evaluating any joint is \_\_\_\_.**

- a. panoramic radiograph
- b. 2 radiographic views offset at 90°
- c. CT scans
- d. cephalometric radiograph

**6. On a T2 image of an MRI scan, a low- intensity signal indicates \_\_\_\_.**

- a. healthy bone marrow
- b. necrotic bone
- c. inflamed bone marrow
- d. thin cortical bone

**7. The blood supply to the cortical bone is derived from \_\_\_\_.**

- a. periosteum on the outside of the bone
- b. marrow on the inside of the bone
- c. both a and b
- d. none of the above

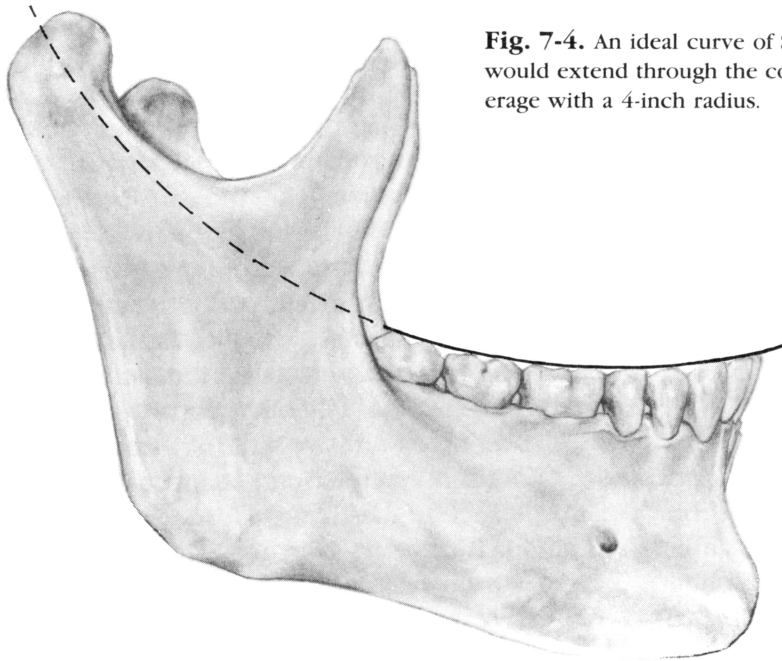
**8. The following statement is FALSE:**

- a. Periosteum does not continue into a joint.
- b. The penetrating blood vessels into the marrow end at the joint periphery.
- c. CT scans are best for determining the health of cortical bone.
- d. Cartilage covering bone is best seen with either MRI or CT scans.

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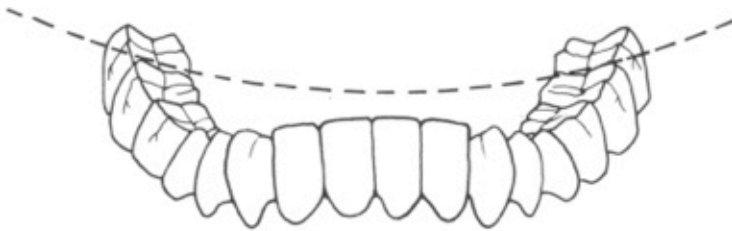
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# From Dawson Text Book "Functional Occlusion"

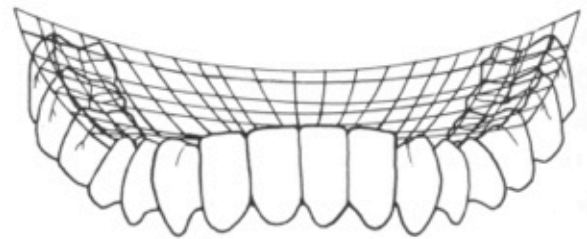


**Fig. 7-4.** An ideal curve of Spee is aligned so that a continuation of its arc would extend through the condyles. The curvature of this arc relates on average with a 4-inch radius.

**Fig. 7-1.** The *curve of Spee* begins at the top of the cuspid and touches the tips of the cusp tips of all the posterior teeth.

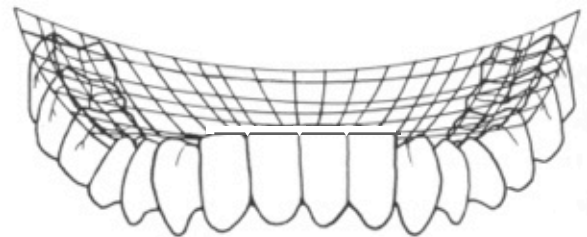
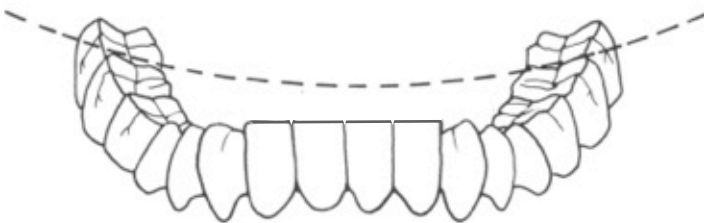


**Fig. 7-2.** The *curve of Wilson* is the mediolateral curve that contacts the buccal and lingual cusp tips on each side of the arch.



**Fig. 7-3.** The *curve of occlusion* combines a composite of the curve of Spee, the curve of Wilson, and the curve of the incisal edges. It is more often called the *plane of occlusion* when it is related to the cranium.

Modified by John R. Droter, DDS



# LD Pankey's 3 Rules of Occlusion

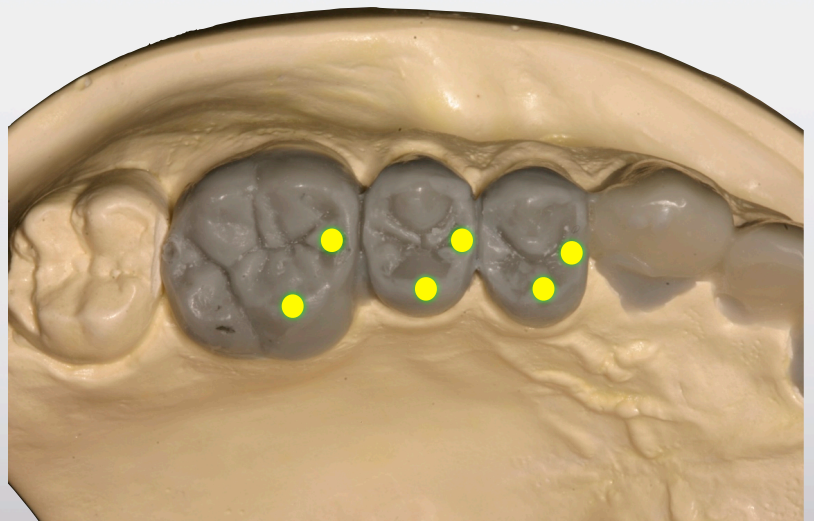
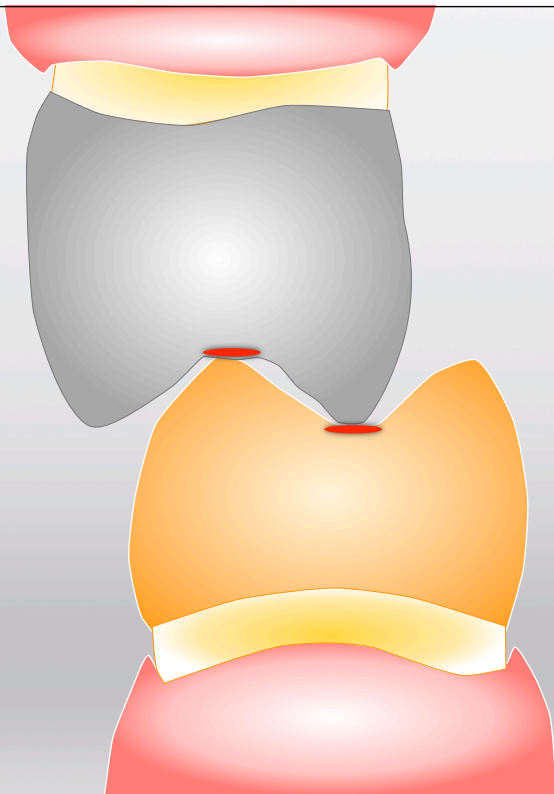
(Clyde Schuyler)

1. With the condyles fully seated in the fossa, all the posterior teeth touch simultaneously and even, with the anterior teeth lightly touching.
2. When you squeeze, neither a tooth nor the mandible moves (in a lateral direction).
3. When you move the mandible in any excursion, no back tooth hits before, harder than, or after a front tooth.

Bonus Rule- Harmonious Anterior Guidance. Cuspid guidance directs the mandible slightly forward, not backward, with smooth cross over from cuspid to anterior teeth. Protrusive contact even on both central incisors.

Bonus Observation- All the above work much better the closer the teeth are to being on the curve of Spee and Curve of Wilson

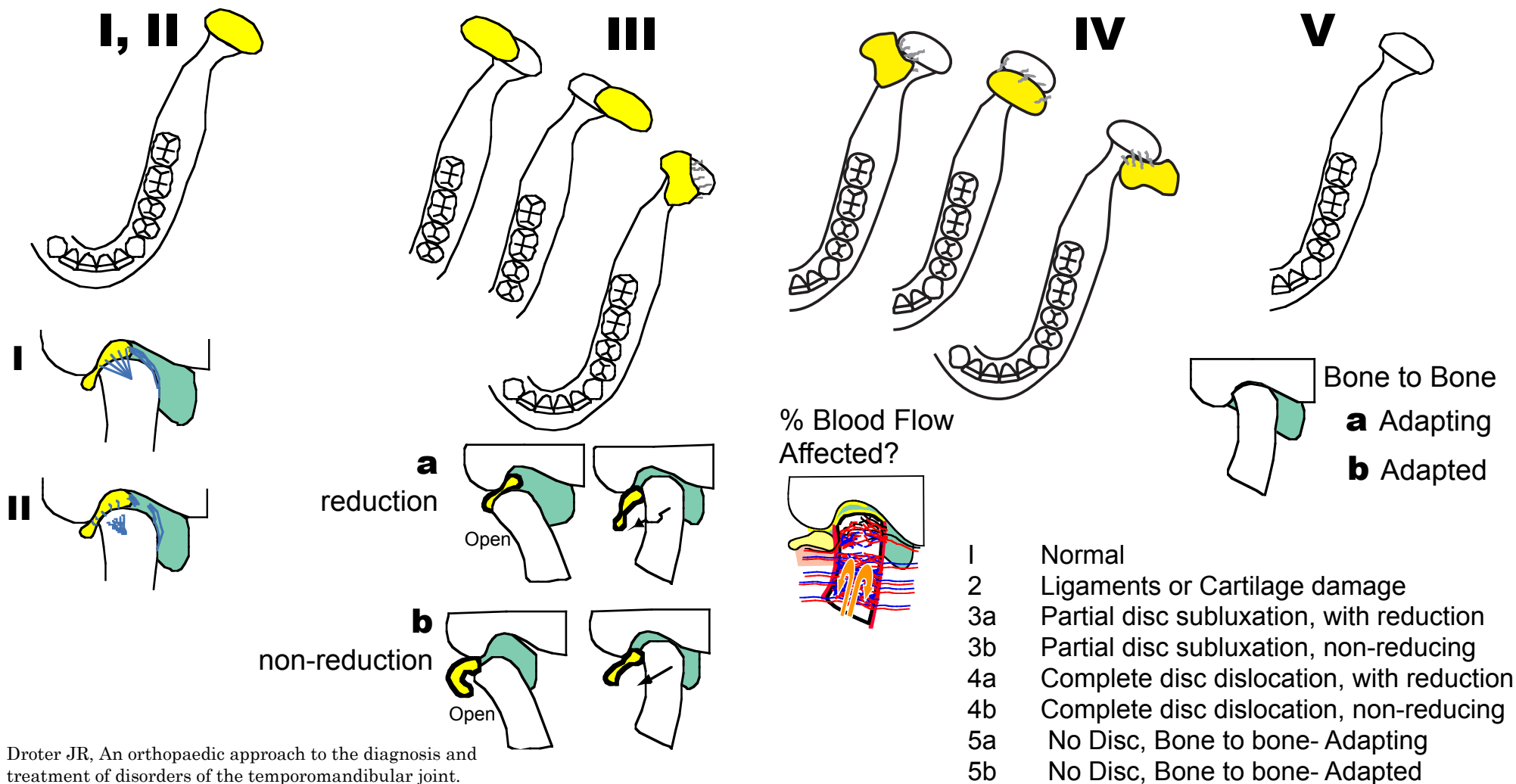
Why LD Never wrote a text book



Slide by Dr Jim Kessler  
Drawing by Dr Jim Kessler

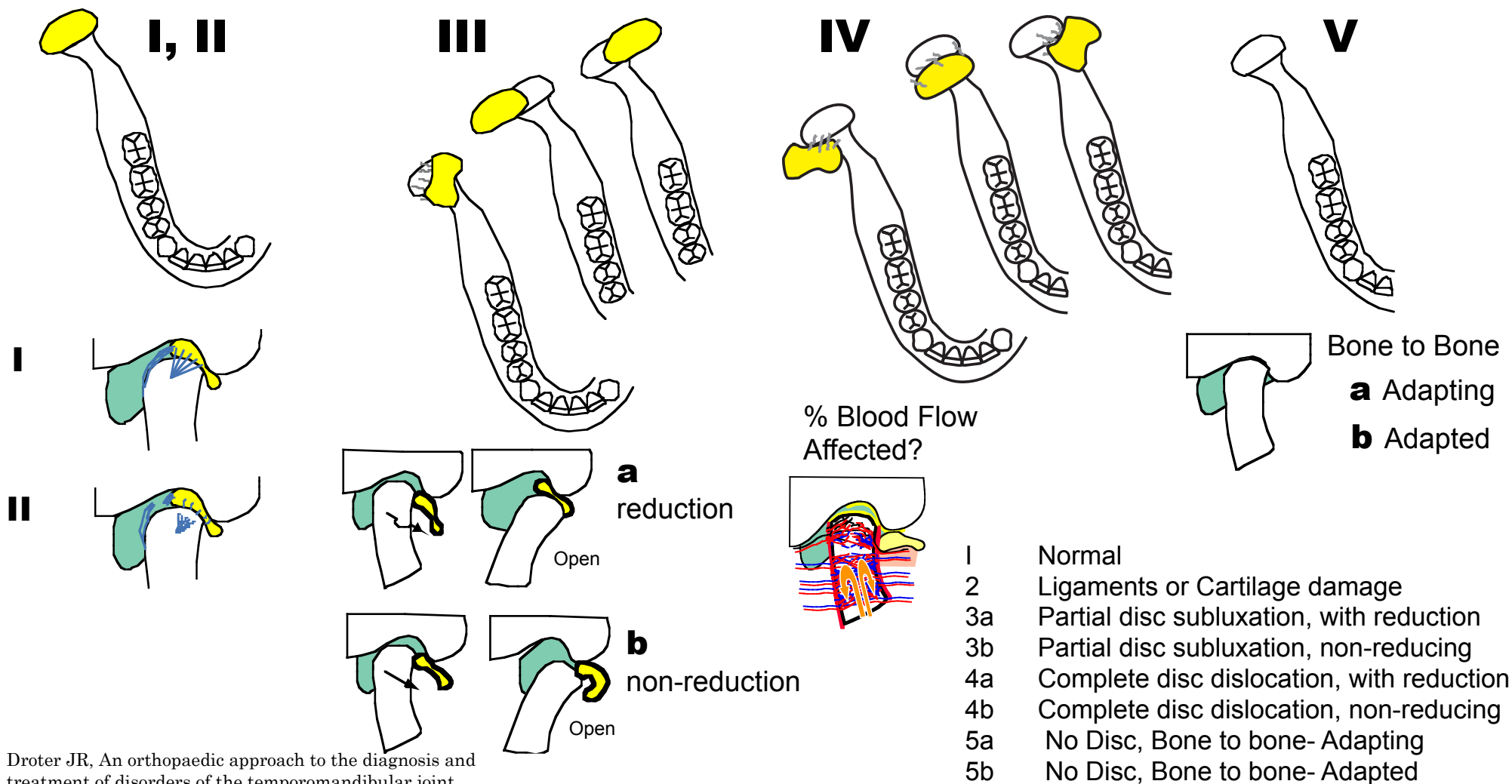
# Dr. Mark Piper's Classification

## Left TMJ



# Dr. Mark Piper's Classification

## Right TMJ





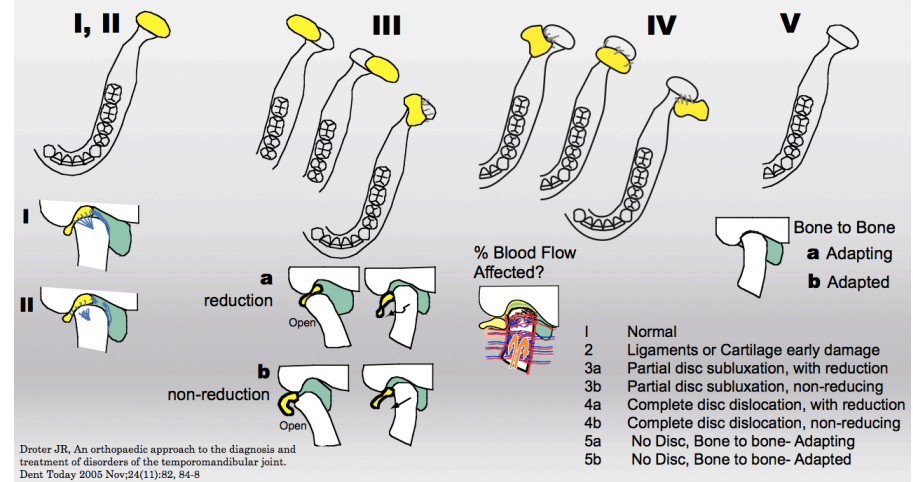
# The Expanded Piper Disc Classification

## TMJ Damage

- I Normal Healthy Disc, Ligament and Cartilage
- 2 Normal Disc Position but damage:
  - Ligaments damage
  - Cartilage Fibrillation
  - Disc Distortion
  - Perforation of Disc
  - Disc unstable due to contralateral TMJ damage
- 3ae Early Partial disc subluxation, with reduction
- 3a Partial disc subluxation, with reduction
- 3b Partial disc subluxation, non-reducing
- 4ae Early Complete disc dislocation, with reduction
- 4a Complete disc dislocation, with reduction
- 4 adh Adhesed disc to eminence
- 4b Complete disc dislocation, non-reducing
- 4b/a Complete disc dislocation, non-reducing in function
- 5a No Disc, Bone to bone- Adapting- OA Active
- 5b No Disc, Bone to bone- Adapted- OA adapted

## Dr. Mark Piper's Classification

Left TMJ



## 4a/4b Qualifiers

Disc Size- small, medium, large

Direction of dislocation-

Anterior, Medial, Lateral, Distal

Thickness of posterior band

Distance posterior band in front of condyle

Conforming of dislocated disc to eminence

Perforation of Pseudo-disc

Subluxation of Pseudo-disc

OA Active without perforation of Pseudo-disc

OA Adapted without perforation of Pseudo-disc

John R Droter DDS



# Radiation Exposure Comparison

Daily Background/day	0.008 mSv
Panoramic	0.02 mSv
1 Trans Atlantic Flight	0.03 mSv
Chest Film	0.1 mSv (0.1-0.2 mSv)
i-CAT Head	0.1 mSv
Full Mouth Series Digital	0.12 mSv
Full Mouth Series F Speed	0.17 mSv
Conventional CT Head	0.5 mSv
Spiral CT Head	2.7 mSv
<b>Daily Background/year</b>	<b>3.1 mSv/year</b>
Airline Crews	4.6 mSv/year
Highest Safe Dose	20 mSv/year
Max Exposure US Worker	50 mSv/year
Exposure that can lead to Cancer	100 mSv/year

MRIs have no Radiation.  
Radiation is cumulative over lifetime.  
Safe dose of a harmful substance?

Comparison conversions done by John R Droter DDS  
Gy converted to Sv using 1mGy/cm head = .0022mSv

Gy= Gray (Joules/kg)  
Sv=Sievert (Joules/kg)



Spiral CT Dose Report  
 $1244 \text{ mGy/cm} \times .0022 = 2.7 \text{ mSv}$

Spiral CT 27x more than CBCT, but about half of airline crews yearly exposure.