

Spear TMD Webinar 2023

John R Droter DDS
Annapolis, Maryland

Annapolis, Maryland
John R Droter DDS

www.drdroter.com

John R Droter, DDS

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Spear TMD 2023

John R. Droter, DDS
Facial Pain, Diagnosis and TMD Rehabilitation

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Upcoming Seminars

July 20, 2016 D-PAS Hand on- In Office, Annapolis MD
July 21-23 2016 Droter Hands on- In office, Annapolis MD
Call Kim 301-805-9400

Pankey TMD Week, Key Biscayne FL
October 23-27, 2016
October 22-26, 2017
Call LD Pankey Institute 305.428.5500

Spear TMD Course 1 with Dr Herb Blumenthal
Aug 11-13, 2016, Scottsdale Arizona
Call [Spear Education \(866\) 781-0072](http://Spear Education)

Most Popular and Common Downloads

TMD Supersheet Download
[SuperTMDdx13.11](#)

Brux supersheet Download



Hello. I am:

**John R Droter DDS
Annapolis, Maryland**

*Annapolis, Maryland
John R Droter DDS*

Milestones



Visiting Faculty Spear Education 2013

Visiting Faculty LD Pankey Institute 2008

Visiting Faculty Orthodontic Program
Washington Hospital Center 2000

On staff AAMC: Orthopedic Rounds
In OR for TMJ Surgery

Devoted Facial Pain Practice 1996
(No Hygiene to Check!!)

CT and MRI Imaging Joints 1992
Guy Haddix, DDS: Mentor
(3,000+ images and rising)

Post Grad CE- GPR, LD Pankey Institute, Dawson, Mahan, Gremillion, Spear, Kois



Disclosures:

Atomic Skis- Sponsored.
I got stuff.

LD Pankey Institute TMD Course
Honarium

Spear Education TMD Course
Honarium

Droter Seminars
My own Hands on TMD Courses

Co-Owner of ArrowPath Sleep
High Quality Dental Orthotics
Patent on sleep device: LatBrux

Ski Coach for National Ski Patrol
Level 3 Certified Professional Ski Instructors of America





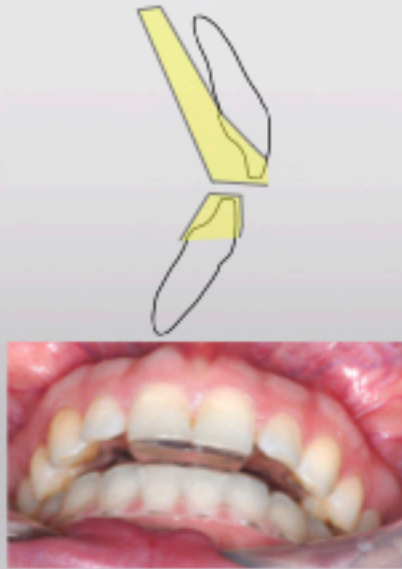
Living Tree Dental Lab
(865) 509-4509
connect@livingtreelab.com

3D Printed Orthotics

D-PAS
Diagnostic-
Palatal Anterior Stop



Brux-PAS
with lower Essix



Hard Lower Posterior Stop
with upper essix



Hard Lower Full Coverage
Centric Relation Orthotic



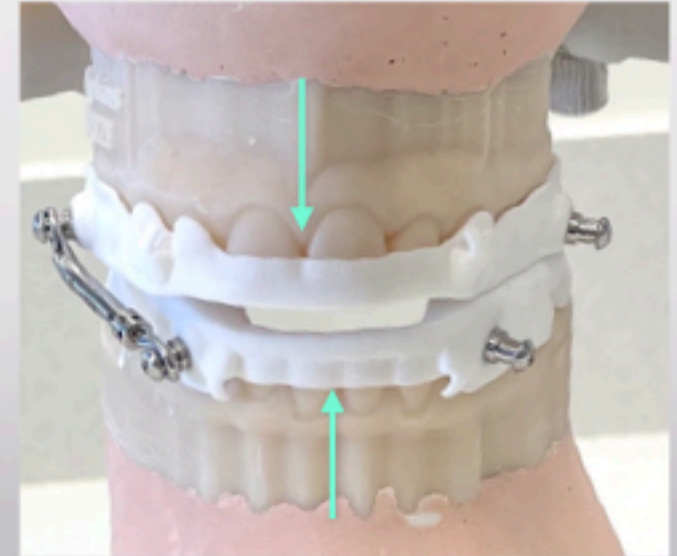


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DENTAL TECHNOLOGIES

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716.871.1161

ArrowPath Sleep
Lat Brux
Lateral Bruxing Guard

Moves lower jaw laterally
Arm only attached on one side
Printed nylon
Can convert to MAD if needed



Patient will have a right and left guard.
Move the jaw to the right one night, left the next

TMJ/TMD Confusion



Dogmatic
Arguments



Differential Diagnosis

Diagnostic Boxes: Pattern Recognition

“My Tooth Hurts”

Reversible Pulpitis secondary to caries

Irreversible Pulpitis secondary to caries

Pulpitis secondary to split tooth

Pulpal necrosis

Referred Pain from Muscle
Trigger Point

Sinus Infection

Sympathetic Mediated Pain

Neuroma

Periodontal Infection

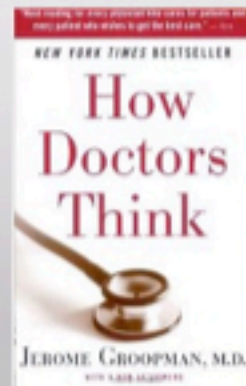
Inflamed Tissue secondary to
popcorn husk

Aphthous Ulcer

Periodontal ligament inflammation
secondary to Occlusal Trauma

Pulpitis secondary to Occlusal Trauma

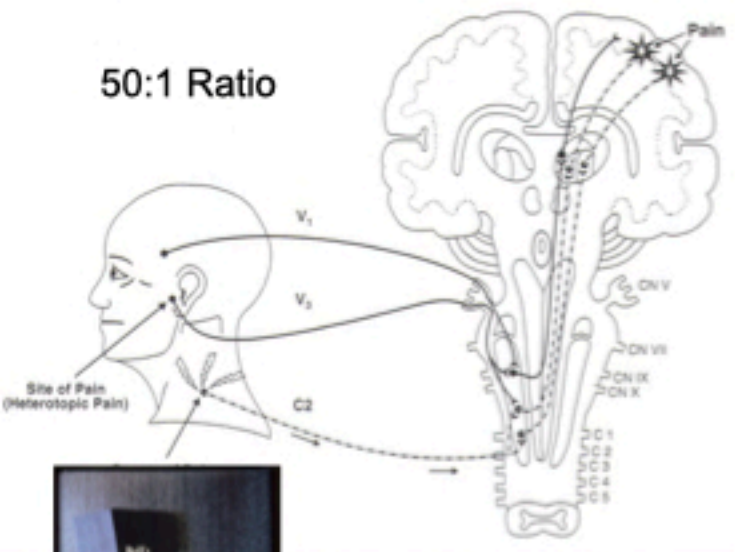
Other



Referred Pain Convergence

More primary sensory neurons than secondary neurons that travel to brain

50:1 Ratio



"Bell's Orofacial Pain"
Jeffery Okeson

Trigger Points

Contracted mass of actin, myosin and histamine

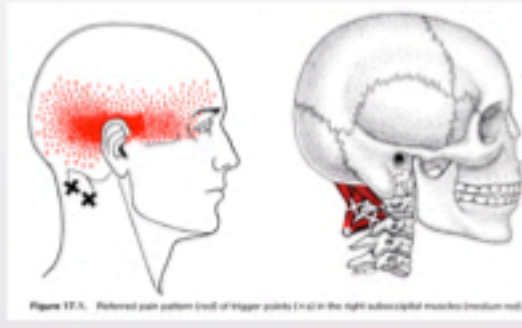
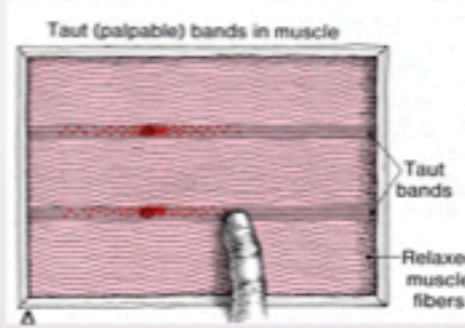
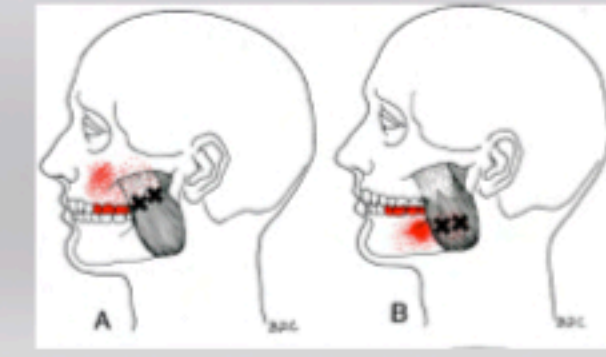
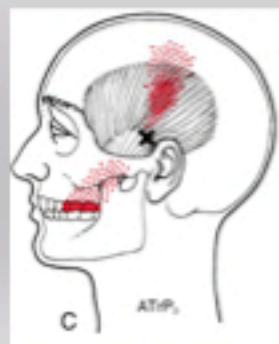
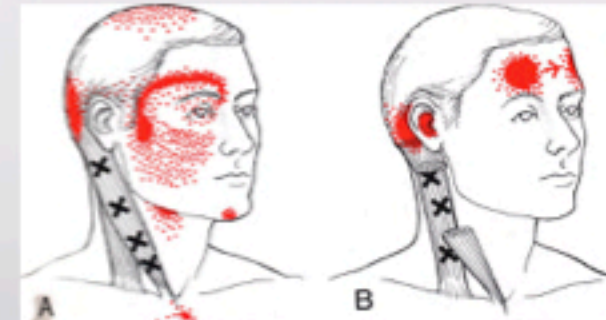
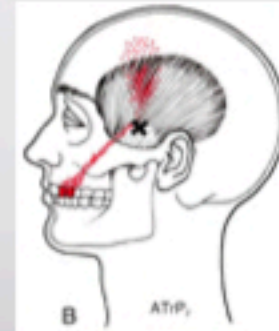
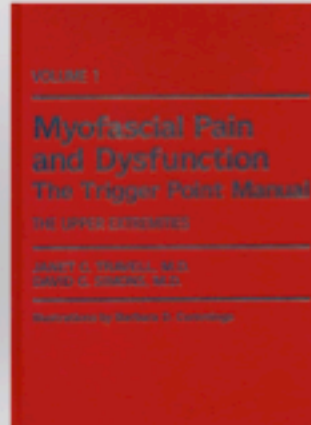


Figure 17.3. Referred pain pattern (red) of trigger points (x) in the right suboccipital muscles (medium rest).

"The Trigger Point Manual"
Janet Travell, MD



Differential Diagnosis

Diagnostic Boxes: Pattern Recognition

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Trigger Point

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Inflamed Tissue secondary to
popcorn husk

Aphthous Ulcer

Periodontal ligament inflammation
secondary to Occlusal Trauma

Pulpitis secondary to Occlusal Trauma

Other



“How Doctors Think”, by Jerome E. Groopman

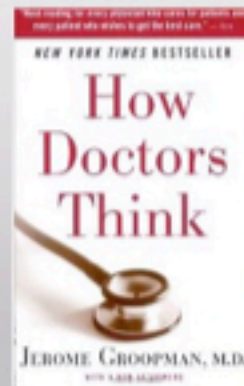
Diagnose by Pattern Recognition

Tendency to make patients fit what we know
Ignore signs and symptoms that do not fit

Always make a differential diagnostic list

Ask, “ It appears to be this, but what else could it be?”

Be aware you are blinded by your beliefs



Differential Diagnosis

Diagnostic Boxes: Pattern Recognition

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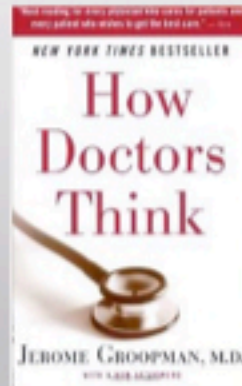
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Pain: Three Types

Inflammation Pain
Physical Damage

Tissue
Muscles
Joints

Nerves
Misbehaving

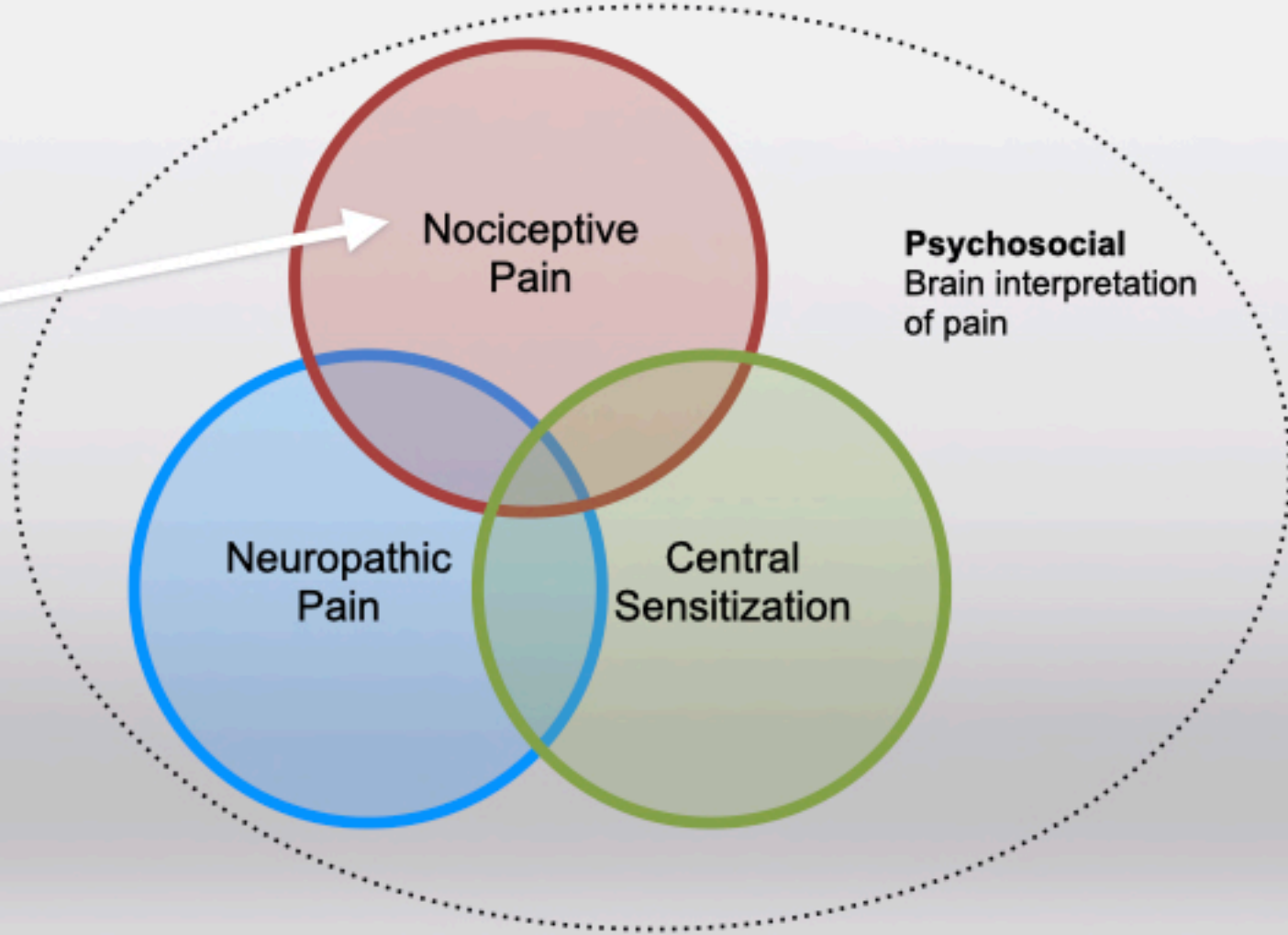
Brain
Misbehaving

Nociceptive
Pain

Psychosocial
Brain interpretation
of pain

Neuropathic
Pain

Central
Sensitization



TMD Different Beliefs

Psychosocial Behavioral

Brain interpretation
of pain



It is not about
the nail



Different Beliefs

Nociceptive Pain

Neuropathic Pain

Central Sensitization

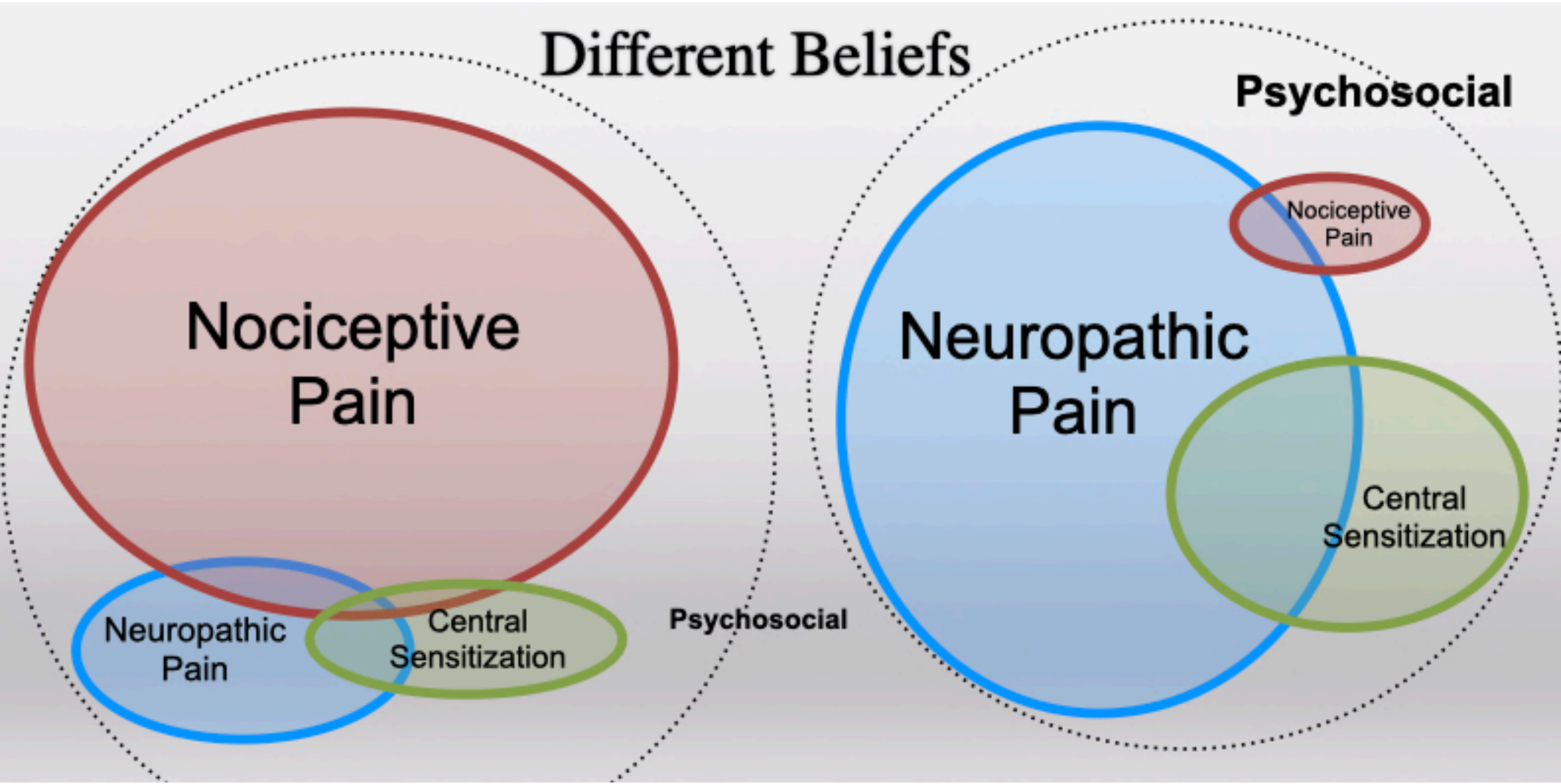
Psychosocial

Psychosocial

Neuropathic Pain

Nociceptive Pain

Central Sensitization



TMDs- What are the choices? (190 Diagnoses, 7 Categories)

1. TMJ Damage

Adhesions and ankylosis of temporomandibular joint
Avascular Necrosis Mandibular Condyle
Cartilage Fibrillation, Mandibular Condyle, Fossa
Closed Lock, Jaw Cartilage, Acute
Closed Lock, Jaw Cartilage, Chronic
Closed Lock, Jaw Cartilage, Intermittent, Mechanically dysfunctional
Crush Injury Mandibular Condyle
Crystal arthropathy, unspecified, TMJ
Dislocation jaw cartilage due to injury, Sequela
Dislocation jaw cartilage with reduction, favorable adaptation, TMJ
Dislocation jaw cartilage without reduction, favorable adaptation, TMJ
Effusion, TMJ

Impingement Retrodiscal Tissue
Inflammatory Tissue Bone Resorption, TMJ Condyle
Loose Body (Joint Mice), TMJ
Malignant neoplasm of bones of skull and face
Open Lock TMJ, Recurring
Osteoarthritis TMJ, active degeneration
Osteoarthritis- inactive
Osteochondritis Dissecans TMJ
Osteolysis Mandibular Condyle, Active
Perforation Pseudodisc, TMJ
Perforation Pseudodisc, TMJ
Rheumatoid Arthritis Sero Negative TMJ
Synovitis

2. Muscles of the TMJ

Dystonia
Habitual posture forward mandible
Hemifacial Muscle spasm
Inhibitory Reflex Dysfunction, Periodontal Ligament Masseter Muscle
Muscle Atrophy, TMJ
Muscle Bracing Neck Stabilization
Muscle Bracing Pain Avoidance
Muscle Bracing TMJ stabilization
Muscle Bracing Airway **Patency** (with Tongue)
Muscle Contracture Fibrosis Lateral Pterygoid
Muscle Contracture Fibrosis Masseter, Medial Pterygoid, Temporalis
Muscle Fatigue Overuse
Muscle Hypertrophy TMJ Muscles

3. Cranial Alignment/Occlusion

Cranial Distortion / Misalignment
Hemifacial Hypoplasia
Hyper Occlusal Awareness
Idiopathic Orthotic Damage
Malocclusion Anterior Open Bite
Malocclusion Centric occlusion Max/C discrepancy
Malocclusion Deep Bite
Malocclusion due to mouth breathing
Malocclusion due to TMJ bone loss
Malocclusion due to tongue, lip or finger habits
Malocclusion Insufficient anterior occlusal guidance
Malocclusion lack of posterior occlusal support
Malocclusion Posterior Openbite Bilateral
Malocclusion Posterior Openbite Unilateral
Malocclusion unspecified

Malposition / Misalignment: Maxilla, Temporal Bone, Mandible
Mandibular asymmetry
Mandibular hyperplasia
Mandibular hypoplasia
Mandibular Retrognathia
Maxillary asymmetry
Maxillary hyperplasia
Maxillary hypoplasia
Maxillary Retrognathia
Occlusal Adaptation, Favorable
Occlusal Dependency for Joint Stabilization/ Proprioception
Tooth Intrusion
Tooth Supereruption

4. Cervical Damage

Cervical Vertebrae Alignment Dysfunction
Cervicocranial Syndrome
Muscle Guarding due Neck Instability
Trigger Point Neck Muscle with Referred Pain
Trigger Point Neck Muscle, Localized Pain

5. Parafunction

Excessive Tooth Wear, Damage
Hyperactive Occlusion
Parafunctional Clenching Teeth, Awake
Parafunctional Clenching Teeth, Sleep
Parafunctional Grinding Teeth, Awake
Parafunctional Grinding Teeth, Sleep
Parafunctional Clench/Grind Wiggle
Parafunctional Tongue Bracing avoiding uncomfortable tooth contact
Parafunctional Tongue Bracing Neck stabilization
Parafunctional Tongue Bracing to maintain Airway
Parafunctional Tongue Bracing unknown cause

6. Whole Body / Systemic

Lyme Disease Arthritis
Magnesium Deficiency
Obstructive Sleep Apnea
Osteoporosis without current pathological fracture
Pathological Habitual Movement Pattern
Postural Disharmony Standing
Postural Disharmony Walking
Postural Forward Head Position
Upper Airway Resistance, UARS

7. Other

Nerve Entrapment Masseteric Nerve due to Masseteric hypertonicity
Neurona Trigeminal Nerve
Obsessive-Compulsive Personality Disorder
Other
Otitis Ear Infection
Pain disorder exclusively related to psychological factors, Somatiform pain disorder
Pain disorder with related psychological factors
Peripetal Sensitization

1. TMD: TMJ Damage and Diseases

Adhesions and ankylosis of temporomandibular joint
Avascular Necrosis Mandibular Condyle
Cartilage Fibrillation, Mandibular Condyle, Fossa
Closed Lock, Jaw Cartilage, Acute
Closed Lock, Jaw Cartilage, Chronic
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Crystal arthropathy, unspecified, TMJ
Dislocation jaw cartilage due to Injury, Sequela
Dislocation jaw cartilage with reduction, favorable adaptation, TMJ
Dislocation jaw cartilage without reduction, favorable adaptation, TMJ
Effusion, TMJ
Fracture of subcondylar process of mandible
Gout, TMJ
Growth Disturbance Prepuberty due to TMJ damage
Hemarthrosis TMJ, Traumatic
Hyperplasia Mandibular Condyle,
Hypoplasia Mandibular Condyle
Hypoxia Reperfusion Injury, TMJ Cartilage Damage
Hypoxic Progressive Condylar Resorption

Impingement Retrodiscal Tissue
Inflammatory Tissue Bone Resorption, TMJ Condyle
Loose Body (Joint Mice), TMJ
Malignant neoplasm of bones of skull and face
Open Lock TMJ, Recurring
Osteoarthritis TMJ, active degeneration
Osteoarthrosis- Inactive
Osteochondritis Dissecans TMJ
Osteolysis Mandibular Condyle, Active
Perforation Meniscus, TMJ
Perforation Pseudodisc, TMJ
Psoriatic Arthritis TMJ
Rheumatoid Arthritis Sero Negative TMJ
Rheumatoid Arthritis TMJ
Sprain Discal Ligament TMJ, acute with joint edema
Subluxation on Loading, TMJ
Subluxation on Movement, TMJ
Synovial Cyst (Ganglion Cyst)
Synovial Hyperplasia
Synovitis

TMD Therapies: (70 therapies)

Physical

Ice
Hot Cold Hot
Cold Laser
TENS in office
TENS home use
Range of motion exercises
Active Stretching: Manual, Tongue Blades, Dynasplint
Refer to Physical Therapy: Rocabado mobilization
Refer to Physical Therapy: Postural Restoration Therapy
Refer to Physical Therapy: Various Muscle Therapies
Refer to Chiropractic: Atlas Orthogonist
Refer to Osteopathic MD: Body alignment
Breathe, Walk , Exercise

Brux Checker
Upper full coverage hard CR guard
BiArch Posterior Deprogrammer
Mandibular Advancement Device
Lateral Bruxing Device
Lingual Light Wire
Condylar Distraction

Medicinal

Anti Inflammatory:
NSAIDs,
Doxycycline low dose
CBD Topical
Glucosamine/Chondroitin MSM
Vitamins: Vit C, Vit D, Vit B12
Minerals: Magnesium, Electrolytes
Minerals: Iron
Refer to MD for Lyme therapies
Refer to MD Rheumatoid Arthritis therapies
Refer Botox Masseter injections
Refer Botox Lateral Pterygoid Injections
Food

Occlusal Orthopedic

Lingual Light Wire
Planas Tracks
Lower soft sectional orthotic
Sectional orthodontics
Expansion orthopedics/ orthodontics
Restorative Dentistry
Occlusal Adjustment with DTR, TekScan
Condylar distraction
Occlusal Adaptation

Tongue Parafunction

Refer for Cervical Alignment/ Stabilization
Myobrace
Upper Lingual light wire
Clear Brux Checker
Frenectomy
Myofunctional therapy

Dental Orthotics

In Office Trial Anterior Stop
Temporary home use anterior stop
Diagnostic Palatal Anterior Stop
Brux-PAS
Lower full coverage CR
Lower posterior deprogrammer
Lower TMJ Rehab flat plane
Lower Indexed
Brux Checker

Upper full coverage hard CR
Posterior Stop Night Guard
Mandibular Advancement Device
Anterior Stop Airway Bite
Facebow Verification
Lateral Bruxing Device
Condylar Distraction
Lingual Light Wire
Lower Soft Sectional

Athletic Mouthguard
Anterior Repositioning
Occlusal Adjust Assist
Aqualizer
Myobrace

Sleep/ Fatigue

Mouth taping
Diet Modification
Positional Therapy
Vitamins: Vitamin D, Vitamin B12, Vit C
Minerals: Magnesium, Iron
Lateral Bruxing Device guided plane
Lateral Bruxing Device Elastomeric
Mandibular Advancement Device
CPAP

Surgical

Refer: Arthrocentesis w/ PRP
Refer: Discectomy w/ Fat Graft
Refer: Total Joint Replacement
Refer: Orthognathic Surgery

Common TMDs

John R Droter DDS
Annapolis, Maryland

Annapolis, Maryland
John R Droter DDS

6 Common TMDs

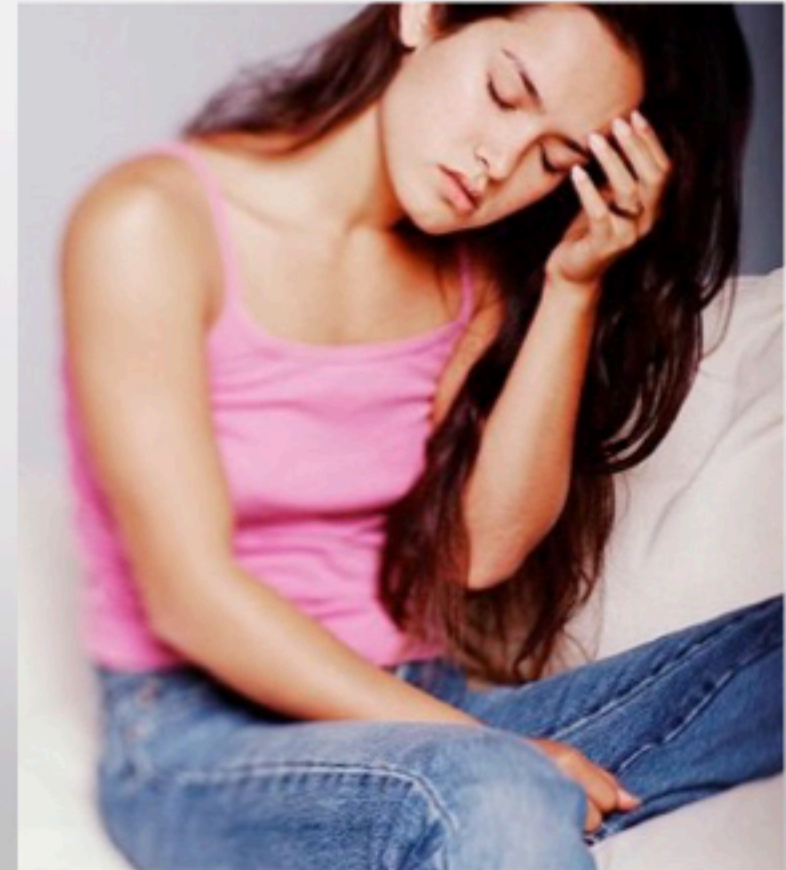
- Parafunctional Clenching
- Parafunctional Grinding
- Occlusal Muscle Dysfunction
- Osteoarthritis
- Acute Sprain
- Acute Closed lock of TMJ disc

5 Common Obstacles

- Neck and Postural Instability
- Wobbly TM Joint (Subluxation)
- Compromised Breathing/Airway
- Avascular Necrosis
- Referred Pain Muscle Triggerpoints

1 TMD that **usually** does not need therapy

- TMJ Clicking



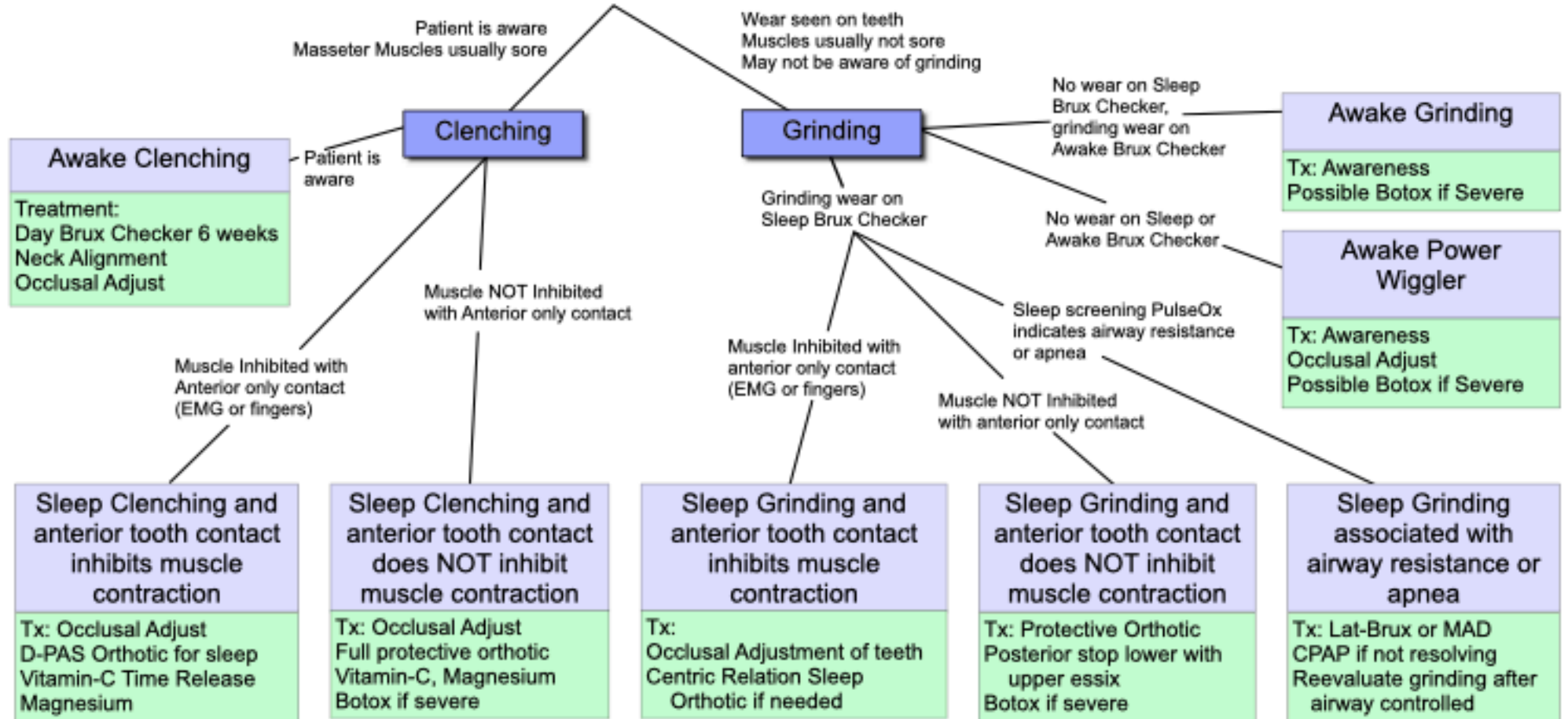
6 Common TMDs

Diagnosis	Pattern	Treatment
Clenching	Patient is aware Masseters Ache Morning TMJ clicking that resolves	Occlusal Adjust D-PAS Night Guard (if inhibition) Magnesium and Vitamin C hs
Sleep Grinding	Worn Teeth	Protective night guard Airway night night guard
Occlusal Muscle Dysfunction	Sore muscles when chewing Sore Lateral Pterygoid, Headaches Day D-PAS Relieves Symptoms	Occlusal Adjustment
Osteoarthritis of TMJ	Arthralgia CBCT shows worn bone loss MRI T2, STIR ++	NSAID for 6-12 weeks Occlusal Adjustment Do not put in a night guard
Sprain Discal Ligament TMJ, Acute	Sudden onset pain TMJ, sore TMJ Limited opening Soft end point active stretch	Cold Laser, Ice 15 min 3x a day Rest, Soft diet, NSAID 7 days Anterior Reposition Orthotic 7 days
Acute Closed Lock TMJ	Sore TMJ Limited opening Hard end point active stretch	Arthrocentesis with PRP

6 Common TMDs

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Acute Closed Lock TMJ	Sore TMJ Limited opening Hard end point active stretch	Arthrocentesis with PRP

BRUXING: PARAFUNCTIONAL TOOTH CONTACT





Clenchers destroy the joint,
Grinders destroy the teeth



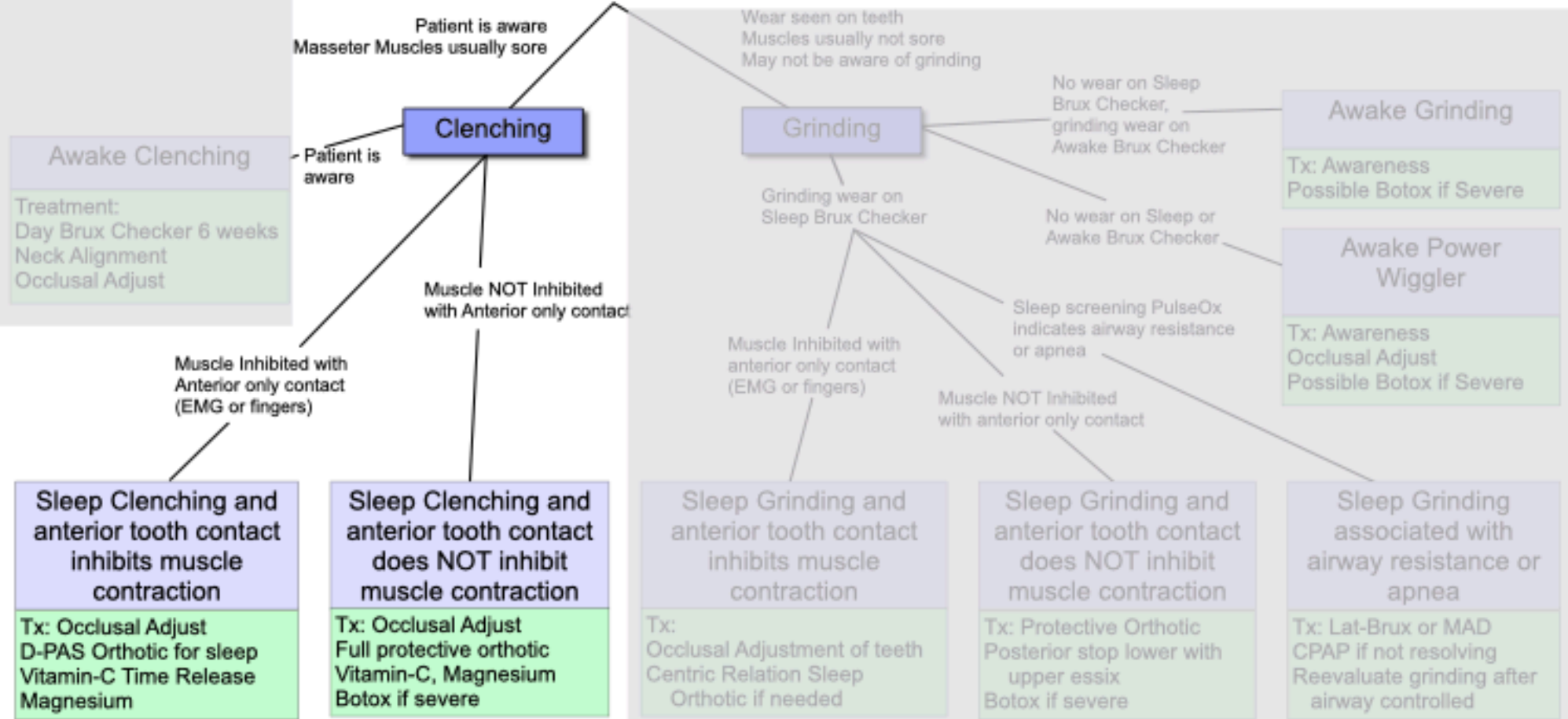
Clenching
Painful Muscles
Patient is usually aware of clenching
Fremitus
Strong Masseters
See slight wear around tooth contacts
Damage TMJ cartilage

Grinding
See tooth wear
Patient is usually not aware
Buttressing bone if teeth are tight
If tooth mobility, on excursions
Strong Masseters
Slight if any soreness muscles
Usually no muscle pain

If patient is unaware of clenching-
Plant seed at hygiene visit
Do you clench?

Parker Mahan-
"Women Hurt, Men destroy"

BRUXING: PARAFUNCTIONAL TOOTH CONTACT



Awake Clenching

Treatment:
Day Brux Checker 6 weeks
Neck Alignment
Occlusal Adjust

Sleep Clenching and anterior tooth contact inhibits muscle contraction

Tx: Occlusal Adjust
D-PAS Orthotic for sleep
Vitamin-C Time Release
Magnesium

Sleep Clenching and anterior tooth contact does NOT inhibit muscle contraction

Tx: Occlusal Adjust
Full protective orthotic
Vitamin-C, Magnesium
Botox if severe

Sleep Grinding and anterior tooth contact inhibits muscle contraction

Tx:
Occlusal Adjustment of teeth
Centric Relation Sleep
Orthotic if needed

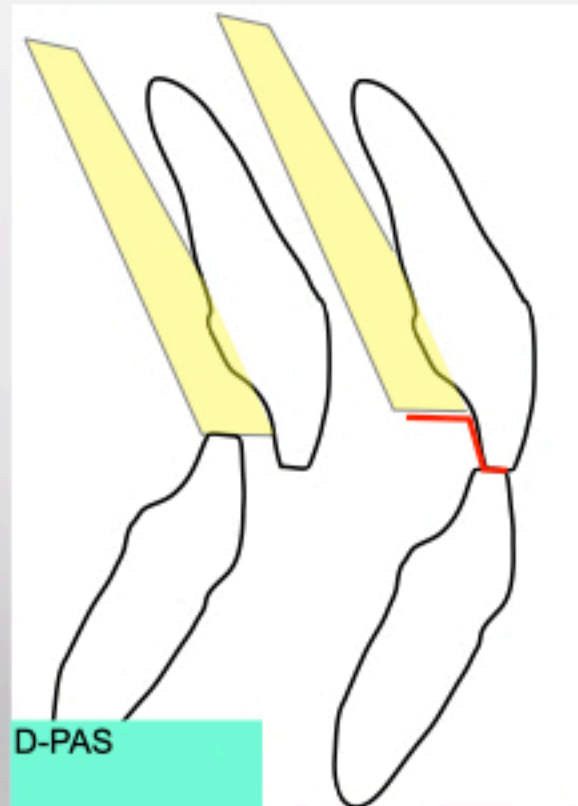
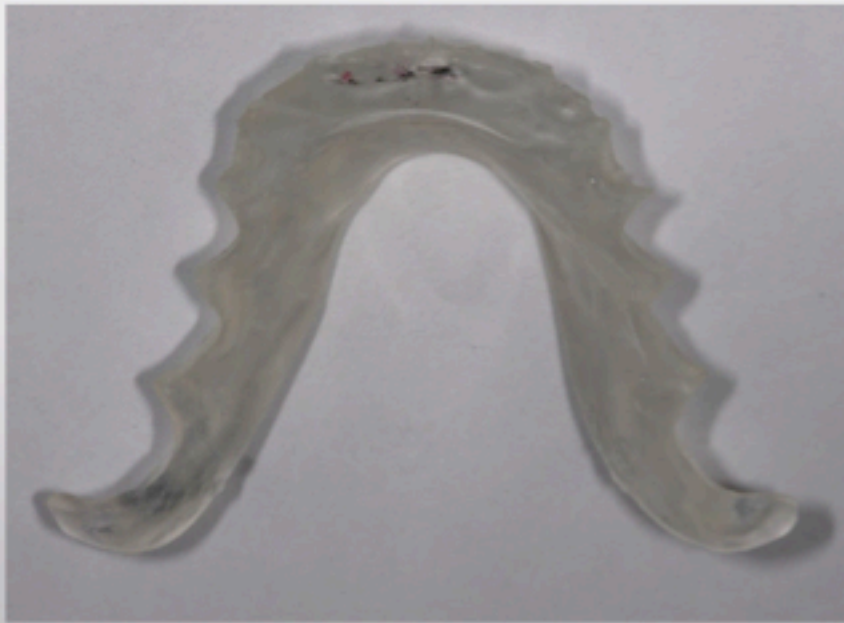
Sleep Grinding and anterior tooth contact does NOT inhibit muscle contraction

Tx: Protective Orthotic
Posterior stop lower with
upper essix
Botox if severe

Sleep Grinding associated with airway resistance or apnea

Tx: Lat-Brux or MAD
CPAP if not resolving
Reevaluate grinding after
airway controlled

Diagnostic Palatal Anterior Stop D-PAS



Basically an upper Hawley with anterior stop without clasps or wire

Diagnostic Palatal Anterior Stop

D-PAS Test: Wear for 2 weeks, 24/7, take out to eat

Better- Decrease in Symptoms

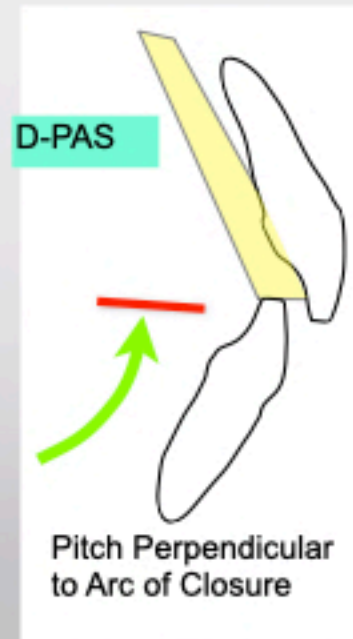
Sleep Clenching Inhibited: Wear D-PAS as night guard
Orthotic Improved Airway: D-PAS as night guard
Occlusal Muscle Disharmony: Occlusal Adjust

Worse- Increase in Symptoms

Mechanically Unstable TMJ, joint subluxation
Intracapsular Problem TMJ
Orthotic Made Sleep Airway Worse

Stays the Same- No Change in Symptoms

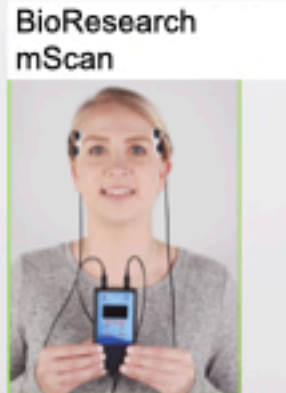
Damaged TMJ are mechanically stable
Pain not related to occlusion



Stapelmann H, Türp JC. The NTI-tss device for the therapy of bruxism, temporomandibular disorders, and headache.....BMC Oral Health. 2008 Jul PMID: 18662411

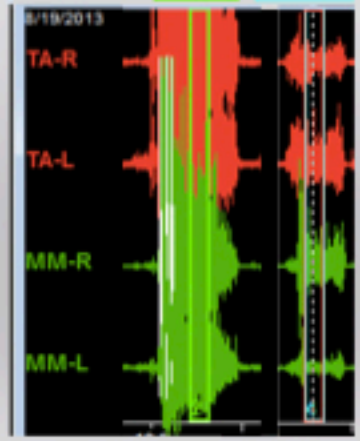
Are the TMJ muscles inhibited from full contraction with anterior only tooth contact?

Detect with EMG or muscle palpation- Clench full power on posterior teeth and then with D-PAS orthotic.



Patient with muscles inhibited by anterior only contact

	Clench MaxIC μV	Anterior Stop D-PAS μV
TA-R	100.6	15.7
TA-L	108.9	25.3
MM-R	115.4	25.5
MM-L	70.5	6.8

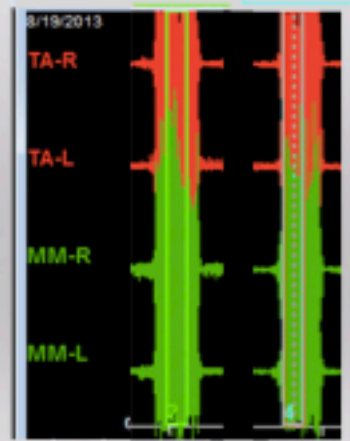


Major decrease in muscle power with D-PAS

BioResearch EMG

Another Patient with muscles NOT inhibited by anterior only contact

	Clench MaxIC μV	Anterior Stop D-PAS μV
TA-R	82.2	77.9
TA-L	124.6	103.6
MM-R	185.0	169.0
MM-L	79.9	86.6



Muscle power same with D-PAS



Diagnostic Palatal Anterior Stop



Choosing the Correct Night Guard

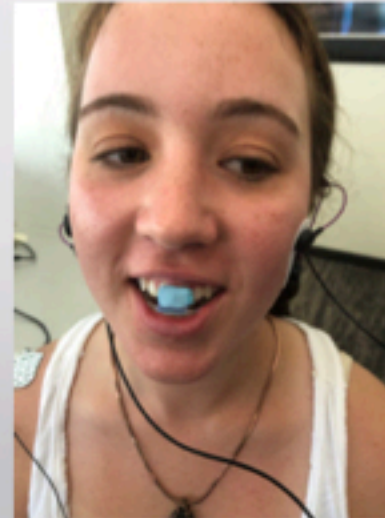
M-Scan EMG Electromyography



Clench back teeth

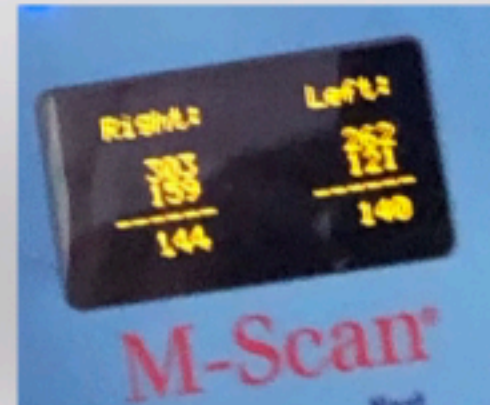


Clench
anterior stop



Can place moderate force
on front teeth

Clench
Back teeth +250 μv
Front teeth +121 μv



Parafunctional Clenching

Signs

- Strong Masseters
- No major wear on teeth
- Slight wear around tooth contacts
- Fremitus
- Tori
- Slight scratch vibration doppler/ JVA



Symptoms

- Aware of clenching
- Sore muscles on waking
- Clicking on waking that goes away
- Headaches



Causes

- Uneven occlusion, especially heavy anterior
- Neck stabilization
- SSRI

Diagnostic Tests

- EMG M-scan
- Determine if muscle inhibition
- D-PAS for sleep



Treatments

- Occlusal Adjustment
- Neck alignment/ stabilization
- D-PAS as night guard
- Time Release Vitamin C
- Angstrom Magnesium
- Clear Brux Checker daytime for 6 weeks

D-PAS Handout to patient

D-PAS Diagnostic Palatal Anterior Stop Test

This is a diagnostic test, not treatment.

D-PAS Instructions:

For next 2 weeks wear for sleeping and as much during the day as possible.
You will need to remove to eat.

Keep track of what changes you notice.

When out of the mouth always put it in its case.

Top: 3 ways appliance are lost or broken:

1. Placed in a paper towel while eating and thrown out.
2. Placed in pocket and sat on.
3. Your dog finds it and uses it as a chew toy.

Clean by scrubbing off with toothbrush and toothpaste.

If facial tightness or muscle soreness increases for more than 2 days, you can stop wearing for 2 days and try again. If still sore stop wearing and contact us.

Symptoms will either get better, get worse, or stay the same.

If symptoms become worse you may have a more serious problem that will require further tests.

Diagnostic Palatal Anterior Stop

D-PAS Test: Wear 2 weeks, Day and Night

Better- Decrease Symptoms

Sleep Clenching: Wear D-PAS as night guard
Occlusal Muscle Disharmony: Occlusal Adjust

Worse- Increase Symptoms

Mechanically Unstable TMJ (Joint subluxation)
Intracapsular Problem TMJ

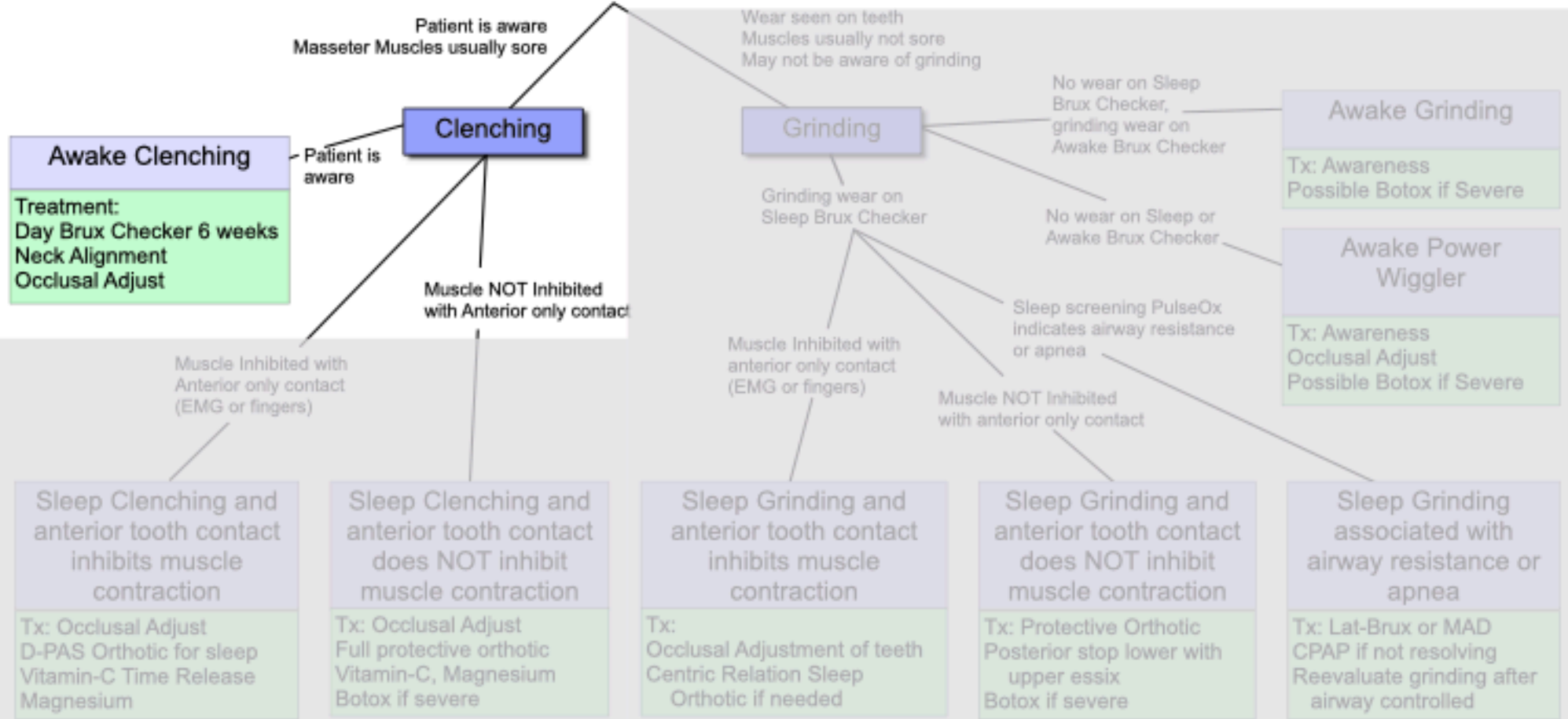
Stays the Same- No Change in Symptoms

Damaged TMJ are mechanically stable
Pain not related to occlusion

This is a diagnostic test, not treatment

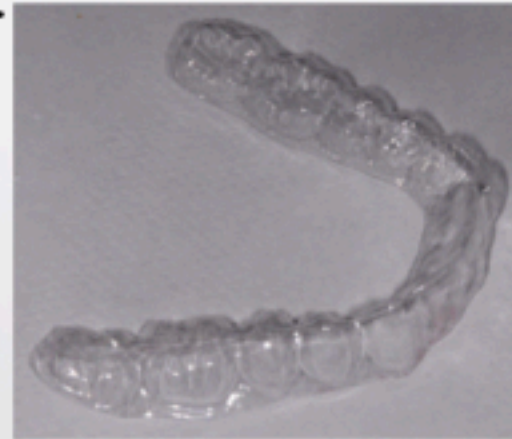


BRUXING: PARAFUNCTIONAL TOOTH CONTACT



Daytime Clenching- Clear Brux Checker Increases awareness to break habit

Very thin: Similar to mylar used for composites
50 μm thick



Living Tree Dental Lab
(865) 509-4509
connect@livingtreelab.com

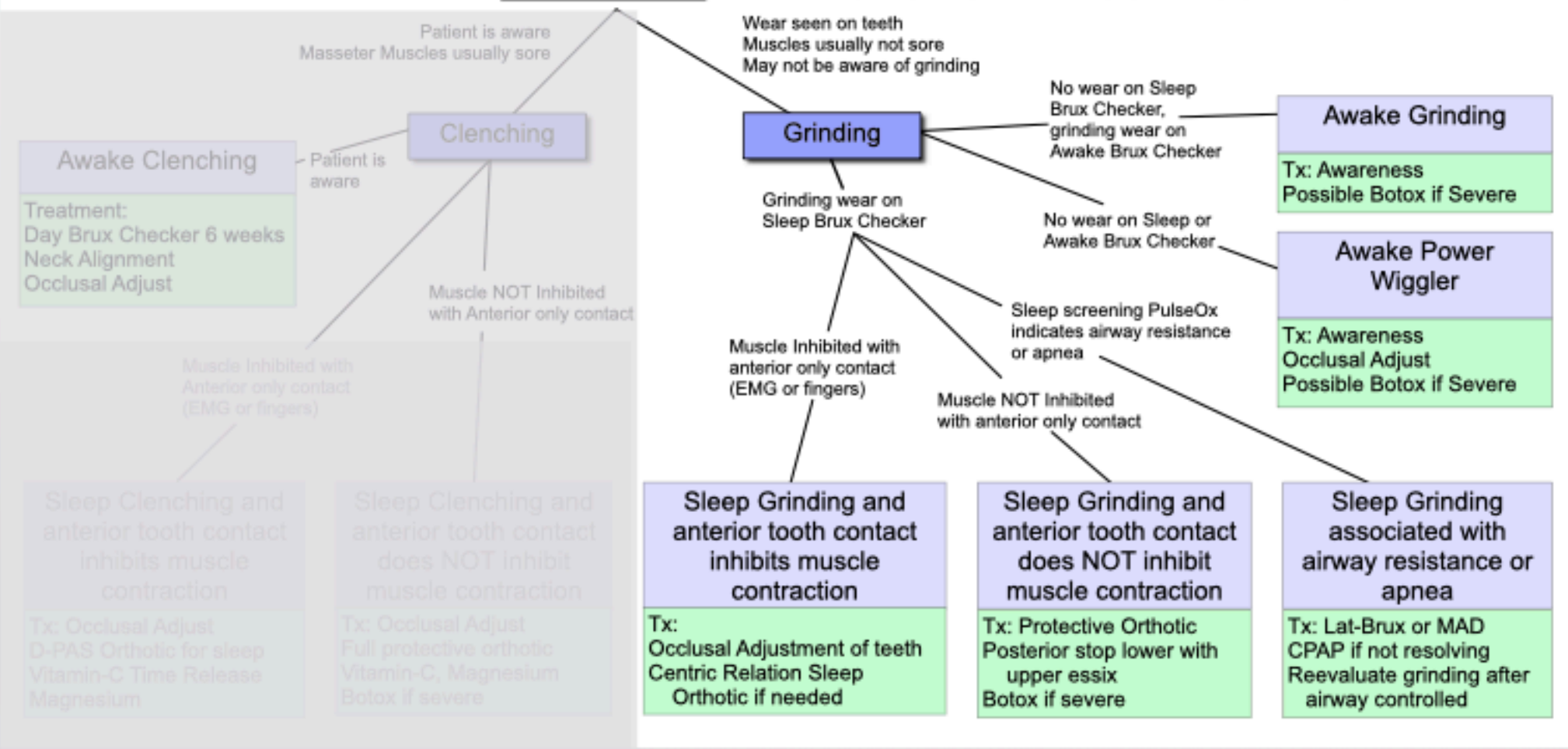
Material from:
Great Lakes Orthodontics
Platzhalterfolie by Scheu
Scheu Ref # 3202.1



6 Common TMDs

Diagnosis	Pattern	Treatment
Clenching	Patient is aware Masseters Ache Morning TMJ clicking that resolves	Occlusal Adjust D-PAS Night Guard (if inhibition) Magnesium and Vitamin C hs
Sleep Grinding	Worn Teeth	Protective night guard Airway night guard
Occlusal Muscle Dysfunction	Sore muscles when chewing Sore Lateral Pterygoid, Headaches Day D-PAS Relieves Symptoms	Occlusal Adjustment
Osteoarthritis of TMJ	Arthralgia CBCT shows worn bone loss MRI T2, STIR ++	NSAID for 6-12 weeks Occlusal Adjustment Do not put in a night guard
Sprain Discal Ligament TMJ, Acute	Sudden onset pain TMJ, sore TMJ Limited opening Soft end point active stretch	Cold Laser, Ice 15 min 3x a day Rest, Soft diet, NSAID 7 days Anterior Reposition Orthotic 7 days
Acute Closed Lock TMJ	Sore TMJ Limited opening Hard end point active stretch	Arthrocentesis with PRP

BRUXING: PARAFUNCTIONAL TOOTH CONTACT





Clenchers destroy the joint,
Grinders destroy the teeth



Clenching
Painful Muscles
Patient is usually aware of clenching
Fremitus
Strong Masseters
See slight wear around tooth contacts
Damage TMJ cartilage

If patient is unaware of clenching-
Plant seed at hygiene visit
Do you clench?

Grinding
See tooth wear
Patient is usually not aware
Buttressing bone if teeth are tight
If tooth mobility, on excursions
Strong Masseters
Slight if any soreness muscles
Usually no muscle pain

Parker Mahan-
"Women Hurt, Men destroy"

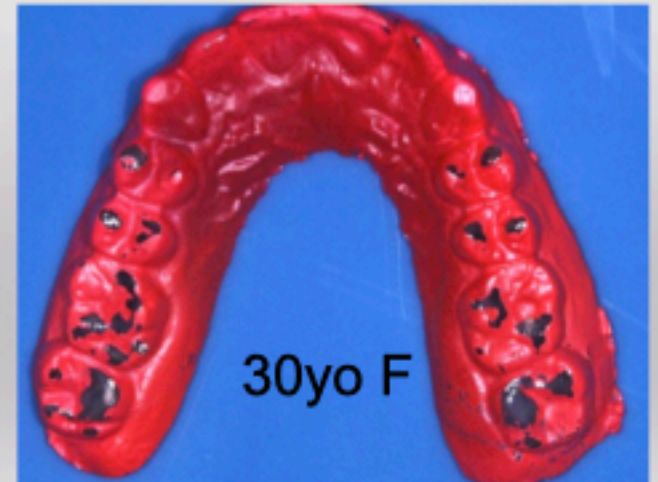
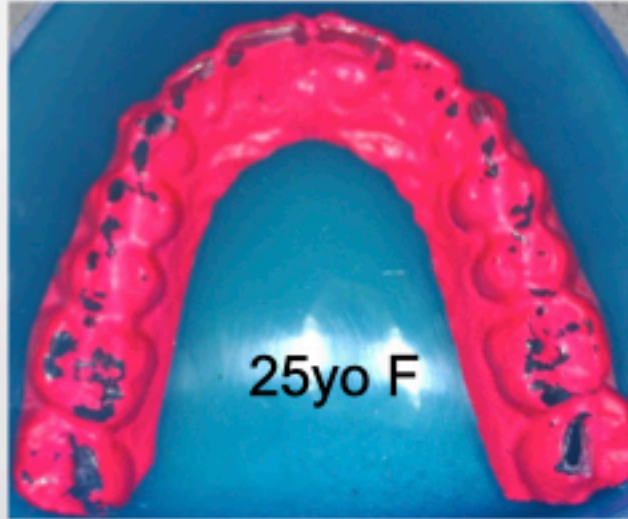
2. Does this occur awake or asleep?

Brux Checker
Great Lakes Orthodontics

0.1mm Mylar



Made on Biostar Machine



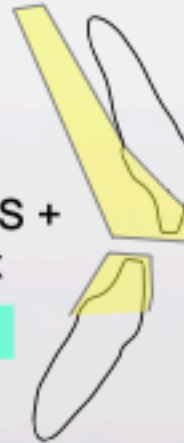
Which Occlusal Orthotic for Grinding?

Lower Posterior Stop with upper essix



Brux-PAS +
Essix

Brux-PAS



Upper Hard CR Orthotic



Lat-Brux
Great Lakes Ortho



Nylon Herbst
Great Lakes Ortho

Lower Posterior Stop Night guard with upper Essix





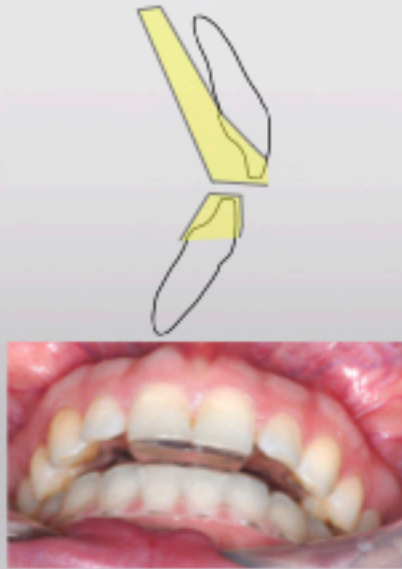
Nate Brock, CDT
(865) 509-4509
connect@livingtreelab.com

3D Printed Orthotics

D-PAS
Diagnostic-
Palatal Anterior Stop



Brux-PAS
with lower Essix



Hard Lower Posterior Stop
with upper essix



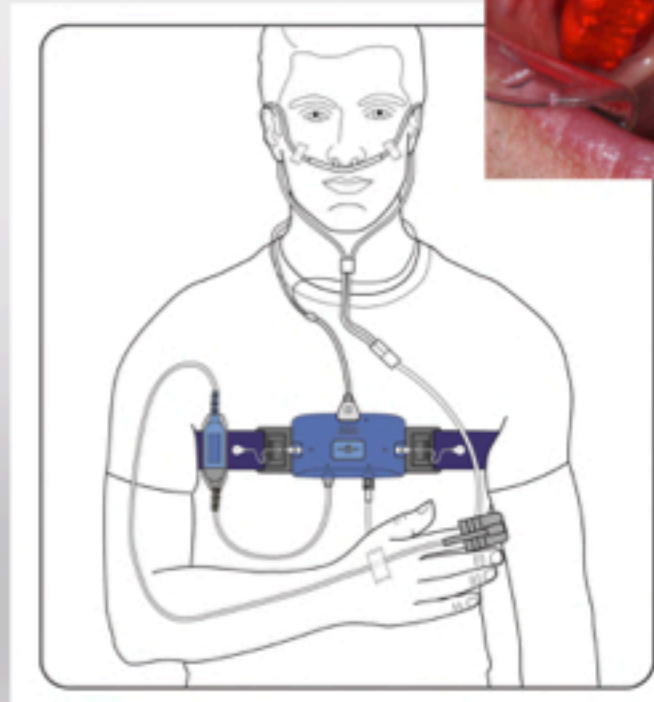
Hard Lower Full Coverage
Centric Relation Orthotic



zMachine

zMachine + Brux Checker
+ Snore Lab

GENERAL
sleep



Call (888) 330-4424

Use Code: DROTER to receive special offer

Also ask for access to Droter Modified Report

Treating Common TMDs in a General Practice

Management

Diagnosis

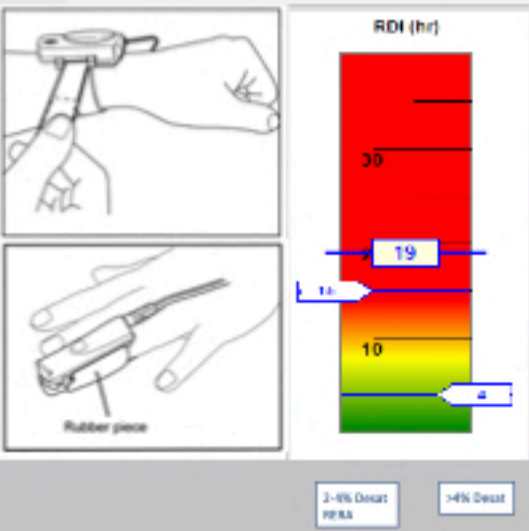
Sleep Grinding Airway Related

Pattern

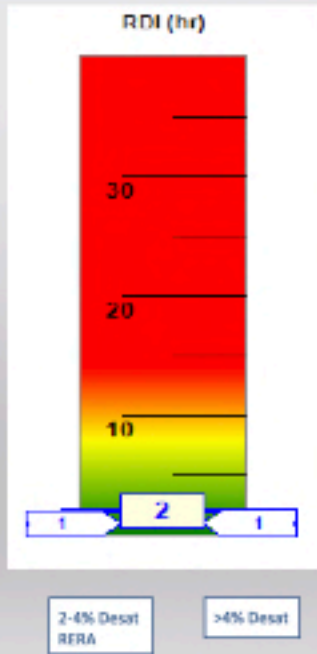
Worn Teeth
Upper Airway Resistance

~~Treatment~~

Mandibular Advancement
Appliance (after MD approves)



Pulse Ox Screening
 Refer to Medical Sleep Doctor
 Get approval for Mandibular Advancement Appliance
 Verify Airway Improves
 19 events/hr before
 2 events/hr with Orthotic



PULSOX 300i, Konica Minolta
with data analysis Patient Safety, Inc.

Nylon MAD
Great Lakes Ortho



6 Common TMDs

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Acute Closed Lock TMJ	Sore TMJ Limited opening Hard end point active stretch	Arthrocentesis with PRP

Occlusal Muscle Disharmony

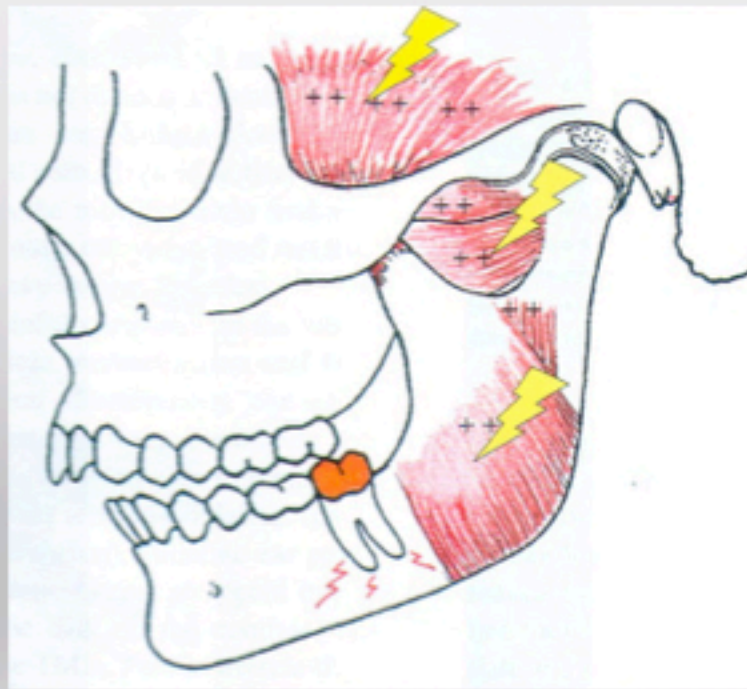
Uneven tooth contact with condyles fully seated triggers muscle activity

Lateral pterygoid fires out of sequence to create even tooth contact on closure

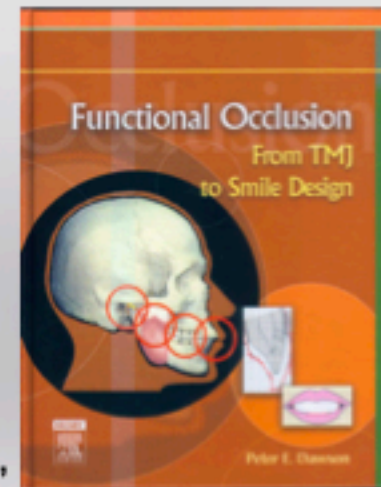
Disharmony in all muscles: Splinting/Bracing

Muscles sore from overuse

Muscles do not think- CNS input

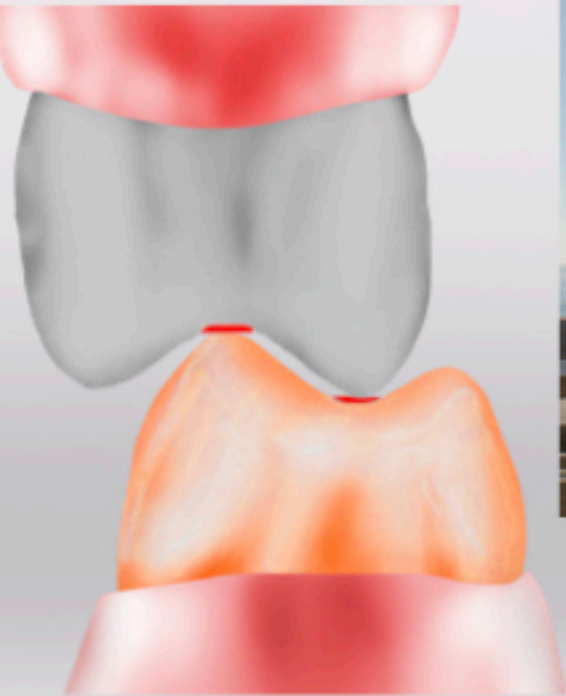


from Dawson's Textbook, "Functional Occlusion"



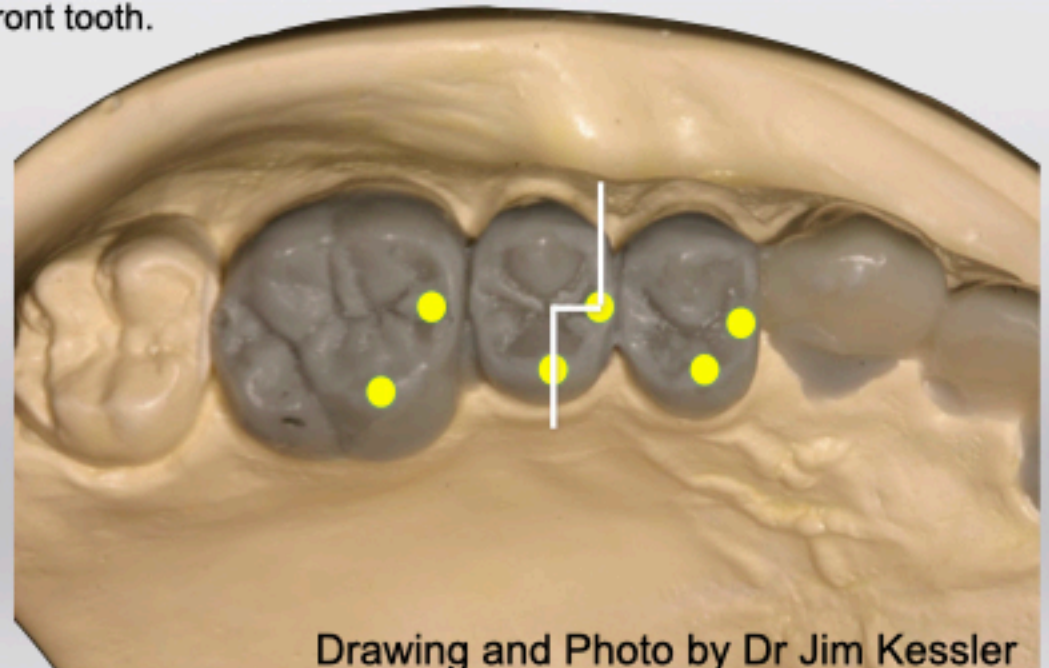
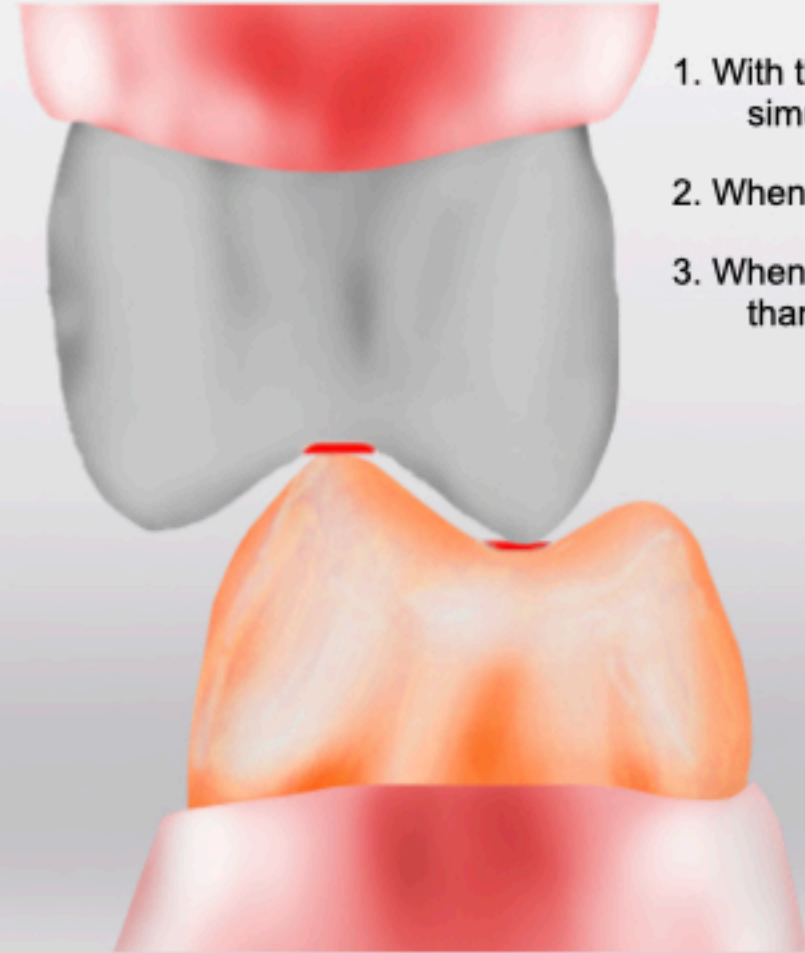
2. When you squeeze, neither a tooth nor the mandible moves (in a lateral direction).

Rule #2 = Flat Landing Area



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.



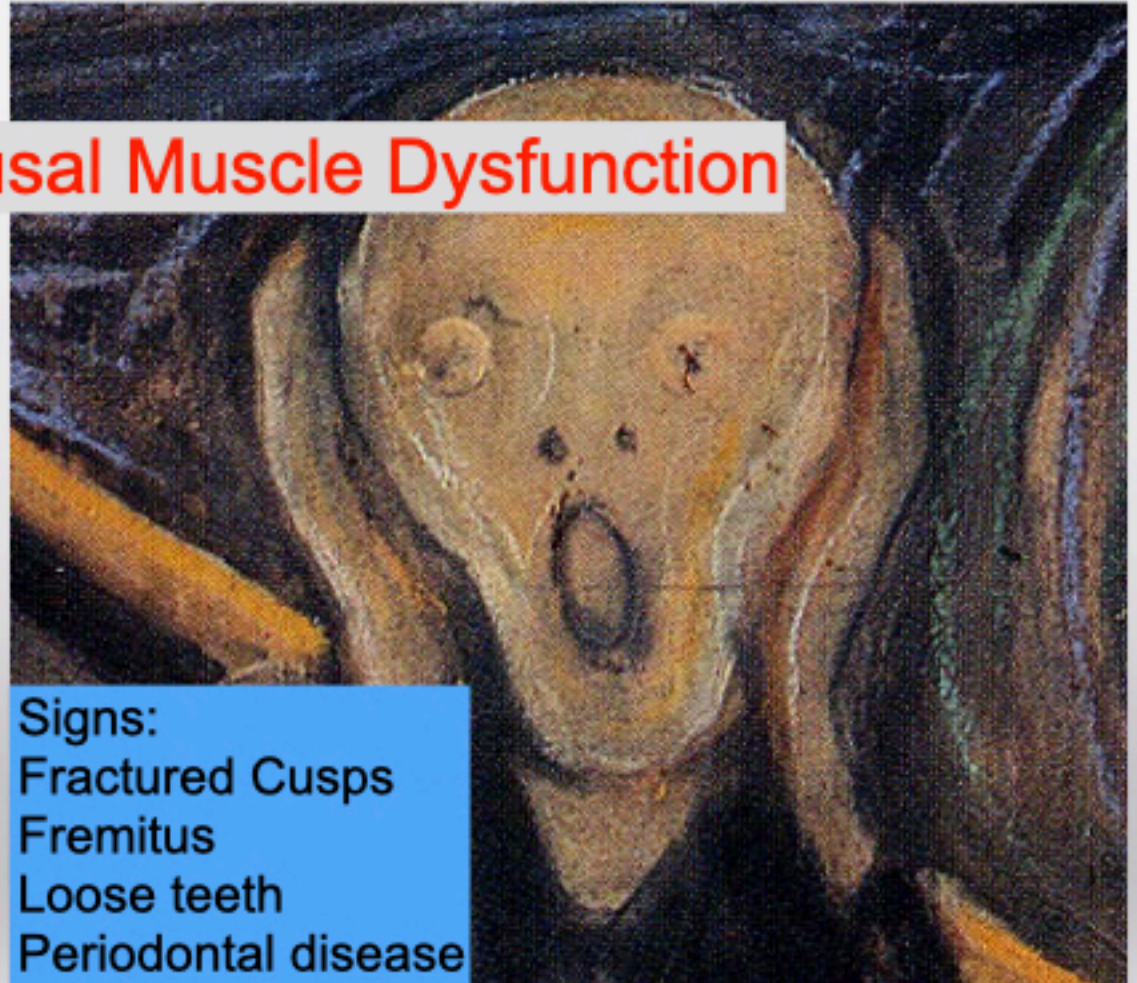
Drawing and Photo by Dr Jim Kessler

TMD Symptoms

Sore TM Joint
Sore TMJ muscles
Difficulty chewing
Headaches
Eye pain
Ear pain
TMJ clicking
Jaw locking
Limited opening
Difficulty open jaw
Difficulty closing jaw
Anterior Open Bite

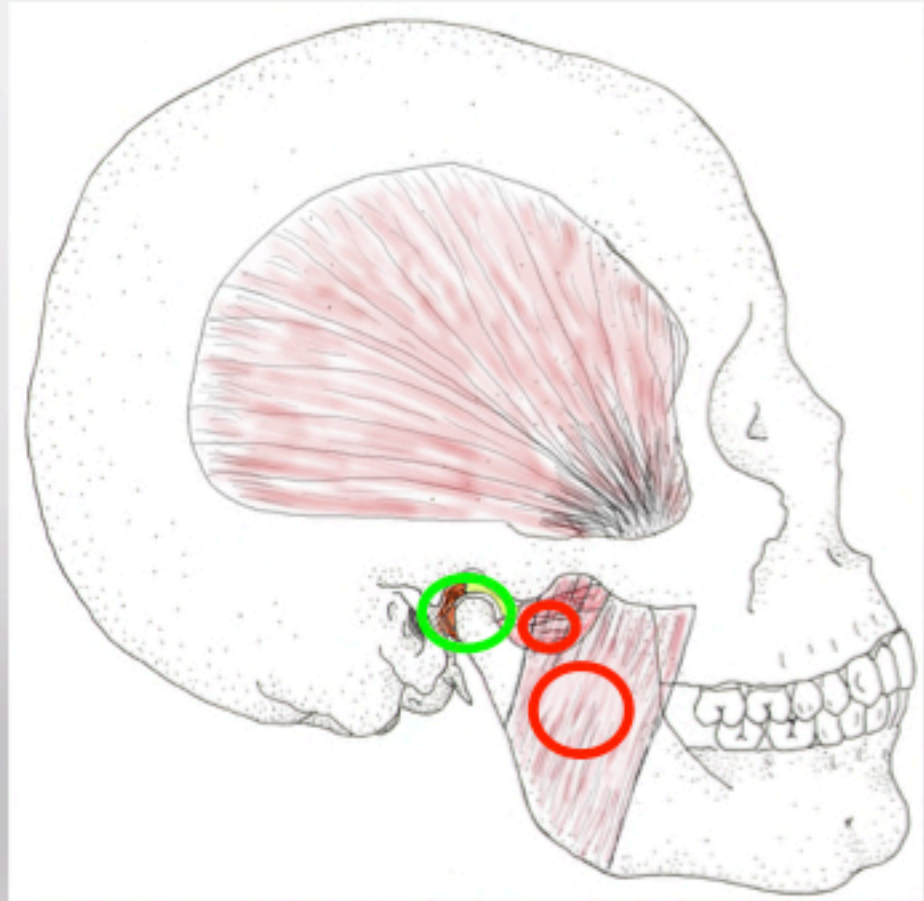
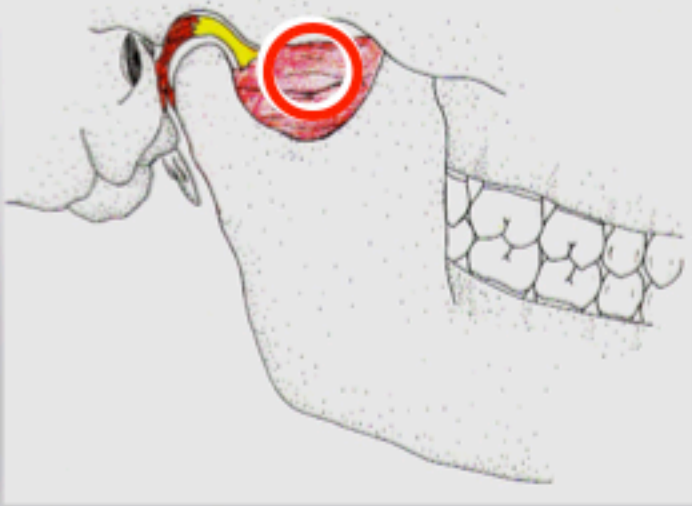
Occlusal Muscle Dysfunction

Signs:
Fractured Cusps
Fremitus
Loose teeth
Periodontal disease



Occlusal Muscle Dysfunction Pattern

Sore muscles when chewing
Sore Lateral Pterygoid
TMJ is not sore
Day orthotic relieves symptoms



Drawings by Gretta Tomb DDS and John Droter DDS

Occlusal Muscle Dysfunction Diagnostic Tests

Occlusal Muscle Dysfunction is a daytime problem

Clenching can be both a daytime and nighttime problem

>30% of headaches have an occlusal component

Occlusal adjustment in patients with craniomandibular disorders including headaches. A 3- and 6-month follow-up. Vallon D, Ekberg E, Nilner M. Acta Odontol Scand. 1995

D-PAS 2 week trial



OR

3-6 week lower CR orthotic



Response to occlusal treatment in headache patients previously treated by mock occlusal adjustment. Forssell H, Kirveskari P, Kangasniemi P. Acta Odontol Scand. 1987

Diagnostic Palatal Anterior Stop

D-PAS Test: Wear for 2 weeks, 24/7, take out to eat

Better- Decrease in Symptoms

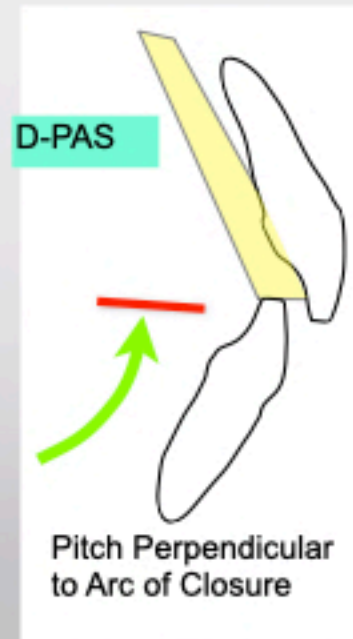
Sleep Clenching Inhibited: Wear D-PAS as night guard
Orthotic Improved Airway: D-PAS as night guard
Occlusal Muscle Disharmony: Occlusal Adjust

Worse- Increase in Symptoms

Mechanically Unstable TMJ, joint subluxation
Intracapsular Problem TMJ
Orthotic Made Sleep Airway Worse

Stays the Same- No Change in Symptoms

Damaged TMJ are mechanically stable
Pain not related to occlusion



Stapelmann H, Türp JC. The NTI-tss device for the therapy of bruxism, temporomandibular disorders, and headache.....BMC Oral Health. 2008 Jul PMID: 18662411



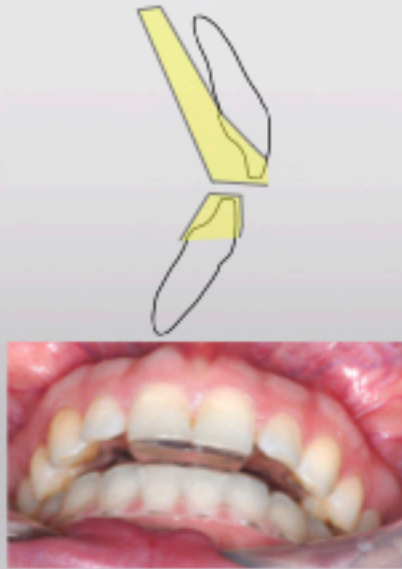
Nate Brock, CDT
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3D Printed Orthotics

D-PAS
Diagnostic-
Palatal Anterior Stop



Brux-PAS
with lower Essix



Hard Lower Posterior Stop
with upper essix



Hard Lower Full Coverage
Centric Relation Orthotic



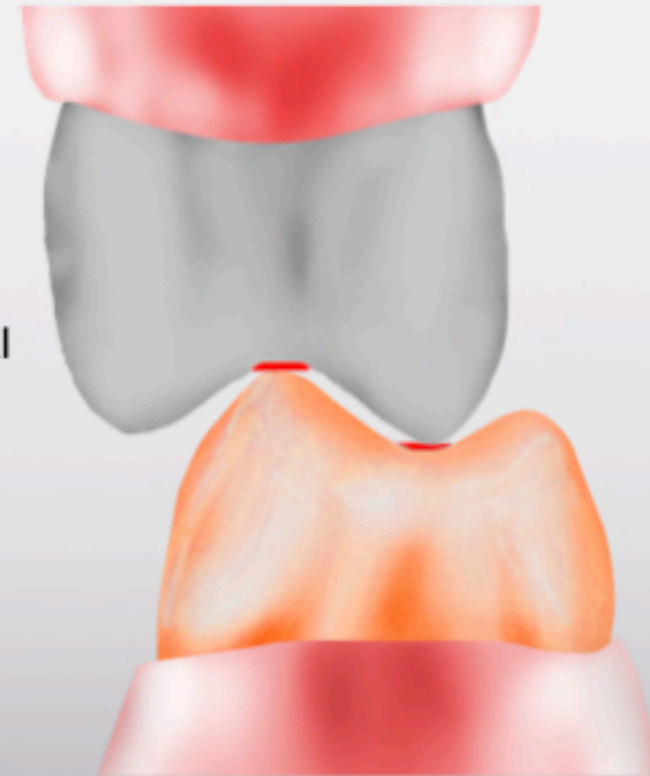
LD Pankey's 3 Rules of Occlusion

(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

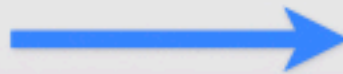


Drawing by Dr Jim Kessler

Treat Occlusal Muscle Dysfunction- Adjust the Occlusion



Teeth reshaped so all teeth hit even with condyles seated in fossa. Posterior teeth separate on lateral and anterior excursions.



Before

After



Occlusal Sculpting Tools, including Zirconia



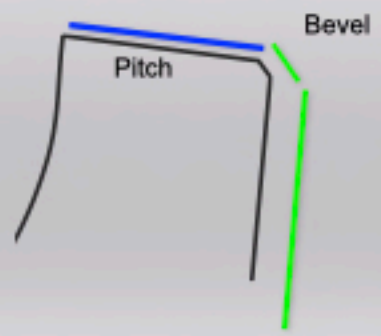
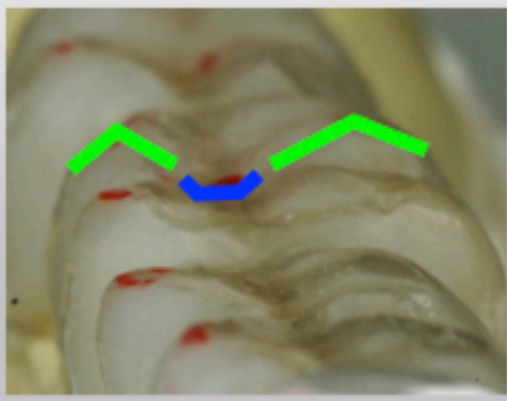
Wheel
 Create Cusp Landing Zone
 Flatten Incisal edges
 Bulk reduction of inclines



Move and Shape Cusps,
 Inclines, Facial Surfaces



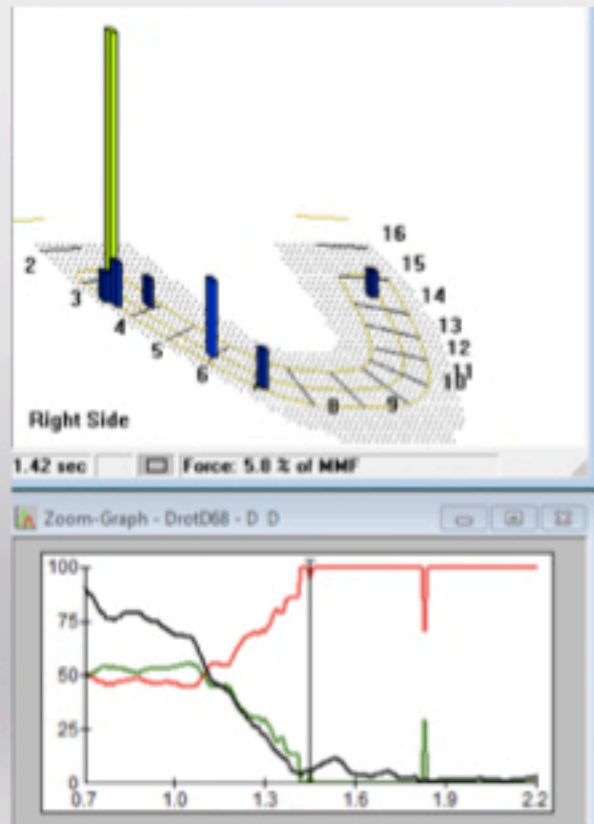
Brassler Brio Shine
 FLBCER-1
 FLBF-2



Premier 860.9 F Wheel Diamond
 Premier 230 F Barrel Diamond
 Neodiamond 1118.7F Roundend taper
 Dedco Green Stone
 White Arkansas stone
 Filtek Supreme- B1B, Albond

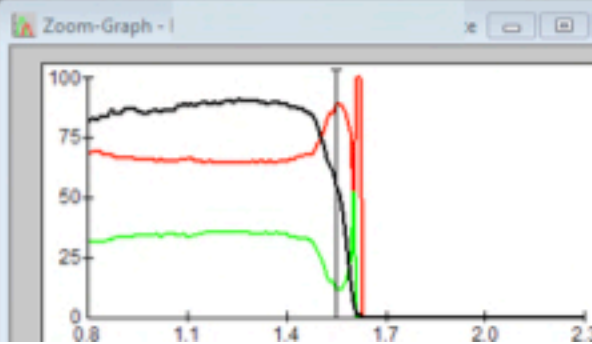
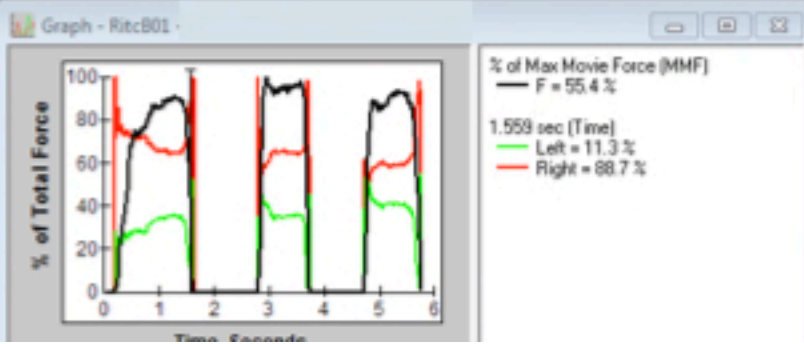
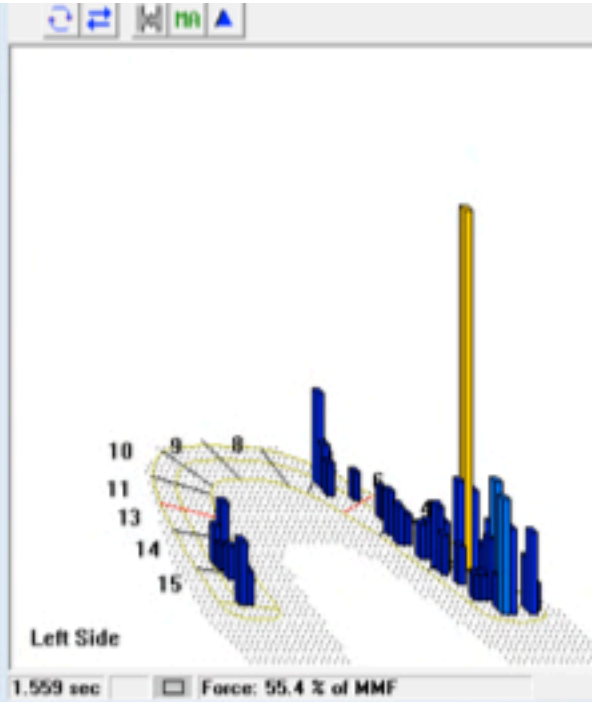
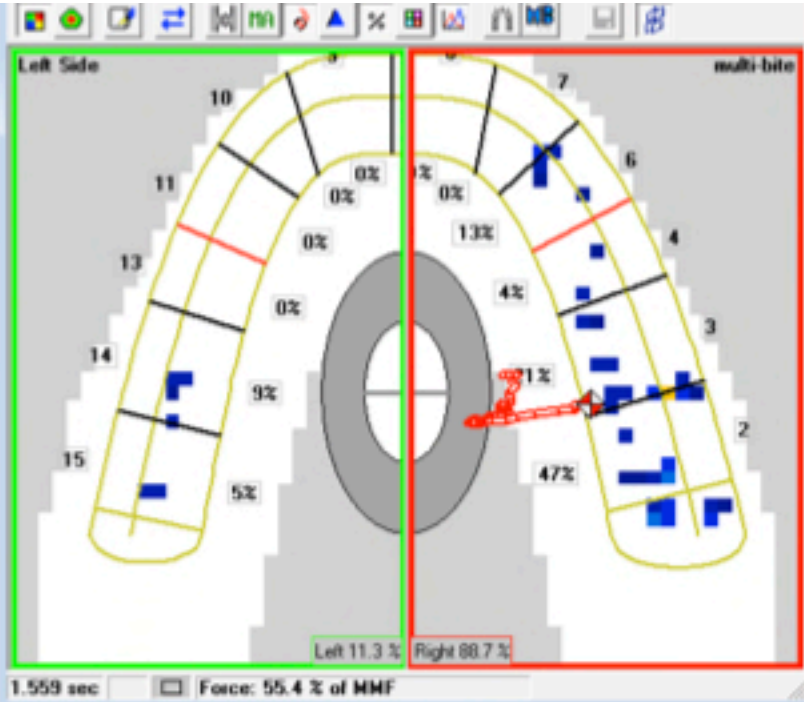
The indispensable value of T-Scan is not in finding heavy CR contacts, but working and nonworking contacts.

Is that a smudge or a muscle activating interference?



Remove too much and you decrease the ability to chew, especially lettuce. Chewing lettuce requires posterior inclines coming close enough to chew, but far enough apart to not touch and activate muscle.

T-Scan is excellent for Patient Education of Occlusal Pathology

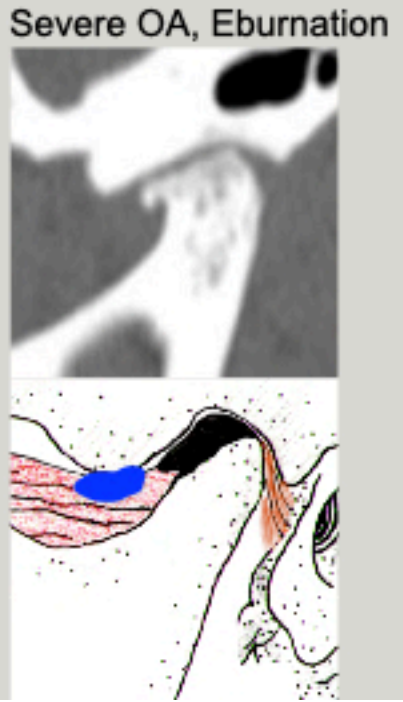
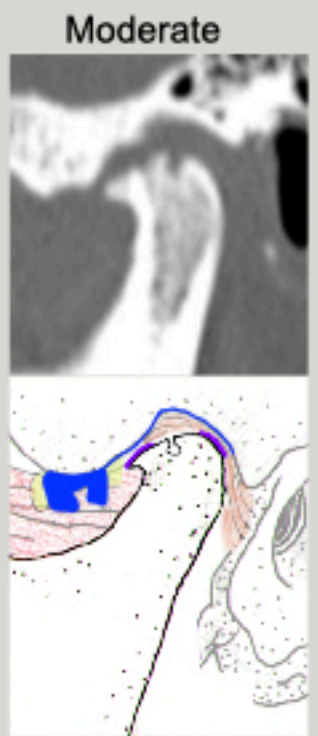
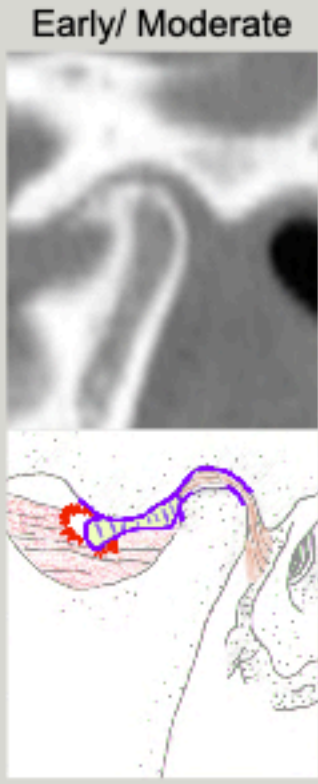
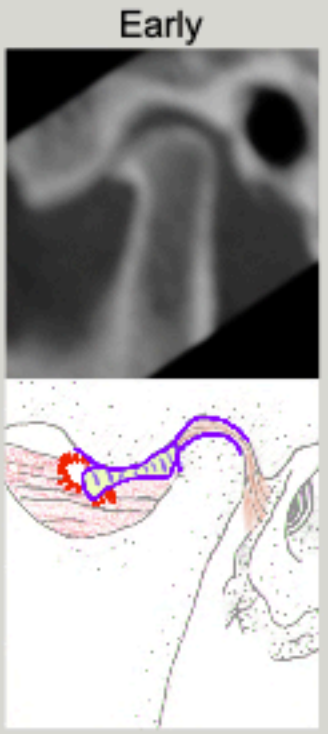
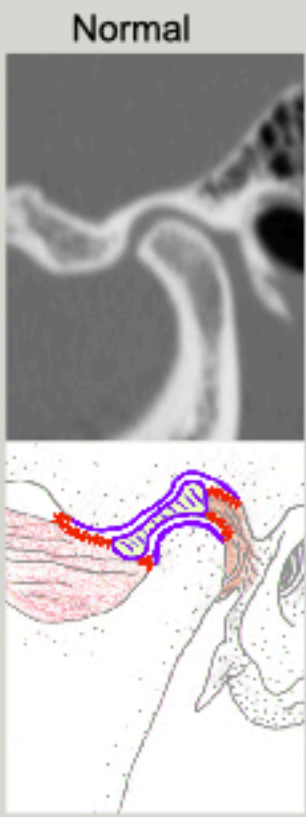


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Osteoarthrosis/Osteoarthritis

Healthy joints have no friction or wear.
Damaged joints have Friction. Friction causes wear.
OA is a wearing out of a joint which starts in cartilage.
Parafunction increases wear.



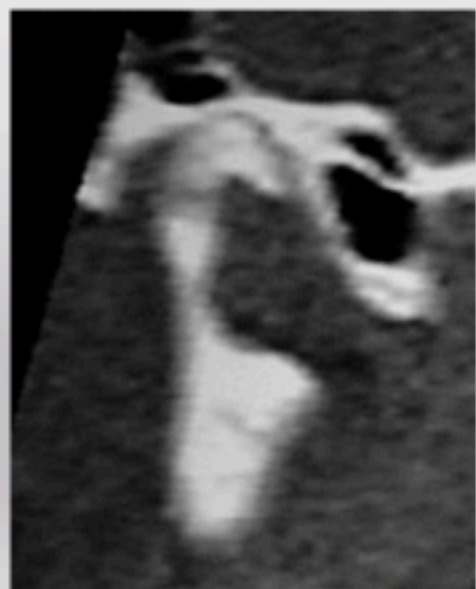
Representative examples of OA in different patients

Drawings by Gretta Tomb DDS and John Droter DDS

Adaptation Chronic Bilateral Osteoarthritis

Mandible recedes Slowly
Teeth Move/ Adapt
Anterior Guidance gets steeper as Condylar Guidance get shallower

OA Right and Left Bone Loss
#8 Ankylosed



Treatment OA

Osteoarthrosis

Glucosamine 1500mg /Chondroitin 600 mg per day

Minimize parafunction:

If sleep grinding due to airway
CPAP or Dental Airway Device

Osteoarthritis

All of the above plus eliminate inflammation.....

NSAIDs for 6+ weeks

Cold Laser

If still inflamed arthrocentesis with
Platelet Rich Plasma (PRP)



Shea Brand CBD



MLS Laser
9 sessions over 4 weeks

MLS Laser: BioResearch

Multiwave Locked System Laser

808 nm Continuous, 905 nm Pulsed

Diode Laser

Stimulates metabolic processes in cells
Increase release NO from cells
Decrease inflammation
Pain Reduction
Faster Healing
Eliminates Trigger Points
Much better than Dry Needling



Chung, H., Dai, T., Sharma, S. K., Huang, Y.-Y., Carroll, J. D., & Hamblin, M. R. (2012). The nuts and bolts of low-level laser (light) therapy. *Annals of Biomedical Engineering*, 40(2), 516–533.

Ilbuldu E, Cakmak A, Disci R, Aydin R. Comparison of laser, dry needling, and placebo laser treatments in myofascial pain syndrome. *Photomed Laser Surg*. 2004 Aug;22(4):306-11.

Treatment OA

Osteoarthrosis

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CPAP or Dental Airway Device

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Osteoarthritis

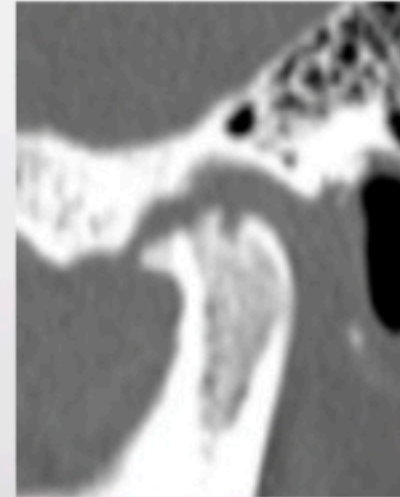
All of the above plus eliminate inflammation.....

NSAIDs

Cold Laser

If still inflamed arthrocentesis with Platelet Rich Plasma (PRP)

If still pain in 6 -12 weeks of NSAID:
Arthrocentesis
Platelet Rich Plasma



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6 Common TMDs

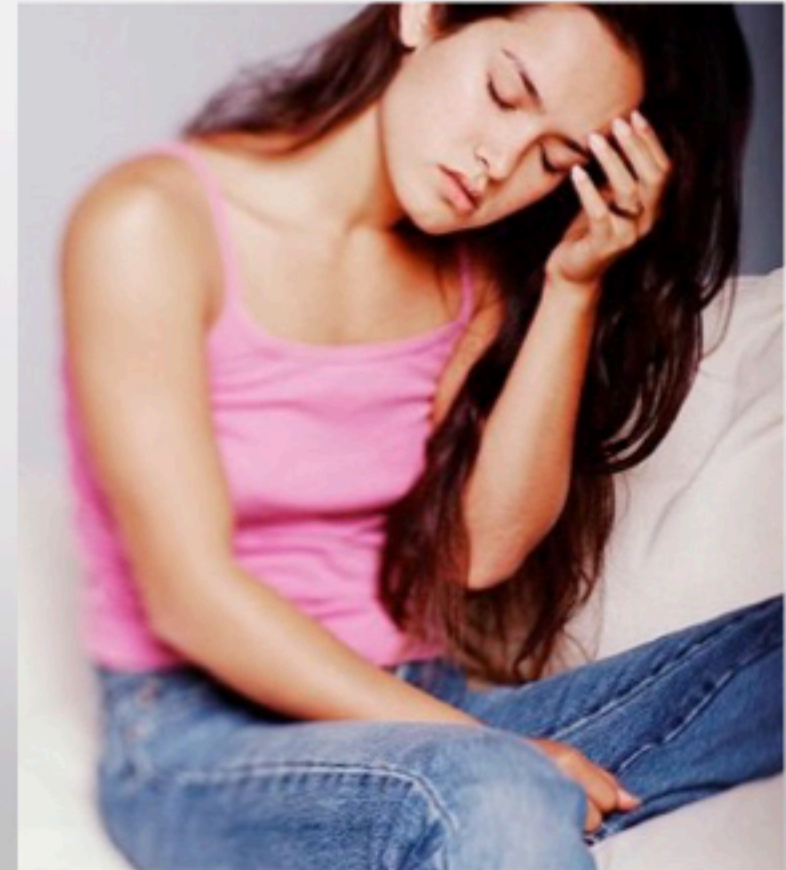
- Parafunctional Clenching
- Parafunctional Grinding
- Occlusal Muscle Dysfunction
- Osteoarthritis
- Acute Sprain
- Acute Closed lock of TMJ disc

5 Common Obstacles

- Neck and Postural Instability
- Wobbly TM Joint (Subluxation)
- Compromised Breathing/Airway
- Avascular Necrosis
- Referred Pain Muscle Triggerpoints

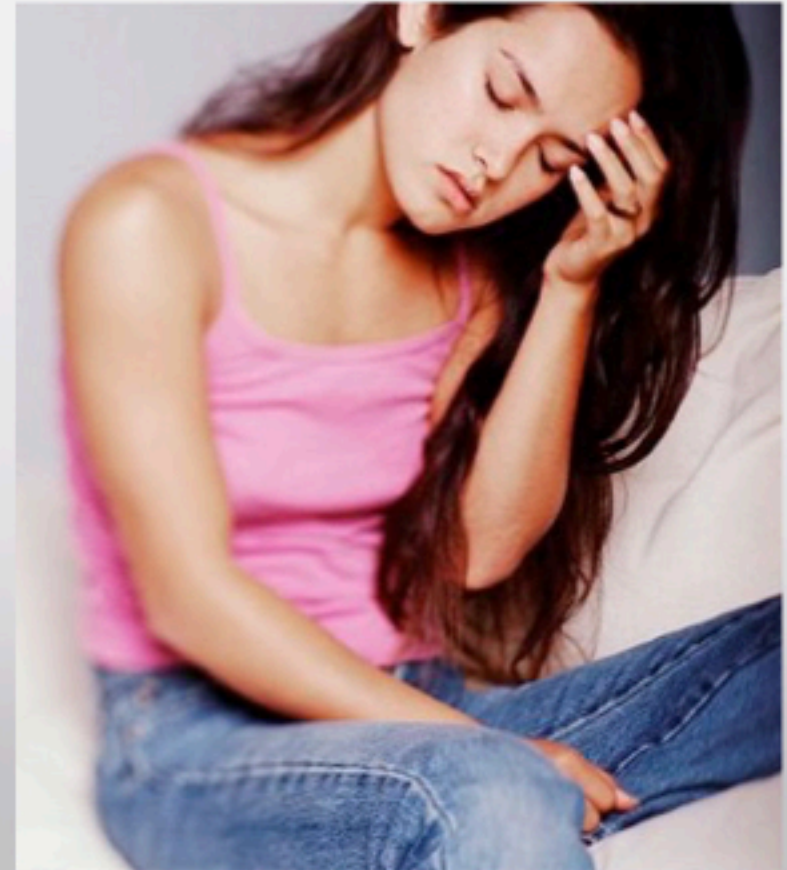
1 TMD that **usually** does not need therapy

- TMJ Clicking



5 Common Obstacles

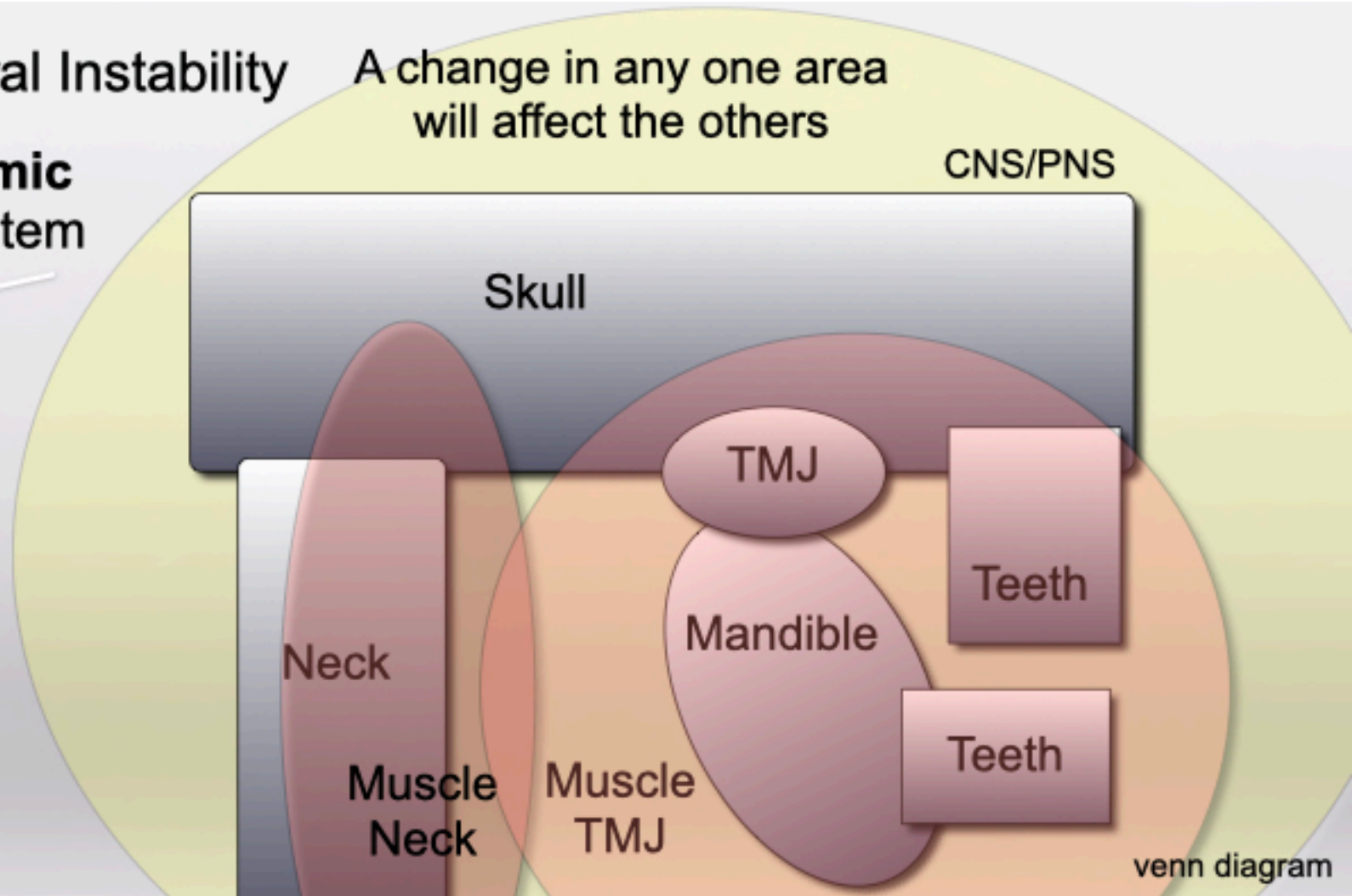
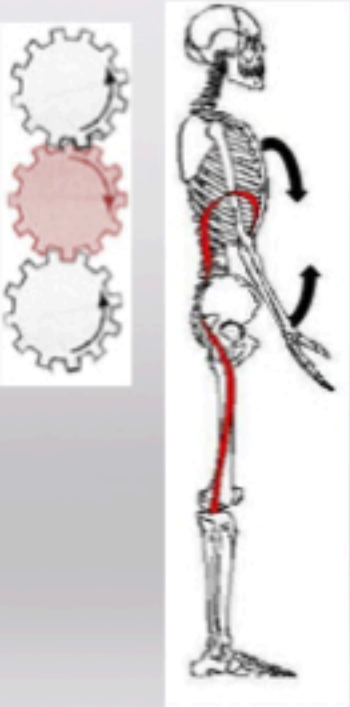
Neck and Postural Instability
Wobbly TM Joint (Subluxation)
Compromised Breathing/Airway
Avascular Necrosis
Referred Pain Muscle Triggerpoints



Neck and Postural Instability

A change in any one area will affect the others

This is a **dynamic** orthopedic System



venn diagram

Non-Linear Joint Deformity- Mechanically Unstable TMJs- “Wobbly Joint”

TM Joint subluxates under load
Adapted CR “wobbles”

TMJ Muscle hyperactivity
Looks similar to OMD
Muscles must stabilize the joint
Deep temporalis especially sore

Clinically:
Hypersensitive bite
Increase muscle pain with anterior deprogrammer
Continued muscle disharmony with flat plane orthotics
CT Scan- CR load zone not medial
JVA- after tooth tap see “wobble- 50hz vibration

How to Avoid Missing Dx- Offer complete exam to crown patients
Include anterior stop dx test
Let patients decide which risk to take.

Treatment: Lock-in Orthotic 6 months, the CR orthotic, then D-PAS.



Diagnostic Palatal Anterior Stop

D-PAS Test: Wear for 2 weeks, 24/7, take out to eat

Better- Decrease in Symptoms

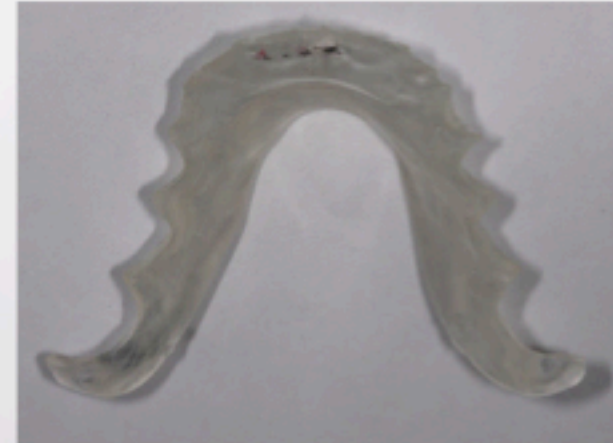
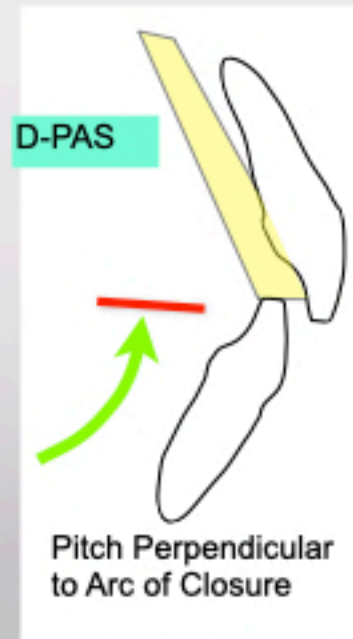
- Sleep Clenching Inhibited: Wear D-PAS as night guard
- Orthotic Improved Airway: D-PAS as night guard
- Occlusal Muscle Disharmony: Occlusal Adjust

Worse- Increase in Symptoms

- Mechanically Unstable TMJ, joint subluxation
- Intracapsular Problem TMJ
- Orthotic Made Sleep Airway Worse

Stays the Same- No Change in Symptoms

- Damaged TMJ are mechanically stable
- Pain not related to occlusion



Stapelmann H, Türp JC. The NTI-tss device for the therapy of bruxism, temporomandibular disorders, and headache.....BMC Oral Health. 2008 Jul PMID: 18662411

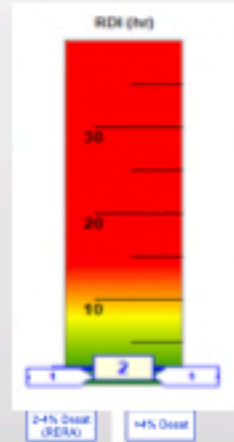
Age 16F
 cc: Facial Pain, Excessive Daytime Fatigue



Medical Sleep Study in Lab RDI = 1
 Dx: Snoring without evidence of gas exchange abnormalities or sleep disruptions

Sleep Latency Test
 Dx: Narcolepsy
 Recommend daytime medication

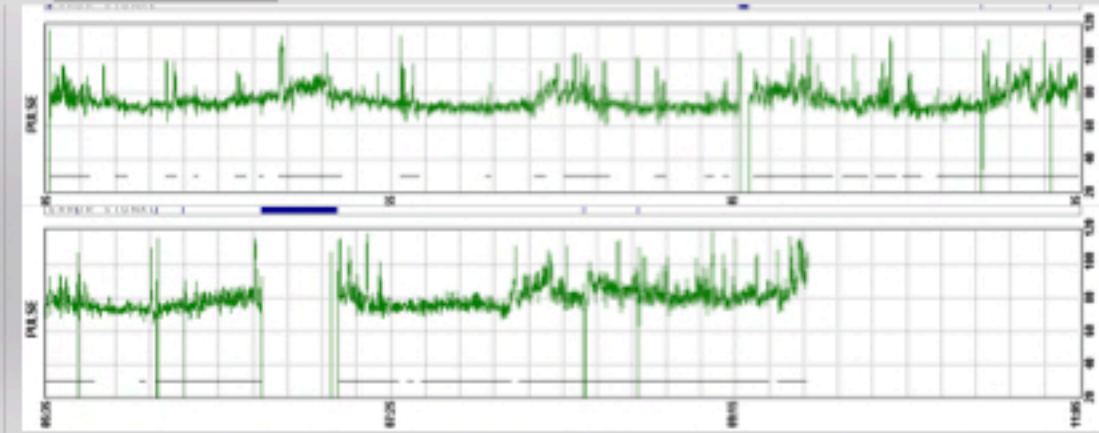
Patient Safety Inc Pulse Ox Sleep Screening
 RDI = 2, Autonomic Arousal **31 /h**



PULSE RATE DATA	
Autonomic Arousal	
Index (#/hr):	31
Pulse Rate Range	
Mean:	78
Min:	34
Max:	122
Tachycardia - Sleep (>90 bpm)	
Duration:	00:34:56
% (VRT):	6%
Bradycardia - Sleep (<50 bpm)	
Duration:	00:00:35
% (VRT):	0%



Heart Rate
 >90 bpm
 for 35 min



Disordered Breathing Disease Progression

Disease Stage 1

Predisposing Factors

Small Airway

Tongue Tie, Lip Tie
Bottle Fed as Infant
Dysfunctional Swallow
Allergies
Nasal Obstruction
Large Tonsil
Large Adenoids
Large Tongue
Mid-face Deficient
Mandibular Deficient
4 Bicuspid Extraction

Disease Stage 2

Compensation: Airway Maintained

Signs

Mouth Breathing
Head Postured Forward
Jaw Postured Forward
Tongue Bracing
Indents in Tongue
Sore Masseters
Sore Neck Muscles

Symptoms

Facial Ache
Not Waking Rested
Daily Fatigue
Neck Soreness

Disease Stage 3

Sleep Airway Partial Collapse

Signs

All of stage 1 and 2 plus.....
Upper Airway Resistance
2-4% Drop O₂ Saturation
RERA- Respiratory Arousals
Sleep Teeth Grinding
↓ Growth Hormone

Symptoms

Heart Rate Fluctuation
Snoring or "Purring"
Weight Gain
Cognitive Impairment, ADD
Hyperactivity

Disease Stage 4

Sleep Airway Full collapse

Signs

All of stage 1, 2, 3 plus....
4%+ drop O₂ Saturation
Apnea
Cardiovascular Damage
Elevated BP
GERD

Symptoms

All of stage 2, 3 plus....
Worn Teeth

Disordered Breathing Disease Stage 4

OSA- Obstructive Sleep Apnea

AHI- Apnea Hypopnea Index

Apnea and Hypopnea events per hour

Apnea- Stop airflow for 10 seconds

Hypopnea- <50% airflow or 4+% O₂ Desaturation

Disease Stage 1	Disease Stage 2	Disease Stage 3	Disease Stage 4
<p>Predisposing Factors</p> <p>Small Airway</p> <p>Tongue Tie, Lip Tie</p> <p>Bottle Fed as Infant</p> <p>Dysfunctional Swallow</p> <p>Allergies</p> <p>Nasal Obstruction</p> <p>Large Tonsil</p> <p>Large Adenoids</p> <p>Large Tongue</p> <p>Mid-face Deficient</p> <p>Mandibular Deficient</p> <p>4 Bicupid Extraction</p>	<p>Compensation: Airway Maintained</p> <p>Signs</p> <p>Mouth Breathing</p> <p>Head Postured Forward</p> <p>Jaw Postured Forward</p> <p>Tongue Bracing</p> <p>Indents in Tongue</p> <p>Sore Masseters</p> <p>Sore Neck Muscles</p> <p>Symptoms</p> <p>Facial Ache</p> <p>Not Waking Rested</p> <p>Daily Fatigue</p> <p>Neck Soreness</p>	<p>Sleep Airway Partial Collapse</p> <p>Signs</p> <p>All of stage 1 and 2 plus....</p> <p>Upper Airway Resistance</p> <p>2-4% Drop O₂ Saturation</p> <p>RERA- Respiratory Arousal</p> <p>Sleep Teeth Grinding</p> <p>↓ Growth Hormone</p> <p>Symptoms</p> <p>Heart Rate Fluctuation</p> <p>Snoring or "Purring"</p> <p>Weight Gain</p> <p>Cognitive Impairment, ADD</p> <p>Hyperactivity</p>	<p>Sleep Airway Full collapse</p> <p>Signs</p> <p>All of stage 1, 2, 3 plus....</p> <p>4%+ drop O₂ Saturation</p> <p>Apnea</p> <p>Cardiovascular Damage</p> <p>Elevated BP</p> <p>GERD</p> <p>Symptoms</p> <p>All of stage 2, 3 plus....</p> <p>Worn Teeth</p>

John R. Droter DDS

AHI 1-4
"Normal" ??

AHI 5-15
Mild OSA

AHI 15-30
Moderate OSA

AHI 30+
Severe

Signs

- Apnea
- 4% drop O₂ Saturation
- Cardiovascular Damage
- Elevated BP
- GERD

Symptoms

- Not Waking Rested, Daily Fatigue
- Cognitive Impairment

Irreversible Damage

John R. Droter DDS

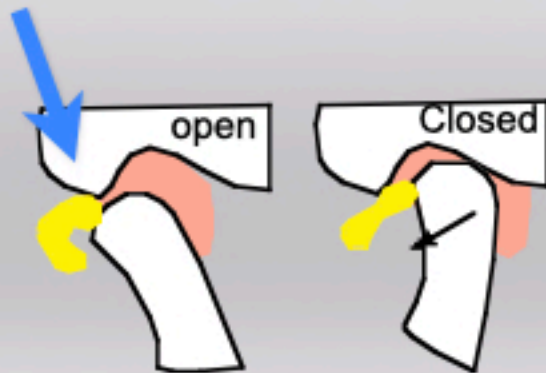
When the clicking stops (4a to 4b):

Condyle Distalized

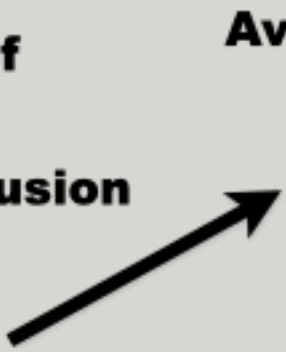
Venous return compromised

Compromised Condylar Perfusion
Blood flow through condyle is decreased

Disc Anterior

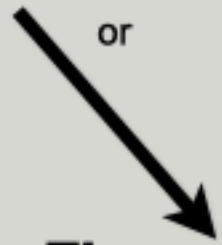


3 Outcomes of Compromised Condylar Perfusion



Bone cells die

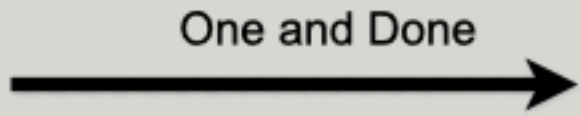
Avascular Necrosis



or

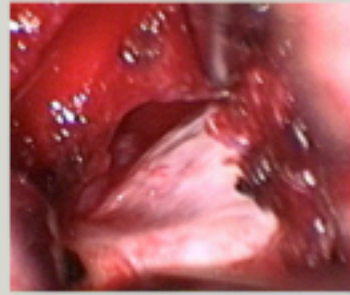
Inflammatory Tissue Bone Resorption

Cortex Collapses, Cartilage tears
 Inflamed tissue contacting bone
 Inflammatory cells activate Osteoclasts



One and Done

Condyle collapses 1y later.
 Cartilage remains intact
 Occlusion shifts once, AVN is finished.



Nothing

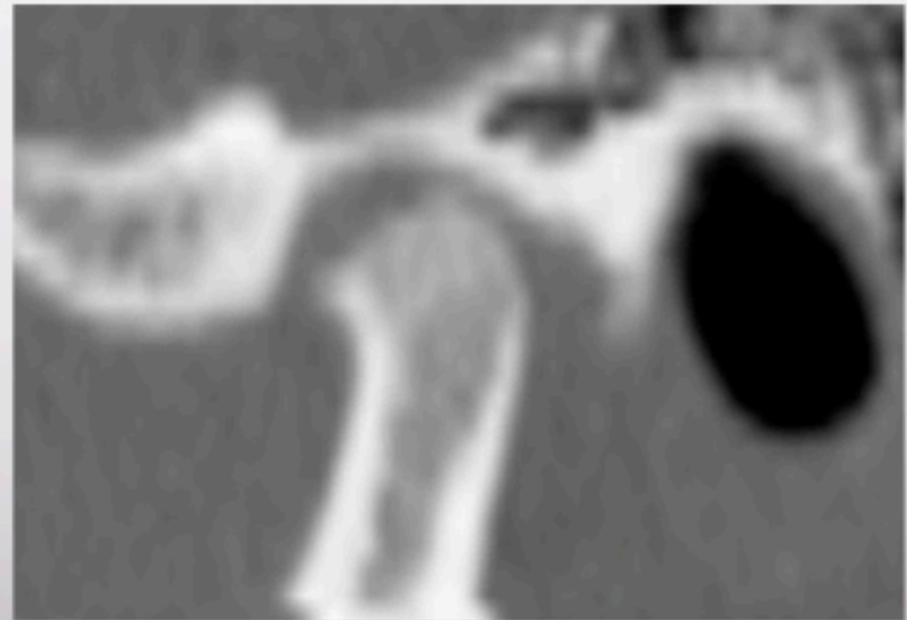
Compromised but adequate.
 99% patients have no problems

Droter JR, An orthopaedic approach to the diagnosis and treatment of disorders of the temporomandibular joint. Dent Today 2005 Nov;24(11):82, 84-8

Hypoxia Induced Progressive Condylar Resorption HI-PCR

On CT see Flat condylar surface
Missing Subchondral Cortex During Active Phase
Slow, Progressive Condylar Resorption

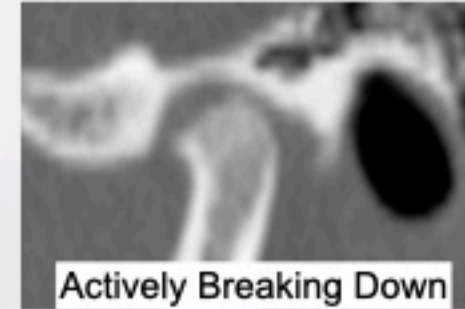
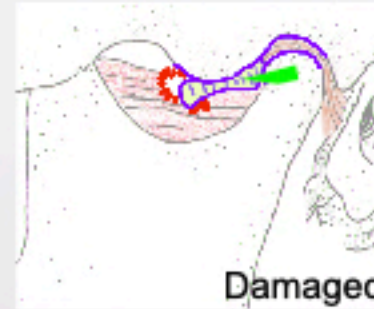
Occlusion will constantly be changing



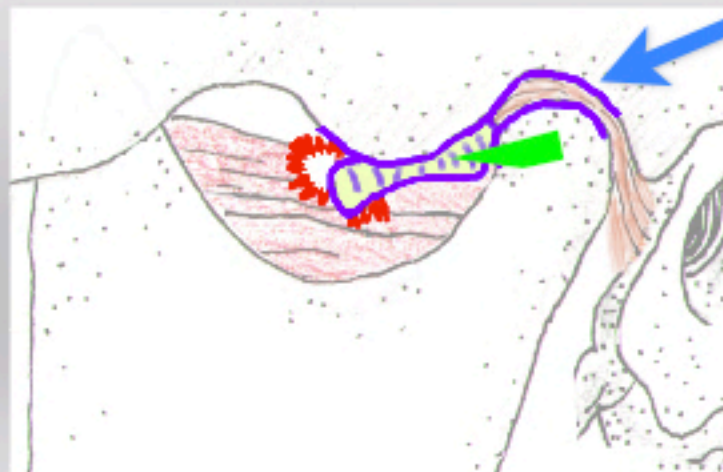
Basic Orthopedics

Joints are either
Healthy or
Damaged

If damaged, joints will be either:
Actively Breaking Down
Adapting
Adapted
Structurally, Mechanically
Favorably, Unfavorably



Majority of damaged
TMJs adapt favorably



Posterior ligament, synovium,
and retrodiscal tissue adapt to
form a
Pseudo-disc

Tissue Fibrosis

Adult Onset Anterior Open Bite Differential Diagnosis

Developed Post-Puberty



TMJ has changed

TMJ Bone Loss (See bone loss choices)

Recent Large Disc Displacement

Condylar Fracture

Teeth have moved

Tongue- used as occlusal cushion

Tongue used to stabilize neck or TMJ

Iatrogenic- Orthotics, Retainers

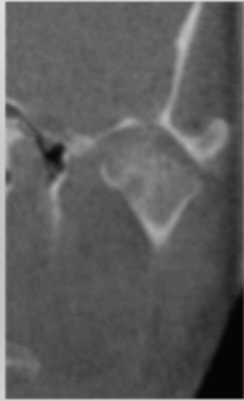
Both have loss of anterior coupling

Anterior Openbite with Active TMJ Bone Loss

Non Surgical Therapies



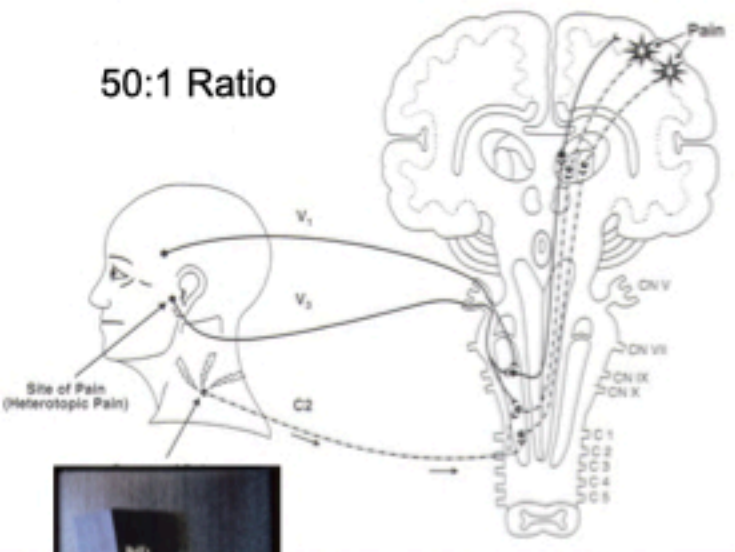
Condylar Distraction
Anti Inflammatory Medications



Referred Pain Convergence

More primary sensory neurons than secondary neurons that travel to brain

50:1 Ratio



"Bell's Orofacial Pain"
Jeffery Okeson

Trigger Points

Contracted mass of actin, myosin and histamine

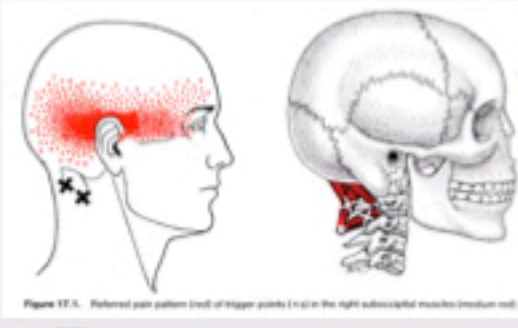
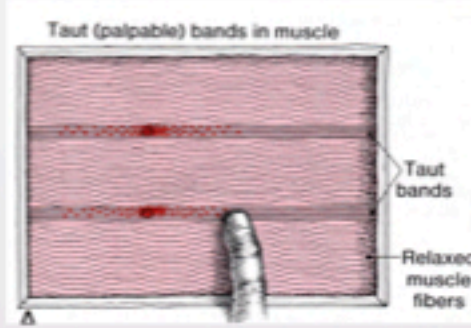
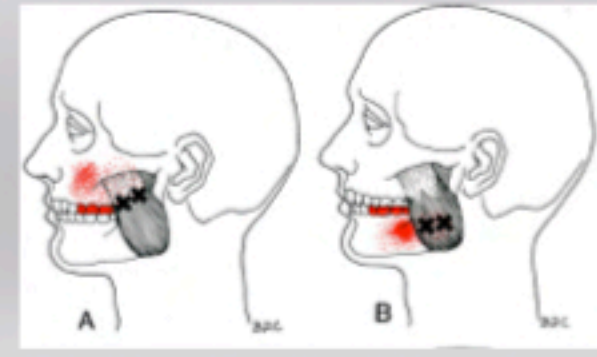
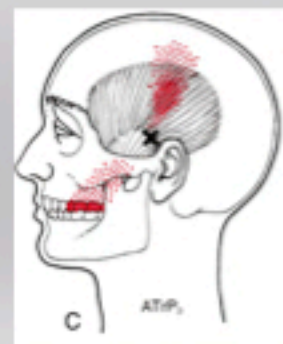
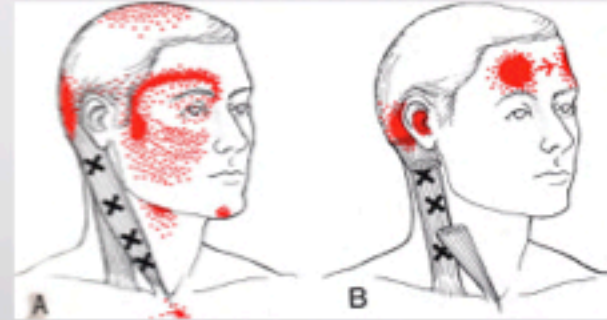


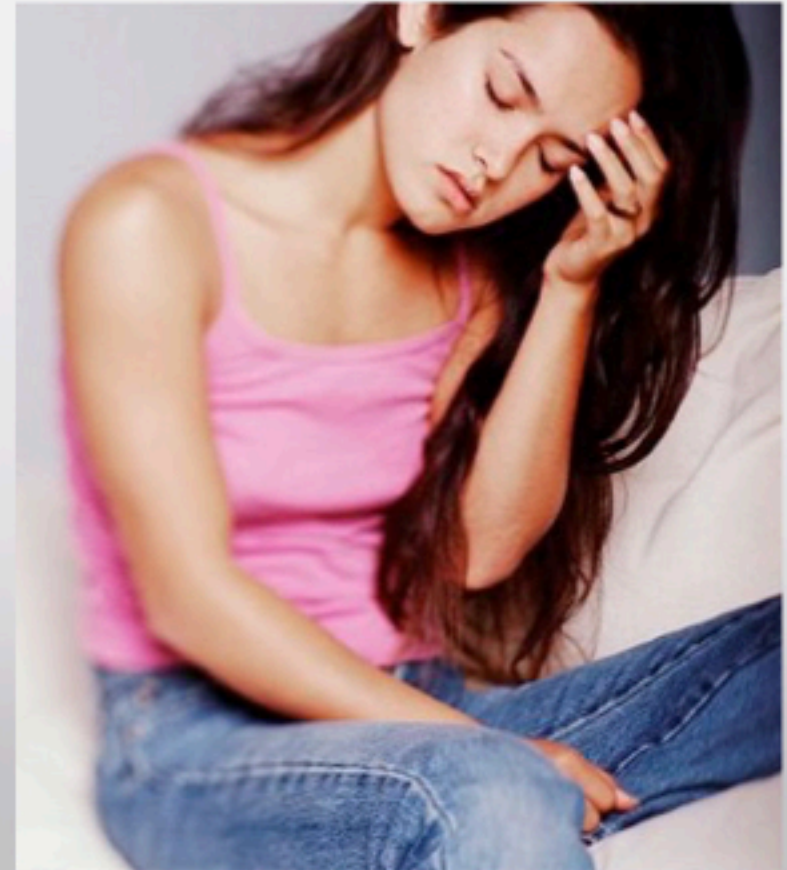
Figure 17.3. Referred pain pattern (red) of trigger points (x) in the right suboccipital muscles (medium rest)

"The Trigger Point Manual"
Janet Travell, MD



5 Common Obstacles

Neck and Postural Instability
Wobbly TM Joint (Subluxation)
Compromised Breathing/Airway
Avascular Necrosis
Referred Pain Muscle Triggerpoints



6 Common TMDs

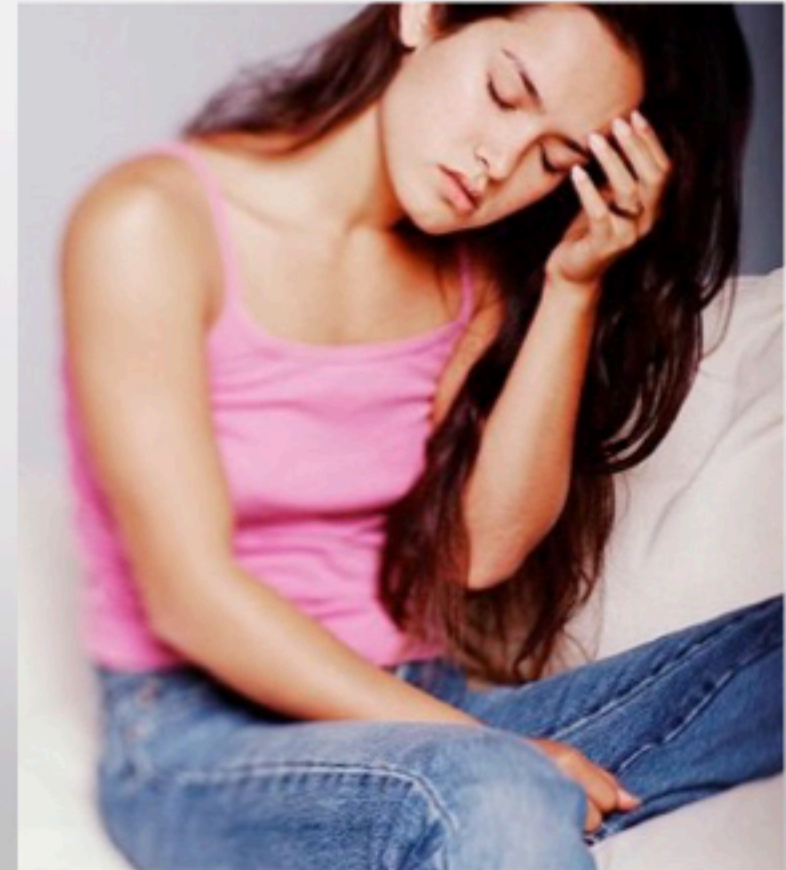
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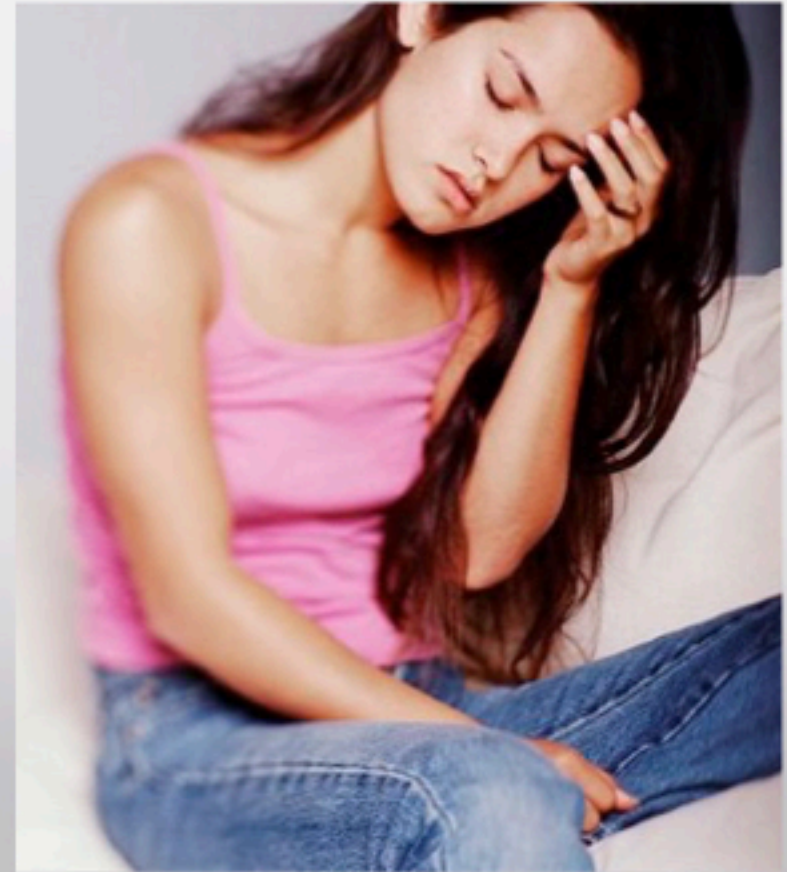
1 TMD that **usually** does not need therapy

- TMJ Clicking



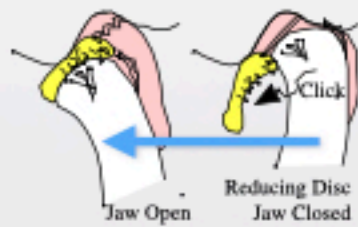
1 TMD that **usually** does not need therapy

TMJ Clicking

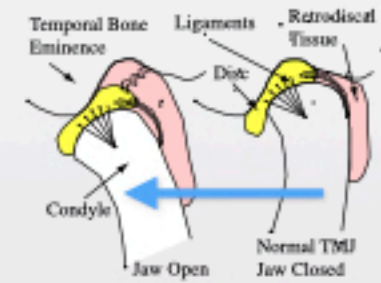


Differential Diagnosis of TMJ Clicking

Disc Reduction



Normal



Adhesive Click



“Sticky Disc” - Disc sticks after prolonged clenching, then releases

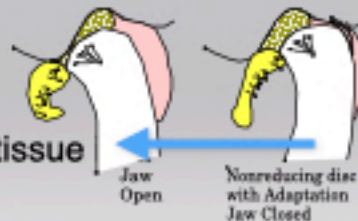
Eminence Thud



A hypermobile condyle moves past the crest of the eminence and makes a thud sound

Adhesion Crackle

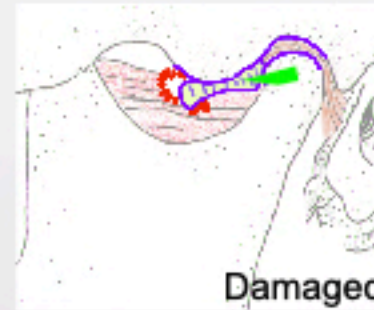
A small piece of fibrous tissue in joint is moved across



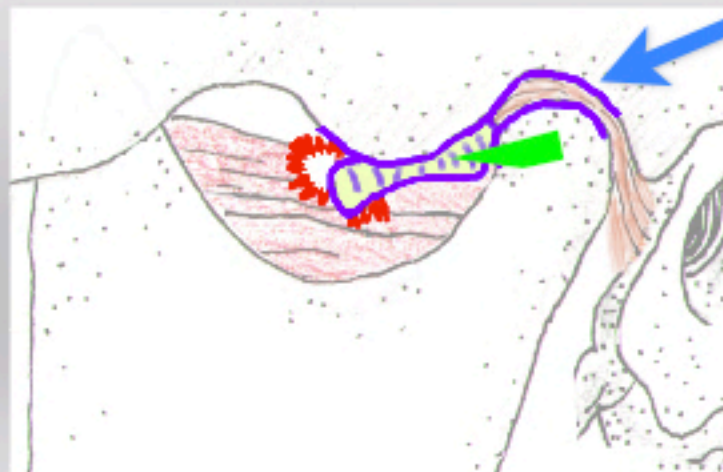
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If damaged, joints will be either:
Actively Breaking Down
Adapting
Adapted
Structurally, Mechanically
Favorably, Unfavorably



Majority of damaged
TMJs adapt favorably



Posterior ligament, synovium,
and retrodiscal tissue adapt to
form a
Pseudo-disc

Tissue Fibrosis

Symptoms of Temporomandibular Joint Osteoarthritis and Internal Derangement 30 years after Non-Surgical Treatment.

Leeuw, Boering, Stegenga, Bont,

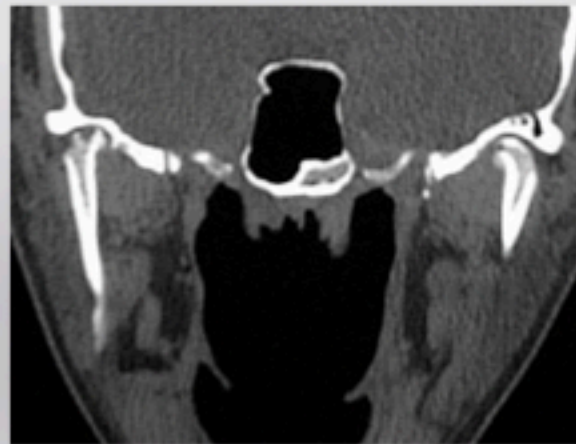
Journal of Craniomandibular Practice, April 1995, vol. 13, No. 2

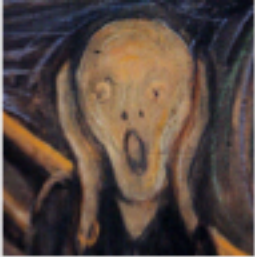
- University Hospital, Netherlands: 134 TMD patients, 30 year follow up
- Patients received good clinical work up and diagnosis 30 years ago, but basically no treatment
 - (Reassurance, PT, exercise, limited occlusal adjust)
- 70% satisfied with results
- 25% still had pain on movement
- 15% not able to eat hard foods
- 35 control patients had no apparent symptoms

**If you have a disease that is
one in a thousand, it is 100% for you**

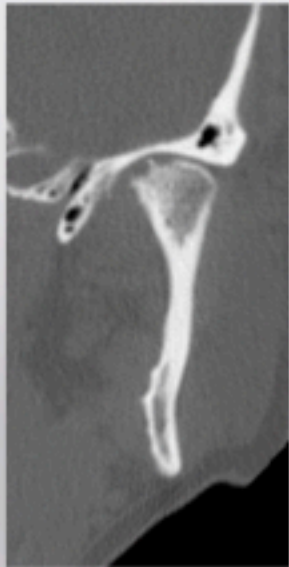
There is no love sincerer than the love of food.

G. B. Shaw





Damaged TMJs



Adapt Favorably 85%
Adapt Fairly 14%
Adapt Poorly <1%



Occlusal Muscle Dysfunction
Osteoarthritis



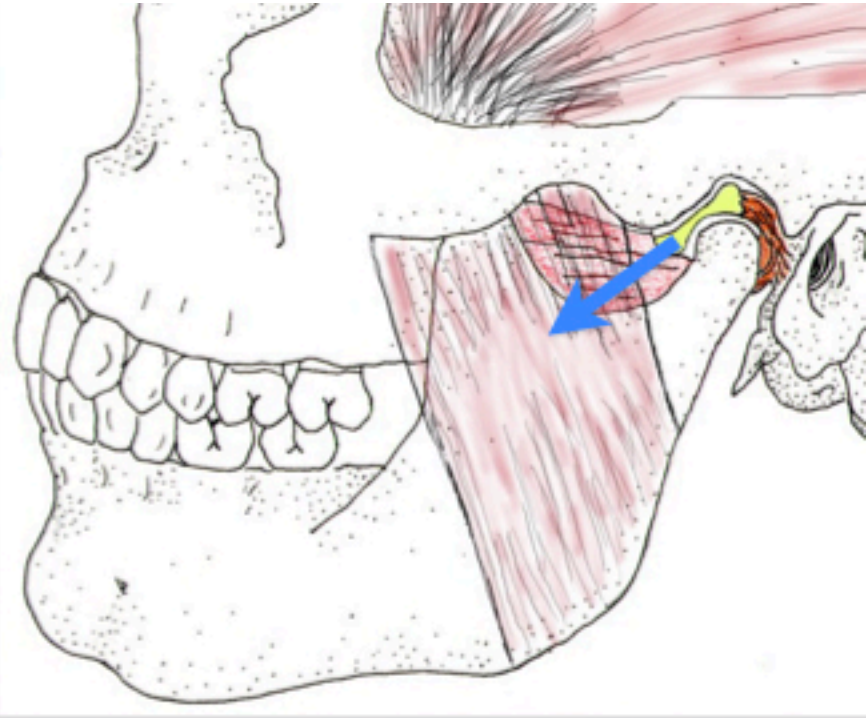
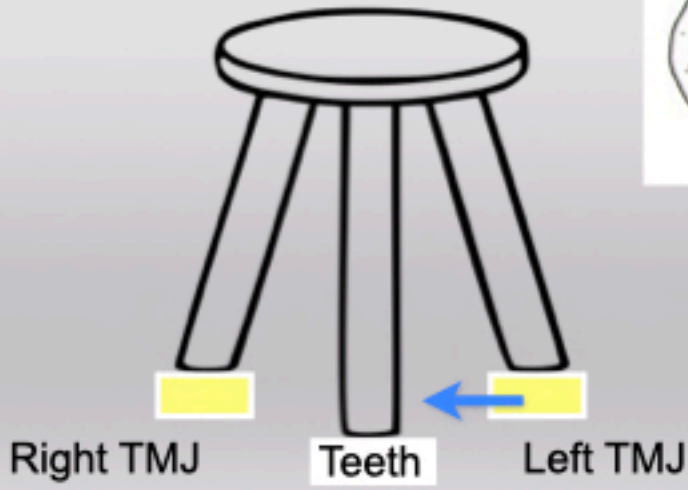
Avascular Necrosis
Progressive Condylar Resorption

*These are my guesses on %, no research to back up to backup

Normal Joint with Normal Occlusion

All teeth touch evenly with condyles seated in fossa

What happens to the occlusion if the disc is dislocated?



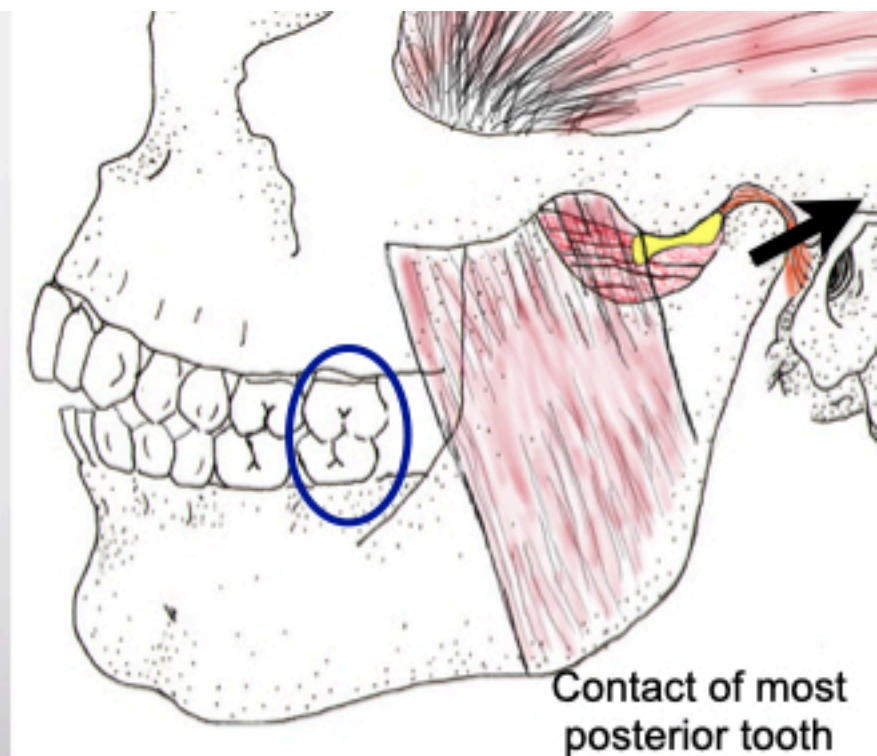
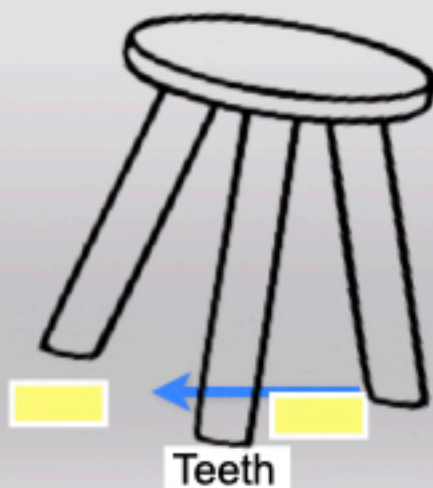
Damaged Joint with Malocclusion

85% damaged joints adapt favorably with respect to the TMJ.

Anteriorly Dislocated Disc, Mandible shifts:
Inadequate Anterior Guidance, Posterior Disclusion
Uneven Occlusion,
CR≠MaxIC
Occlusal Muscle Disharmony develops.

Treat Adapted joints with OMD
the same as healthy joints with OMD:
Occlusal Adjustment

CR≠MaxIC should be 2mm or less.
(Anterior Posterior 2mm)
If >2mm something else is going on.



Occlusal Muscle Disharmony

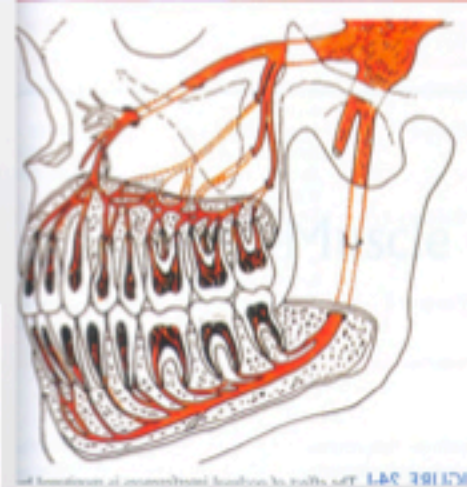
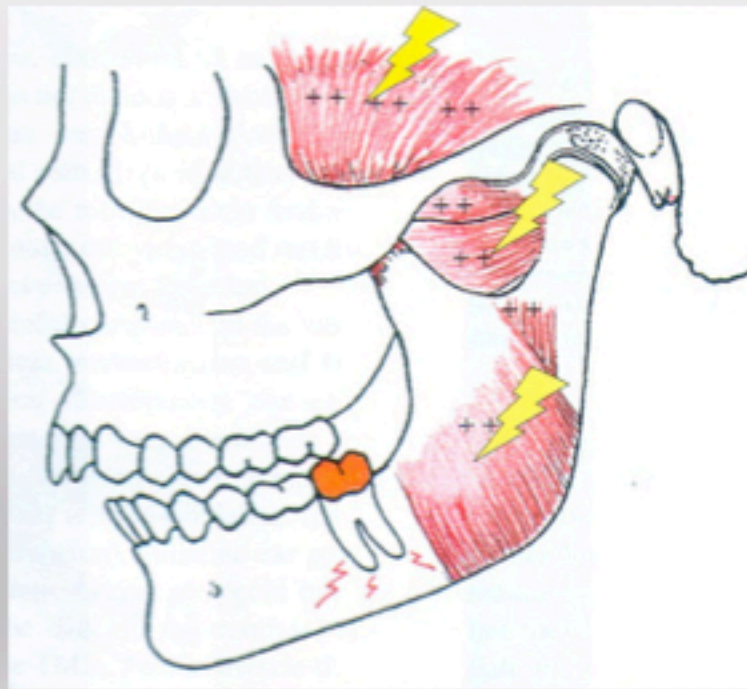
Uneven tooth contact with condyles fully seated triggers muscle activity

Lateral pterygoid fires out of sequence to create even tooth contact on closure

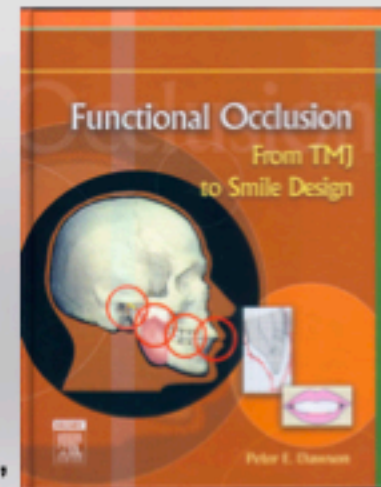
Disharmony in all muscles: Splinting/Bracing

Muscles sore from overuse

Muscles do not think- CNS input



from Dawson's Textbook, "Functional Occlusion"



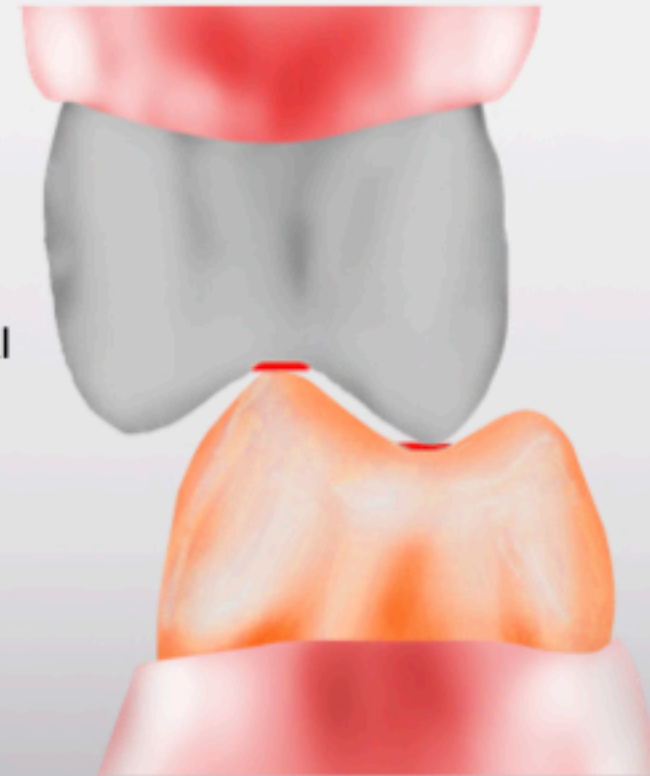
LD Pankey's 3 Rules of Occlusion

(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

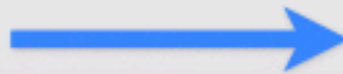


Drawing by Dr Jim Kessler

Treat Occlusal Muscle Dysfunction- Adjust the Occlusion



Teeth reshaped so all teeth hit even with condyles seated in fossa. Posterior teeth separate on lateral and anterior excursions.



Before

After



Occlusal Sculpting Tools, including Zirconia



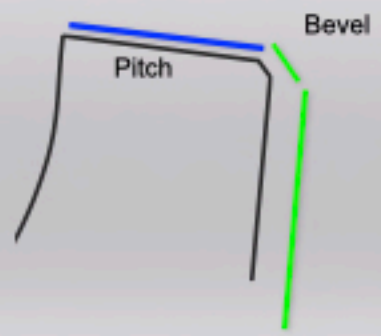
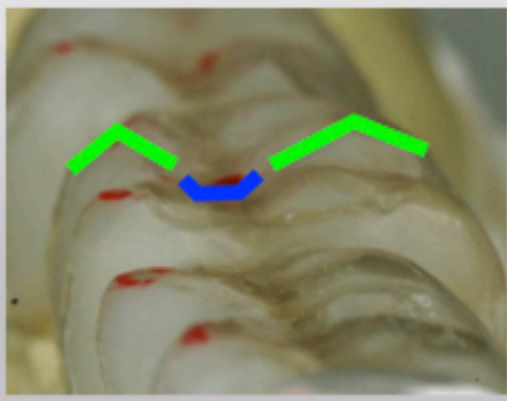
Wheel
 Create Cusp Landing Zone
 Flatten Incisal edges
 Bulk reduction of inclines



Move and Shape Cusps,
 Inclines, Facial Surfaces



Brassler Brio Shine
 FLBCER-1
 FLBF-2



Premier 860.9 F Wheel Diamond
 Premier 230 F Barrel Diamond
 Neodiamond 1118.7F Roundend taper
 Dedco Green Stone
 White Arkansas stone
 Filtek Supreme- B1B, Albond

6 Common TMDs

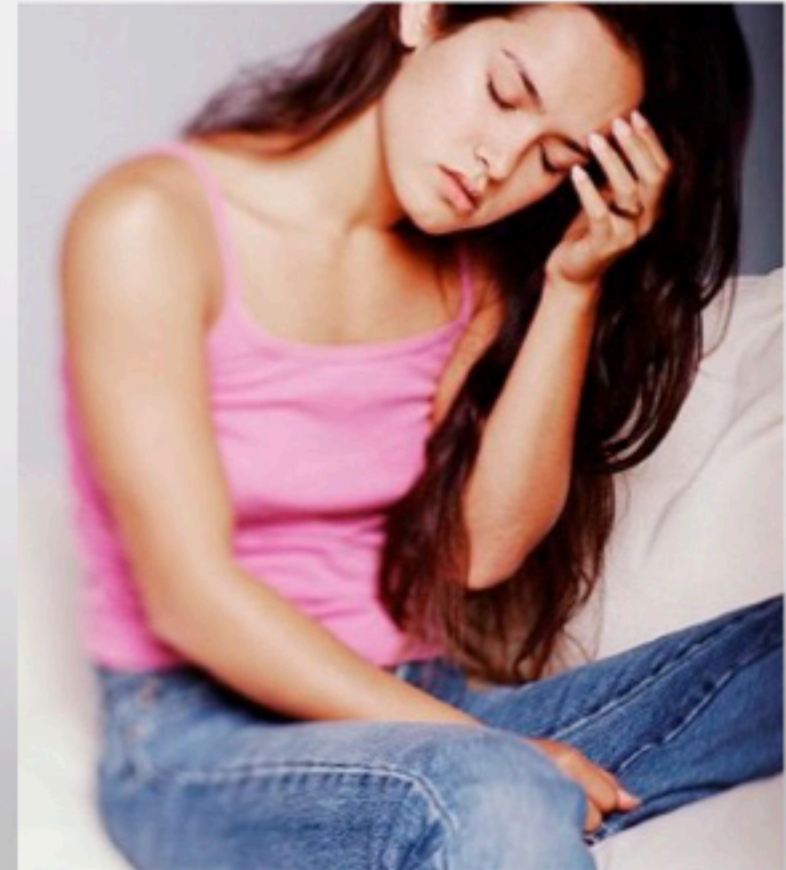
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5 Common Obstacles

- Neck and Postural Instability
- Wobbly TM Joint (Subluxation)
- Compromised Breathing/Airway
- Avascular Necrosis
- Referred Pain Muscle Triggerpoints

1 TMD that **usually** does not need therapy

- TMJ Clicking





Know Yourself

Know Your Work



Know Your Patient

Apply Your Knowledge

LD Pankey Institute

Write your Dream

John R. Droter, DDS
drdroter@mac.com
301-805-9400

Afternoon Session

Spear TMD Webinar 2023

John R Droter DDS
Annapolis, Maryland

Annapolis, Maryland
John R Droter DDS

www.drdroter.com

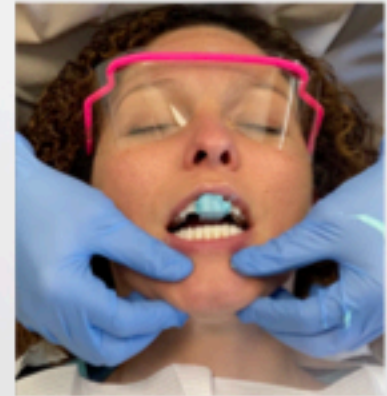
TMD Hands on: John, Herb, and Matt

Annapolis Maryland

TMD 1: April 11, 12, 13 2024

TMD 2: June 20, 21, 22 2024

John Droter DDS
Herb Blumenthal DDS
Matt Stensrud PT



Class size limited to 12
Send email or call Amber
jrdroter@mac.com
301-805-9400

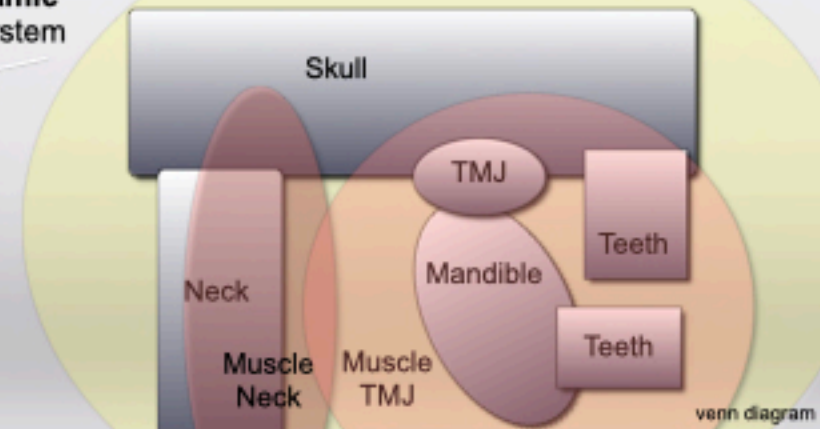
Adaptation

This is a **dynamic** orthopedic System



A change in any one area will affect the others

CNS/PNS



Exam and Diagnostic Tests

John R Droter DDS
Annapolis, Maryland

Facial Pain Diagnosis

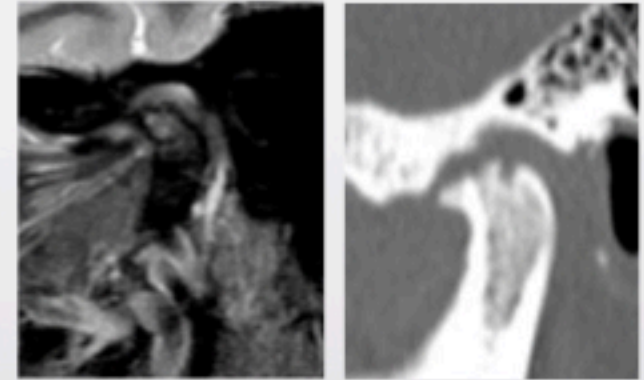
Diagnostic Tools

- 1 Written and Oral History
- 2 Observation
- 3 Physical Exam
 - Muscle Palpation
 - Joint Palpation
 - Joint Auscultation
 - Joint Motion
- 4 Anterior Stop Test
- 5 Sleep Airway Screening
- 6 CT Scan
- MRI
- Blood Tests

Biometrics

- Joint Vibration
- Jaw Tracker
- Electromyography
- T-Scan

- Occlusion: CR Mounted Study Models
- Complete Dental Exam
- Clinical Photographs
- Dx Blocks
- Dx Orthotics- Brux Checker, CR Orthotic



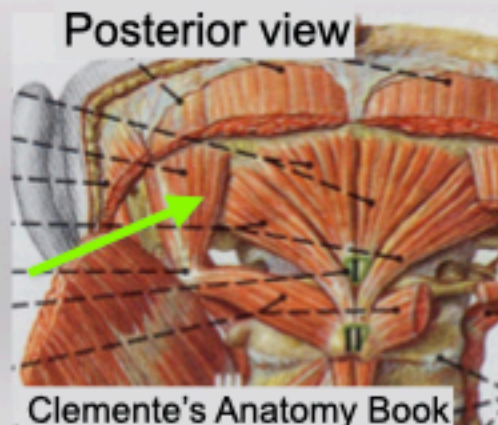
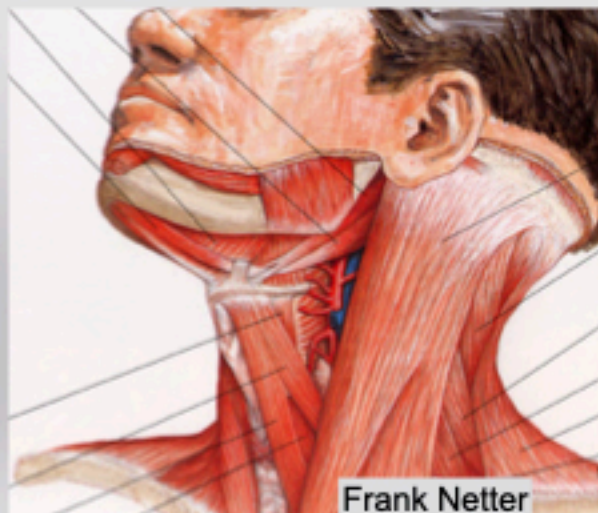
Facial Pain Diagnosis

While I palpate many muscles, the ones I find key are:

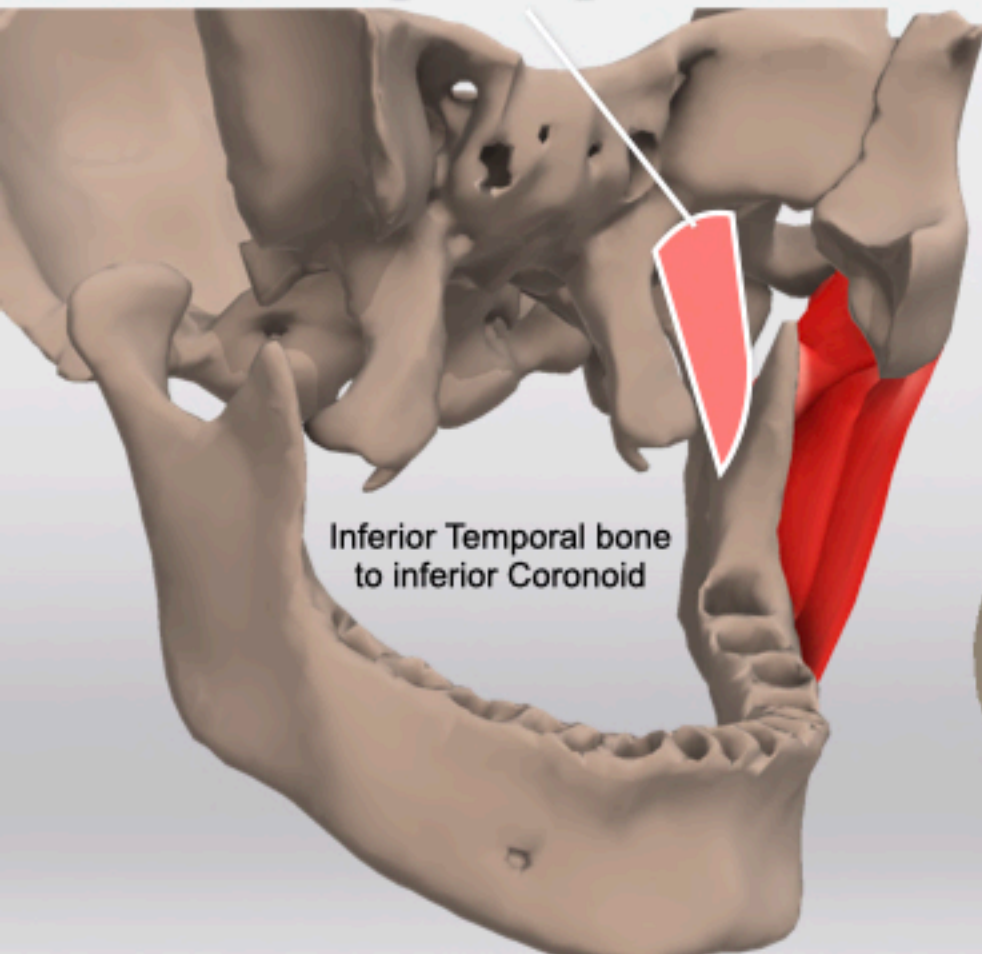
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 - 4 Anterior Stop Test
 - 5 Sleep Airway Screening
 - 6 CT Scan
- MRI
Blood Tests

Anterior Temporalis
Masseter
Posterior Digastric
Superior Oblique Capitus
Deep Temporalis
Lateral Pterygoid

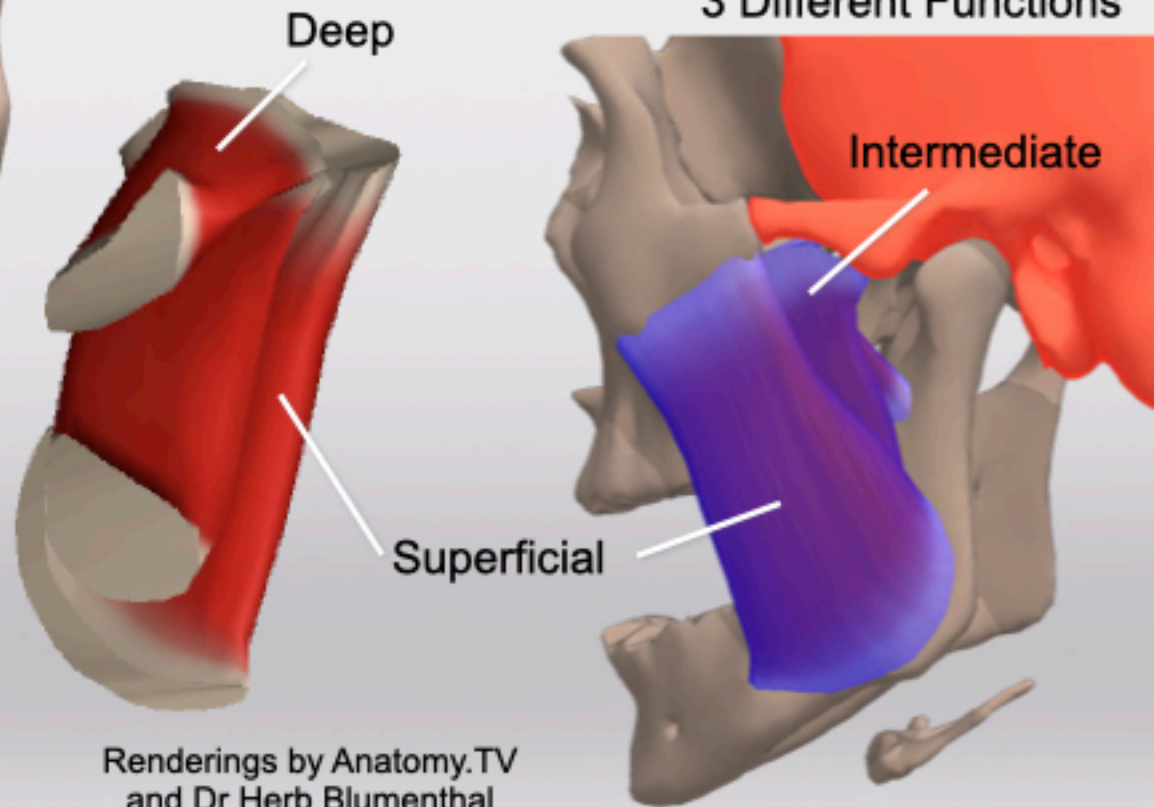


Deep Temporalis



Masseter Muscle is Complex

Complex Muscle
3 Different Portions
3 Different Functions



Renderings by Anatomy.TV
and Dr Herb Blumenthal

Facial Pain Diagnosis

Diagnostic Tools

- 1 Written and Oral History
 - 2 Observation
 - 3 Physical Exam
 - Muscle Palpation
 - Joint Palpation**
 - Joint Auscultation
 - Joint Motion
 - 4 Anterior Stop Test
 - 5 Sleep Airway Screening
 - 6 CT Scan
- MRI
Blood Tests

Anterior Lateral Pole



Load in CR- gradual increase pressure
Load In Excursions if negative in CR
No pain does not mean stable



Posterior Lateral Pole



Indirect through Ear



Key Question: What is sore?
Is it the joint, or is it muscle,
or both, or neither?

Facial Pain Diagnosis

Diagnostic Tools

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 - Joint Auscultation**
 - Joint Motion
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- MRI
- Blood Tests

A healthy joint is quiet,
A damage joint is not.

A joint that does not move is also quiet.

Stethoscope

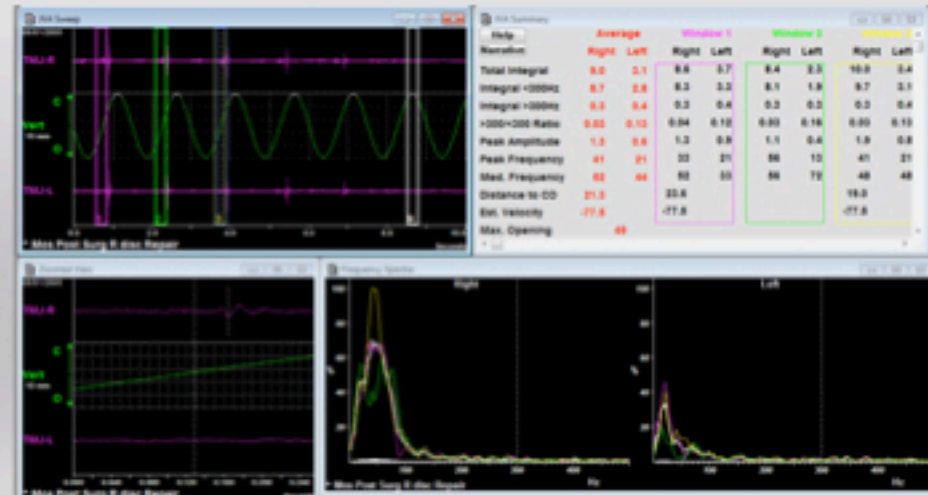
Doppler - Landmark Healthcare 800-334-5618
 Huntleigh Mini Dopplex 5hz
 Great Lakes Orthodontics 800-828-7626

Joint Vibration Analysis/Jaw Tracker

BioResearch 800-251-2315



Sounds/ Vibrations



Sounds/ Vibrations Stethoscope



Use Bell side, not Diaphragm side,
over the TMJ

3M Littmann Classic II S.E. Stethoscope

My Subjective Description of Joint Sounds

smooth
paper
sand
pebbles
rocks
glass

fine
med
coarse

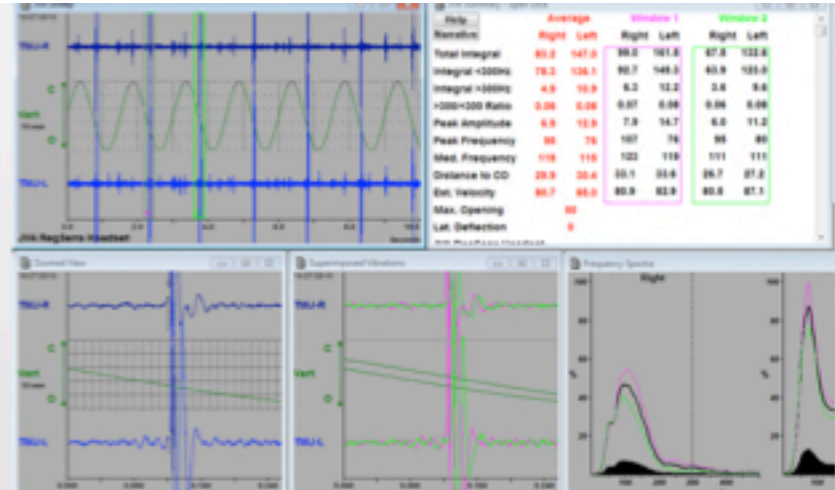
crackle
crunchy
squeaky
scratch

negative joint movement
minimal joint movement

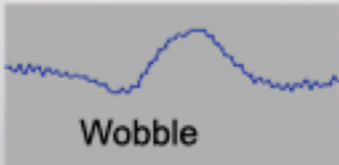
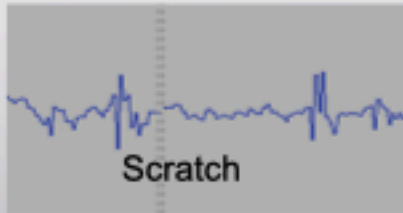
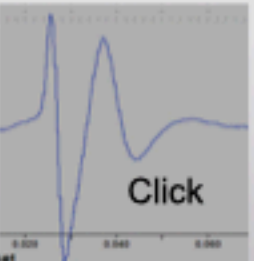
Click
soft
crisp
squishy
early
late
100%
75%
50%
25%
sporadic
??

Joint Vibration Analysis

Objectively measures and quantifies joint vibrations during motion which is an indication of cartilage health



Three main types of sounds



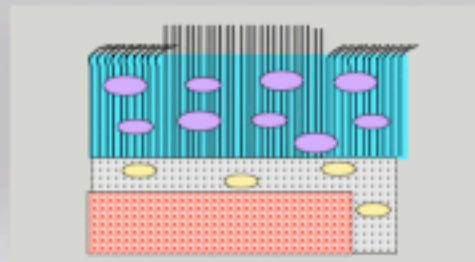
Disc Reduction
Disc Dislocation
Adhesion crackle
tooth tap

Osteoarthritis
Pseudo Disc
Damaged Cartilage

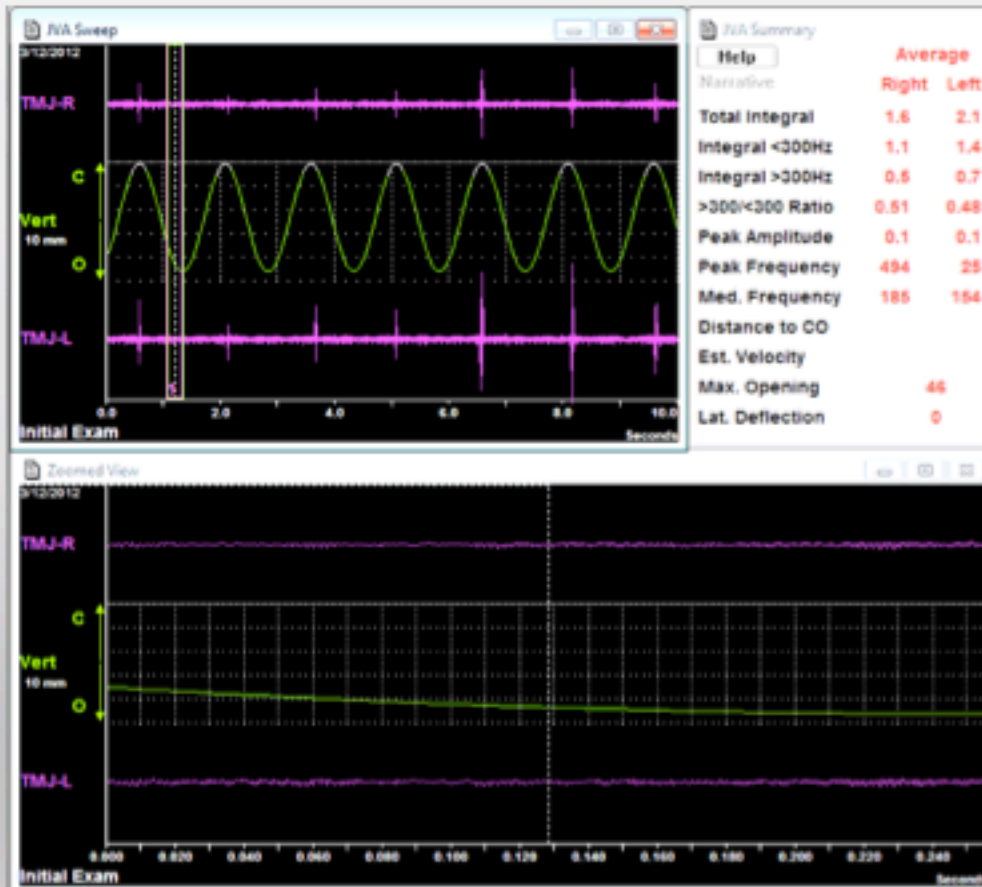
Disc Subluxation
Joint Subluxation
Disc Reduction
Disc Dislocation

Based on Sonar.
It is not a microphone

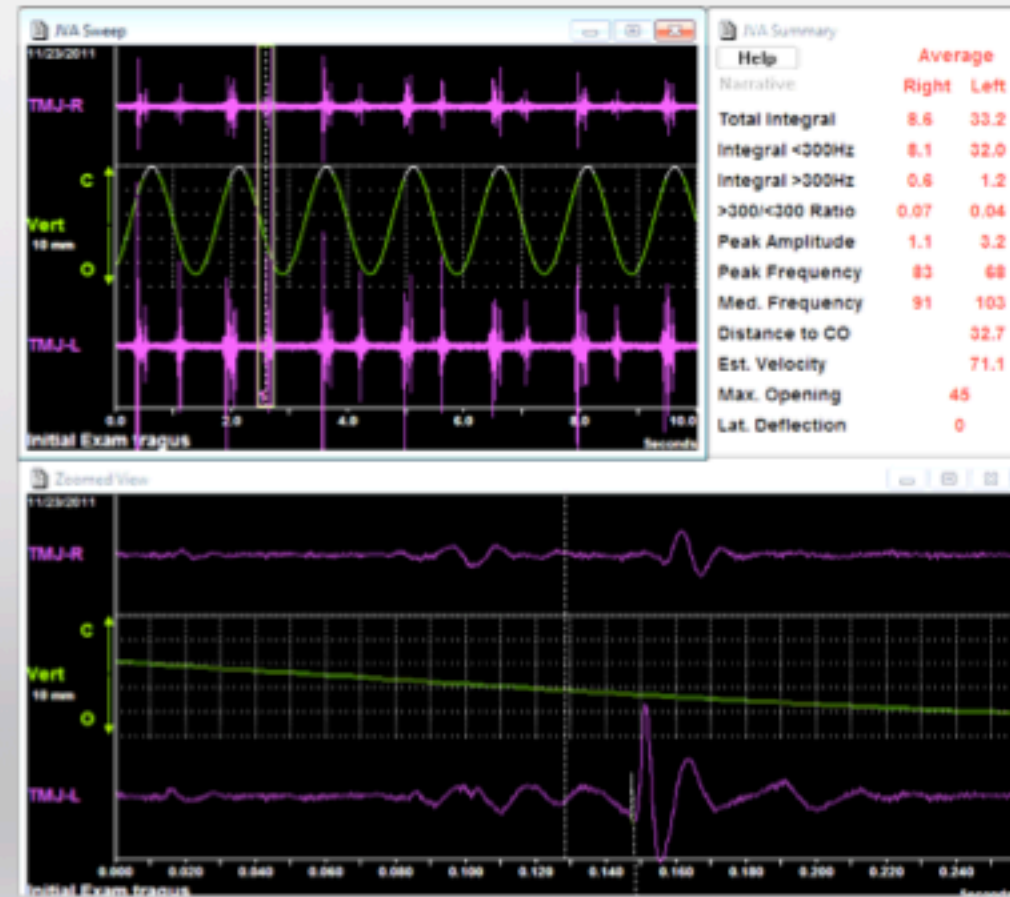
JVA measures the health of the cartilage



Healthy or Damaged?



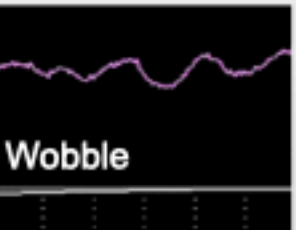
Healthy or Damaged?



Why is Joint making this vibration?



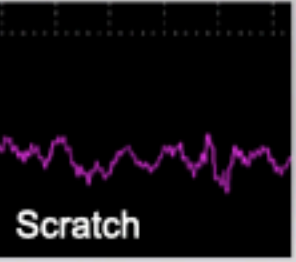
Good Vibrations
Healthy Cartilage
No Movement



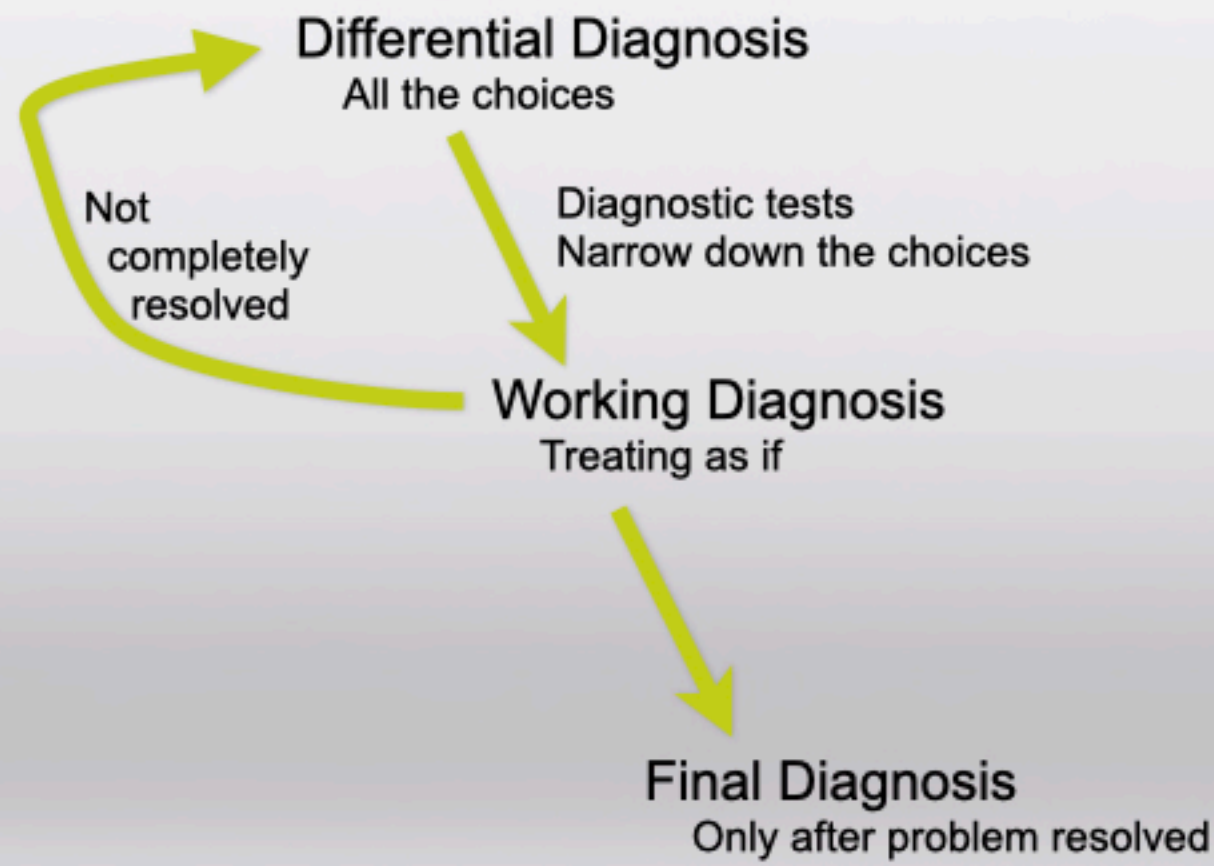
Wobble
Disc Dislocation
Disc Reduction
Disc subluxation
Joint subluxation
Condyle bumps Disc
Sensor roll on face



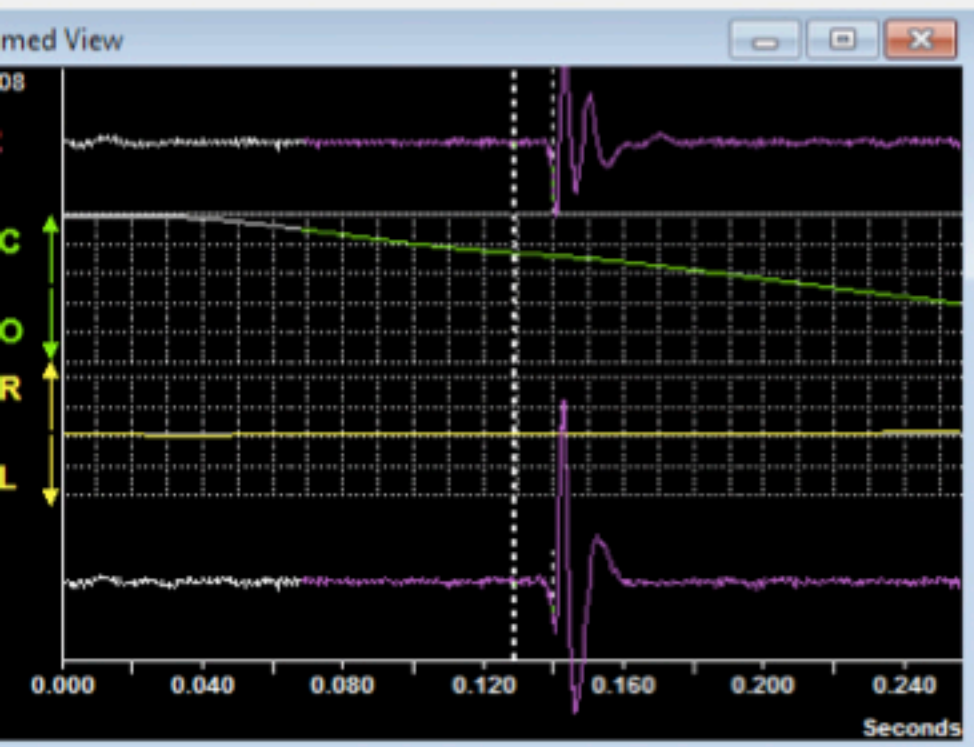
Click
Disc Reduction
Disc Dislocation
Adhesion Crackle
Tooth Tap
Contralateral Transference



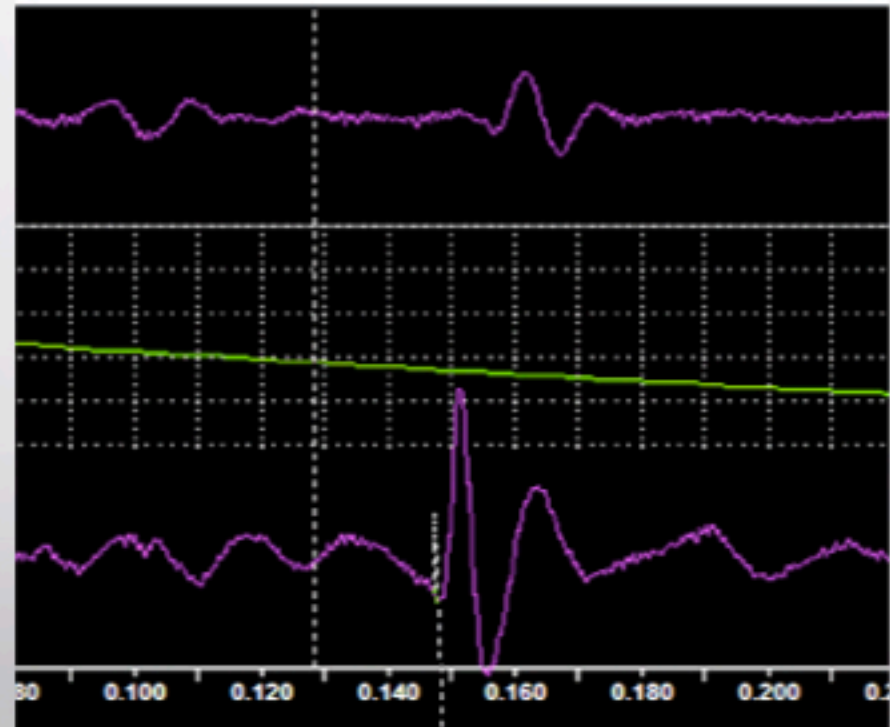
Scratch
Cartilage Fibrillation
Cartilage against tissue
Bone against bone
Velcro Noise



Simple or Complex



Simple left click with transference vibration to right
L4a



Complex Click
L3a, R4b

Facial Pain Diagnosis

Evaluate for Full, Smooth Range of Motion

40-55 mm, 300mm/sec velocity, straight path, consistent arc

Diagnostic Tools

- 1 Written and Oral History
- 2 Observation
- 3 Physical Exam
 - Muscle Palpation
 - Joint Palpation
 - Joint Auscultation

Joint Motion

- 4 Anterior Stop Test
 - 5 Sleep Airway Screening
 - 6 CT Scan
- MRI
Blood Tests

Take 4 Measurements:

Maximum Opening	40-55mm
Right Lateral	10-12mm
Left Lateral	10-12mm
Protrusive	10-12mm

38+4 indicates 38mm edge to edge plus 4mm overbite for a total of 42mm

Normal excursion are 25% of the max open

Evaluate Smoothness:
Light hold on chin as patient
moves jaw

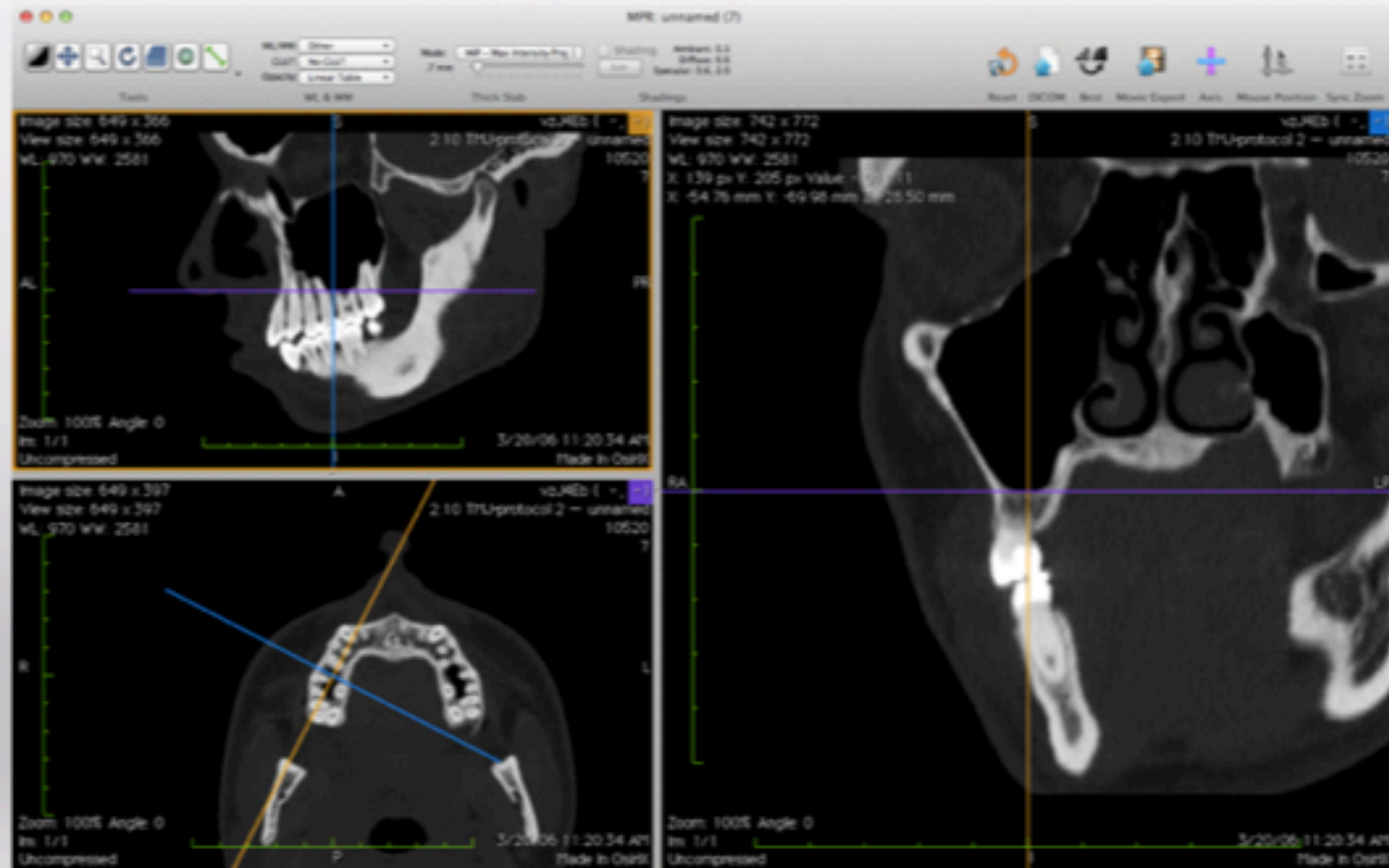


Therabite, 1-800-217-0025
www.therabite.com

Facial Pain Diagnosis

Diagnostic Tools

- 1 Written and Oral History
- 2 Observation
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 - Joint Palpation
 - Joint Auscultation
 - Joint Motion
- 4 Anterior Stop Test
- 5 Sleep Airway Screening
- 6 **CT Scan**
 - MRI
 - Blood Tests



Normal TMJ- Bone

Bone Density

Intact Cortex

Even pattern Trabecular bone

Normal Size/Shape Condyle/Fossa

Ovoid Condylar Shape

Non-Congruent Condyle/Fossa

Condyle 70% Size Fossa

Condyle Centered in Fossa

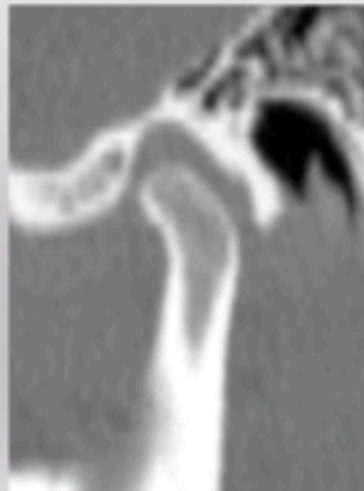
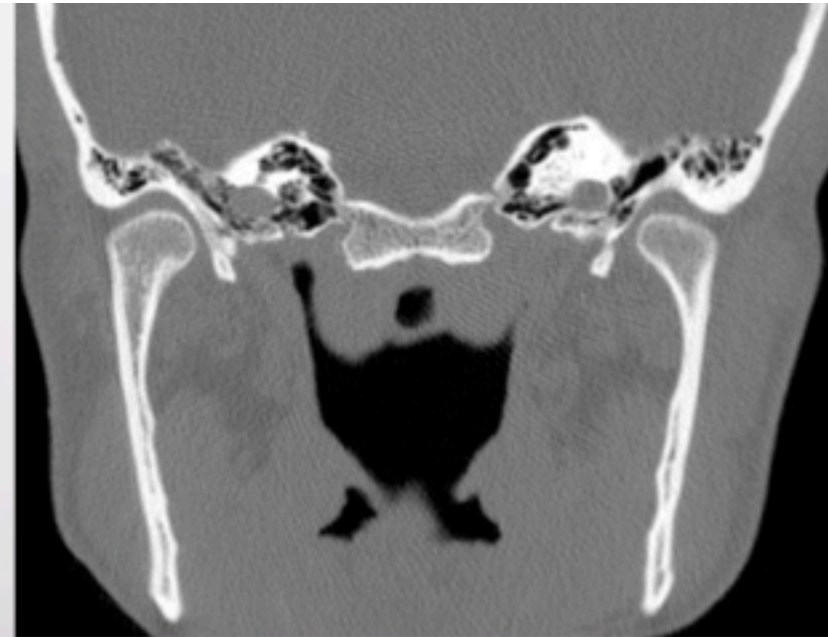
Coronal and Sagittal

Room for Disc

Stable CR load Zone

Condyle closest to fossa

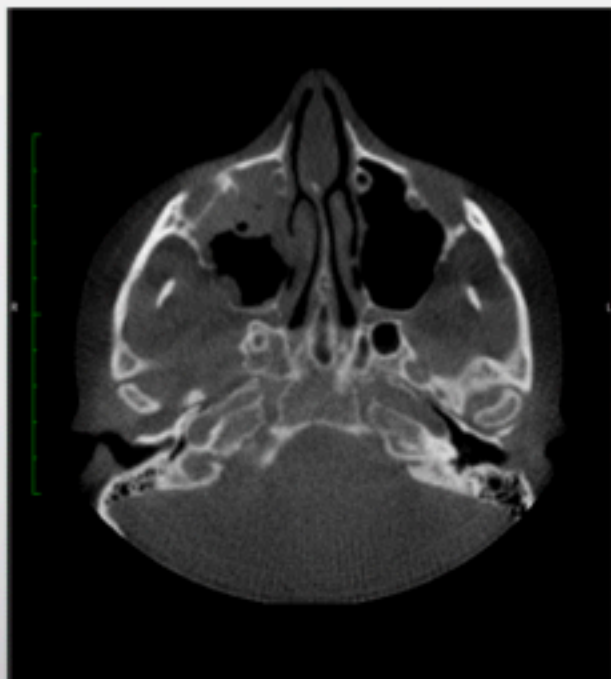
CT Scan
Coronal View



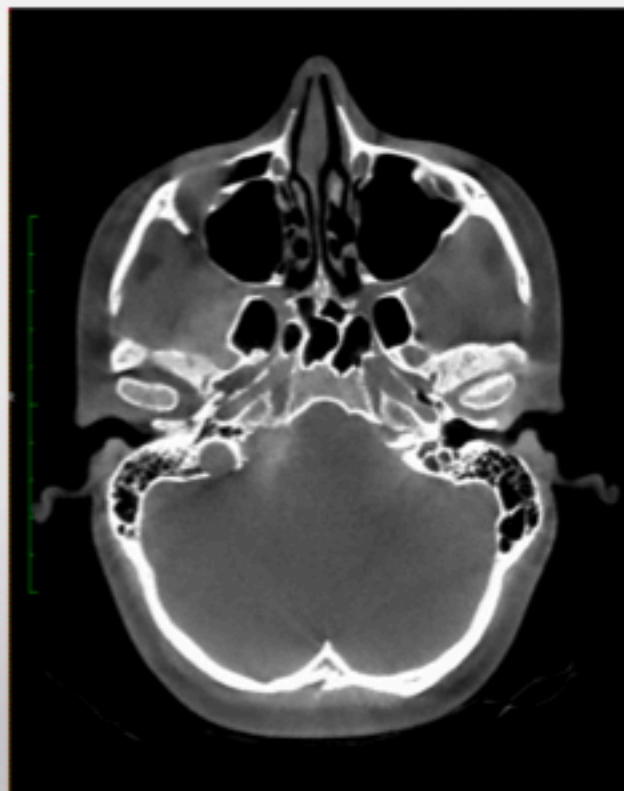
CT Scan
Sagittal View

Compare CT scans

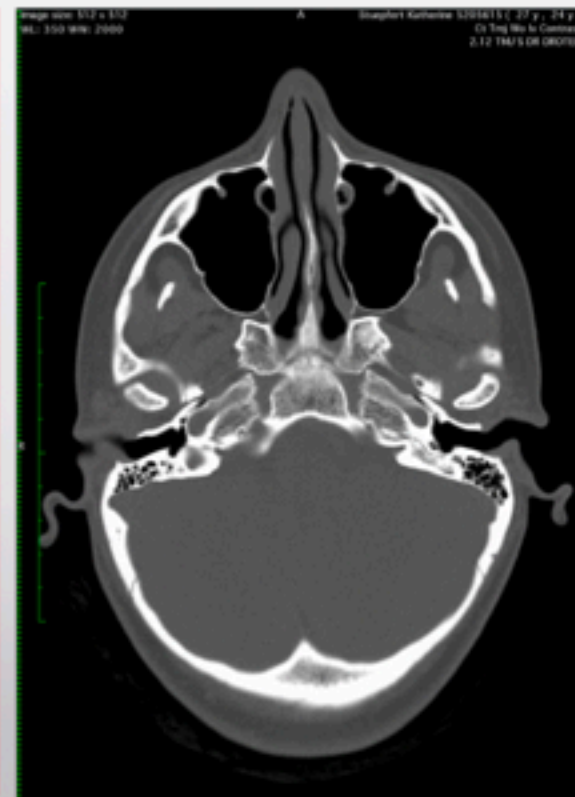
CBCT- iCAT



CBCT- Vatech i3D Premium



Spiral CT



Best Contrast
Much more radiation

Interpreting CBCT

Review of Scan: CBCT
John R Droter, DDS

Name _____ Scan Date _____

Review Date: _____
Scan Quality: Good Fair Marginal

How to use: scroll through axial, coronal, and sagittal for global impressions.

Right TMJ *Small Coronal Sagittal and Coronal Coronal*

Condyle: Normal Size Small condylar size
 Normal Shape Altered condylar shape
 Cortex Intact Cortex not intact
 Cortex Even Hypertroplification

Fossa: Normal Size Small fossa size
 Normal Shape Flattened fossa shape
 Cortex Intact Cortex not intact

Condyle Position Centered in fossa Condyle distalized
 Joint spacing Room for disc No room for disc
 CR Lead Zone Superior medial Superior Lateral

Estimate Piper: R1 R2 R3a R3b R4a R4b R5a R5b
 Right TMJ Health: Healthy Damaged Active Degeneration Adapting Adapted

Left TMJ *Small Coronal Sagittal and Coronal Coronal*

Condyle: Normal Size Small condylar size
 Normal Shape Altered condylar shape
 Cortex Intact Cortex not intact
 Cortex Even Hypertroplification

Fossa: Normal Size Small fossa size
 Normal Shape Flattened fossa shape
 Cortex Intact Cortex not intact

Condyle Position Centered in fossa Condyle distalized
 Joint spacing Room for disc No room for disc
 CR Lead Zone Superior medial Superior Lateral

Estimate Piper: L1 L2 L3a L3b L4a L4b L5a L5b
 Left TMJ Health: Healthy Damaged Active Degeneration Adapting Adapted

Swelling *Coronal View, Sagittal View, Axial View*

All Tissue Right = Left = Except _____
 Look for tumors Brain, Muscle, Parotid Submand Gland, Hypertrophy

All Bones Right = Left = Except _____
 Look for hyperplastic or radiolucent areas, cysts

Nasal *(Sagittal, Cor)* Open Restricted Deviated Septum
 Sinuses Clear Thickened Lining Muc Polyps
 Airway Adequate Restricted
 Teeth *(Sagittal, Cor)* No PAP PAP # _____
(Axial) No Gross Caries

Perio *(Thick Sagittal)* No Gross Perio Bone Loss

Axial ID Appears Centered Not Level with Skull Base
 C2, C3, C4 ID Aligned Misaligned

Max Head Relation Normal Sagittal Retrognathic Maxilla Mandible
 Max Head Casting Normal Coronal Asymmetric Cast Maxilla Mandible

Impression: _____

Signature: _____

www.jrdroter.com

Review of Scan: CT/CBCT Guide

TMJ
Condyle
Fossa

Normal Size, Normal Shape, Cortex Intact
 Condyle is 30% size of the fossa, with an oval shape. The condyle and fossa are noncongruent convex surfaces. The outer cortex of bone is a solid continuous line with no breaks. Look for areas of hypertroplification which are indicative of excess load in that area or damage and repair. The right and left TMJs should be the same size.

Condyle Position
 Centered in fossa
 The condyle should be centered in the fossa. A distalized condyle is indicative of either joint damage and disc dislocation anteriorly or heavy anterior tooth contact. An anteriorly positioned condyle is indicative of a large CR/CO discrepancy, usually associated with an adapted mandibular retrognathia.

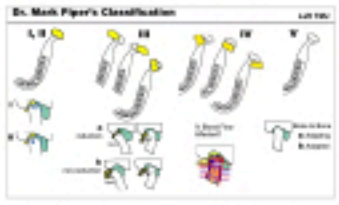
Joint Spacing
 Centered in fossa
 There should be room to "draw" a disc between the condyle and fossa.

CR Lead Zone (Centric Relation Lead Zone)
 Superior medial
 Ideally the condyle in its optimal load bearing position (Centric Relation) should load on the superior medial surface. In the coronal view the area where the condyle is closest to the fossa is the Centric Relation Lead Zone. A series of normal is to have both condyles load on the superior lateral surfaces. If the lead zones of the right and left do not match (i.e. one is medial the other lateral) this is indicative of joint damage and disc dislocation. Need to evaluate for joint mechanical stability (joint wobble) with a D-PM. Clinically these patients may have a hypertroplastic "bite".

Estimate Piper
 This estimation combines clinical data from the clinical history, exam, joint palpation, arthroscopic visualization, Doppler (JA) [Joint Vibration Analysis] and the CT scan. If you see a left distalized condyle and the left TMJ clinically clicks, my estimation would be a Piper 4b. A left distalized condyle and no clicking is either a Piper 4b or a health joint distalized due to heavy anterior contact (usually isotropic). In the case of the 4b, JA would show some slight "scratch vibrations", whereas a health TMJ distalized due to occlusion would show "smooth vibrations", and clinically have fremitus on the anterior teeth.

- 1 Normal joint- MRI and CT are normal (See all above). No joint sounds, full range of motion, JA no vibrations, quiet Doppler.
- 2 The TMJ is damaged but disc is still in place so MRI and CT are normal. Usually the cartilage is damaged, roughened from parafunctional bruxing. Doppler and JA will both indicate slight vibrations. A well adapted 4b will also have the same vibratory signals as a Piper 2, but the 4b will show changes in condylar position on the CBCT, and the MRI will show the disc dislocation.
- 3 This is a partial dislocation of the disc, usually in an anterior medial direction with the lateral ligament being taut or stretched. The joint reduces on opening and will make a vibration, either a click or wobble on JN. If a 3a is opposite a health joint there is not a change in occlusion so CT is normal. A Piper 3a is often contralateral to a 4b. With loss of the opposing disc, the mandible shifts coronally, the CR lead zone changes in both joints leading to 3a.
- 3b Same as above except nonreducing and therefore no clicking vibrations. CT is normal.
- 4 The disc is fully displaced off the head of the condyle and reduces on opening. There will be a shifting of the mandible which can be seen on the CBCT. Condyle not centered in fossa. Clinically there will "click or wobble" vibration as the disc reduces and subluxates. While most vibrations are in the subtle range some may not be. These will be detected with JN.
- 4b The disc is fully displaced off the head of the condyle and does not reduce on opening. This will look the same on CBCT as a 4a. Condyle not centered in fossa. While limited opening may occur, many can have a full range of motion. Range of motion should not be a sole determining factor on whether a joint is 4b.
- 5a Osteoarthritis. There will be changes to the condylar shape and cortex seen on the CBCT. Osteoarthritis is the inflammatory phase of Osteoarthrosis. Look for missing cortex indicative of active degeneration. The joint will be tender to palpation. An MRI is helpful in detecting extent of inflammation.
- 5b Osteoarthrosis. There will be changes to the condylar shape and cortex seen on the CBCT. The Cortex however will be intact and the joint will not be tender to palpation. Hypertroplification will be seen having reinforced the damaged area. There is a loss of congruency as the condyle and fossa wear down and become flattened. Parafunctional tooth grinding increases CA bone wear.

John R Droter DDS



First do quick scroll through axial, coronal, and sagittal for global impression.

Right TMJ

Scroll Corrected Sagittal and Corrected Coronal

Condyle:

- | | | |
|--|---|--------------------------|
| <input type="checkbox"/> Normal Size | <input type="checkbox"/> Small condylar size | <input type="checkbox"/> |
| <input type="checkbox"/> Normal Shape | <input type="checkbox"/> Altered condylar shape | <input type="checkbox"/> |
| <input type="checkbox"/> Cortex Intact | <input type="checkbox"/> Cortex not intact | <input type="checkbox"/> |
| <input type="checkbox"/> Cortex Even | <input type="checkbox"/> Hypercalcification | <input type="checkbox"/> |

Fossa:

- | | | |
|--|--|--------------------------|
| <input type="checkbox"/> Normal Size | <input type="checkbox"/> Small fossa size | <input type="checkbox"/> |
| <input type="checkbox"/> Normal Shape | <input type="checkbox"/> Flattened fossa shape | <input type="checkbox"/> |
| <input type="checkbox"/> Cortex Intact | <input type="checkbox"/> Cortex not intact | <input type="checkbox"/> |

Condyle Position

- | | | |
|--|---|--------------------------|
| <input type="checkbox"/> Centered in fossa | <input type="checkbox"/> Condyle distalized | <input type="checkbox"/> |
|--|---|--------------------------|

Joint spacing

- | | | |
|--|---|--------------------------|
| <input type="checkbox"/> Room for disc | <input type="checkbox"/> No room for disc | <input type="checkbox"/> |
|--|---|--------------------------|

CR Load Zone

- | | | |
|--|---|--------------------------|
| <input type="checkbox"/> Superior medial | <input type="checkbox"/> Superior Lateral | <input type="checkbox"/> |
|--|---|--------------------------|

Estimate Piper:

- | | | | | | | | |
|----|----|-----|-----|-----|-----|-----|-----|
| R1 | R2 | R3a | R3b | R4a | R4b | R5a | R5b |
|----|----|-----|-----|-----|-----|-----|-----|

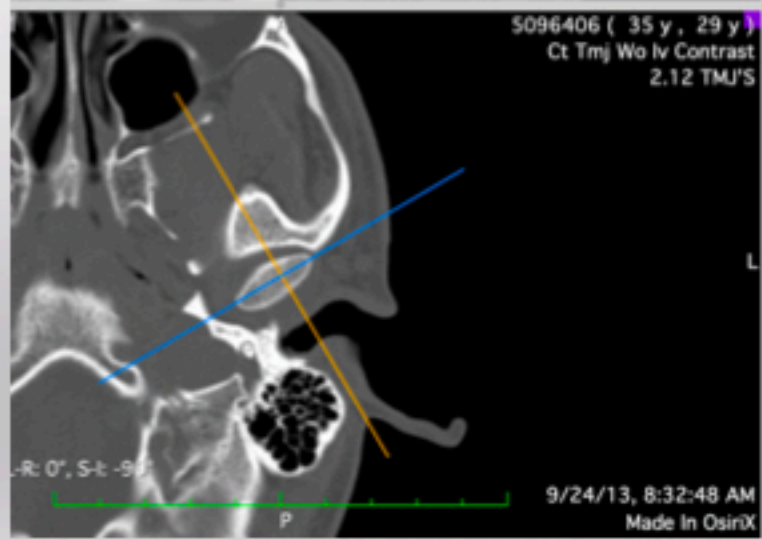
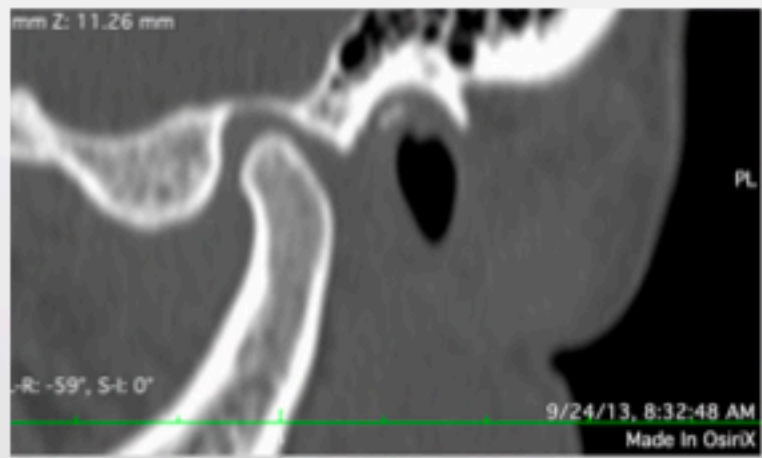
Right TMJ Health:

- | | | |
|----------------------------------|-----------------------------------|--|
| <input type="checkbox"/> Healthy | <input type="checkbox"/> Damaged | <input type="checkbox"/> Active Degeneration |
| | <input type="checkbox"/> Adapting | <input type="checkbox"/> Adapted |

CT Left Piper 2 from MRI

- Condyle:
 - Normal Size
 - Normal Shape
 - Cortex Intact
 - Cortex Even
- Fossa:
 - Normal Size
 - Normal Shape
 - Cortex Intact
- Condyle Position
 - Centered in fossa
- Joint spacing
 - Room for disc
- CR Load Zone
 - Superior medial

- Hypercalcification
- Condyle distalized
- Superior Lateral



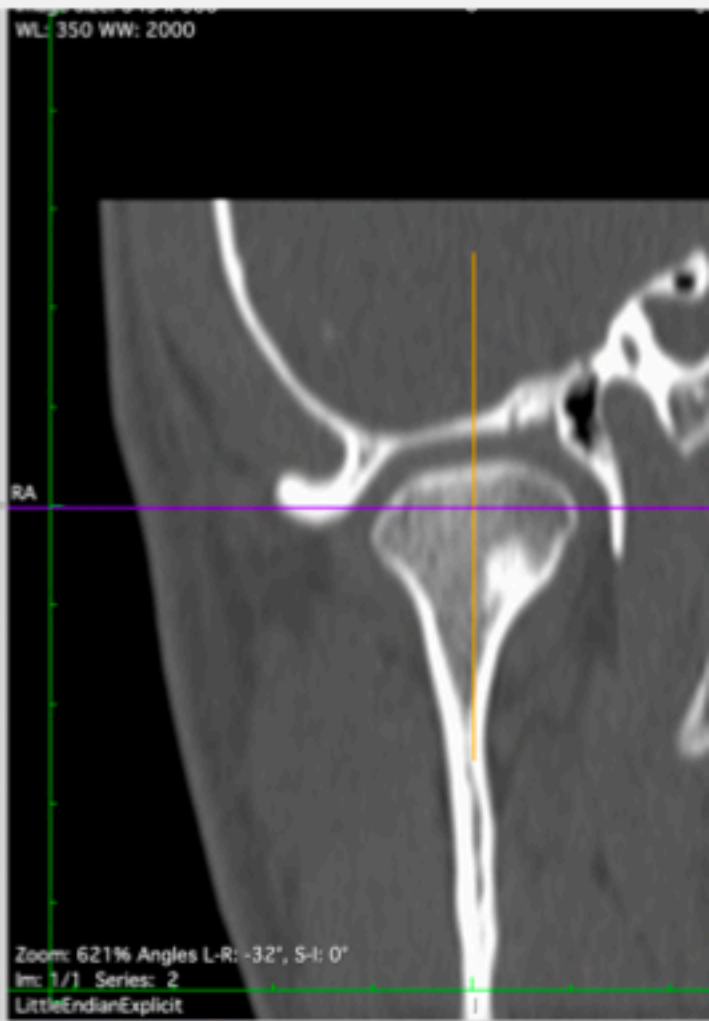
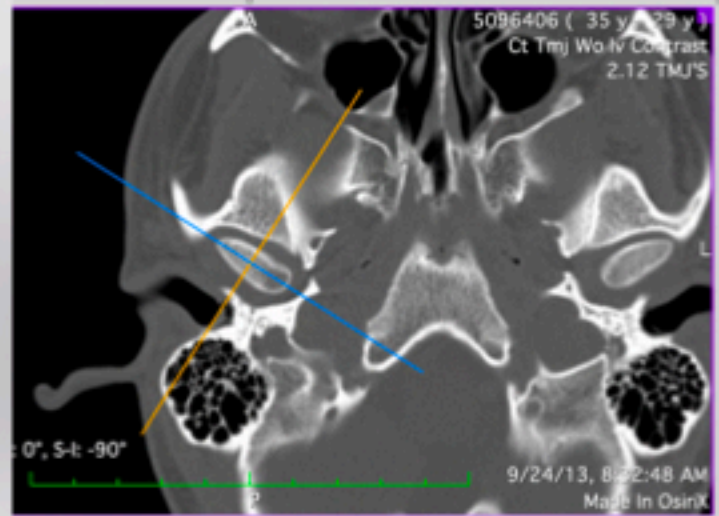
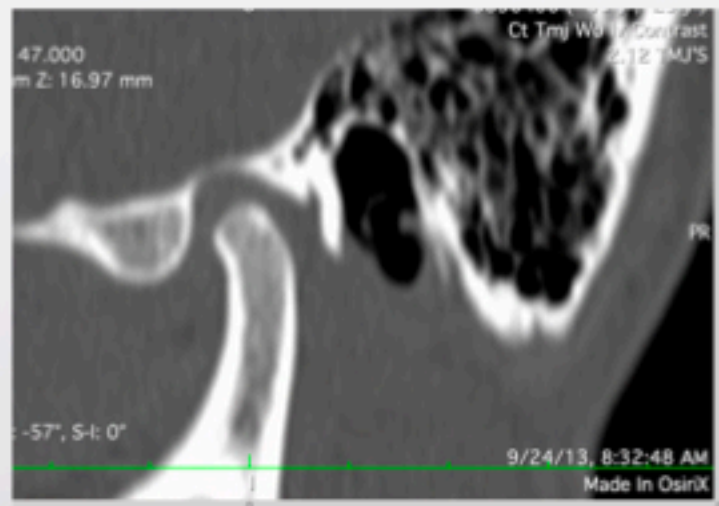
CT Right Piper 4a-e from MRI

- Condyle:
 - Normal Size
 - Normal Shape
 - Cortex Intact
 - Cortex Even
- Fossa:
 - Normal Size
 - Normal Shape
 - Cortex Intact
- Condyle Position
 - Centered in fossa
- Joint spacing
 - Room for disc
- CR Load Zone
 - Superior medial

Hypercalcification

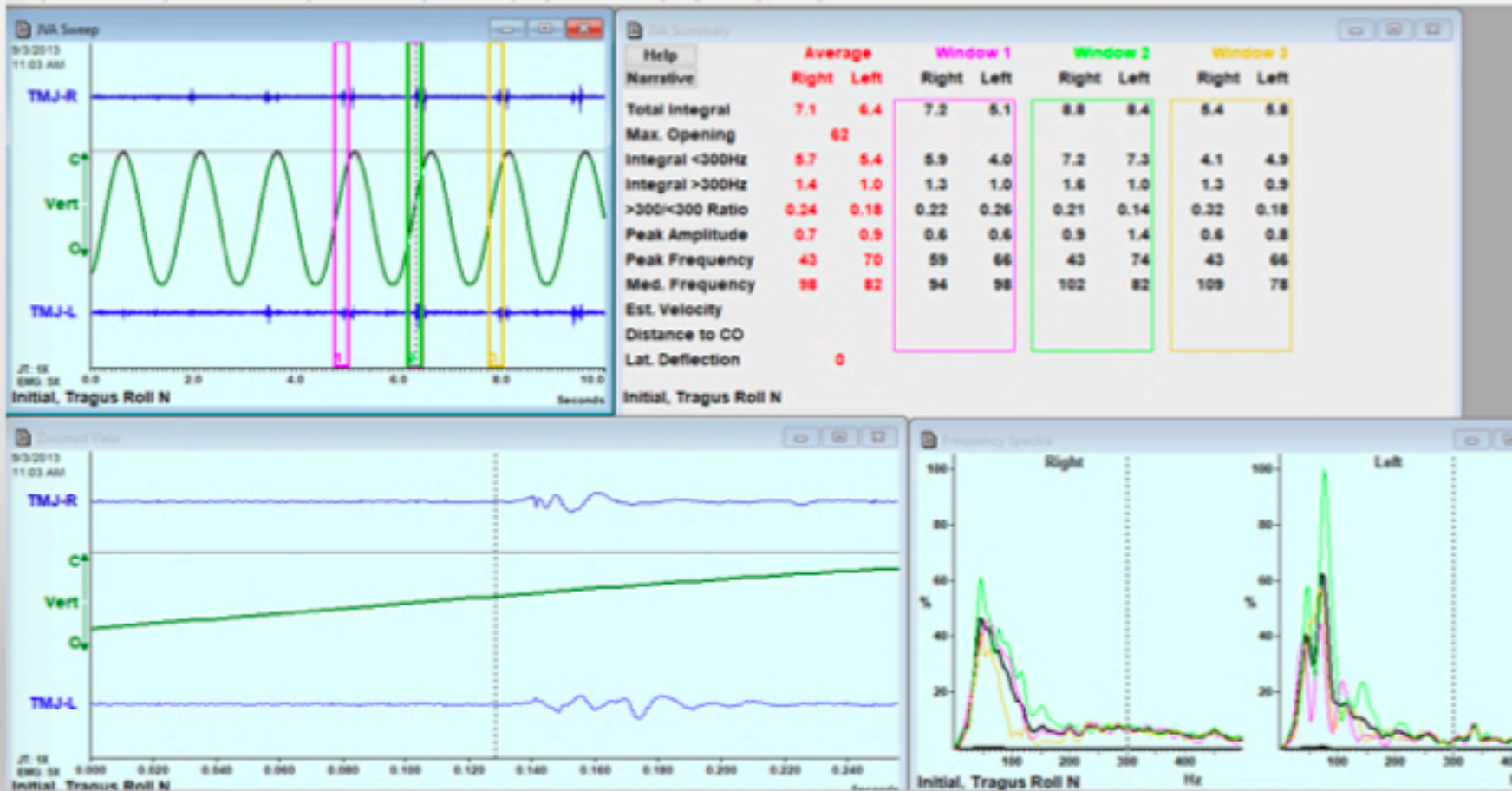
Superior Lateral

Note: Large joint space



Slight Wobble
before tooth
contact

Joint
subluxation
on movement

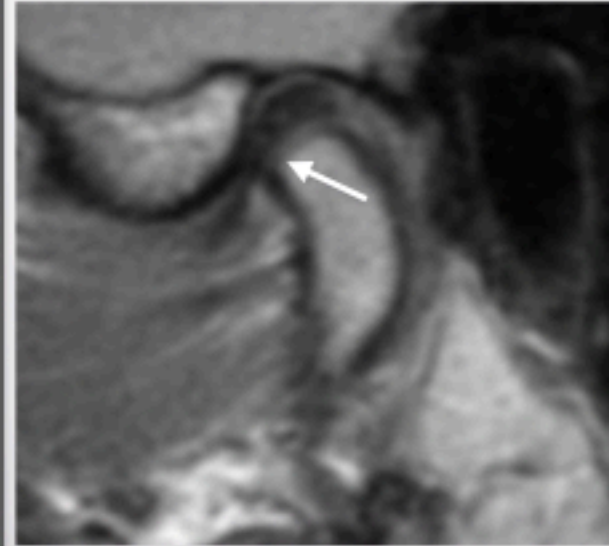
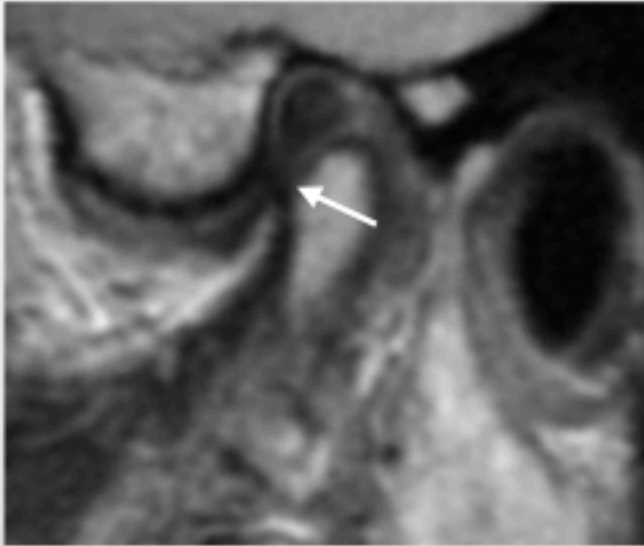


Clinical
Relevance?

Early damage
from
parafunction

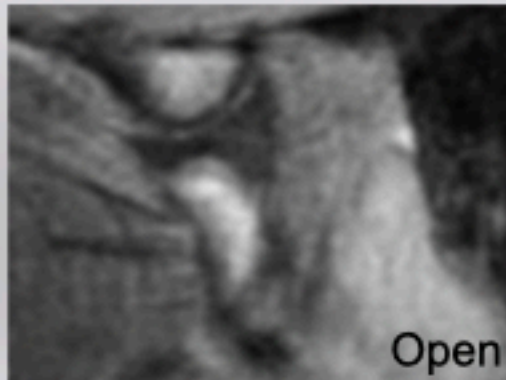
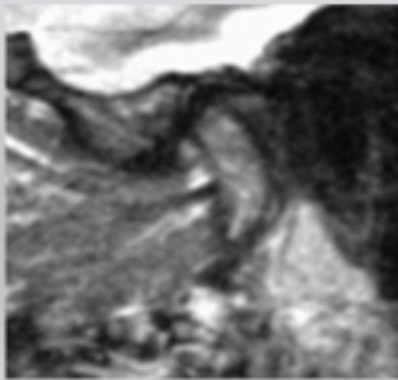
MRI
R4a-e, L2

Right
PD Closed



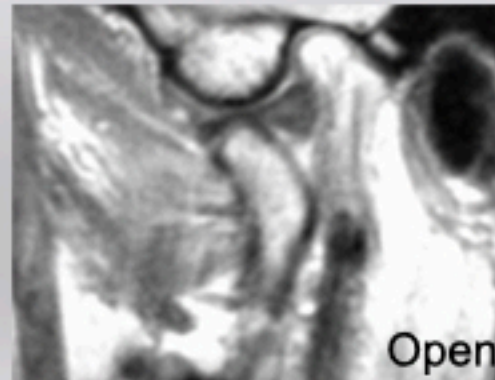
Left
PD Closed

Stir



Open

Stir



Open



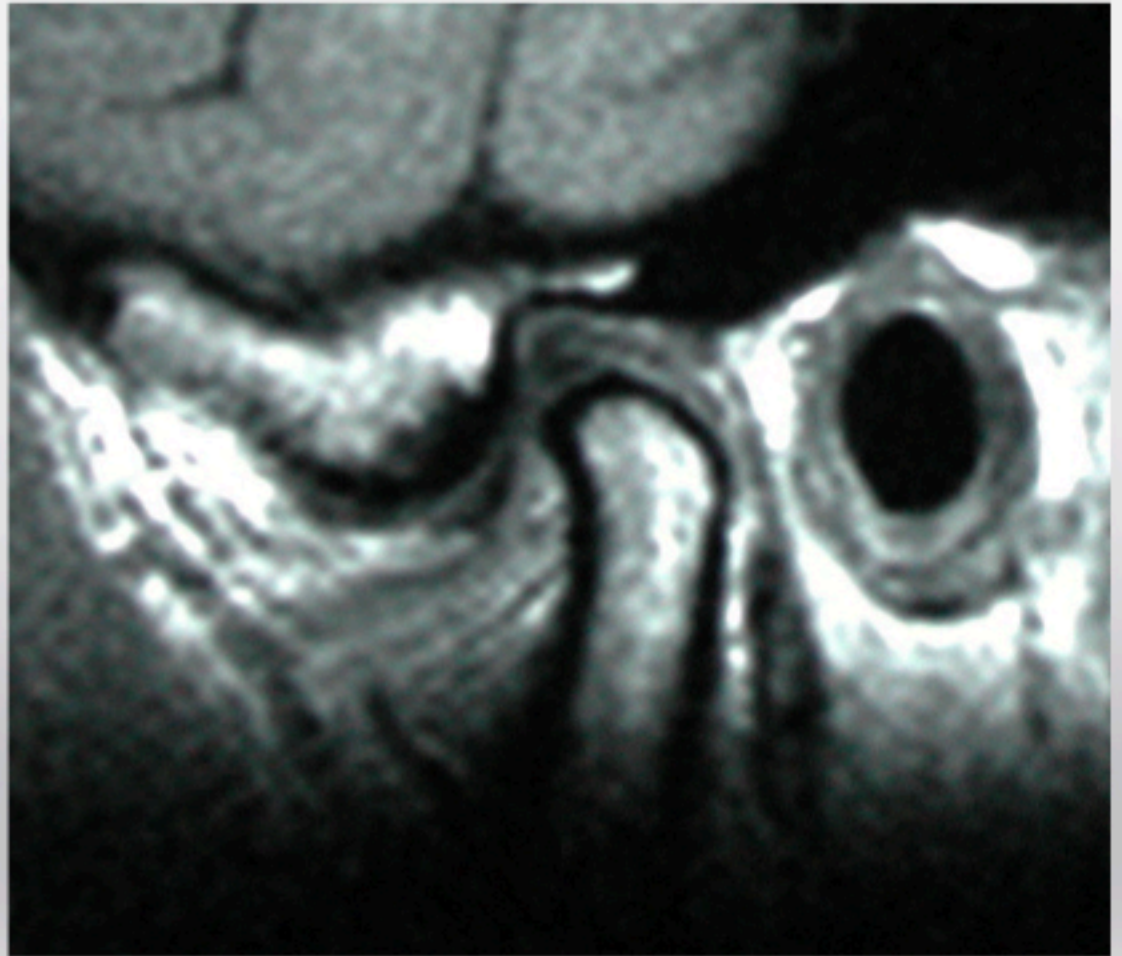
Facial Pain Diagnosis

Diagnostic Tools

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 - Joint Motion
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- 6 CT Scan

MRI

Blood Tests

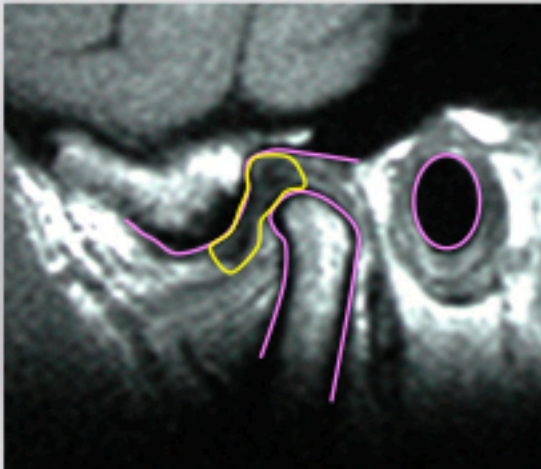


Short

T1 Inverted

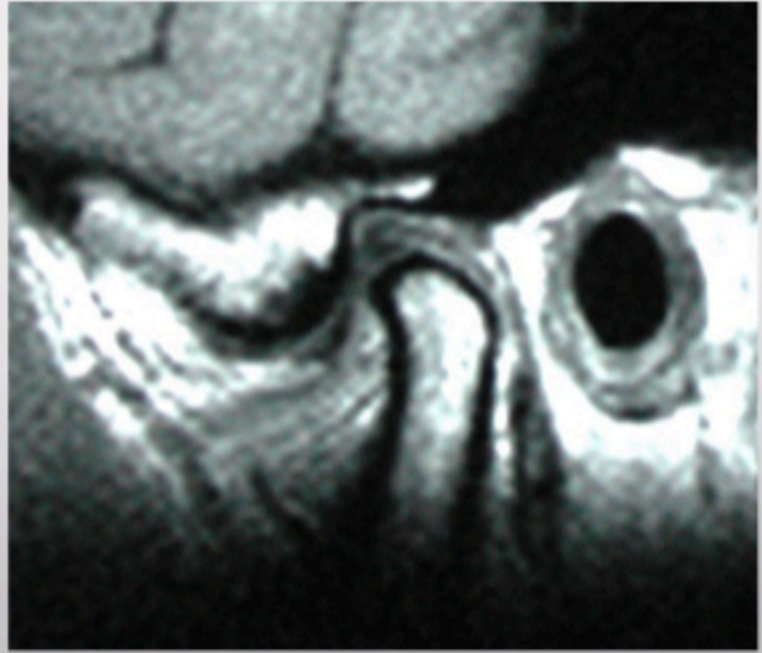


T1 Sagittal Closed



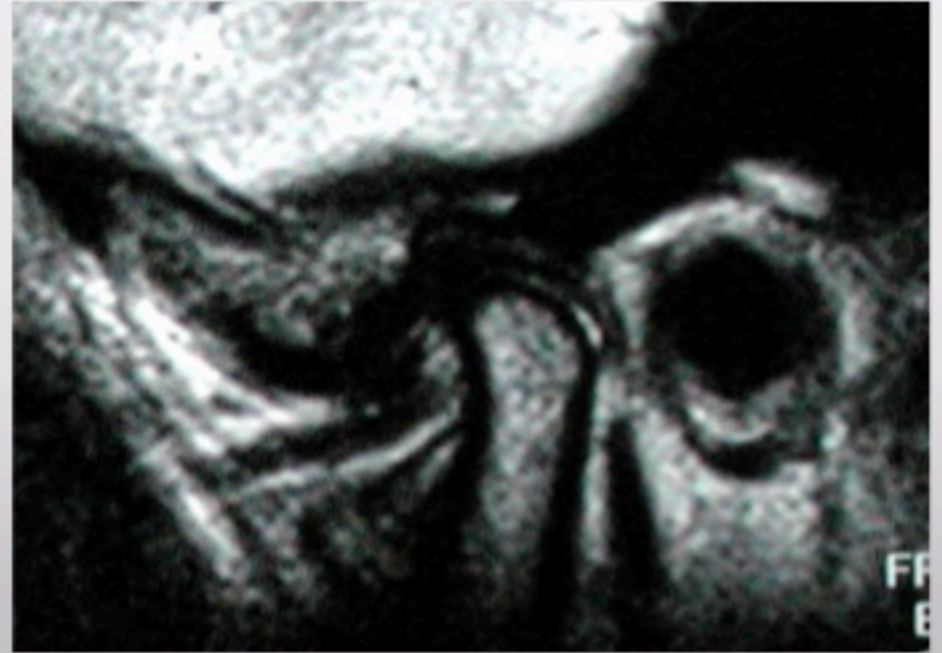
Normal MRI T1 and T2

T1 Sagittal Closed



T1 shows more fat

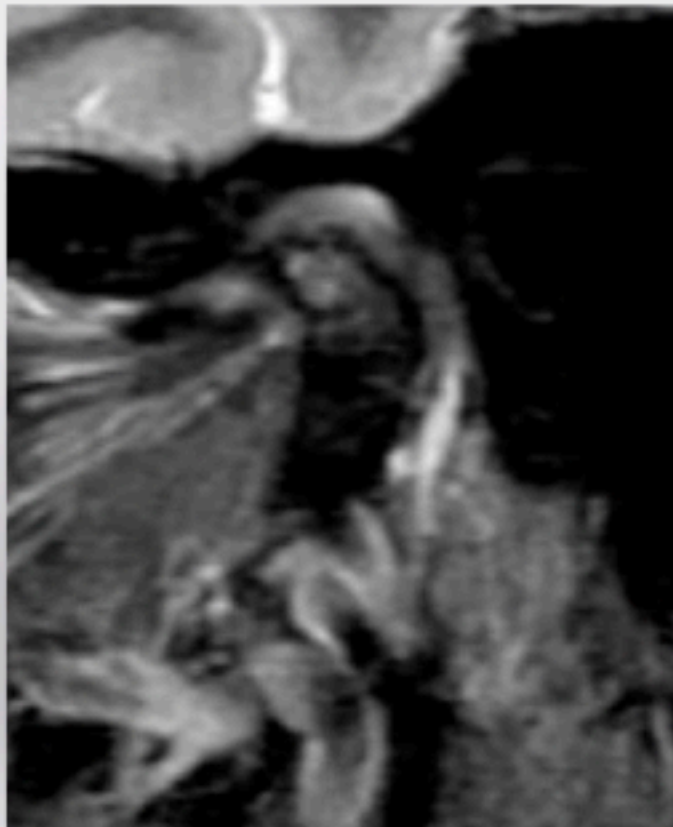
T2 Sagittal Closed



T2 shows more water:
Inflammation
Pathology

MRI STIR Image

STIR- Short T1 Inversion Recovery



STIR- "Supercharged" T2

Retrodiscal Inflammation

Marrow Edema

Diff Dx is active AVN, Osteoarthritis, Lyme Ds, RhA, Hypoxic Progressive Condylar Resorption, Other.

STIR and T2 shows water as white

Facial Pain Diagnosis

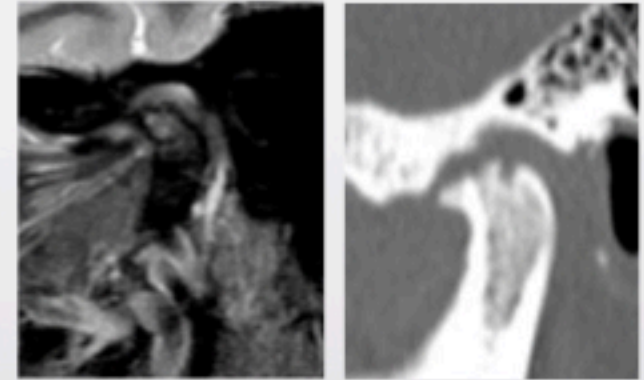
Diagnostic Tools

- 1 Written and Oral History
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 - Joint Auscultation
 - Joint Motion
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- 5 Sleep Airway Screening
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- MRI
- Blood Tests

Biometrics

- Joint Vibration
- Jaw Tracker
- Electromyography
- T-Scan

- Occlusion: CR Mounted Study Models
- Complete Dental Exam
- Clinical Photographs
- Dx Blocks
- Dx Orthotics- Brux Checker, CR Orthotic





Know Yourself

Know Your Work



Know Your Patient

Apply Your Knowledge

John R. Droter, DDS
drdroter@mac.com
301-805-9400

LD Pankey Institute

Write your Dream