

Pankey TMD

January 2025

John R Droter DDS
Annapolis, Maryland

Annapolis, Maryland
John R Droter DDS

www.drdroter.com

John R Droter, DDS

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go to www.drdroter.com

Seminar Download

Pankey TMD

The screenshot shows a web browser window with the URL www.drdroter.com/seminar-downloads/. The page title is "John R. Droter, DDS" and the main heading is "SEMINAR DOWNLOADS". The navigation menu includes "HOME", "PATIENT DOWNLOADS", "NEW PATIENT EXAMS", "ABOUT TMD", "SEMINAR DOWNLOADS", and "CONTACT". The "SEMINAR DOWNLOADS" link is highlighted in green. The "Upcoming Seminars" section lists:

- 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](http://LDPankeyInstitute.com) 305.428.5500
- Spear TMD Course 1 with Dr Herb Blumenthal
Aug 11-13, 2016, Scottsdale Arizona
Call [Spear Education](http://SpearEducation.com) (866) 781-0072

The "Most Popular and Common Downloads" section lists:

- TMD Supersheet Download
[SuperTMDx13.11](#)
- Brux supersheet Download

TMJ/TMD Confusion



Dogmatic
Arguments



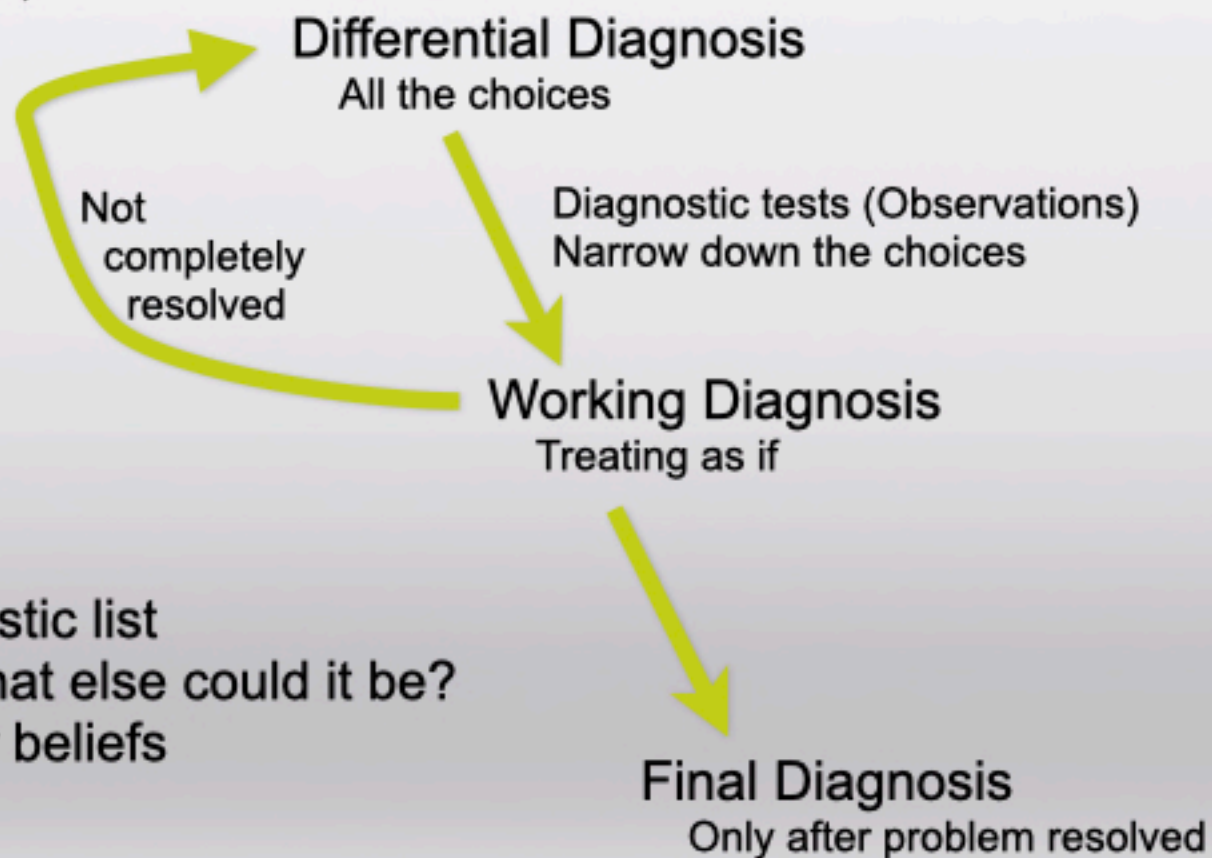
The Diagnostic Process

When diagnosing and treating facial pain, we have entered the world of medicine.



Think!!

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



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 Pseudocyst, TMJ
Perforation Pseudocyst, 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
Iatrogenic 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, Somatosform pain disorder
Pain disorder with related psychological factors
Peripheral Sensitization

1. TMJ Damage and Diseases

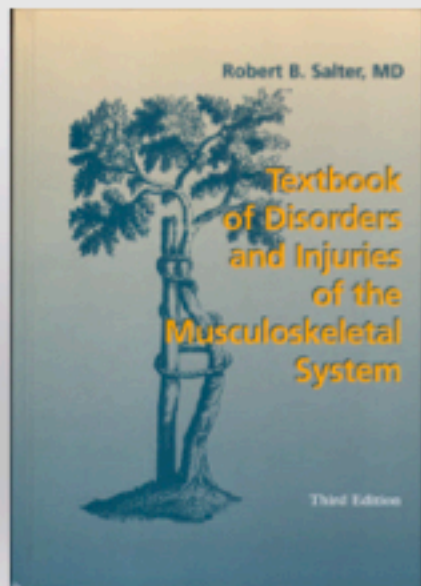
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Effusion, TMJ
Fracture of subcondylar process of mandible
Gout, TMJ
Growth Disturbance Prepuberty due to TMJ damage
Hemarthrosis TMJ, Traumatic
Hyperplasia Mandibular Condyle,
Hypoplasia Mandibular Condyle
Hypoxia Reperfusion Injury, TMJ Cartilage Damage
Hypoxic Progressive Condylar Resorption

Impingement Retrodiscal Tissue
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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

My Core Belief

The TMJ is a synovial joint of the human body and will undergo the same disease processes as any other synovial joint

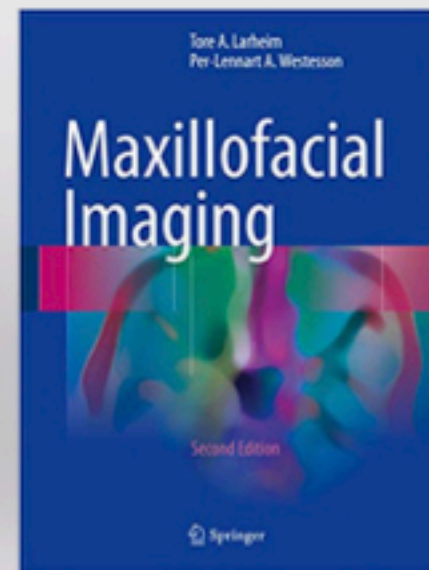
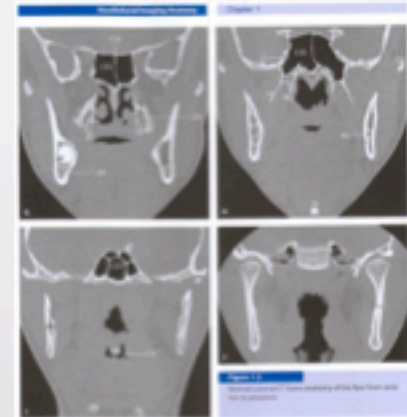
Understanding orthopedic medicine is the key to understanding joints, including the TMJ



Textbook of Disorders and Injuries of the Musculoskeletal System
Robert Salter MD

Buy Salter's Orthopedic Textbook.
When you have a patient with specific disease (i.e. osteoarthritis), read that chapter.

Maxillofacial Imaging
Larheim
Westesson



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

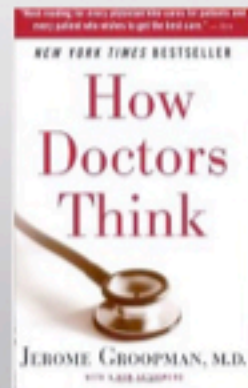
Surgical

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

Differential Diagnosis

Diagnostic Boxes: Pattern Recognition

“My Tooth Hurts”



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

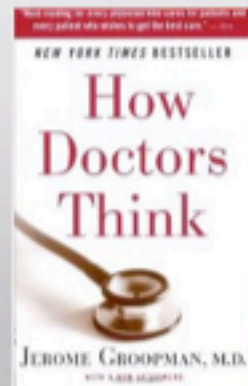
Inflamed Tissue secondary to
popcorn husk

Aphthous Ulcer

Periodontal ligament inflammation
secondary to Occlusal Trauma

Pulpitis secondary to Occlusal Trauma

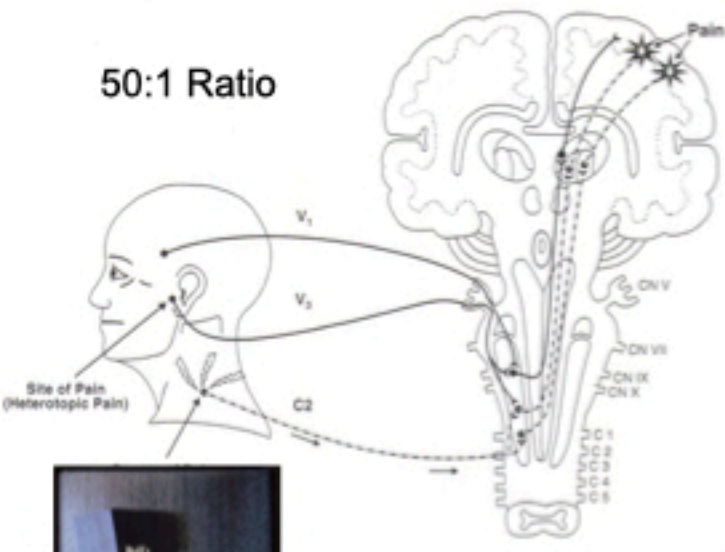
Other



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

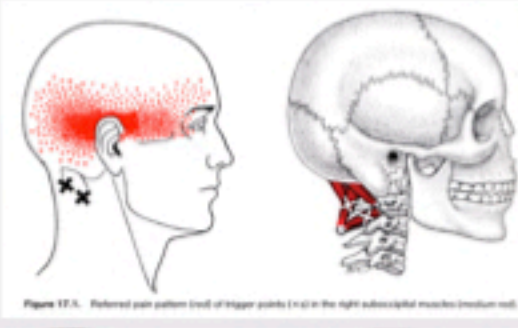
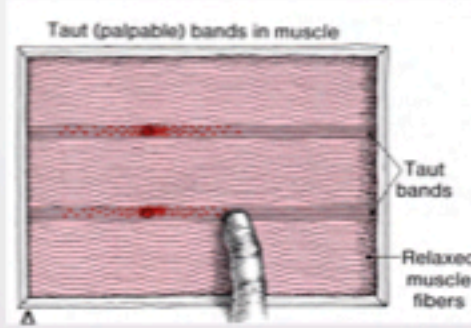
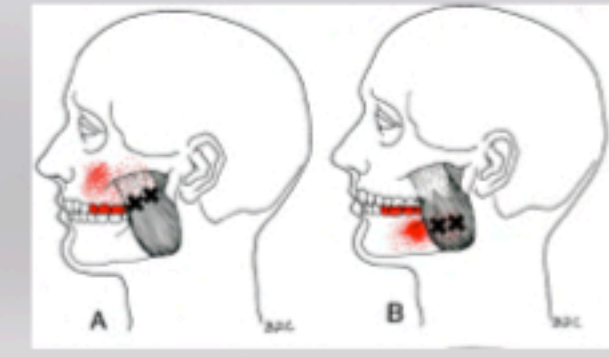
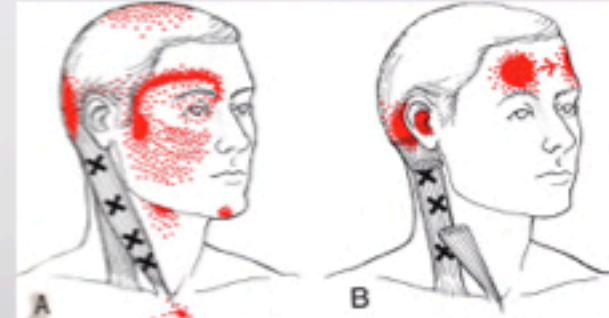
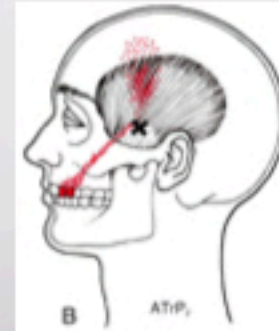
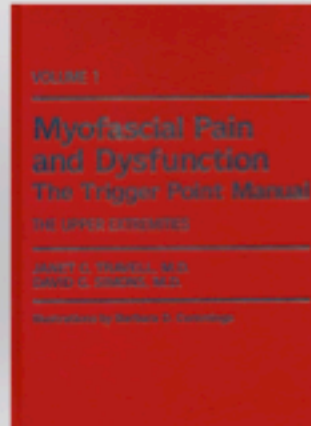


Figure 17.1. Referred pain pattern (red) of trigger points (x) in the right suboccipital muscles (medium rest).

"The Trigger Point Manual"
Janet Travell, MD



Differential Diagnosis

Diagnostic Boxes: Pattern Recognition

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Periodontal ligament inflammation
secondary to Occlusal Trauma

Pulpitis secondary to Occlusal Trauma

Other



“How Doctors Think”, by Jerome E. Groopman

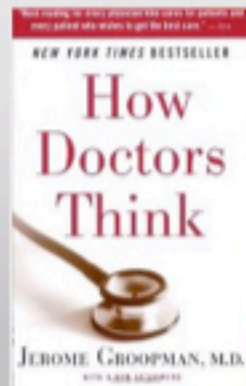
Diagnose by Pattern Recognition

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

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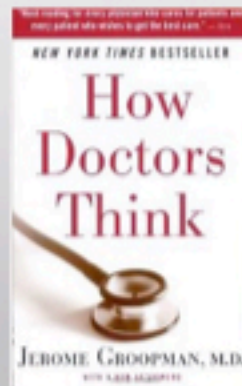
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Hello. I am:

**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



CT and MRI Scans in my practice since 1992.



Closet full of printed scans just as digital appeared!!

Dr Guy Haddix had been taking CT scans since 1990

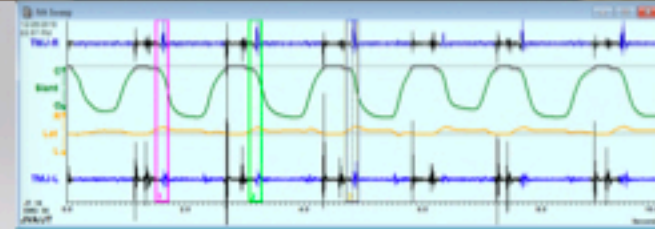


The magic in the coronal view
The Load Zone

Compare CT, Mounted models, MRI, JVA before and after a case. What can I see now looking back?



JVA since 2004



Herb Blumenthal
My friend, mentor, and colleague



Yoda of Muscles



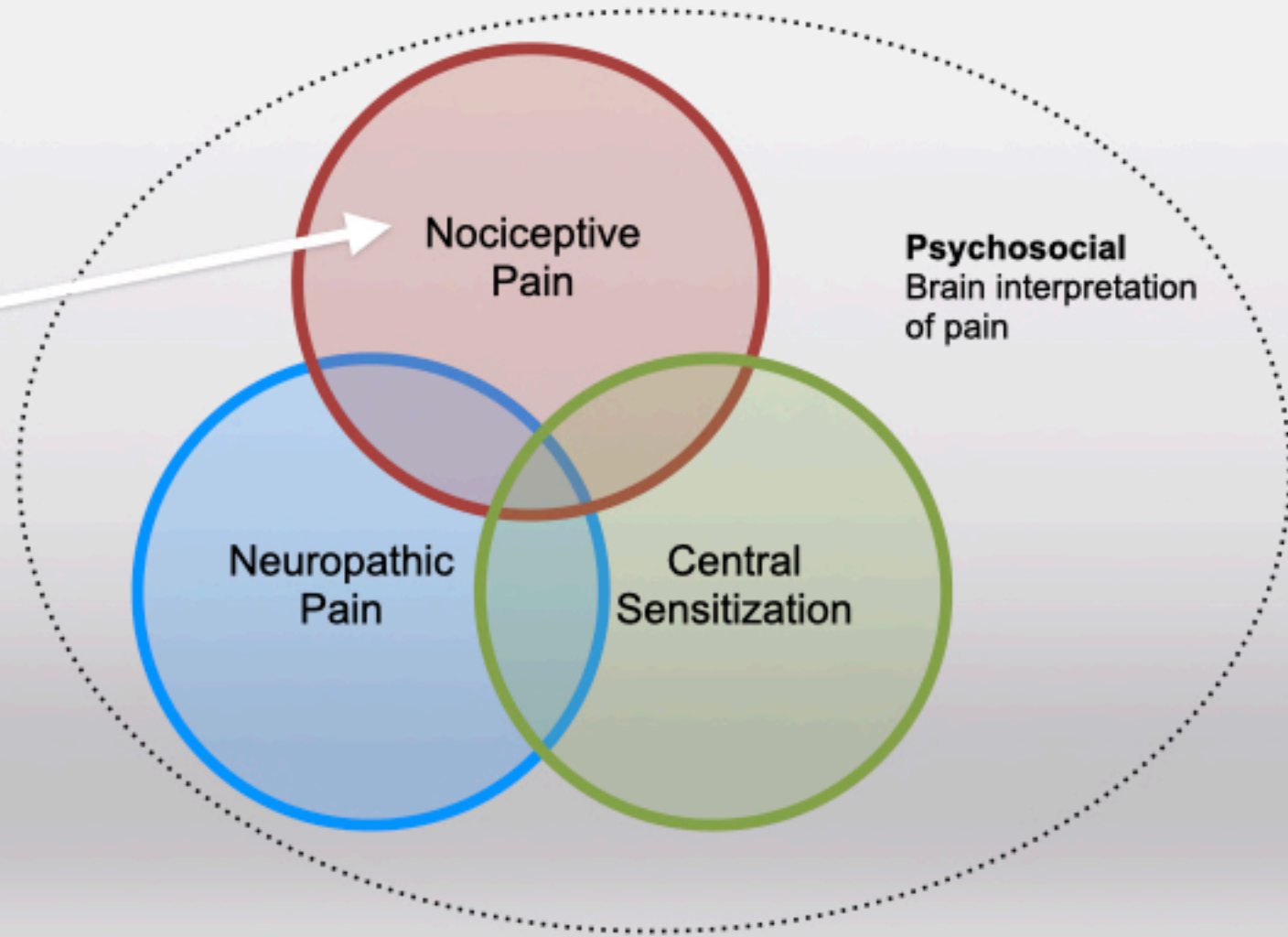
Pain: Three Types

Inflammation Pain
Physical Damage

Tissue
Muscles
Joints

Nerves
Misbehaving

Brain
Misbehaving



Psychosocial
Brain interpretation
of pain

Neuropathic
Pain

Central
Sensitization

Nociceptive
Pain



TMD Different Beliefs

Psychosocial Behavioral

Brain interpretation
of pain



It is not about
the nail



TMD Different Beliefs

Nociceptive Pain

Neuropathic Pain

Central Sensitization

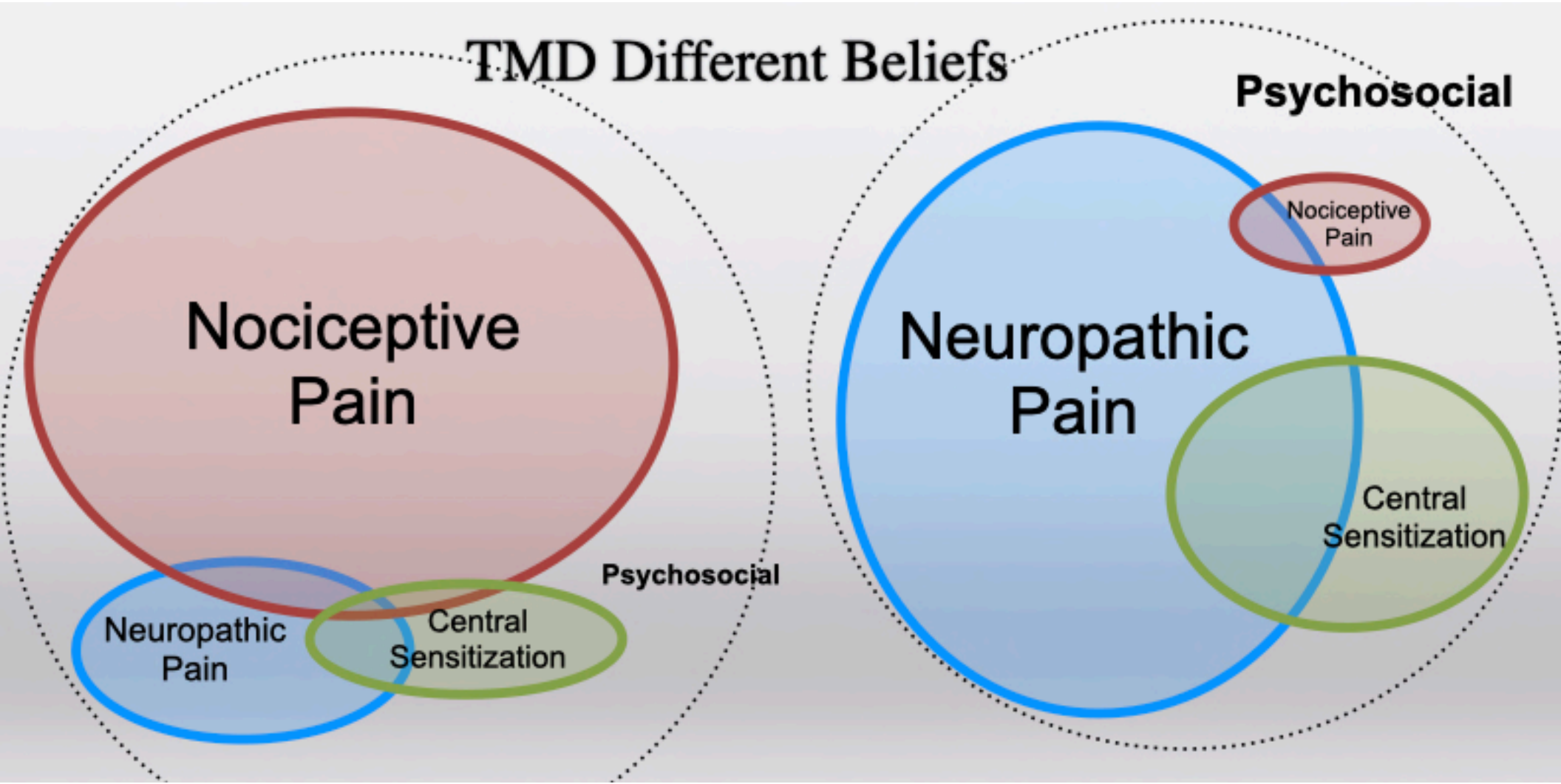
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Disclosures:

Atomic Skis- Sponsored.
I got stuff.

LD Pankey Institute TMD Course
Honorarium

Co-Owner of ArrowPath Sleep
Patent on sleep device: LatBrux

Living Tree Dental Lab
High Quality Dental Orthotics
Royalties on my designs



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





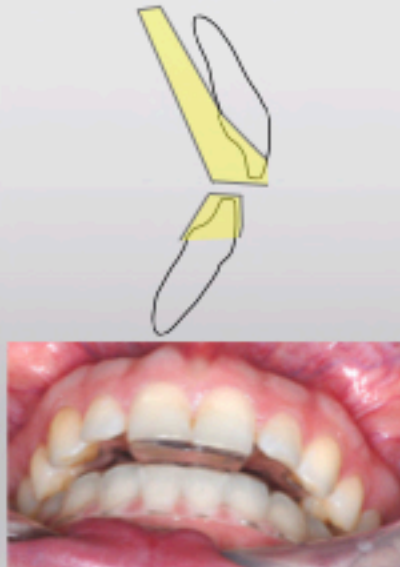
Living Tree Dental Lab
(865) 509-4509
connect@livingtreelab.com

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





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

3D Printed Orthotics

APS Temp Anterior Stop



APS in Office Anterior Stop

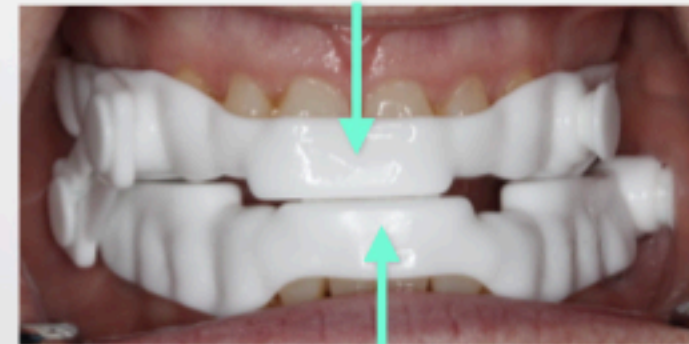


APS Airway Bite





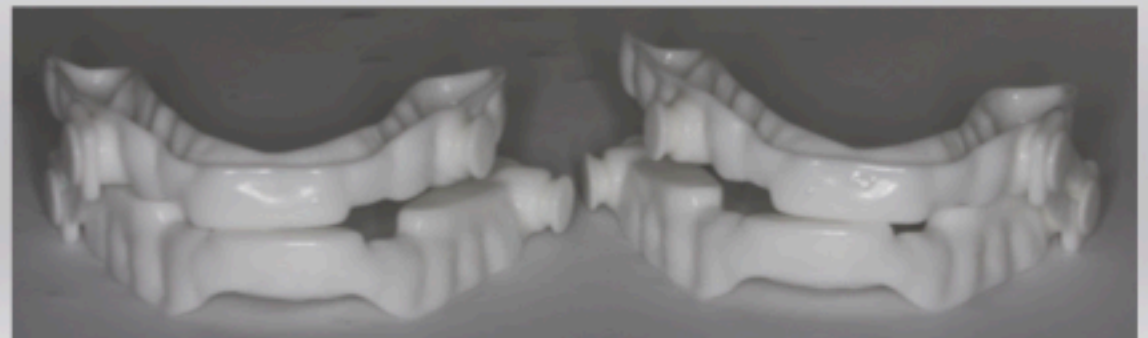
ArrowPath Sleep
Lat Brux
Lateral Bruxing Guard



Midline sits left

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 right one night, left the next



Common TMDs

John R Droter DDS
Annapolis, Maryland

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John R Droter DDS

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6 Common TMDs

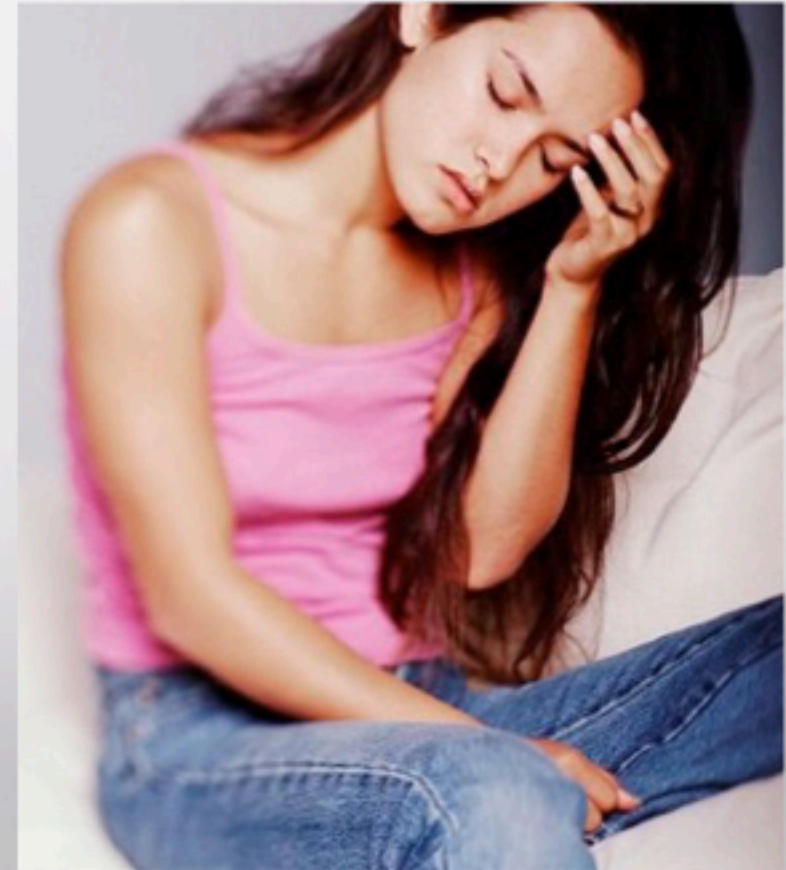
- Parafunctional Clenching
- Parafunctional Grinding
- Occlusal Muscle Dysfunction
- Osteoarthritis
- Acute Sprain
- Acute Closed lock of TMJ disc

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



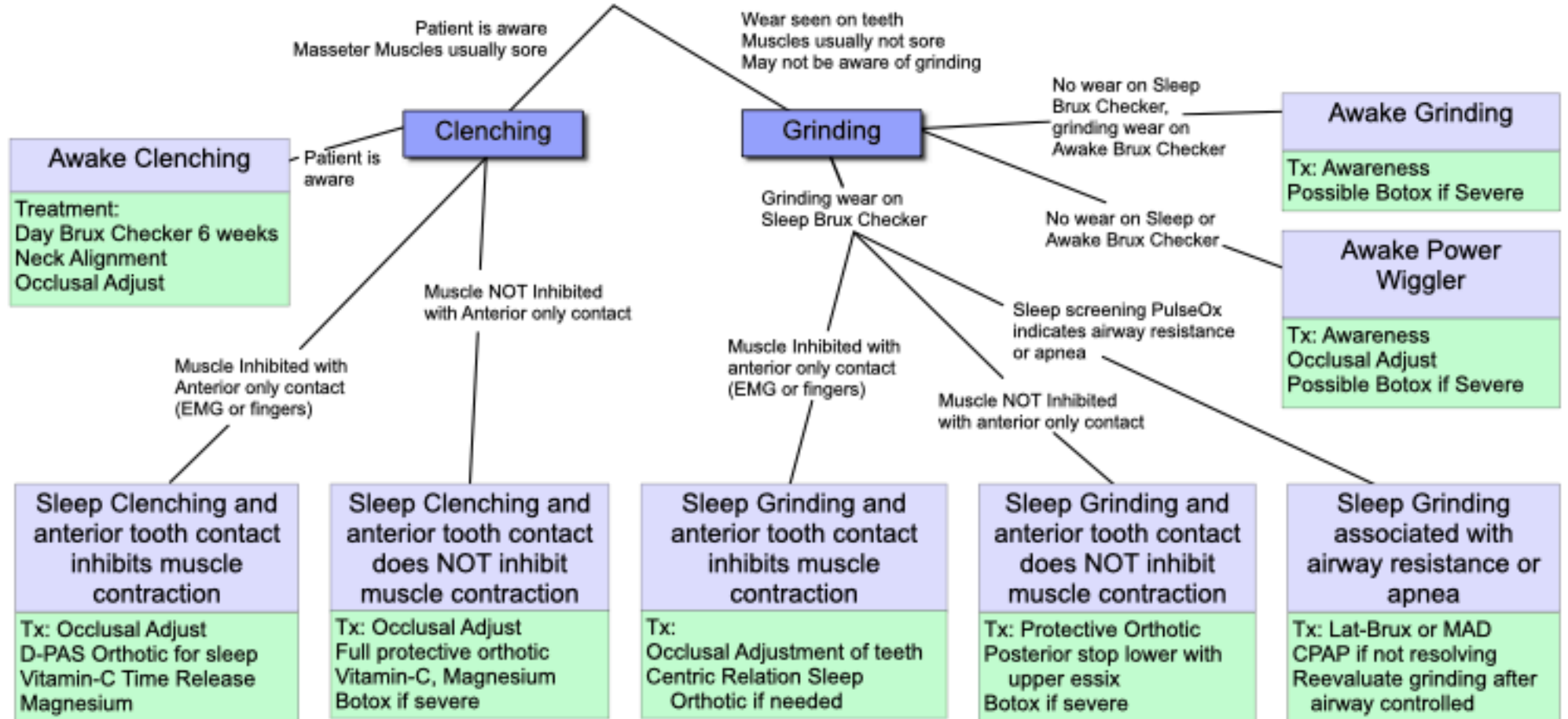
6 Common TMDs

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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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



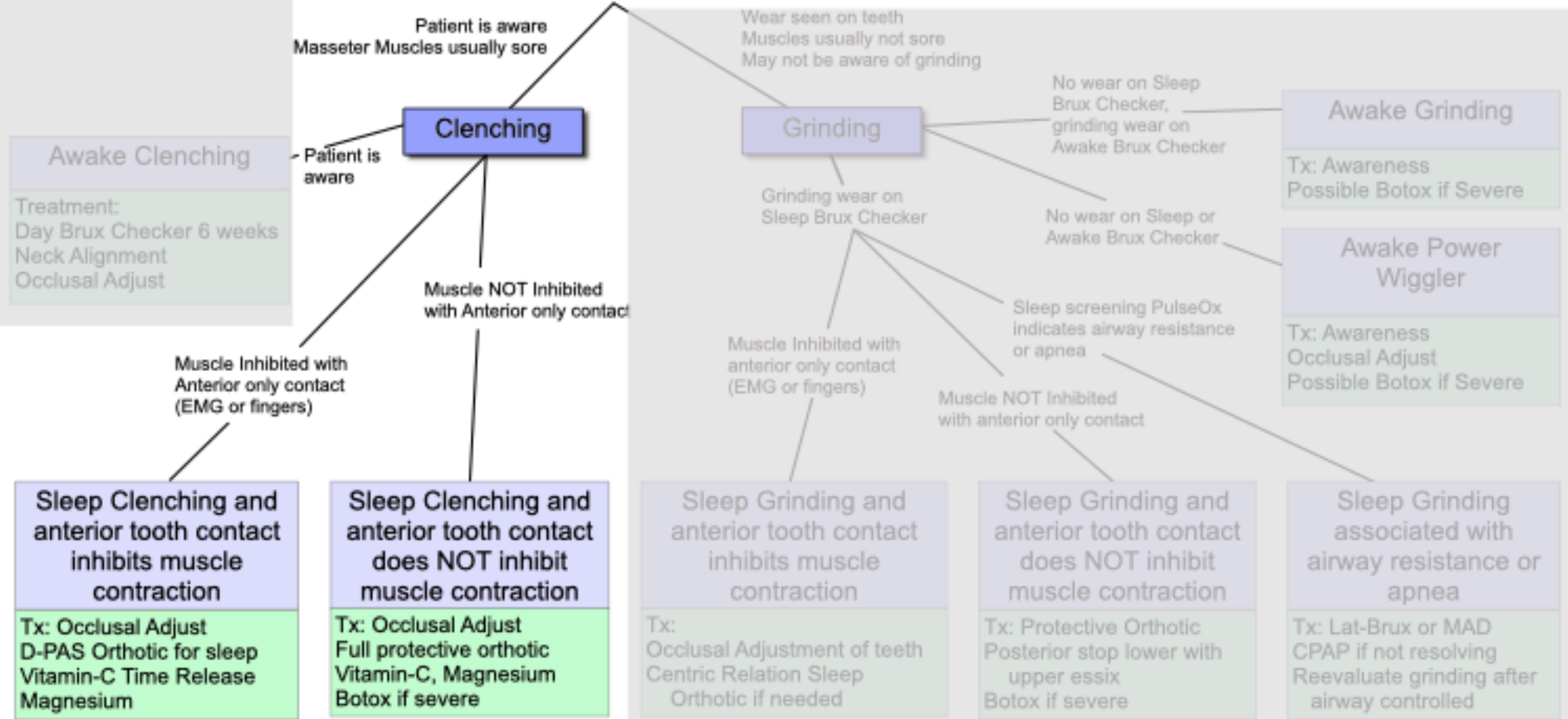
Clenching
Painful Muscles
Patient is usually aware of clenching
Fremitus
Strong Masseters
See slight wear around tooth contacts
Damage TMJ cartilage

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

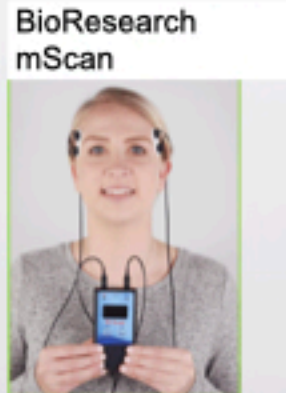
Parker Mahan-
"Women Hurt, Men destroy"

BRUXING: PARAFUNCTIONAL TOOTH CONTACT



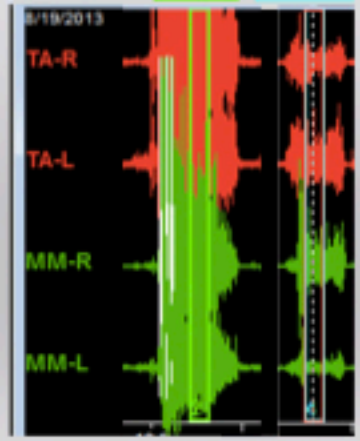
Are the TMJ muscles inhibited from full contraction with anterior only tooth contact?

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

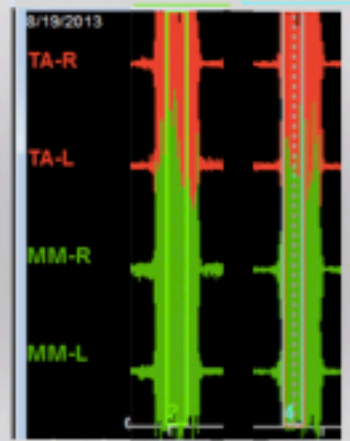


Major decrease in muscle power with D-PAS

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

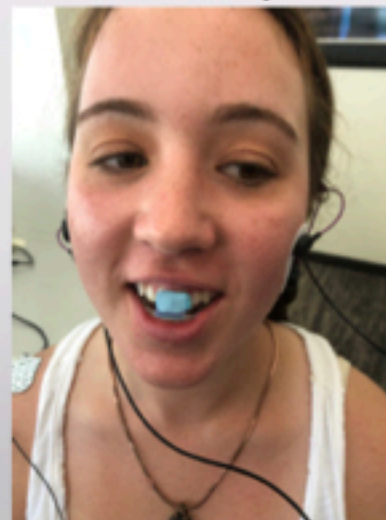
M-Scan EMG Electromyography



Clench back teeth



Clench
anterior stop

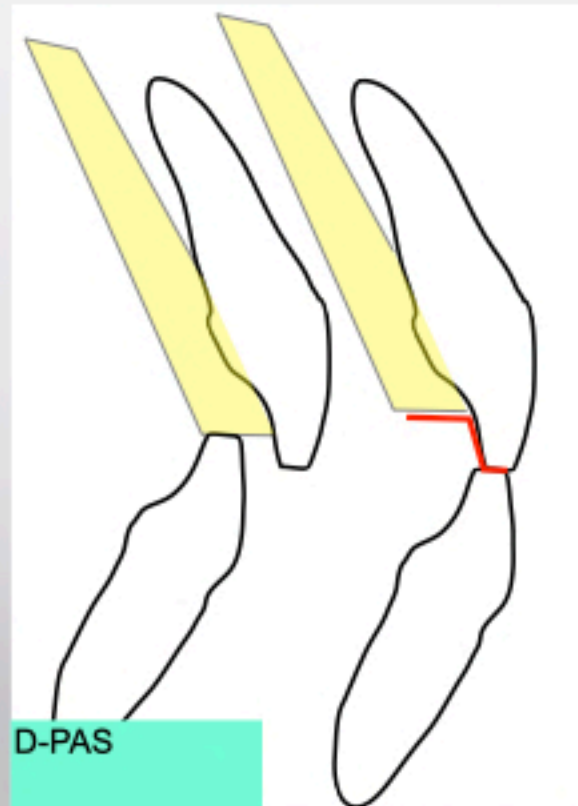
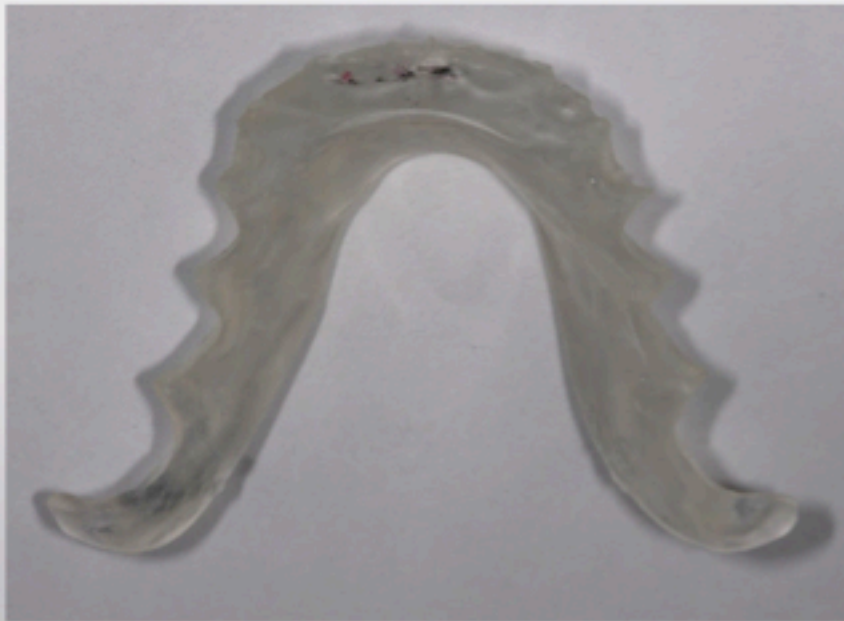


Can place moderate force
on front teeth

Clench
Back teeth +250 μv
Front teeth +121 μv



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 2 weeks for sleep, and occasional daytime

Better- Decrease in Symptoms

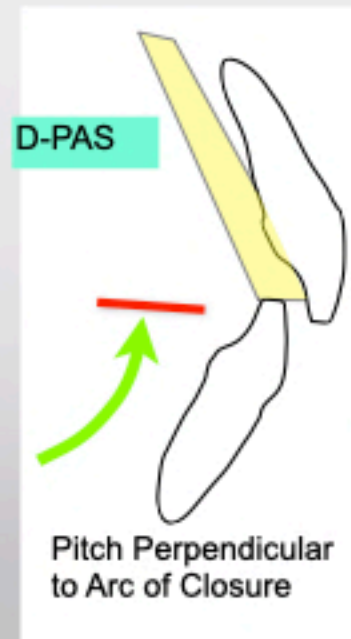
Sleep Clenching Inhibited: Wear D-PAS as night guard
Orthotic Improved Airway: D-PAS as night guard
Occlusal Muscle Disharmony: Occlusal Adjust

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

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



Temporary Anterior Stop Test

Wear for sleep for 1-2 weeks
Limited daytime wear if headache

Better- Decrease Symptoms on Waking

Sleep Clenching or Grinding
Orthotic Improved Airway

Worse- Increase Symptoms

Mechanically Unstable TMJ (Joint subluxation)
Intracapsular Problem TMJ
Orthotic Made Airway Worse

This is a diagnostic test, not treatment



Anterior Stop Orthotics



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



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

TMD Therapies

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

Vit C 1,000 mg
before exercise
or clenching



Mother Earth Ionic Angstrom
Magnesium 2 oz bottle
0.5 teaspoon sublingual



Women
add iron





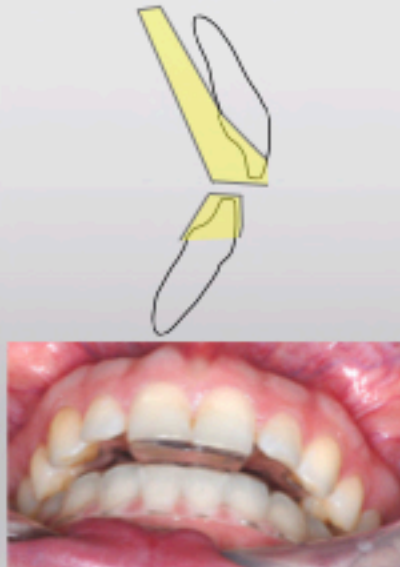
Living Tree Dental Lab
(865) 509-4509
connect@livingtreelab.com

3D Printed Orthotics

D-PAS
Diagnostic-
Palatal Anterior Stop



Brux-PAS
with lower Essix



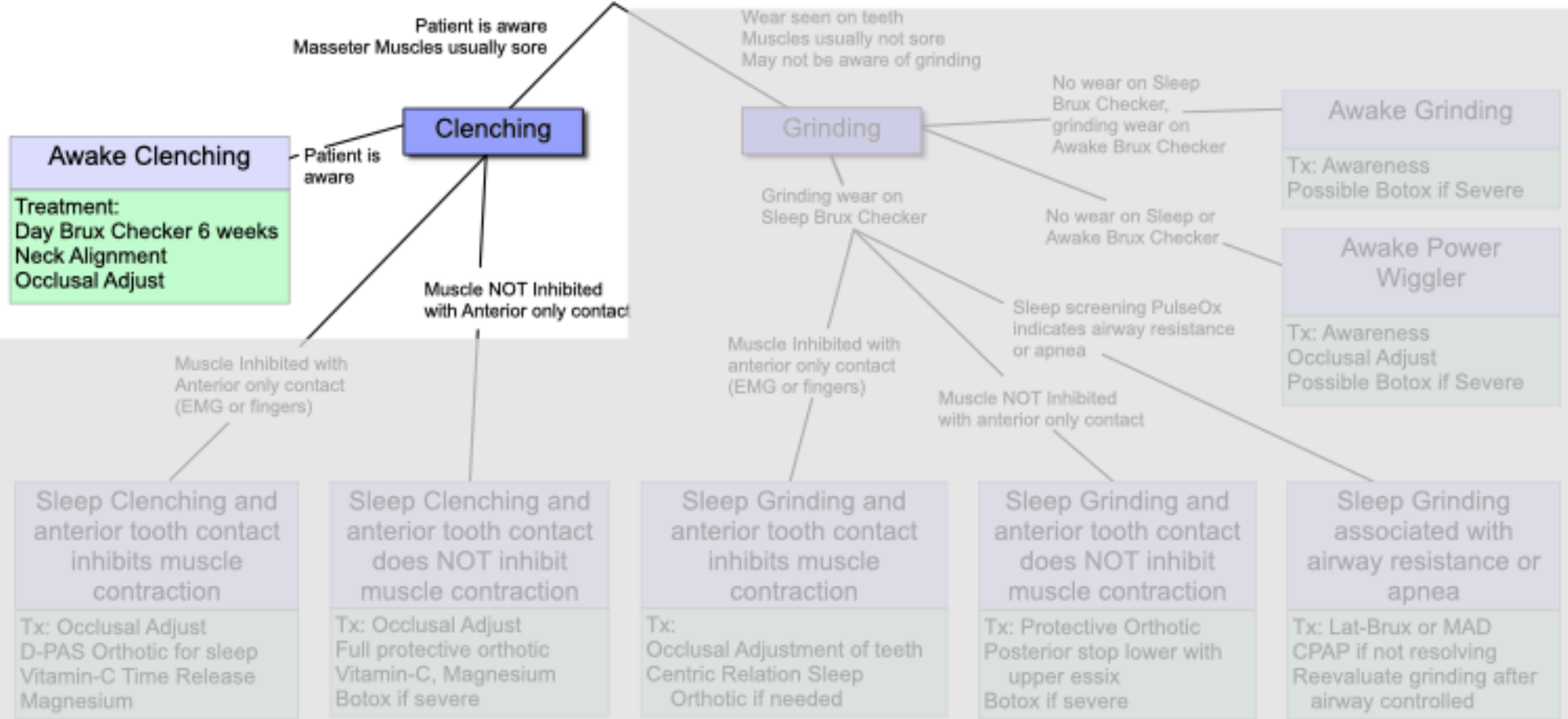
Hard Lower Posterior Stop
with upper essix



Hard Lower Full Coverage
Centric Relation Orthotic

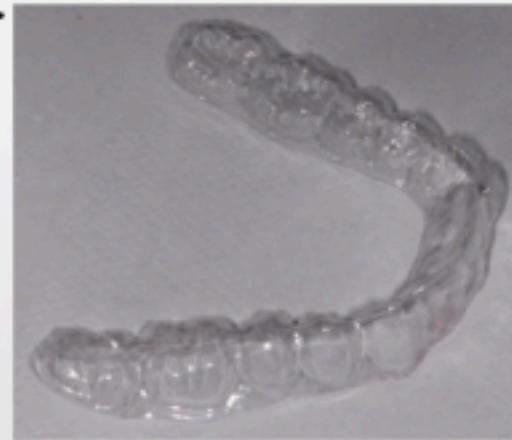


BRUXING: PARAFUNCTIONAL TOOTH CONTACT



Daytime Clenching- Clear Brux Checker Increases awareness to break habit

Very thin: Similar to mylar used for composites
50 μ m thick



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

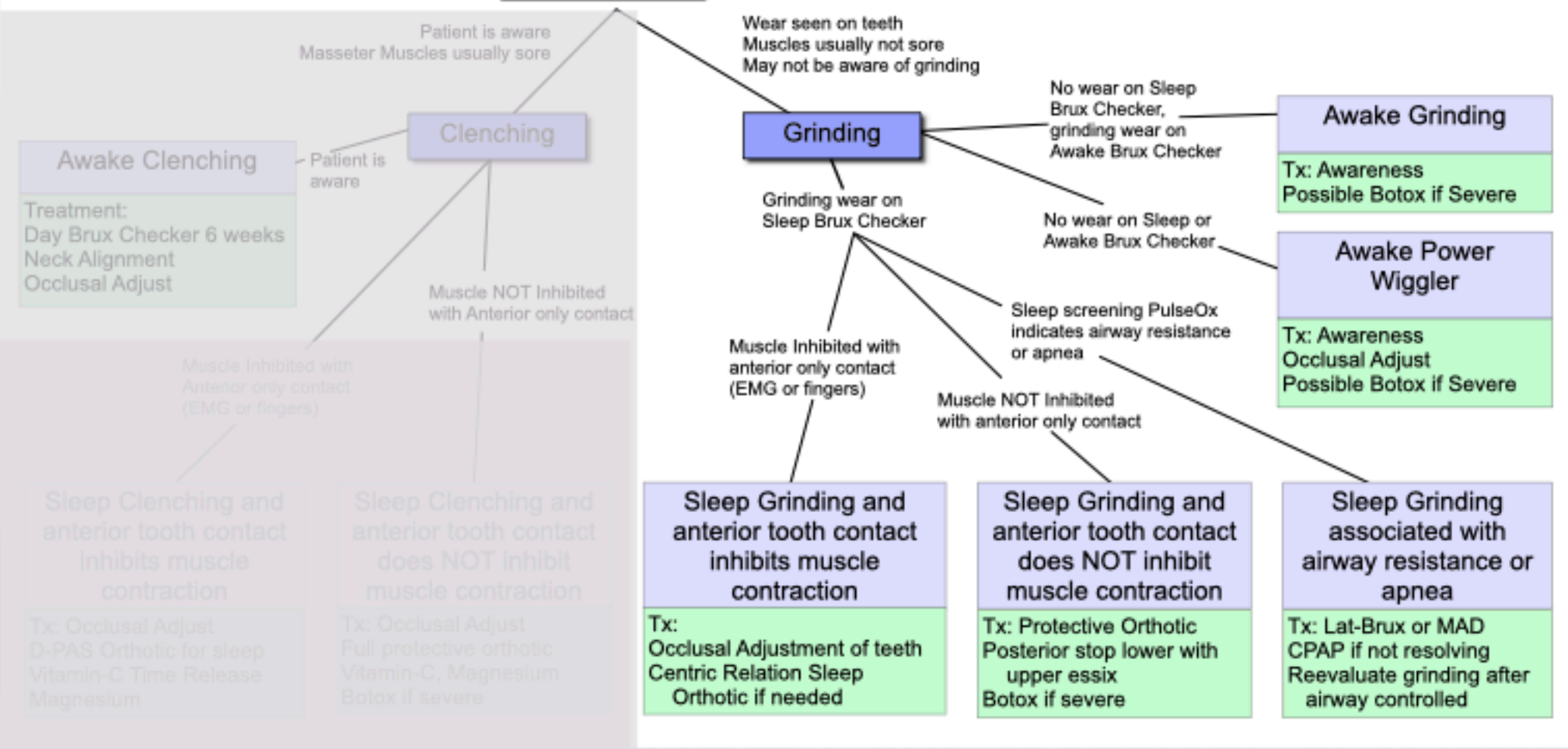
Material from:
Great Lakes Orthodontics
Platzhalterfolie by Scheu
Scheu Ref # 3202.1



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
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Fremitus
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Damage TMJ cartilage

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Plant seed at hygiene visit
Do you clench?

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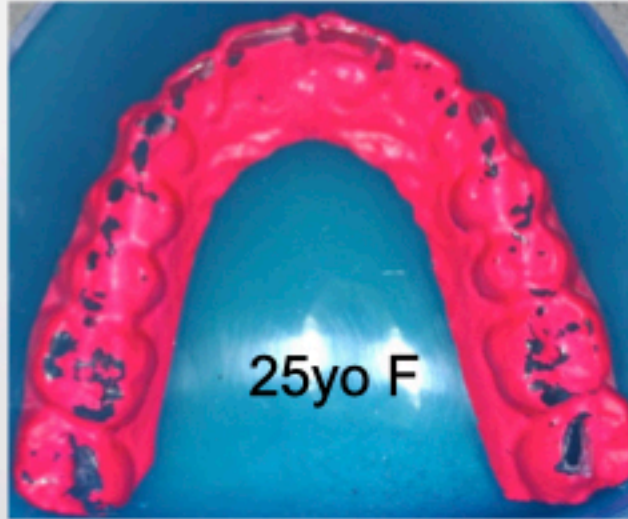
2. Does this occur awake or asleep?

Brux Checker
Great Lakes Orthodontics

0.1mm Mylar



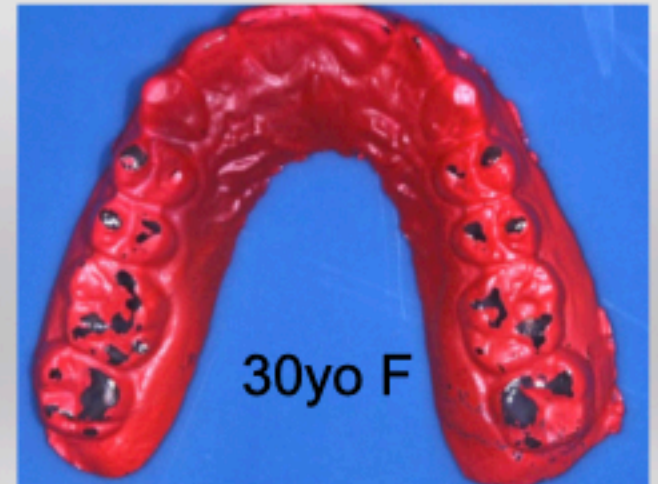
Made on Biostar Machine



25yo F



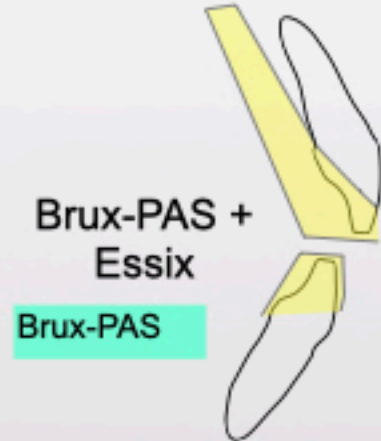
29yo F



30yo F

Which Occlusal Orthotic for Grinding?

Lower Posterior Stop with upper essix



Upper Hard CR Orthotic



Lat-BruX



Nylon Herbst
Great Lakes Ortho



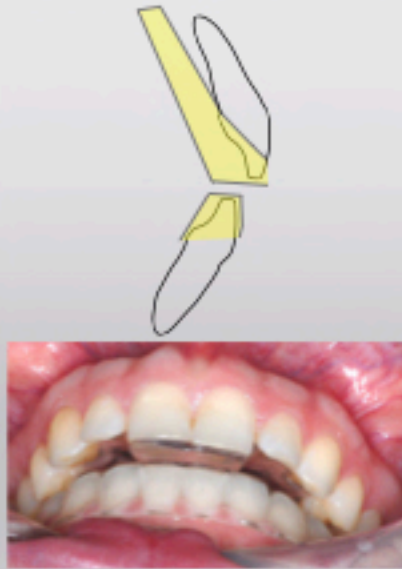
Nate Brock, CDT
(865) 509-4509
connect@livingtreelab.com

3D Printed Orthotics

D-PAS
Diagnostic-
Palatal Anterior Stop



Brux-PAS
with lower Essix



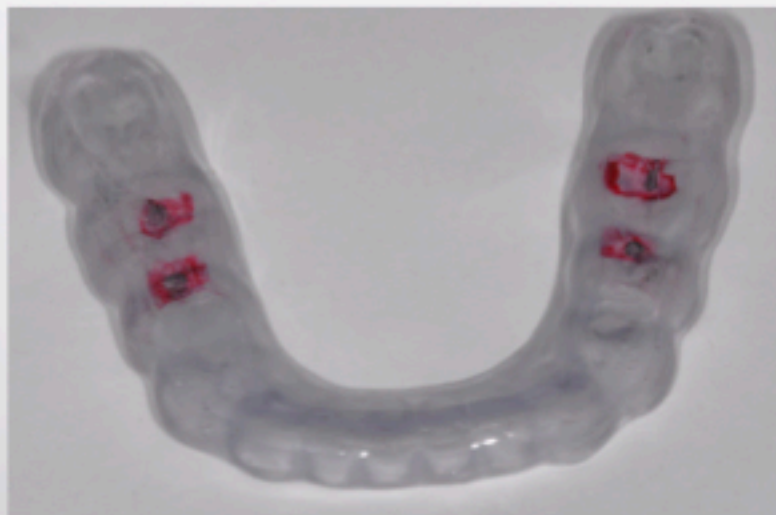
Hard Lower Posterior Stop
with upper essix



Hard Lower Full Coverage
Centric Relation Orthotic



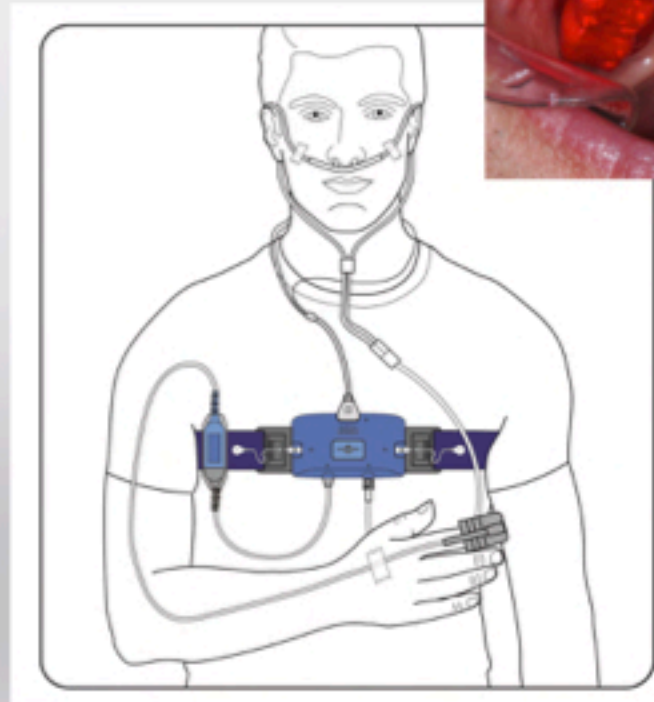
Lower Posterior Stop Night guard with upper Essix



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

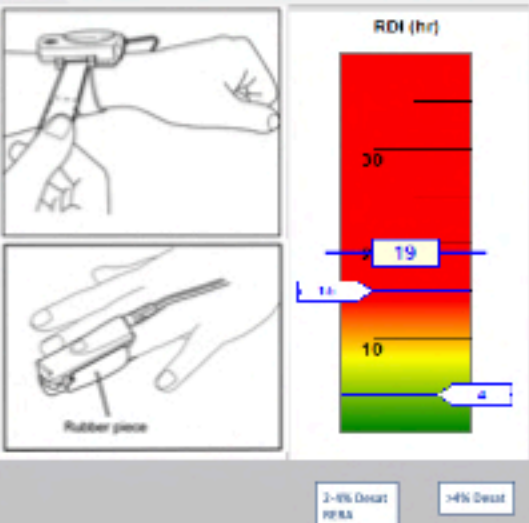
Sleep Grinding Airway Related

Pattern

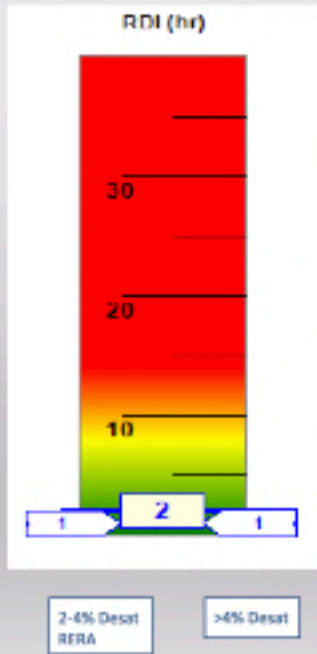
Worn Teeth
Upper Airway Resistance

~~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

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
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Occlusal Muscle Disharmony

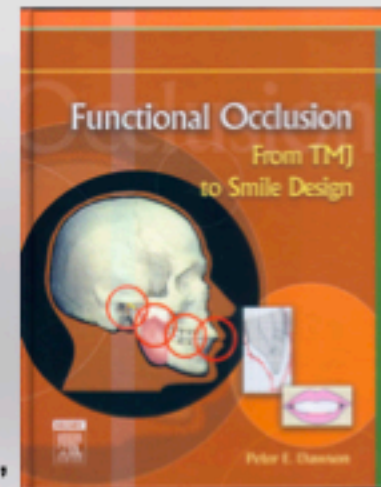
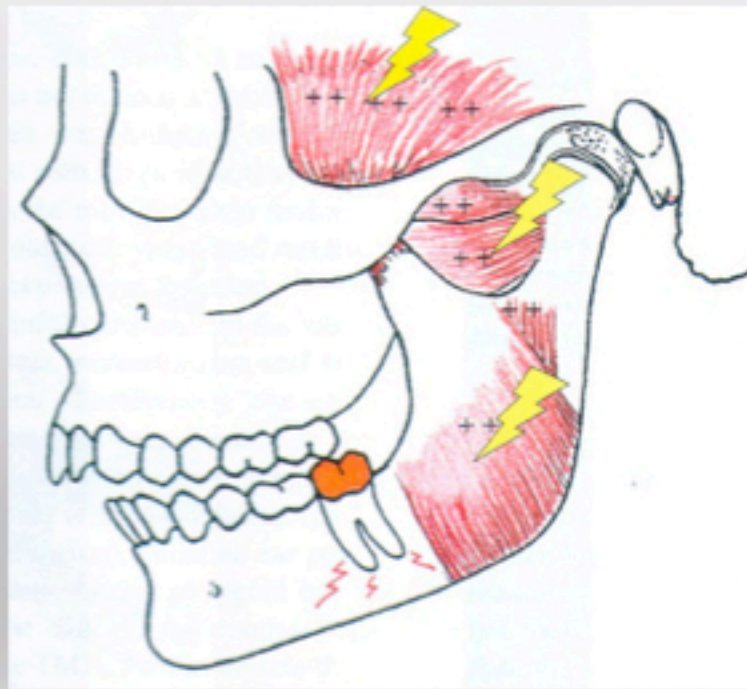
Uneven tooth contact with condyles fully seated triggers muscle activity

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

Disharmony in all muscles: Splinting/Bracing

Muscles sore from overuse

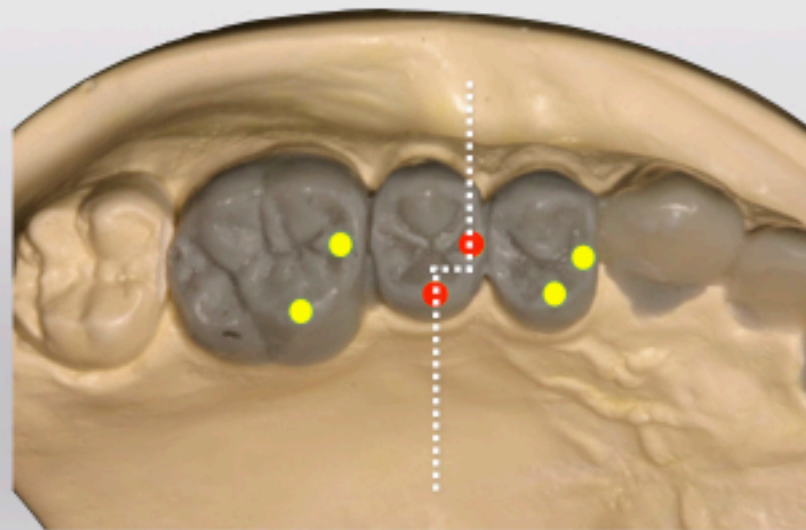
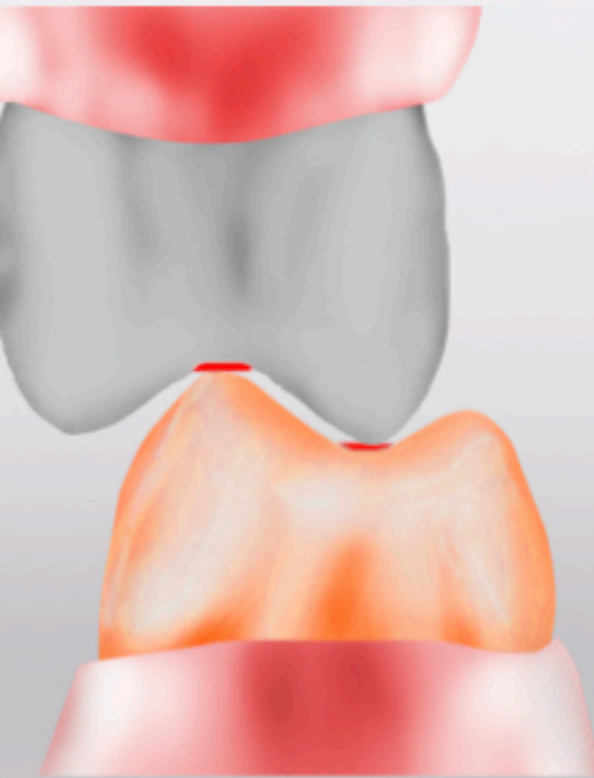
Muscles do not think- CNS input



from Dawson's Textbook, "Functional Occlusion"

LD Pankey's 3 Rules of Occlusion (Clyde Schuyler)

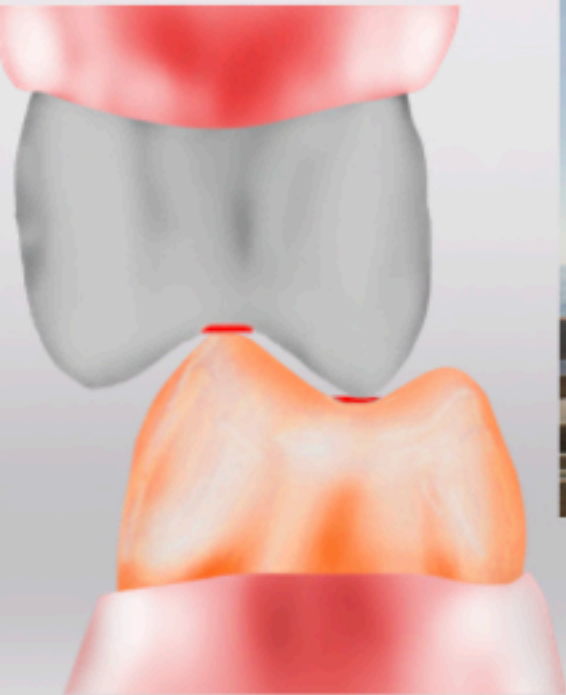
1. With the condyles fully seated in the fossa, all the posterior teeth touch simultaneously and even, with the anterior teeth lightly touching.
2. When you squeeze, neither a tooth nor the mandible moves (in a lateral direction).
3. When you move the mandible in any excursion, no back tooth hits before,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



Drawing by Dr Jim Kessler

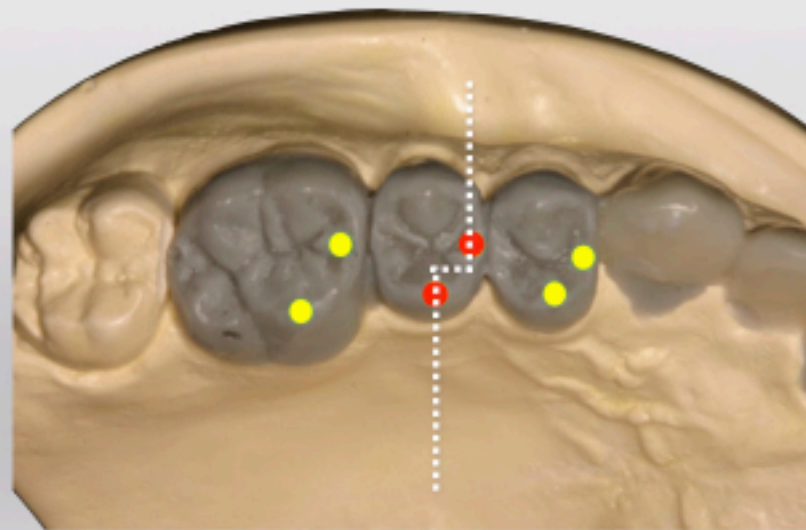
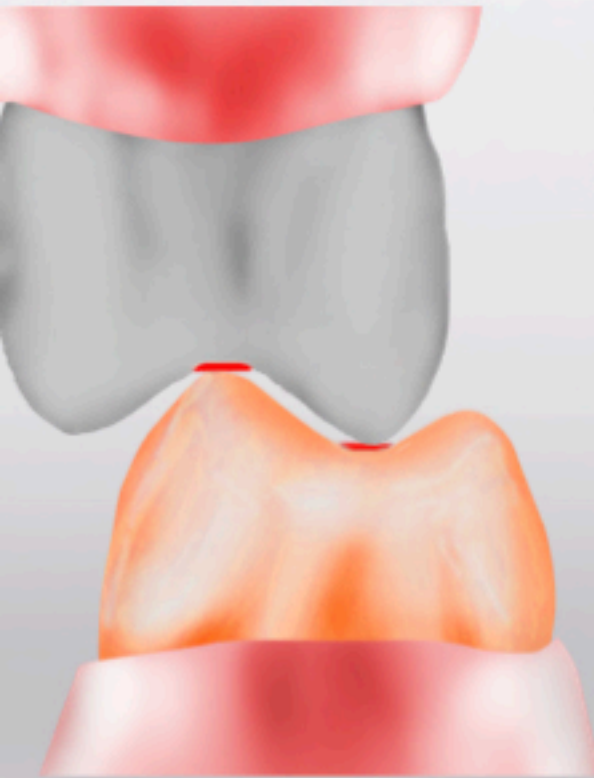
2. When you squeeze, neither a tooth nor the mandible moves (in a lateral direction).

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.
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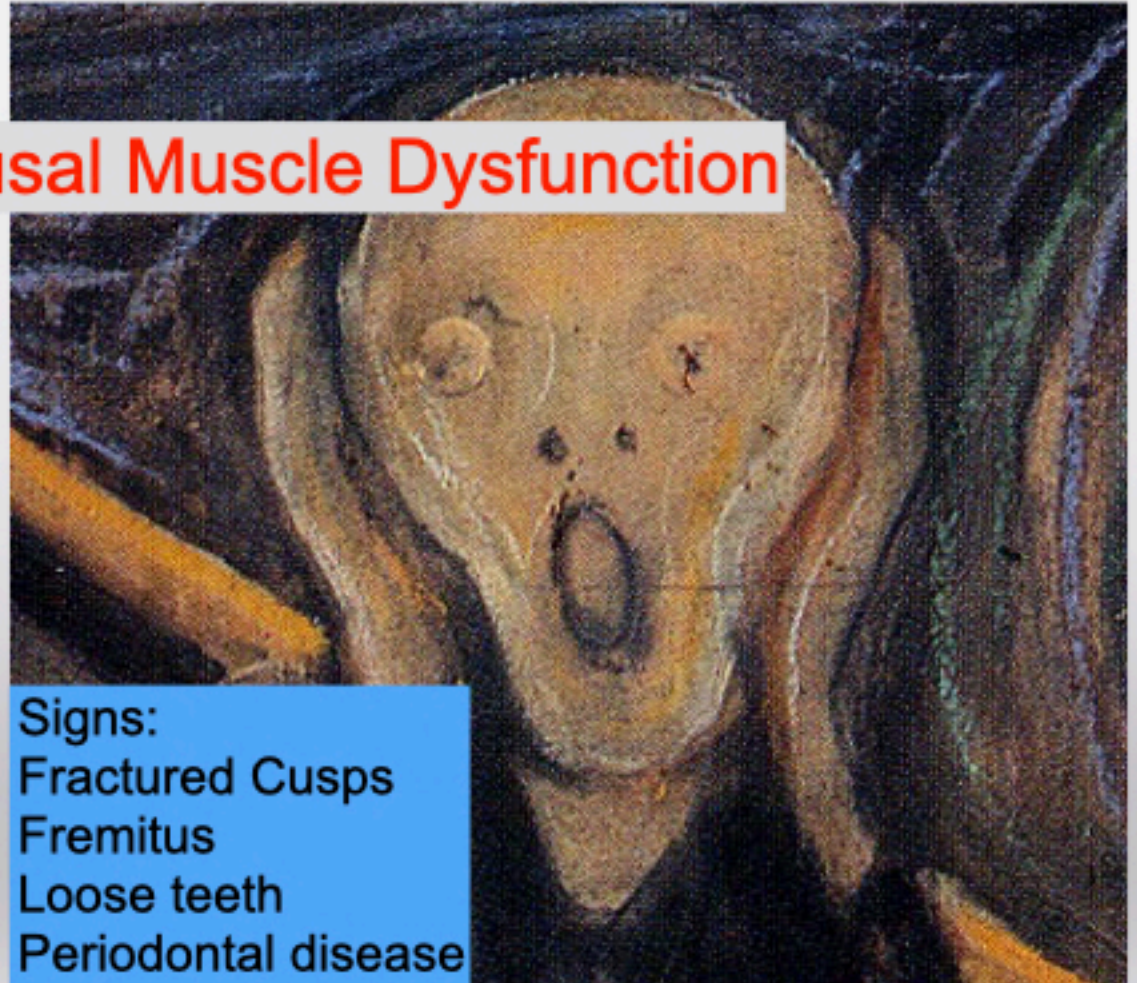
Drawing by Dr Jim Kessler

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

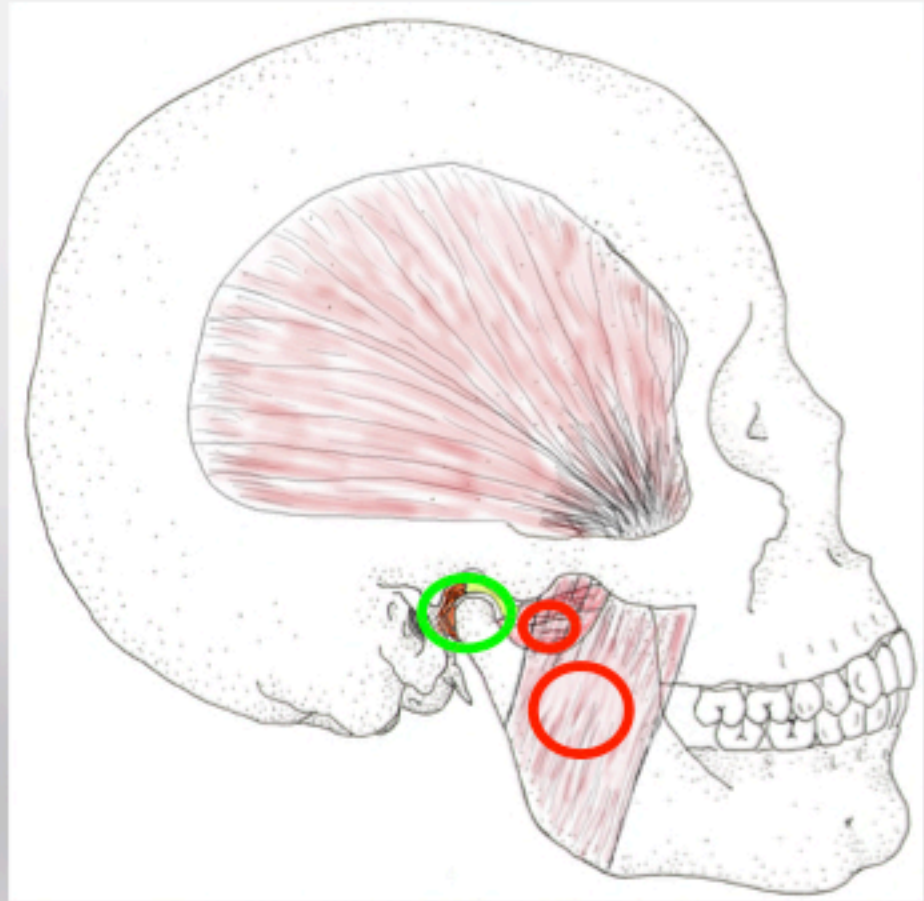
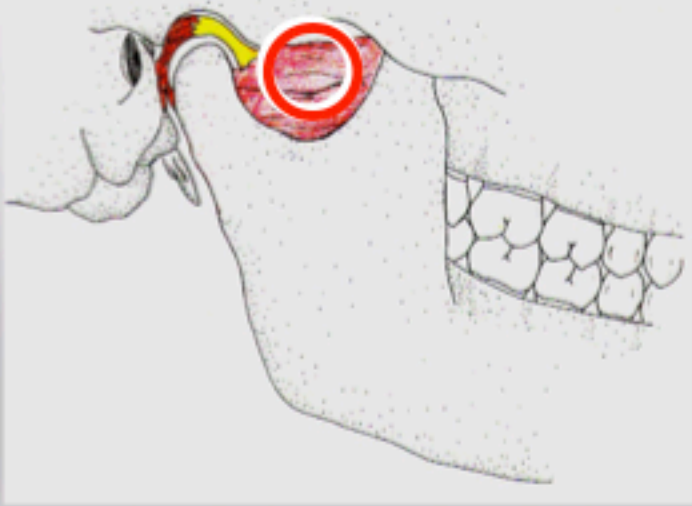
Occlusal Muscle Dysfunction

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 2 weeks for sleep, and occasional daytime

Better- Decrease in Symptoms

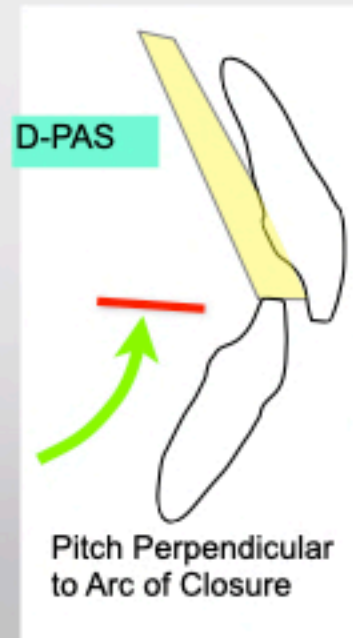
Sleep Clenching Inhibited: Wear D-PAS as night guard
Orthotic Improved Airway: D-PAS as night guard
Occlusal Muscle Disharmony: Occlusal Adjust

Worse- Increase in Symptoms

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

Stays the Same- No Change in Symptoms

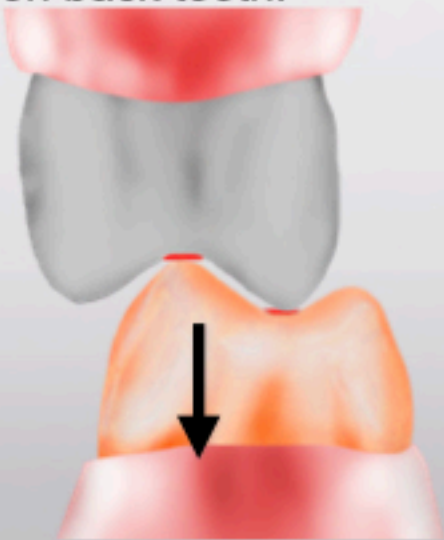
Damaged TMJ are mechanically stable
Pain not related to occlusion



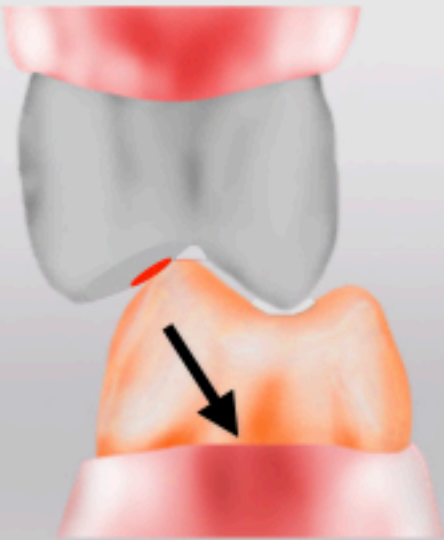
Stapelmann H, Türp JC. The NTI-tss device for the therapy of bruxism, temporomandibular disorders, and headache.....BMC Oral Health. 2008 Jul PMID: 18662411

Ideal Occlusion for Comfortable Muscles

Ideal
No sideways forces
on back teeth.



Not Ideal
Tense Muscles
Teeth can fracture



Sideways forces can fracture teeth

Not Ideal
Tense Muscles

Back teeth will have
sideways force
when the jaw moves
left or right.



Not Ideal
This is now a
functionless tooth.
Other teeth now
have more force.

Occlusal Sculpting

Reshape

The image illustrates the occlusal sculpting process through several components:

- Diagrams:** On the left, a diagram shows a tooth with a red arrow pointing to the initial contact point. On the right, a diagram shows a tooth with a red arrow pointing to the final occlusal contact point.
- Clinical Photos:** Two photographs show a dentist using a handpiece to reshape a patient's teeth.
- Tools:** Two images show different types of dental burs used for reshaping. Below them is a diagram of a circular bur with a blue U-shaped outline.
- Polish:** An image shows a polishing wheel with the word "Polish" written above it.

Occlusal Sculpting Tools, including Zirconia



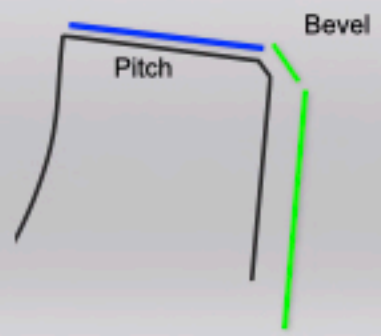
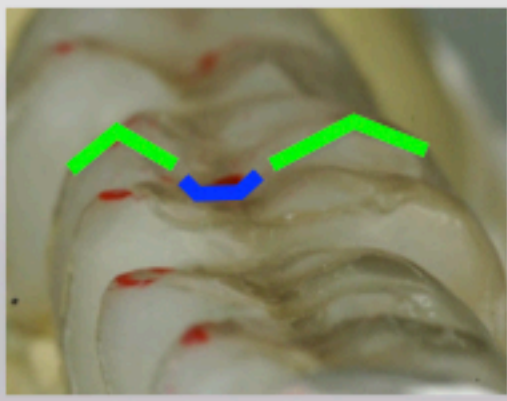
Wheel
 Create Cusp Landing Zone
 Flatten Incisal edges
 Bulk reduction of inclines



Move and Shape Cusps,
 Inclines, Facial Surfaces



Brassler Brio Shine
 FLBCER-1
 FLBF-2

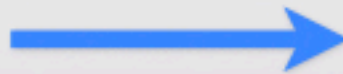


Premier 860.9 F Wheel Diamond
 Premier 230 F Barrel Diamond
 Neodiamond 1118.7F Roundend taper
 Dedco Green Stone
 White Arkansas stone
 Filtek Supreme- B1B, Albond

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.



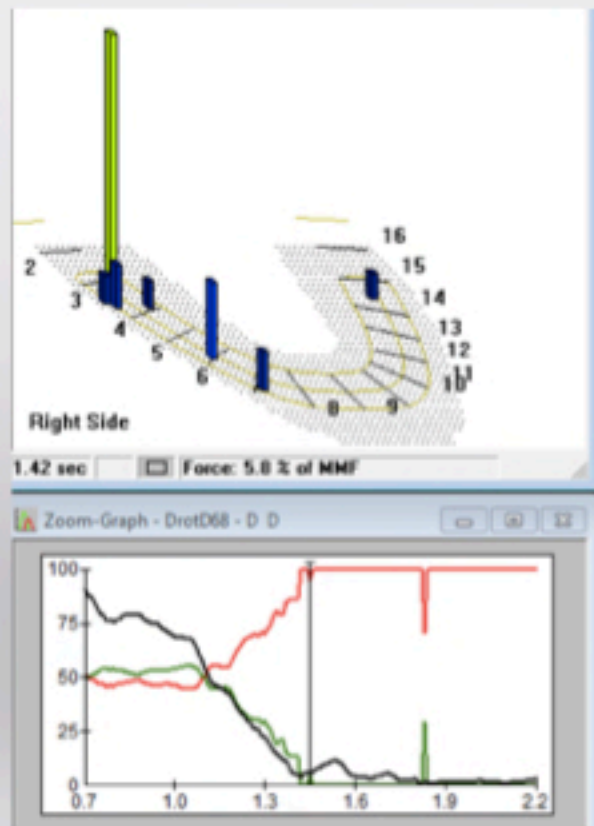
Before

After



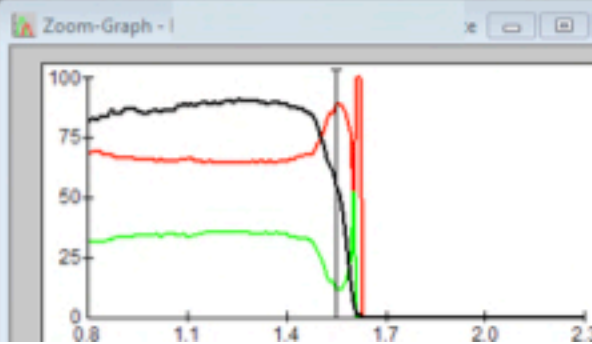
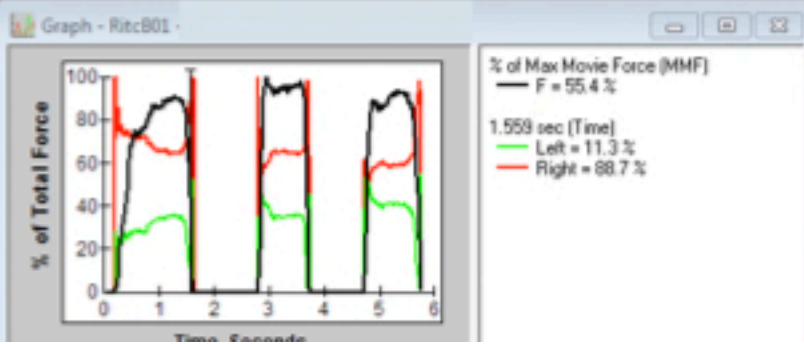
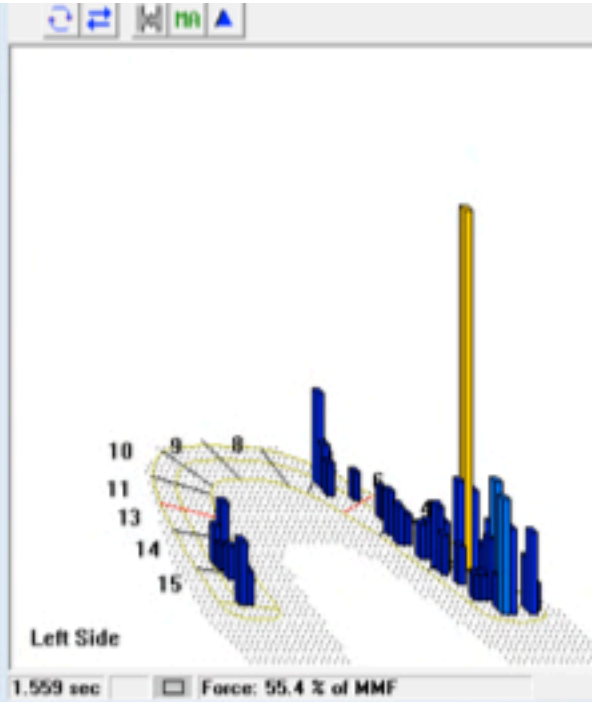
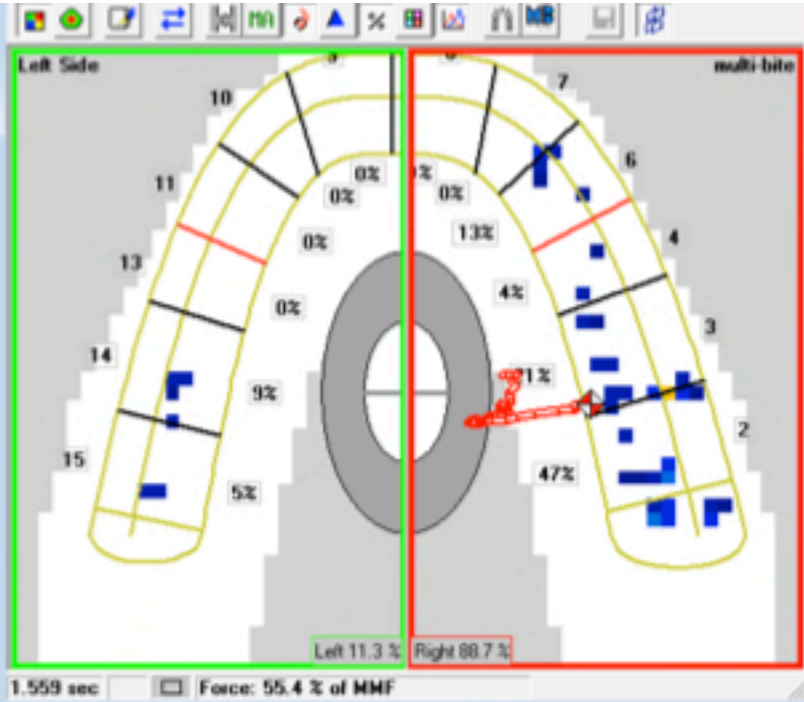
The indispensable value of T-Scan is not in finding heavy CR contacts, but working and nonworking contacts.

Is that a smudge or a muscle activating interference?



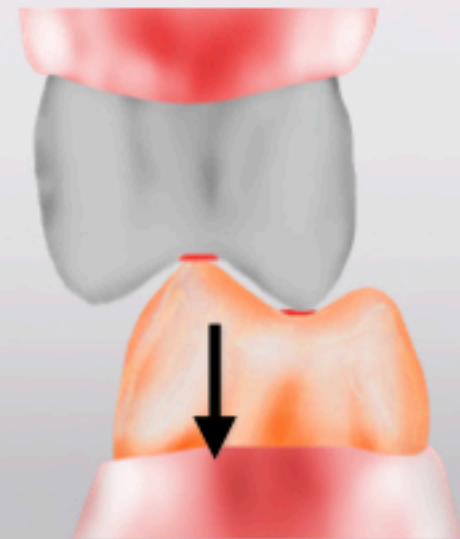
Remove too much and you decrease the ability to chew, especially lettuce. Chewing lettuce requires posterior inclines coming close enough to chew, but far enough apart to not touch and activate muscle.

T-Scan is excellent for Patient Education of Occlusal Pathology

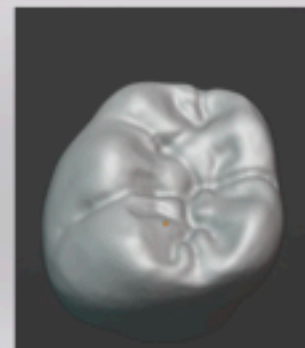
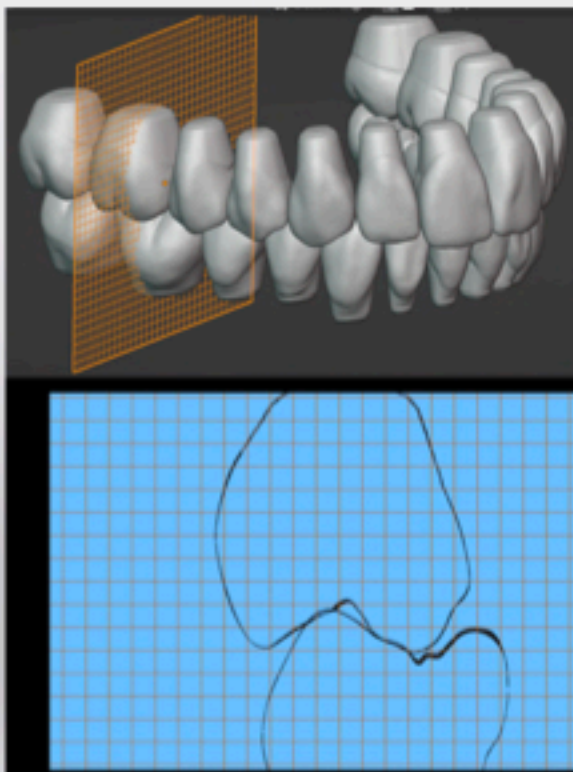


Ideal Occlusion

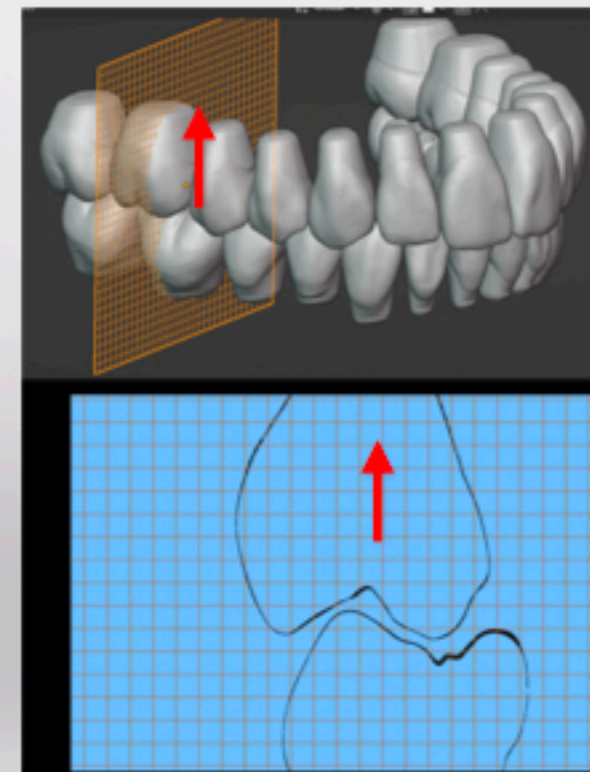
No sideways forces on back teeth.
Comfortable Muscles.



Digital Tooth Libraries Occlusal Contacts on Inclines



Presets on how far out of occlusion to make crown

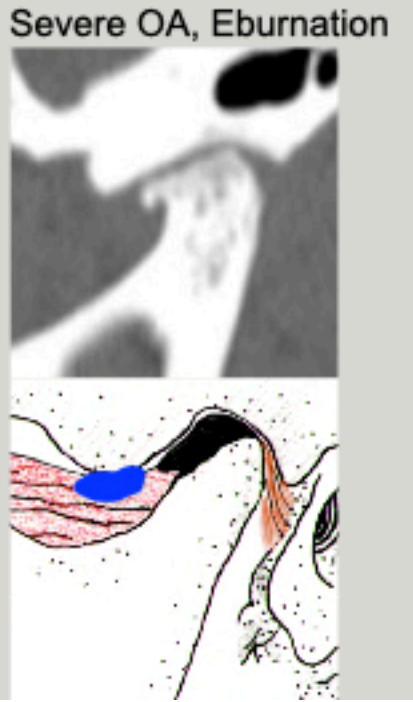
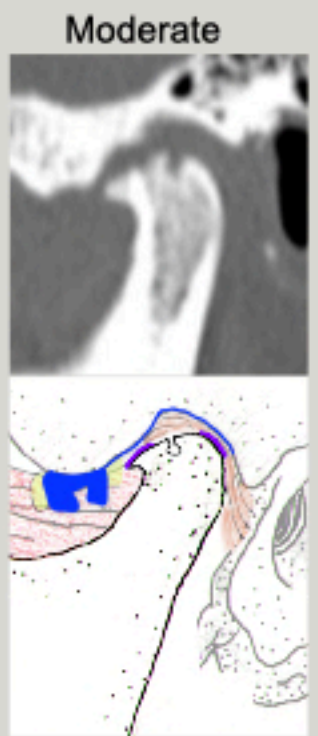
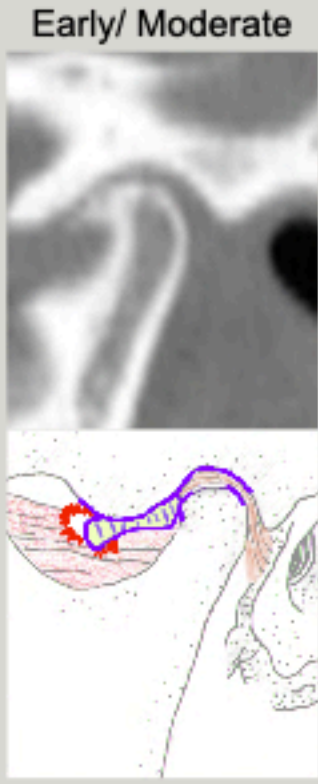
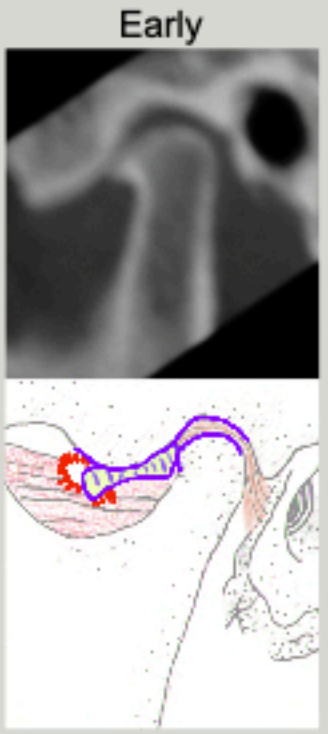
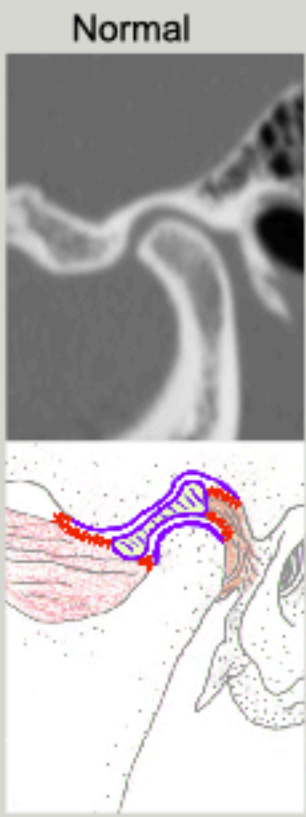


6 Common TMDs

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

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.



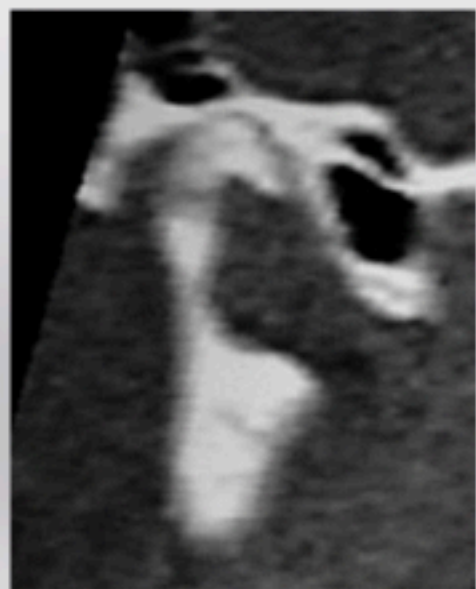
Representative examples of OA in different patients

Drawings by Gretta Tomb DDS and John Droter DDS

Adaptation Chronic Bilateral Osteoarthritis

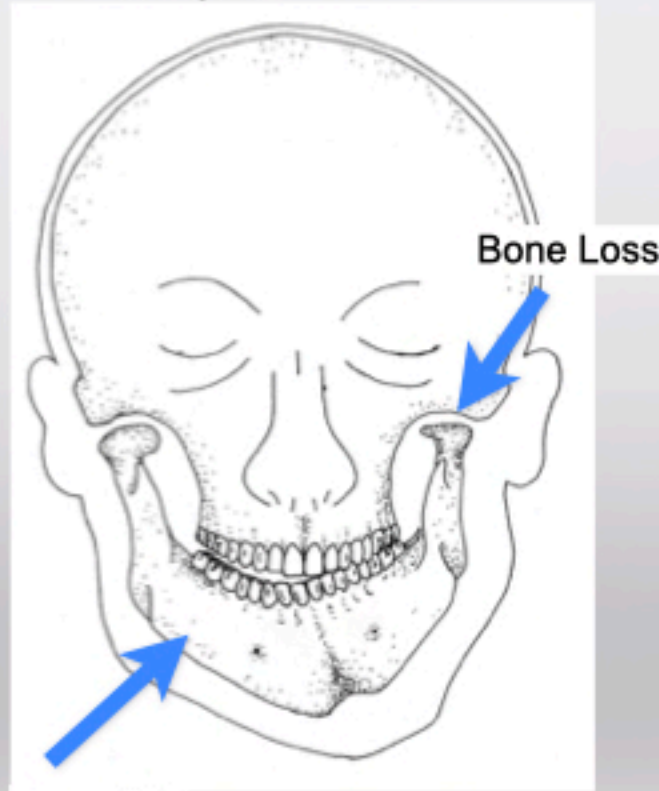
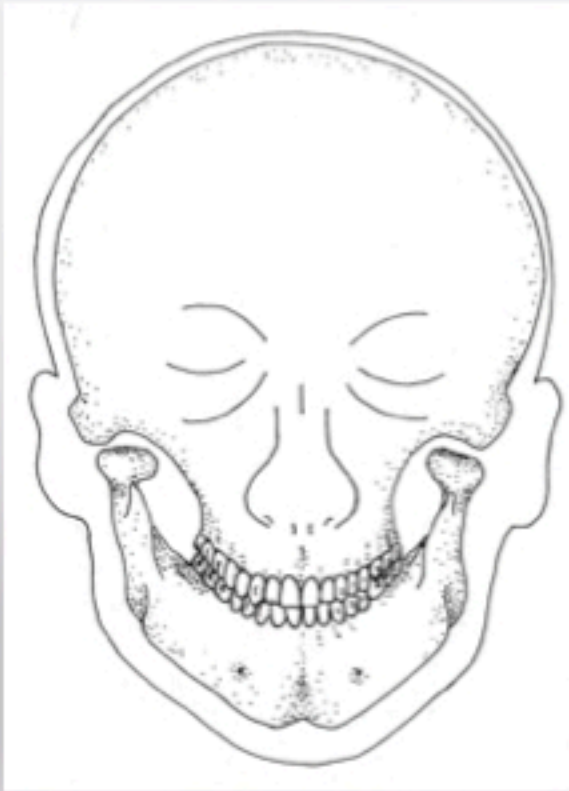
Mandible recedes Slowly
Teeth Move/ Adapt
Anterior Guidance gets steeper as Condylar Guidance get shallower

OA Right and Left Bone Loss
#8 Ankylosed

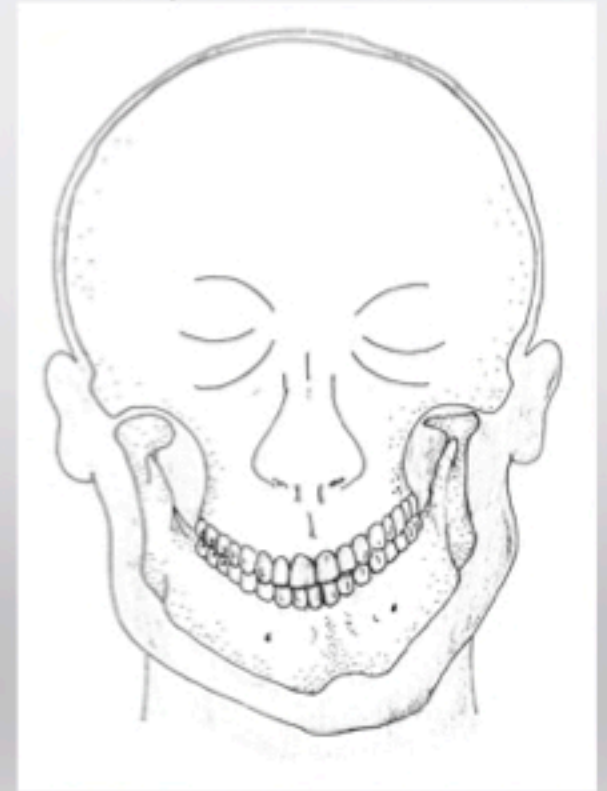


Diseases that cause bone loss in the TMJ alter the Occlusion

Condylar Bone Loss



Adaptation Over Time



Drawings by Gretta Tomb, DDS

Treatment OA

Osteoarthrosis

Glucosamine 1500mg /Chondroitin 600 mg per day

Minimize parafunction:

D-PAS

Brux Pas

Posterior stop night guard



Shea Brand CBD

Osteoarthritis

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

NSAIDs for 6+ weeks

Cold Laser

If still inflamed arthrocentesis with
Platelet Rich Plasma (PRP)



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

Minimize parafunction:

If sleep grinding due to airway:

CPAP or Dental Airway Device

Glucosamine 1500mg /Chondroitin 600 mg per day

Osteoarthritis

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

NSAIDs

Cold Laser

If still inflamed arthrocentesis with:

Platelet Rich Plasma (PRP)

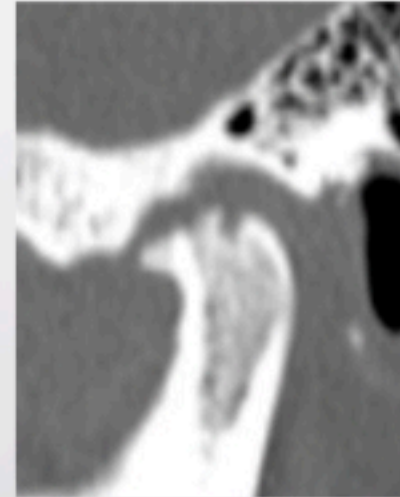
Anterior stop

Jaw Movement Exercises

If still pain in 6 -12 weeks of NSAID:

Arthrocentesis

Platelet Rich Plasma



6 Common TMDs

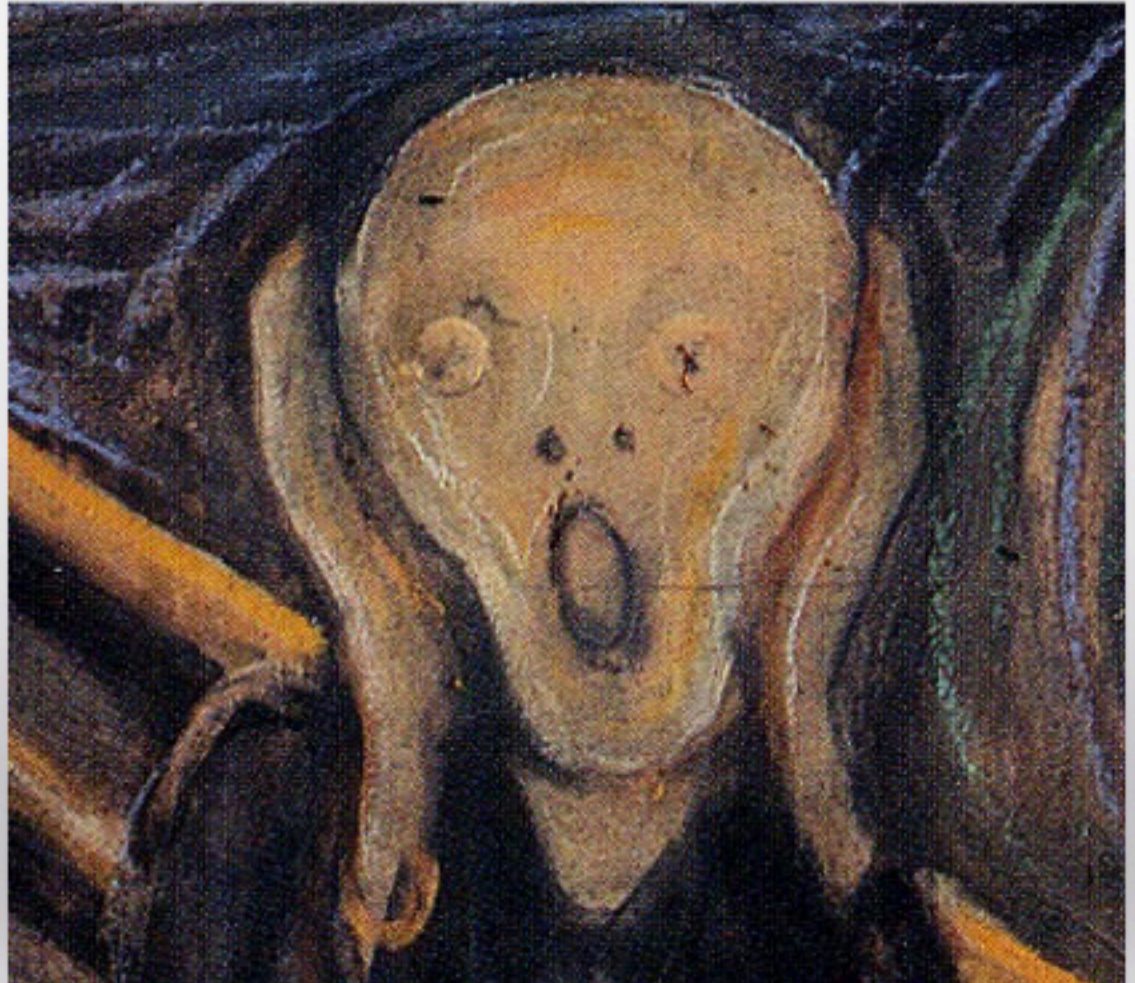
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Acute Closed Lock TMJ	Sore TMJ Limited opening Hard end point active stretch	Arthrocentesis with PRP

TMD Symptoms

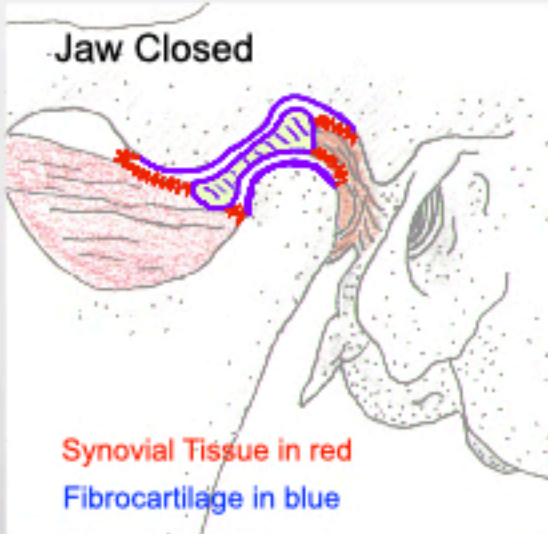
Limited Opening

Diseases to consider and rule out:

- Pain Avoidance Sore Joint
- Pain Avoidance Sore Muscle
- Hematoma
- Muscle Spasm
- Masseteric Space Infection
- Nonreducing Disc (4b,3b Acute)
- Joint Fibrosis, Muscle Fibrosis
- Other

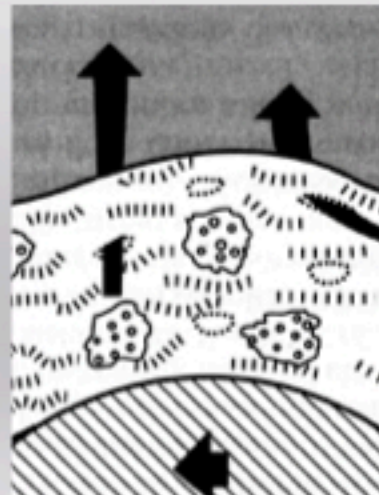
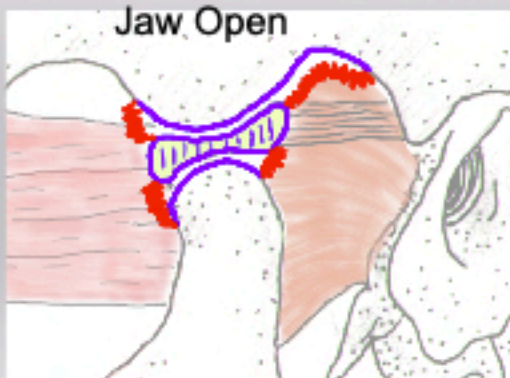
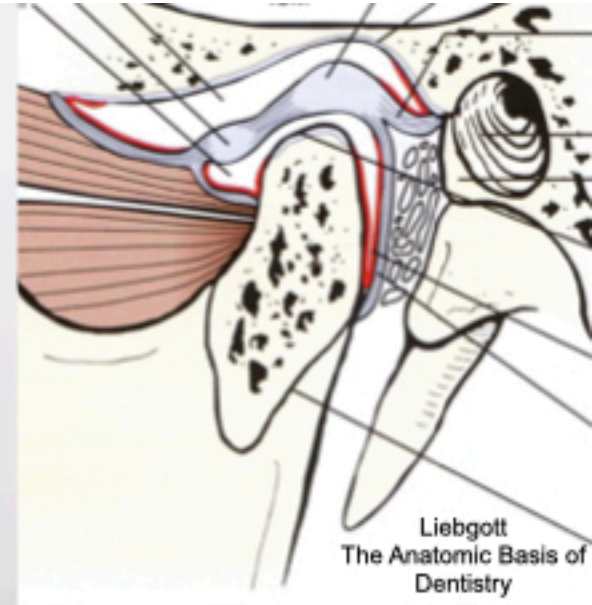


Normal TMJ- Synovium, Cartilage



Fibrocartilage-
Slope of Eminence
Disc
Top of Condyle

Synovial Tissue makes Synovial Fluid
No blood vessels in a health joint
Nutrition to the cartilage cells
Lubrication- Hyaluronic Acid and Lubricin



Fibrocartilage surface covered in fluid
Cartilage is hydrophilic
Proteoglycan negative charge
Surface Active Phospholipids
Fluid slides against fluid
5x slipperier than ice

Differential Diagnosis: Limited Joint Motion

Muscle Spasm

Painful to Move
Joint Pain
Muscle Pain

Mechanically Blocked
4b Acute
Adhesion

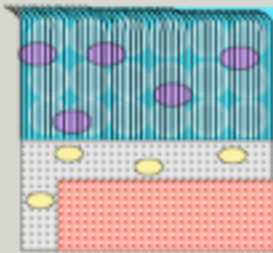
Masseteric Space
Infection
Hematoma

Lose 50% height of cartilage
Proteoglycans not being produced by Chondrocytes
Loss of 50% proteoglycans and water
Collagen still intact
Process is reversible
Move joint with light force/repetitive motion next 30 days

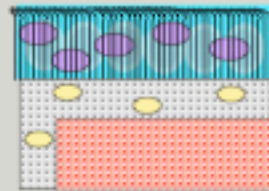
You have 6-8 weeks to get jaw moving
before cartilage is irreversibly damaged,
independent of the cause of the
immobilization



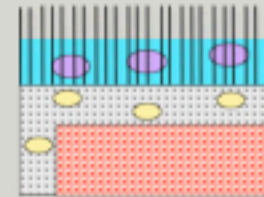
Healthy Cartilage



4 Weeks



8 Weeks

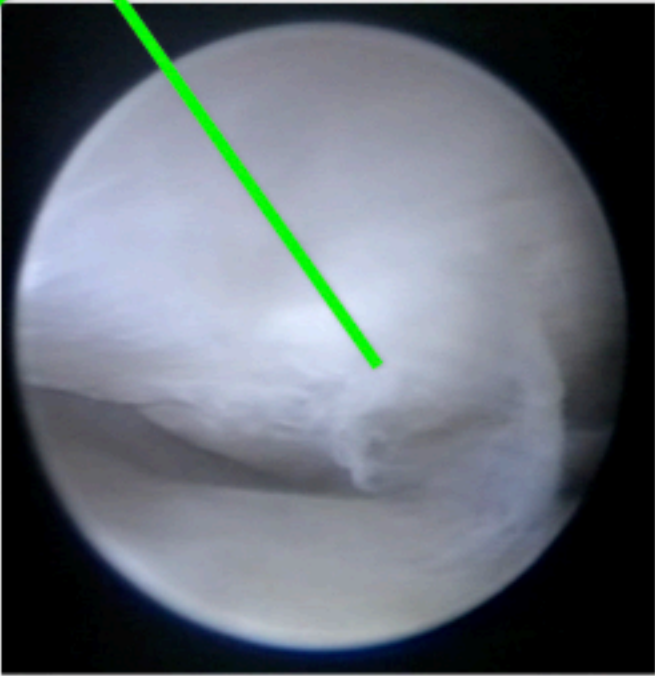
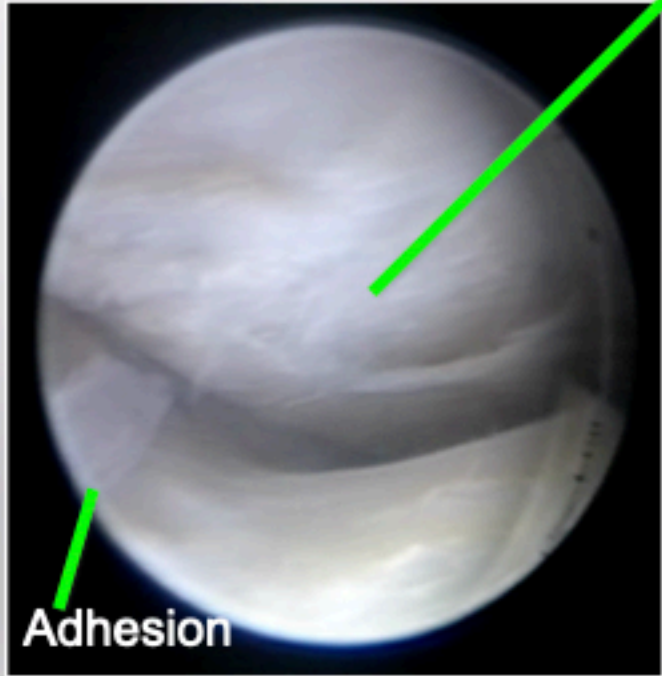
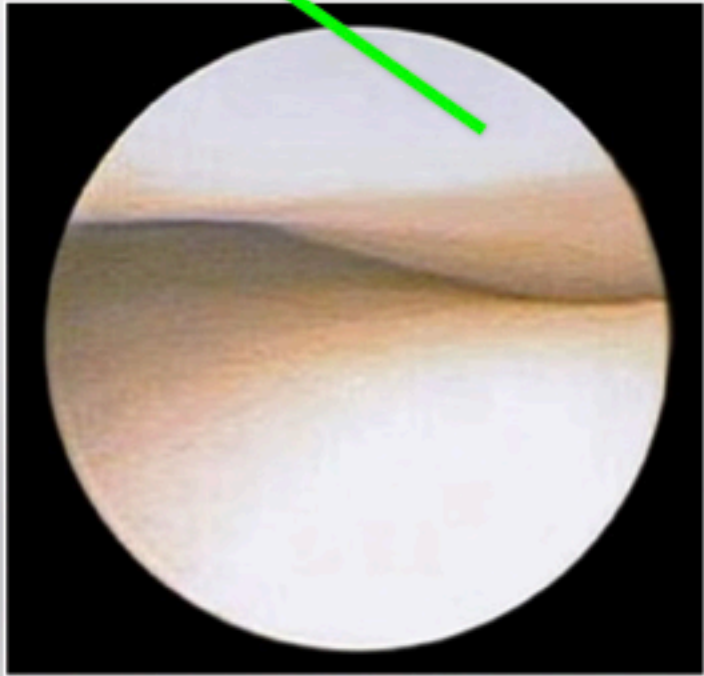


E.B. Evans, GWN Eggers, J.K. Butler, and J. Blumel, Experimental immobilization and remobilization of rat knee joints, J Bone Joint Surg Am, 1960 vol. 42 (5) pp. 737-758
Enneking WF, Horowitz M. The intra-articular effects of immobilization on the human knee. J Bone Joint Surg Am. 1972 Jul;54(5):973-85. PMID: 5068717

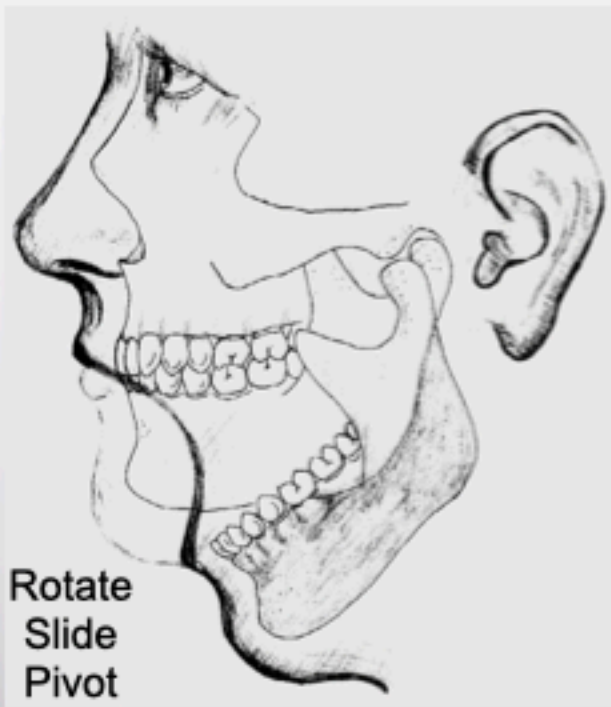
Arthroscopic View Left TMJ

Eminence Healthy Cartilage

Eminence Necrotic Cartilage



Not Same Patient



Rotate
Slide
Pivot

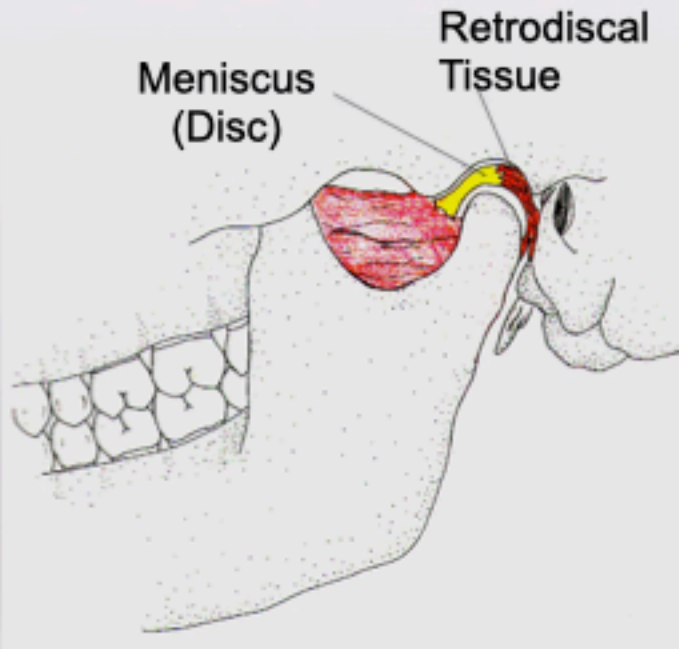
Rotation only 25mm

Max Open	40-55mm
Right Lateral	10-12mm
Left Lateral	10-12mm
Protrusive	10-12mm



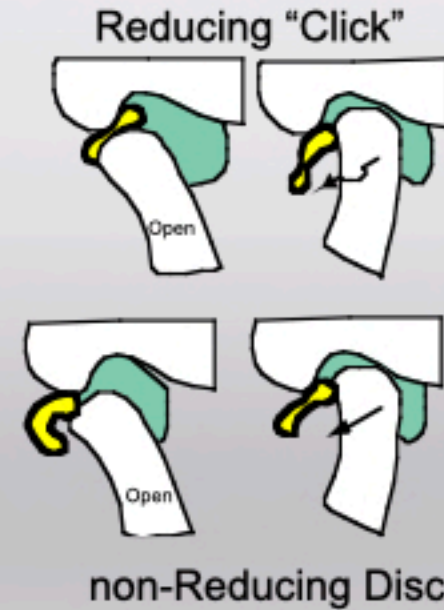
TMJ has 2 Joint Compartments:

Upper- Translation
Lower- Rotation



Acute non-Reducing Disc
Limits Translation.

"Old Adapted" may have
full range of motion.



Limited Opening Algorithm

Differential Diagnosis Limited Opening:

- Pain Avoidance Sore Joint
- Pain Avoidance Sore Muscle
- Hematoma
- Muscle Spasm
- Masseteric Space Infection
- Nonreducing Disc (4b,3b Acute)
- Joint Fibrosis, Muscle Fibrosis
- Other

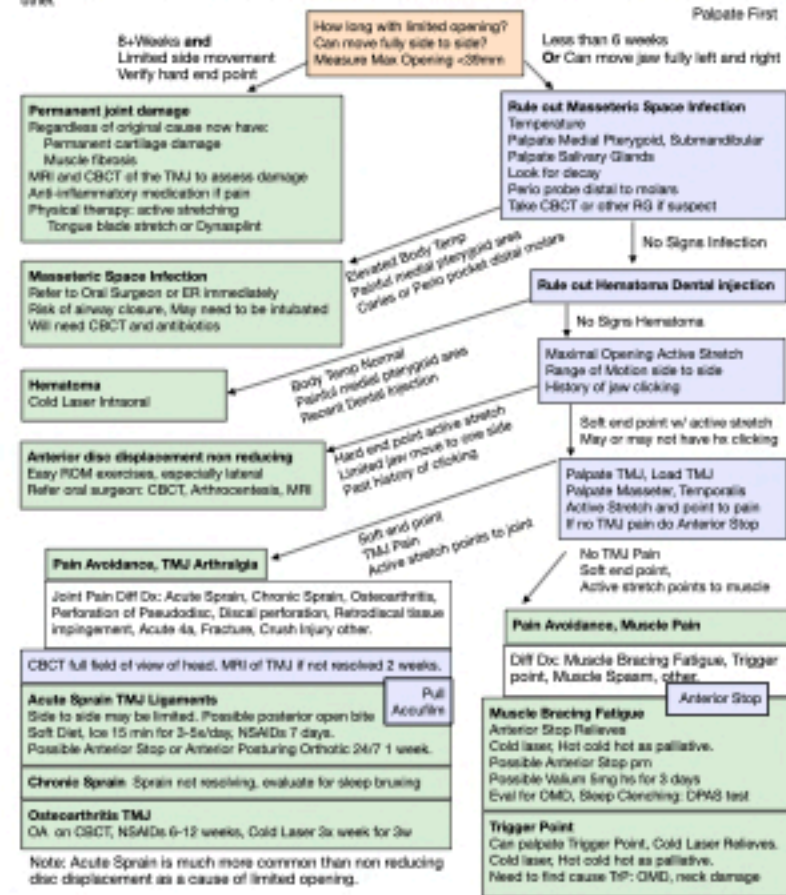
Diagnostic Tests:

- History: How long limited
- Body Temperature
- Caries Exam, Perio exam
- ROM open, side to side
- Gentle Active stretch
- Point to area of pain
- Anterior Stop
- If needed CBCT, MRI



Dr Droter's Limited Opening Algorithm

Differential Diagnosis Limited Opening (Less than 30mm): Pain Avoidance Sore Joint, Pain Avoidance Sore Muscle, Hematoma, Muscle Spasm, Masseteric Space Infection, Nonreducing Disc (4b,3b Acute), Joint Fibrosis, Muscle Fibrosis, other



Subjective:

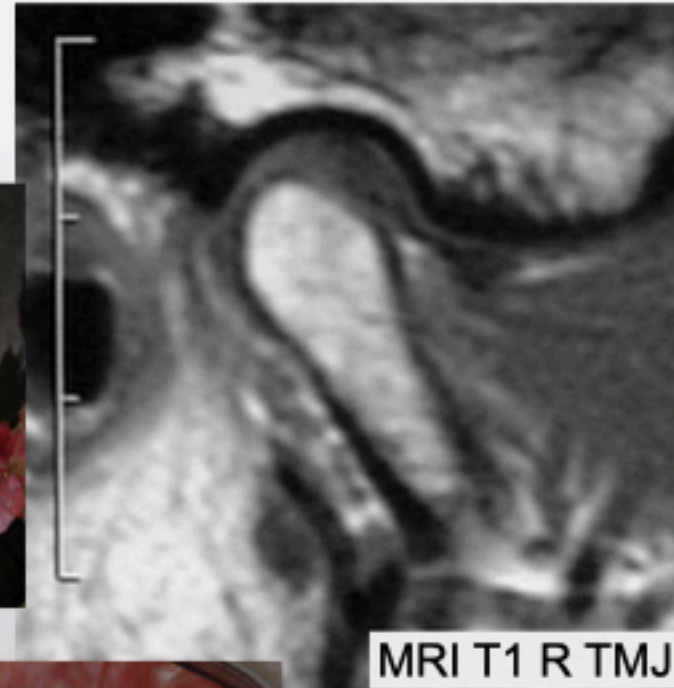
Dentist doing crown prep #30 1 week ago
Severe pain Right TMJ after moving jaw at end of appt
Constant deep pain Right TMJ
Limited opening

Objective:

Limited opening 32mm, Mandible shifts Left
Normal side to side motion
98 temp, normal perio probe 2nd molars, no caries
No pain palpation RL Medial Pterygoid
Soft end point on active stretch, 45mm, R TMJ pain
Right TMJ pain to palpation, Left TMJ normal
Posterior openbite Right, does not hold Accufilm

Assessment:

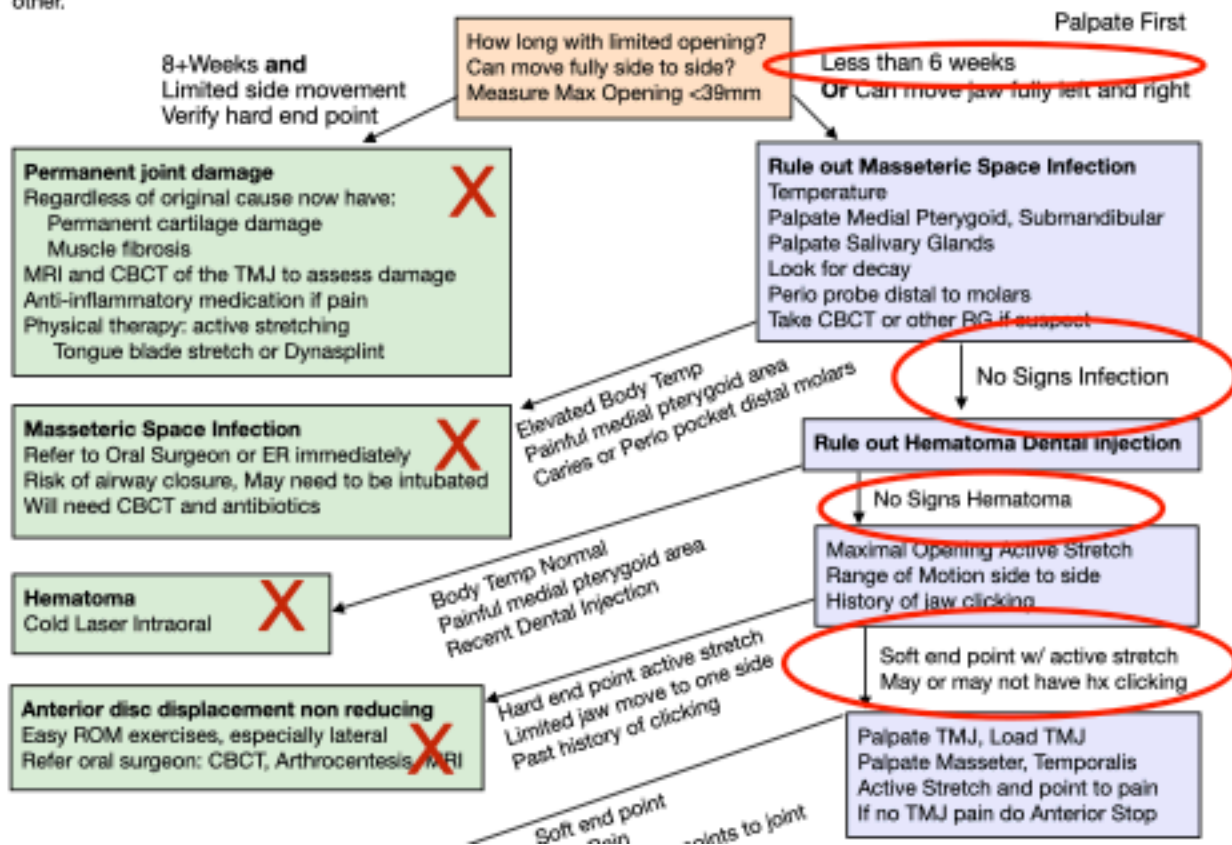
Limited opening due to Right TMJ pain avoidance
Acute Sprain Right TMJ Ligaments



Dr Droter's Limited Opening Algorithm

22.3

Differential Diagnosis Limited Opening (Less than 39mm): Pain Avoidance Sore Joint, Pain Avoidance Sore Muscle, Hemtoma, Muscle Spasm, Masseteric Space Infection, Nonreducing Disc (4b,3b Acute), Joint Fibrosis, Muscle Fibrosis, other.



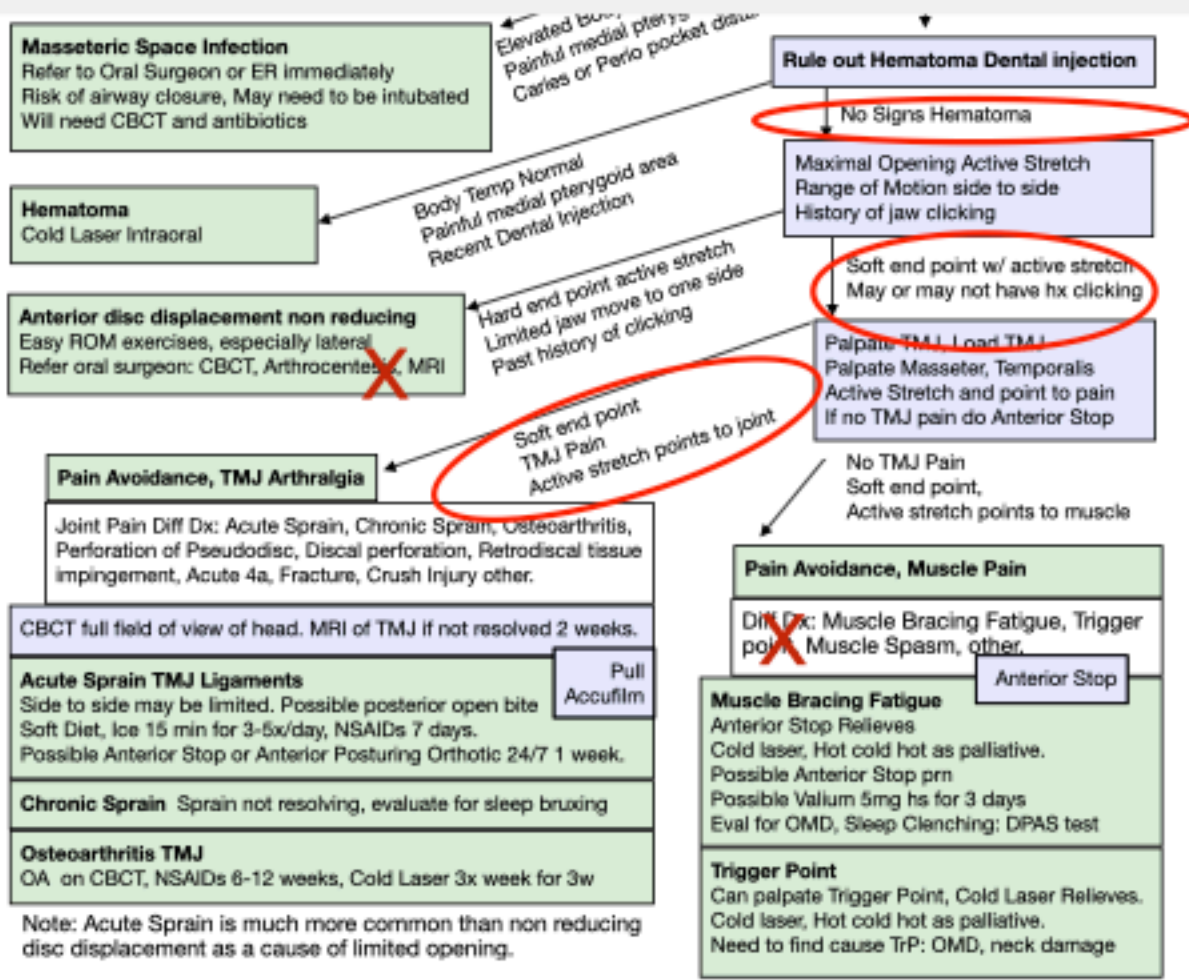
Objective:

Limited opening 32mm, Mandible shifts Left
Normal side to side motion

98 temp, normal perio probe 2nd molars, no caries

No pain palpation RL Medial Pterygoid
Soft end point on active stretch, 45mm, R TMJ pain

Right TMJ pain to palpation, Left TMJ normal
Posterior openbite Right, does not hold Accufilm



Objective:

- Limited opening 32mm, Mandible shifts Left
- Normal side to side motion
- 98 temp, normal perio probe 2nd molars, no caries
- No pain palpation RL Medial Pterygoid
- Soft end point on active stretch, 45mm, R TMJ pain
- Right TMJ pain to palpation, Left TMJ normal
- Posterior openbite Right, does not hold Accufilm

Working Diagnosis: Sprain Discal Ligament TMJ, acute with joint edema.
Pain Avoidance Sore Joint. Muscle bracing painful joint.

Treatment:

Ice 15-20 minutes for 3-5x 2 days only

Anterior repositioning orthotic 24/7 one week

NSAID for 5 days- 800mg Advil Liquid gel caps, q8h

Soft chew diet

At 1 week Anterior repositioning orthotic sleep only for second week

Week 3, no orthotic, reintroduce harder foods



At 4 weeks patient had full ROM
No clicking

Another Case Limited Opening :

Subjective:

Finished Invisalign 1 year ago
Has been clenching her teeth
Months ago jaw started locking in the morning on waking
8 weeks ago pain right jaw joint, could not open all the way
Motrin 800 mg upset stomach

Objective:

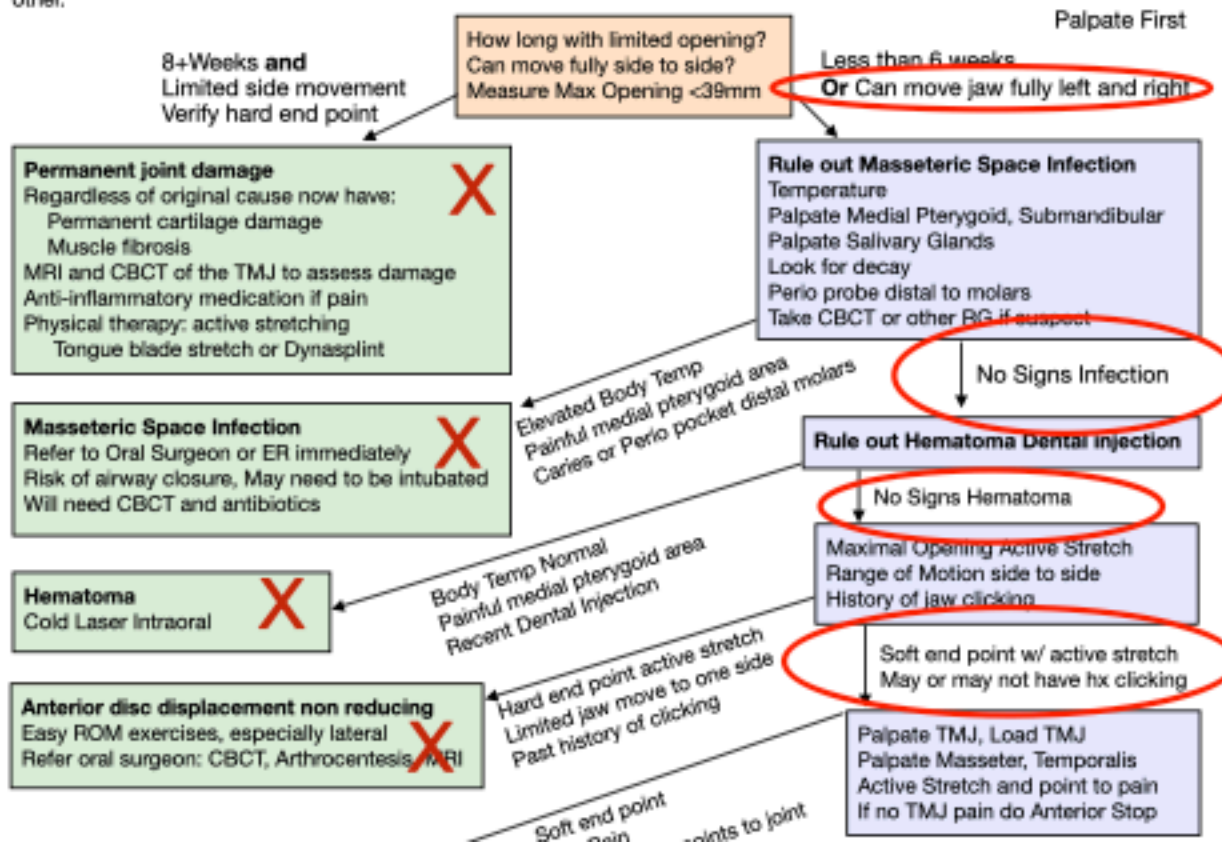
Limited opening 25, Mandible shifts right
Normal side to side motion
98 temp, normal perio probe 2nd molars, no caries
No pain palpation RL Medial Pterygoid
Soft end point on active stretch, 35mm, R TMJ pain
Right TMJ pain to palpation, Left TMJ normal
Posterior cross bite on left



Dr Droter's Limited Opening Algorithm

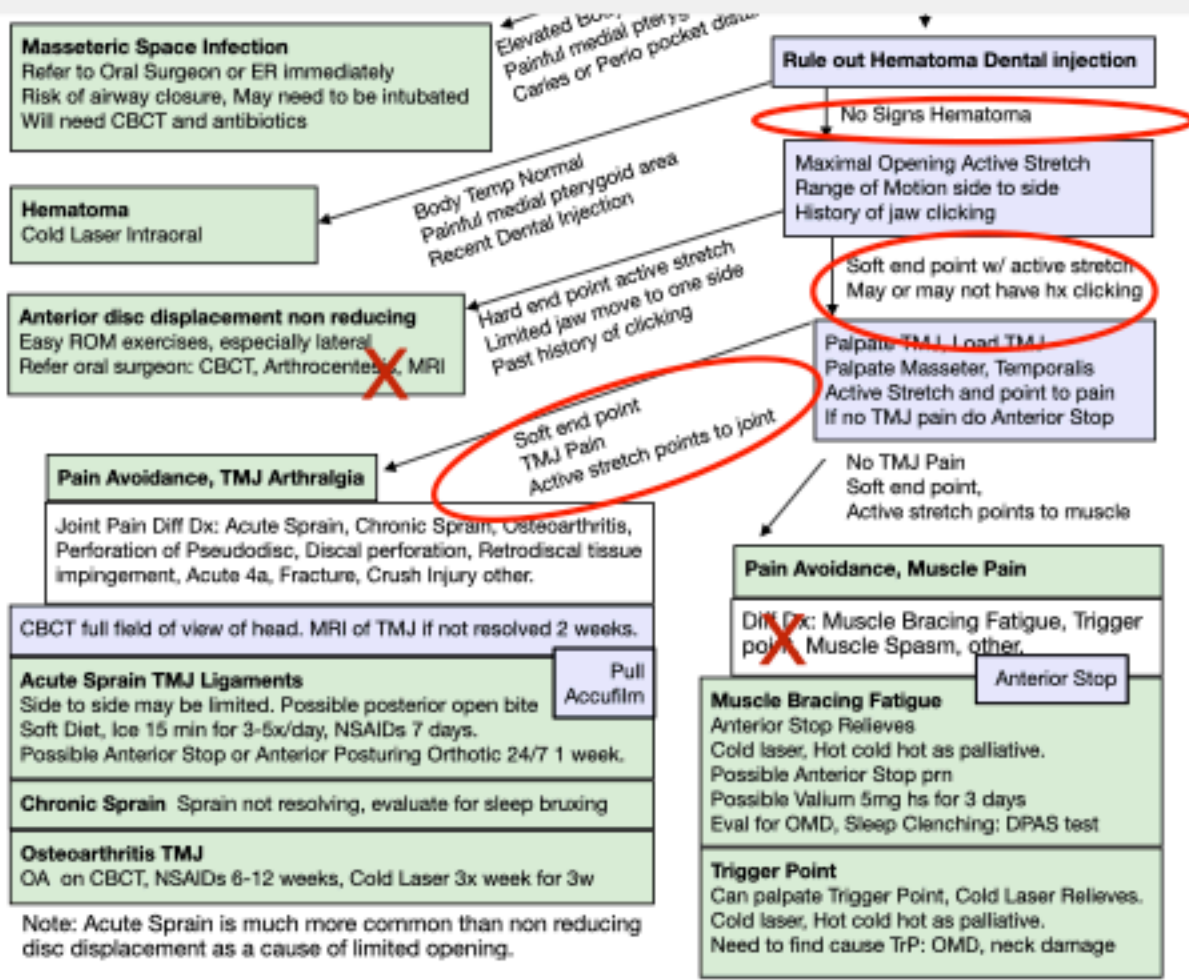
22.3

Differential Diagnosis Limited Opening (Less than 39mm): Pain Avoidance Sore Joint, Pain Avoidance Sore Muscle, Hemtoma, Muscle Spasm, Masseteric Space Infection, Nonreducing Disc (4b,3b Acute), Joint Fibrosis, Muscle Fibrosis, other.



Objective:

Limited opening 25mm, Mandible shifts Left
Normal side to side motion
Normal temp, normal perio probe 2nd molars
No caries
No pain palpation RL Medial Pterygoid
Soft end point on active stretch, 35mm,
with R TMJ pain
Right TMJ pain to palpation, Left TMJ normal



Working Diagnosis:

Acute Sprain Right TMJ Ligaments

Limited opening due to muscle bracing Right TMJ pain

Current Sprain Protocol

We used Advil gel caps
600mg tid with food

Soft chew diet

Ice over TMJ 15 minutes 3-5 times a day for 3-5 days,

Ice 2-3x a day for additional 3 days if needed

NSAID: Advil Liquid Gel Caps 200mg, 3 caps 3x a day

or Aleve Liquid Gel Caps 220mg, 1 cap twice a day for 5 days or

Temporary upper Anterior Stop for sleep

Cold Laser 350 hz both joints: 30 seconds open, 30 seconds closed

If still sore in 1 week will need TMJ imaging: CBCT and MRI



Temporary Anterior Stop
ArrowPath Sleep



ThermoSafe
U-Tek Cold Pack
-23° C

1 layer paper towel

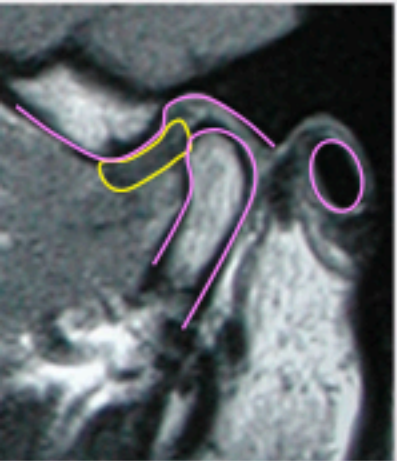


MLS Cold Laser
BioResearch

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

Treatment Acute Closed Lock



Anterior Stop or D-PAS for 3 weeks

Jaw Movement Exercises

Open Close
Front Back
Left Right

Cold Laser
Ice
NSAID



If still locked arthrocentesis with:
Platelet Rich Plasma (PRP)
Anterior stop
Jaw Movement Exercises





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

6 Common TMDs

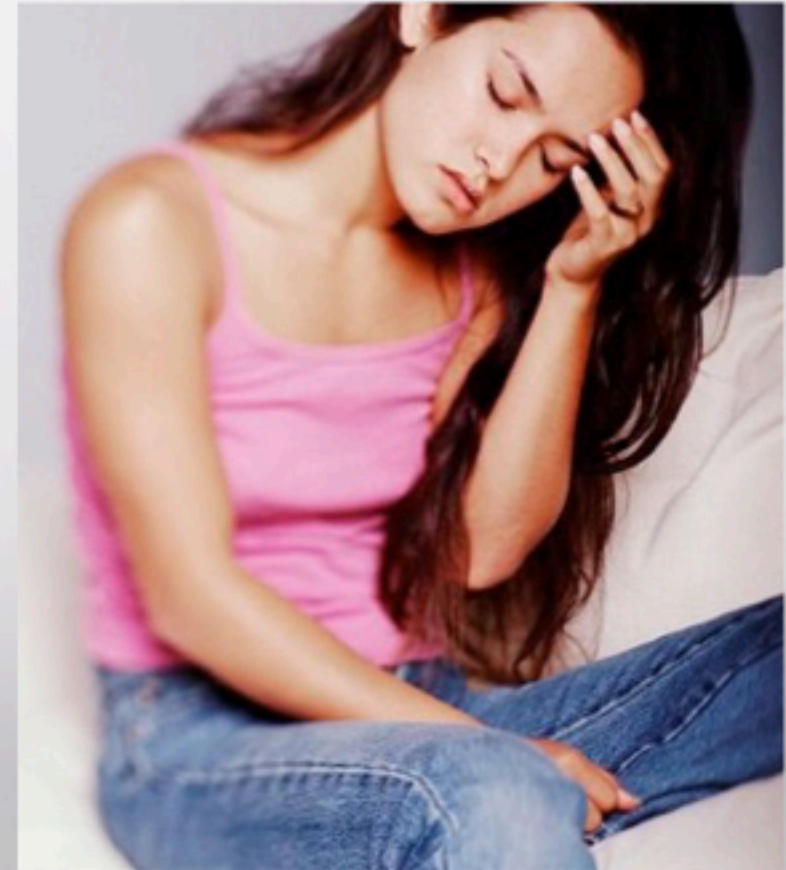
- Parafunctional Clenching
- Parafunctional Grinding
- Occlusal Muscle Dysfunction
- Osteoarthritis
- Acute Sprain
- Acute Closed lock of TMJ disc

5 Common Obstacles

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

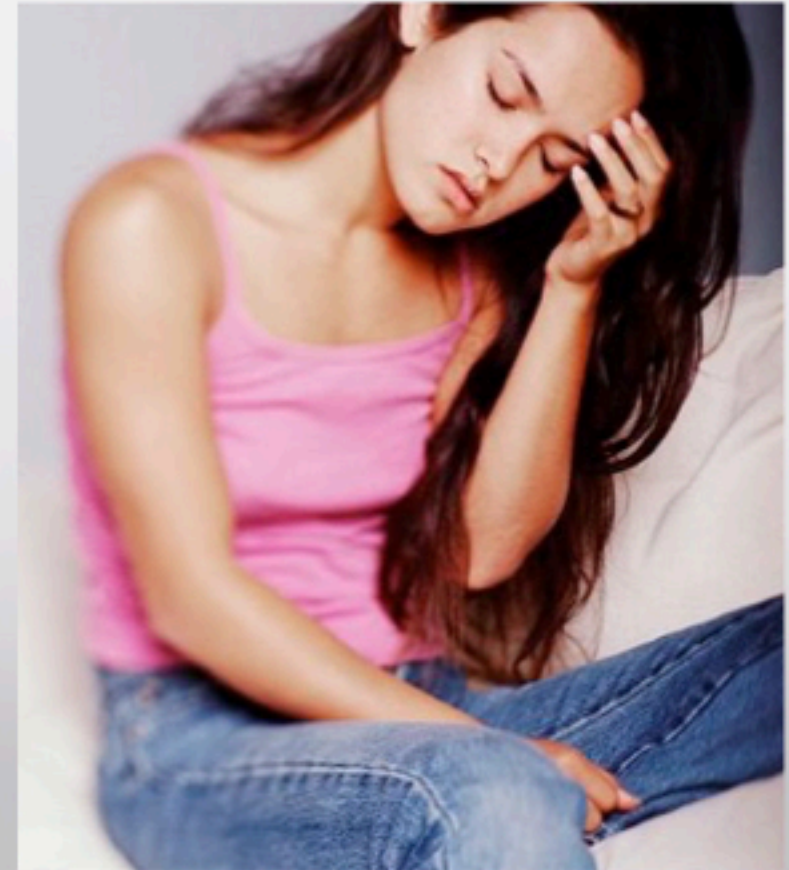
1 TMD that **usually** does not need therapy

- TMJ Clicking



5 Common Obstacles

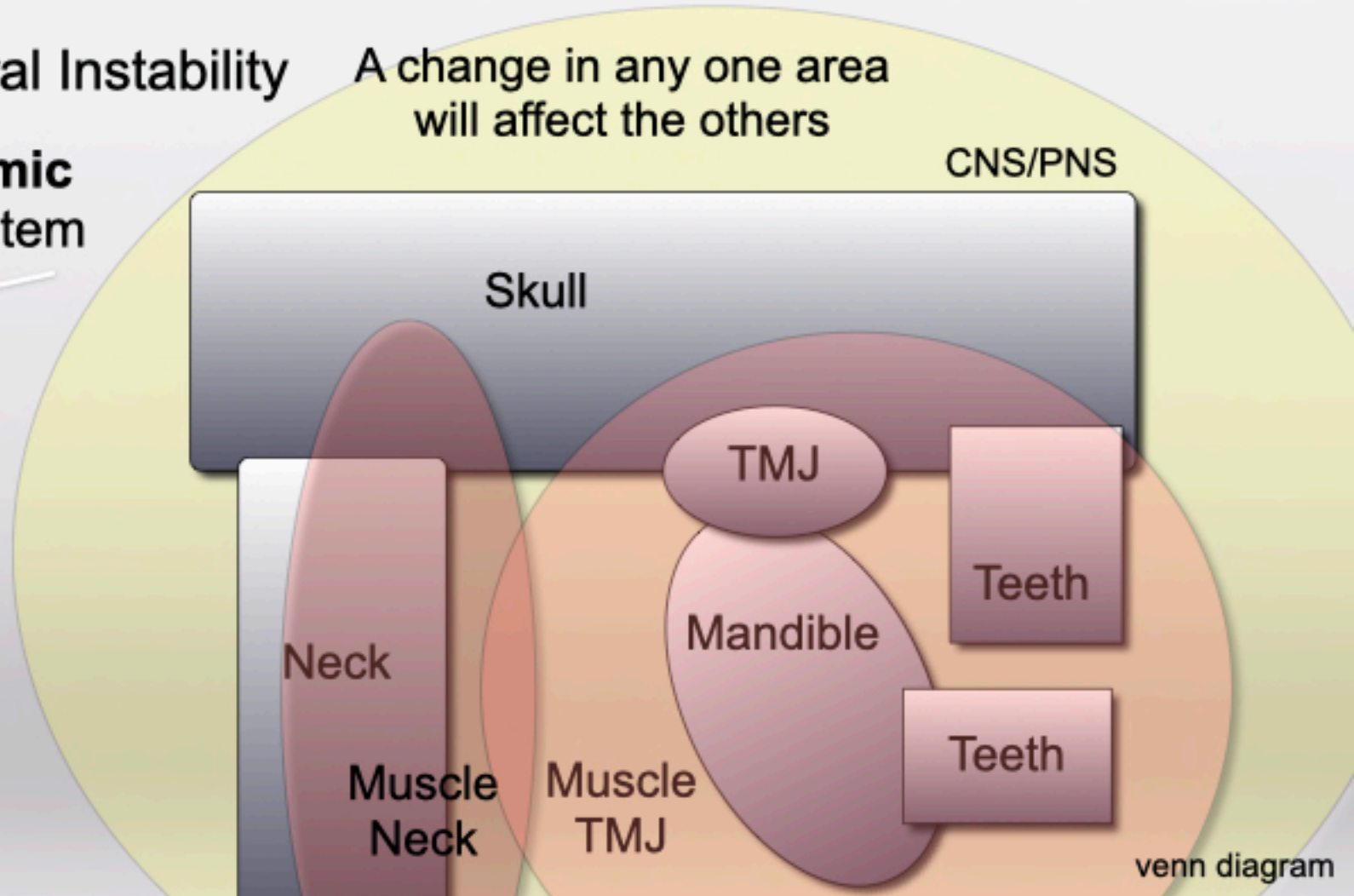
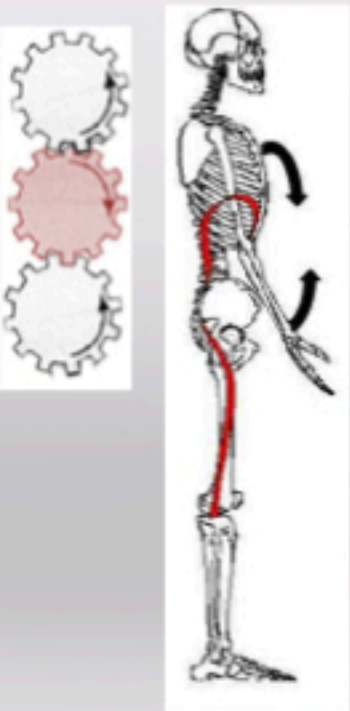
Neck and Postural Instability
Wobbly TM Joint (Subluxation)
Compromised Breathing/Airway
Avascular Necrosis
Referred Pain Muscle Triggerpoints



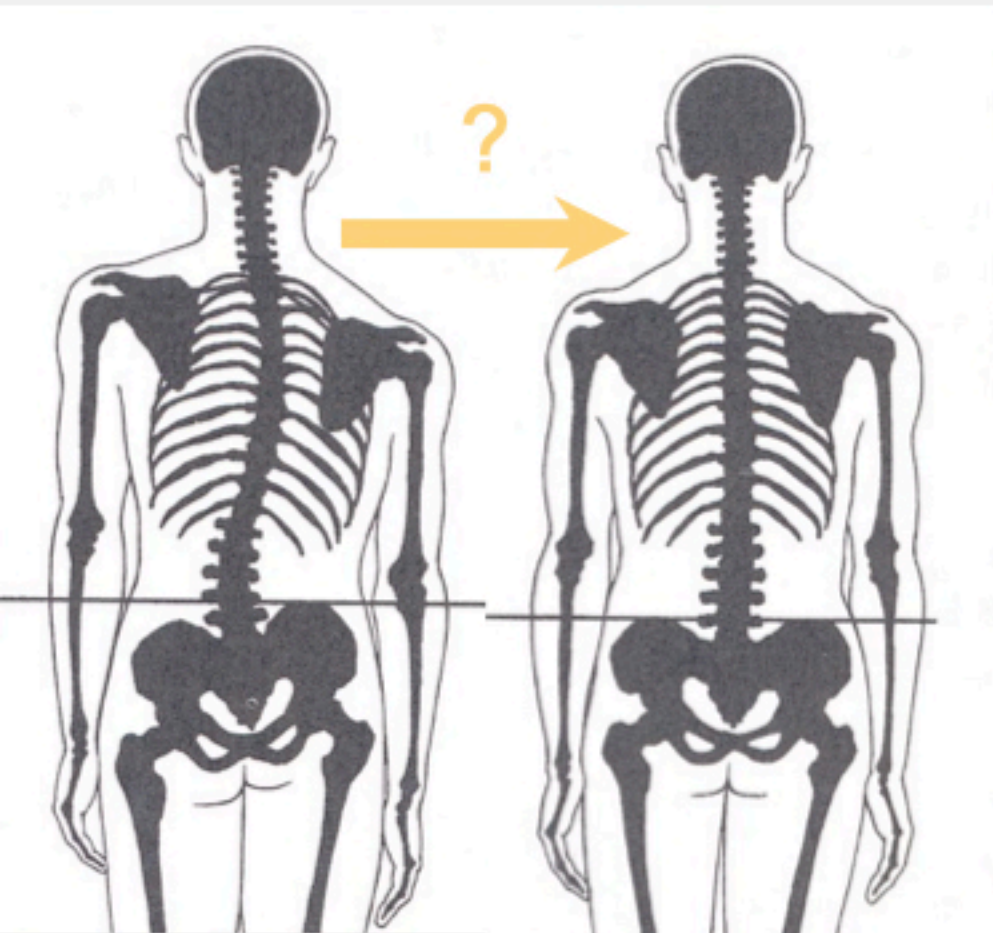
Neck and Postural Instability

A change in any one area will affect the others

This is a **dynamic** orthopedic System



How to Rehabilitate?



Define the Problem:

Bones not Stacked

Disproportionate Weak/Strong opposing muscle groups

Causes:

Postural- Habitual, Functional

Pain Avoidance- sore joint, sore muscle

Adaptation from physical damage

Genetics

Treatment:

Eliminate Pain

Mobilize Joints

Stack the bones

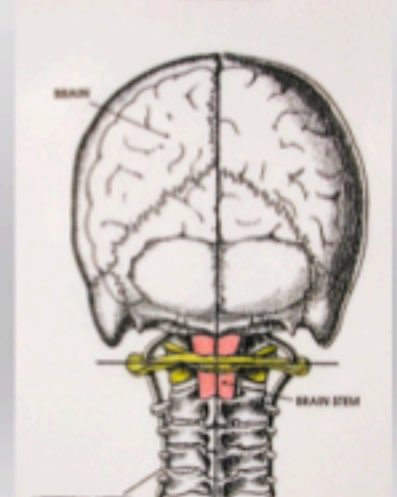
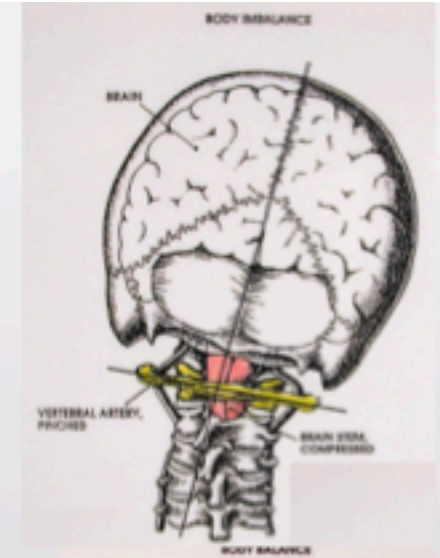
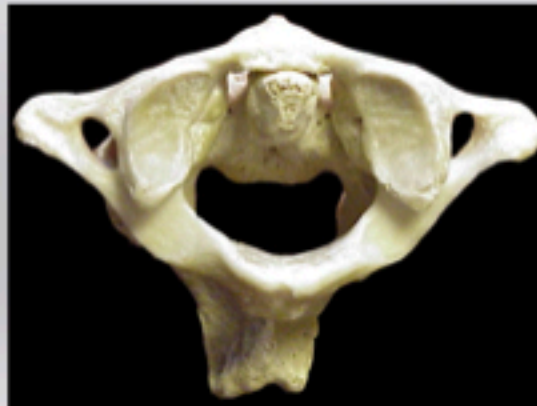
Strengthen weak muscle groups

Does stretching and palliatively eliminating TrP fix this?

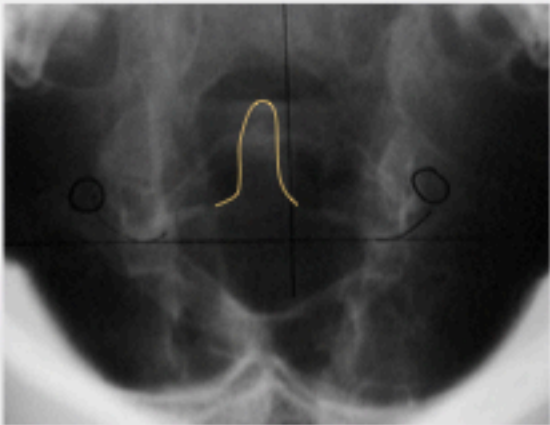
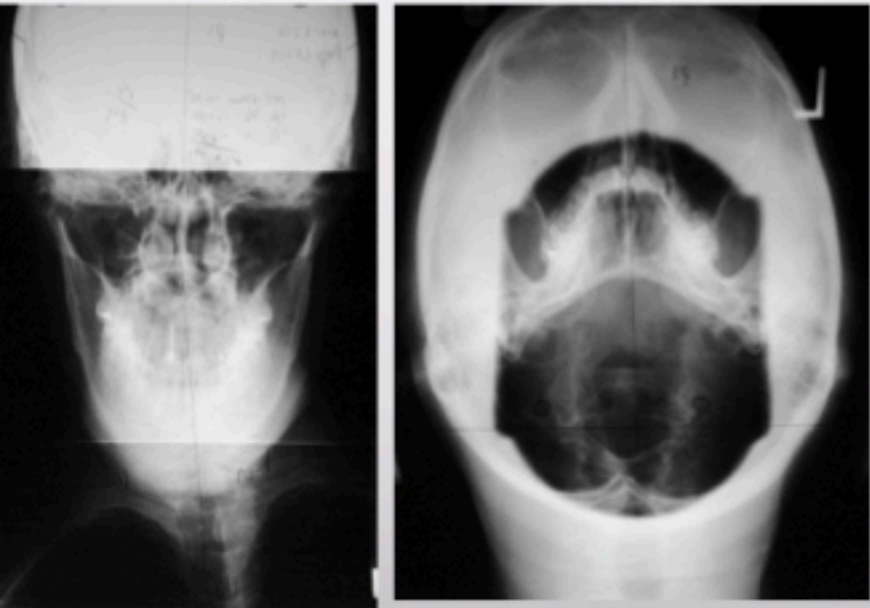
Atlas Orthogonist
Branch of Chiropractic Medicine



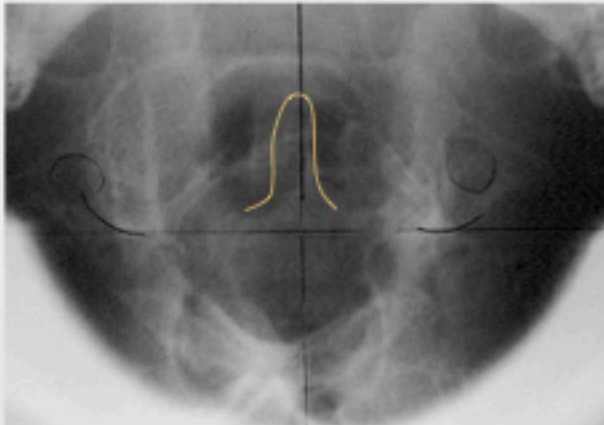
Uses sound wave to move atlas,
disrupts muscle bracing



My Neck



Before Atlas Adjustment



After Atlas Adjustment



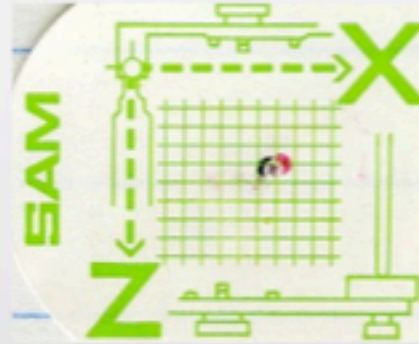
CR Changes with Atlas position

?Pressure on Occiput moves
Temporal bone?

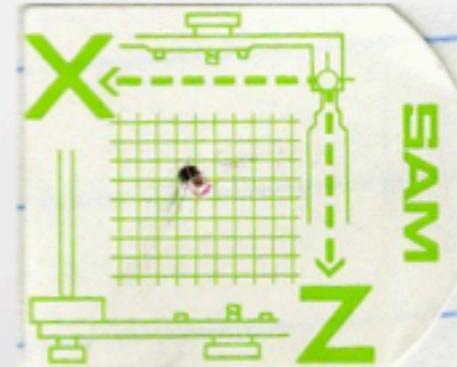
Put your teeth together and bend
neck side to side



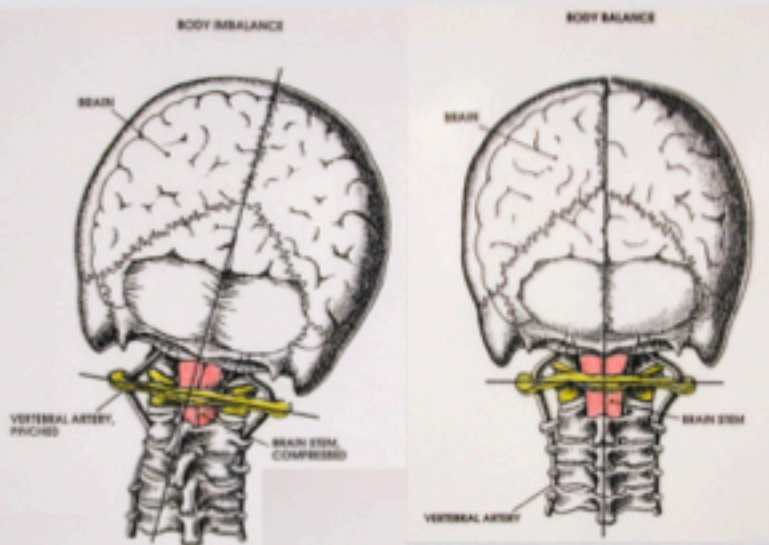
SAM Articulator Vericheck



Right Condyle
Black- Atlas Out
Red- Atlas in shifts
condyle up and
forward 0.6mm



Left Condyle
Black- Atlas Out
Red- Atlas in shifts
condyle down and
back 0.5mm



Postural Restoration Therapist



posturalrestoration.com/



Physical Therapist with additional training

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

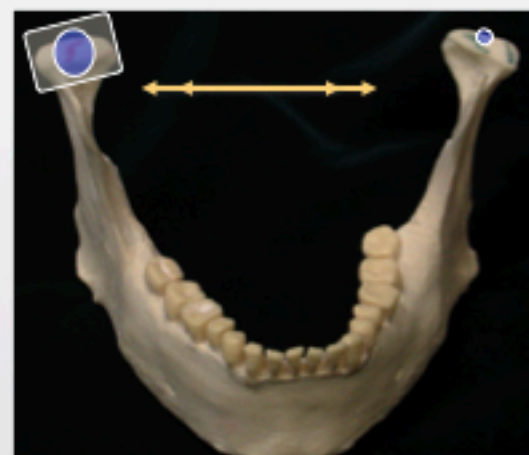
TM Joint subluxates under load
Adapted CR “wobbles”

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 2 weeks for sleep, and occasional daytime

Better- Decrease in Symptoms

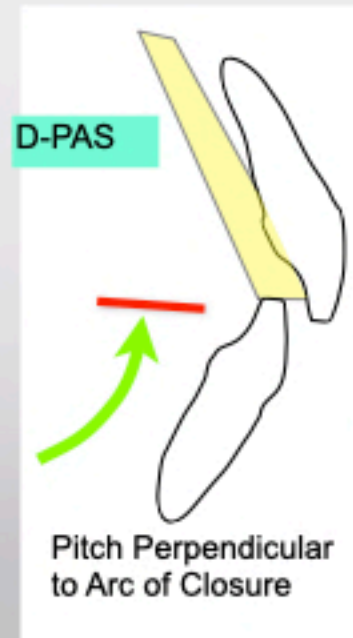
Sleep Clenching Inhibited: Wear D-PAS as night guard
Orthotic Improved Airway: D-PAS as night guard
Occlusal Muscle Disharmony: Occlusal Adjust

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 19F
 cc: Severe jaw pain since
 12y/o, Wiggle jaw to open



Patient Safety
 Inc Pulse Ox
 Sleep Screening



Brux PAS pm wear, jaw exercises

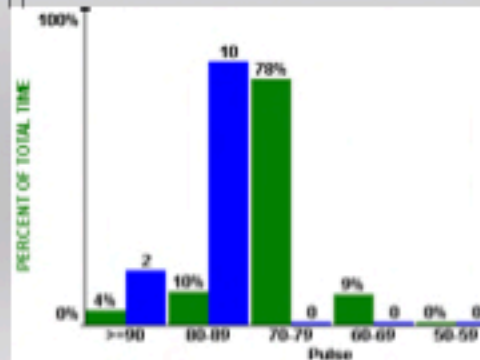
1 week, significant decrease in pain,
 much less wiggle to open.



4% RDI = 3/h
 Autonomic Arousals **19 /h**

PULSE RATE DATA	
Autonomic Arousals	Index (#/hr): 19
Pulse Rate Range	Mean: 76
	Min: 60
	Max: 225

76

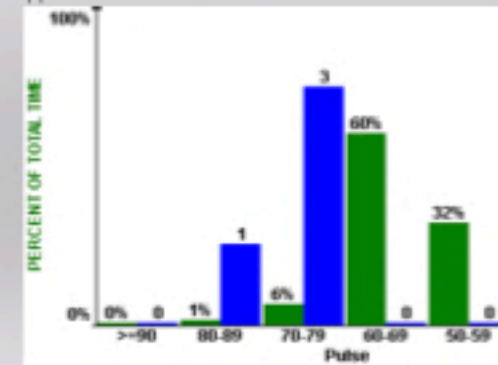


Brux-PAS

4% RDI = 1/hr
 Autonomic Arousals **9 /h**

PULSE RATE DATA	
Autonomic Arousals	Index (#/hr): 9
Pulse Rate Range	Mean: 63
	Min: 52
	Max: 120

63



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> <ul style="list-style-type: none"> 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 Bicupid Extraction 	<p>Compensation: Airway Maintained</p> <p>Signs</p> <ul style="list-style-type: none"> Mouth Breathing Head Postured Forward Jaw Postured Forward Tongue Boacing Indents in Tongue Sore Masseters Sore Neck Muscles <p>Symptoms</p> <ul style="list-style-type: none"> Facial Ache Not Waking Rested Daily Fatigue Neck Soreness 	<p>Sleep Airway Partial Collapse</p> <p>Signs</p> <ul style="list-style-type: none"> All of stage 1 and 2 plus.... Upper Airway Resistance 2-4% Drop O₂ Saturation RERA- Respiratory Arousal Sleep Teeth Grinding ↓ Growth Hormone <p>Symptoms</p> <ul style="list-style-type: none"> Heart Rate Fluctuation Snoring or "Purring" Weight Gain Cognitive Impairment, ADD Hyperactivity 	<p>Sleep Airway Full collapse</p> <p>Signs</p> <ul style="list-style-type: none"> All of stage 1, 2, 3 plus.... 4%+ drop O₂ Saturation Apnea Cardiovascular Damage Elevated BP GERD <p>Symptoms</p> <ul style="list-style-type: none"> All of stage 2, 3 plus.... Worn Teeth

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

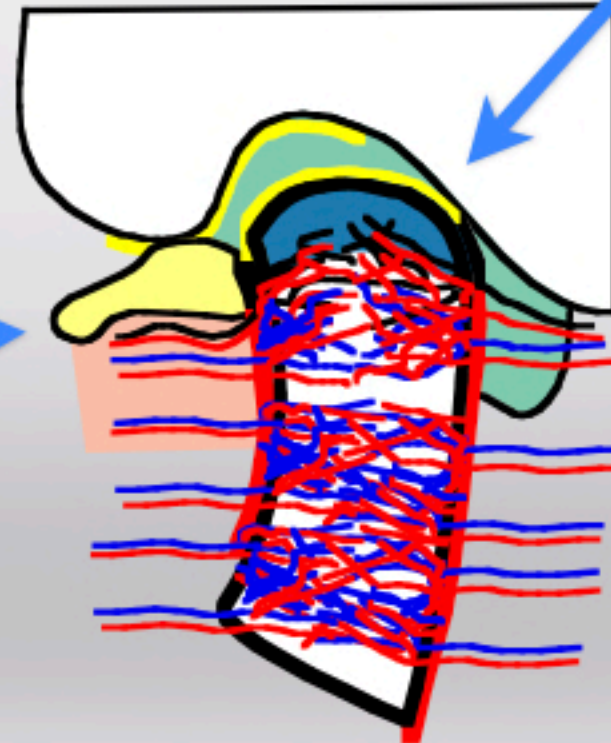
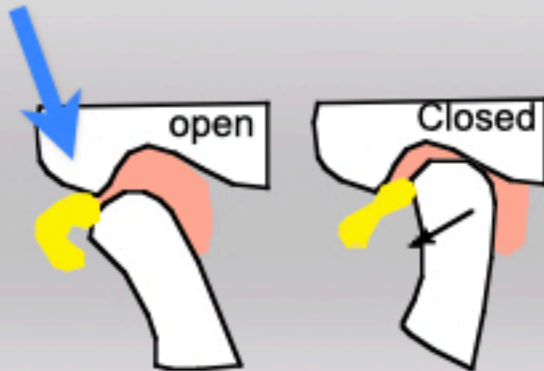
When the clicking stops (4a to 4b):

Condyle Distalized

Venous return compromised

Compromised Condylar Perfusion
Blood flow through condyle is decreased

Disc Anterior



3 Outcomes of Compromised Condylar Perfusion



Avascular Necrosis

Bone cells die



or

Inflammatory Tissue Bone Resorption

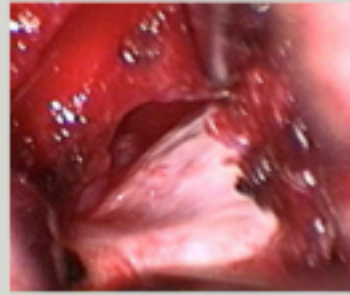
Cortex Collapses, Cartilage tears
Inflamed tissue contacting bone
Inflammatory cells activate Osteoclasts



One and Done



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



Nothing

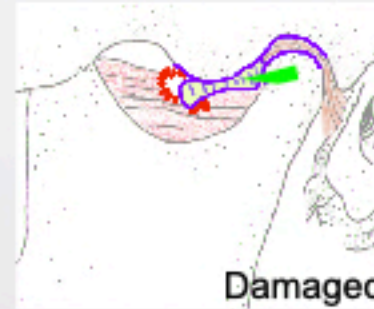
Compromised but adequate.
99% patients have no problems

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

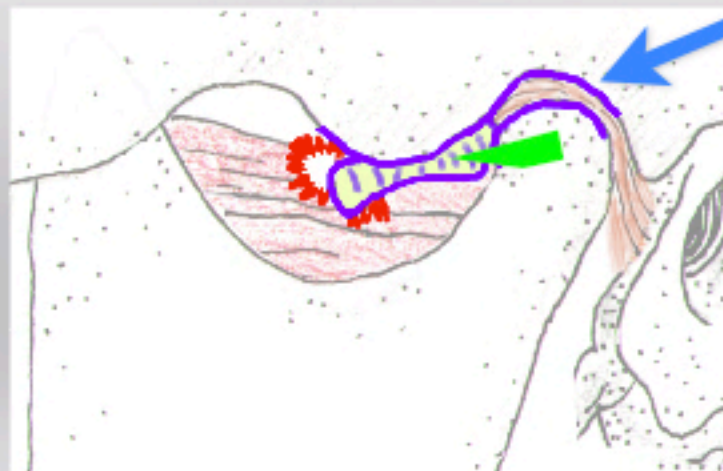
Basic Orthopedics

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

Use articulator to calculate how much distraction:

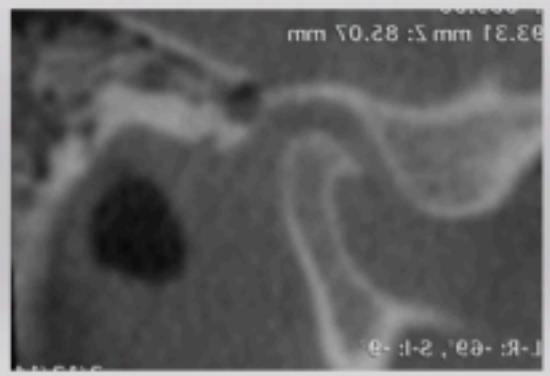
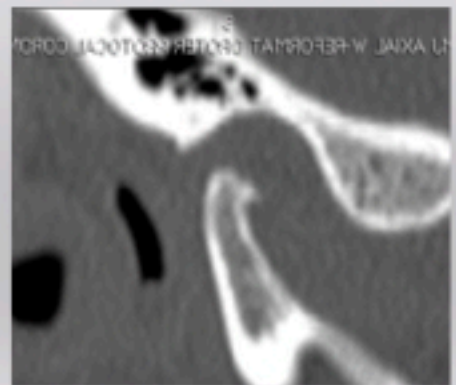
Right condyle down 6.2 mm back 2 mm
Left condyle down 4.5 mm back 2 mm



Condylar Distraction



Ball needs to land in the hole



Anterior Openbite with Active TMJ Bone Loss

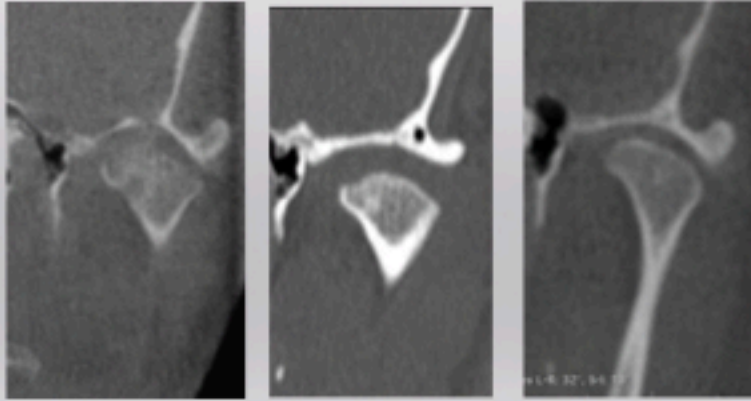
Non Surgical Therapies



Condylar Distraction



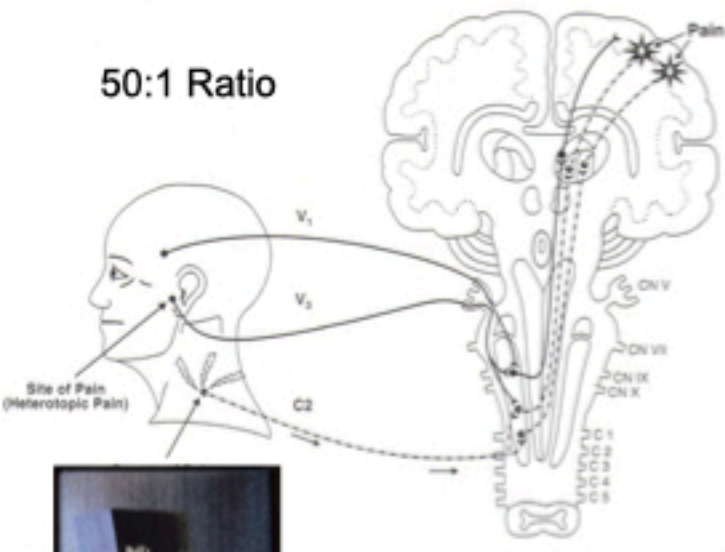
Anti Inflammatory Therapies



Referred Pain Convergence

More primary sensory neurons than secondary neurons that travel to brain

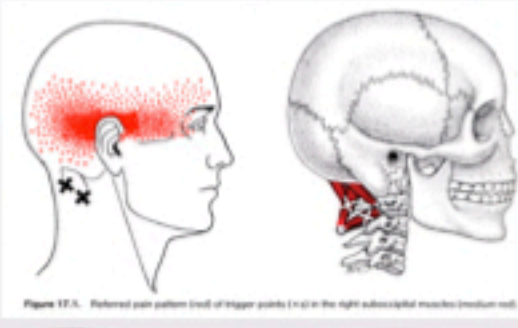
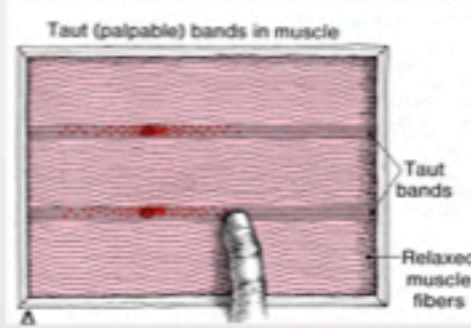
50:1 Ratio



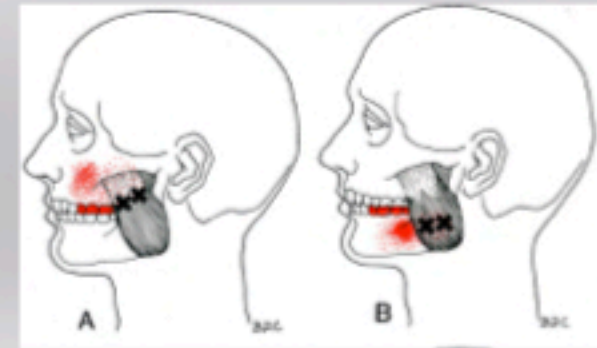
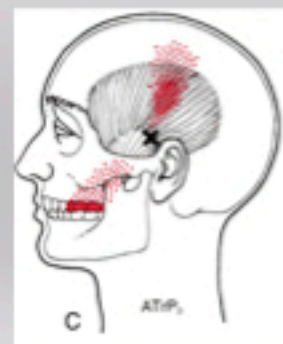
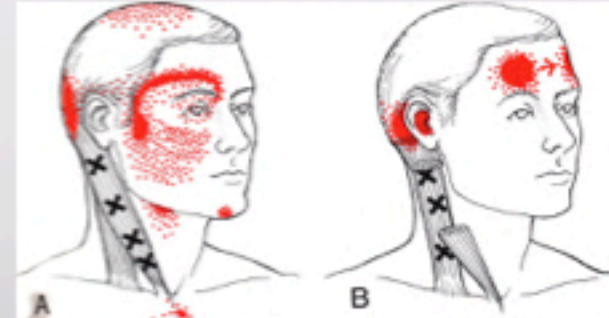
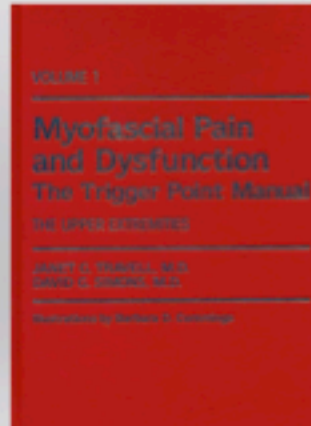
"Bell's Orofacial Pain"
Jeffery Okeson

Trigger Points

Contracted mass
of actin, myosin
and histamine

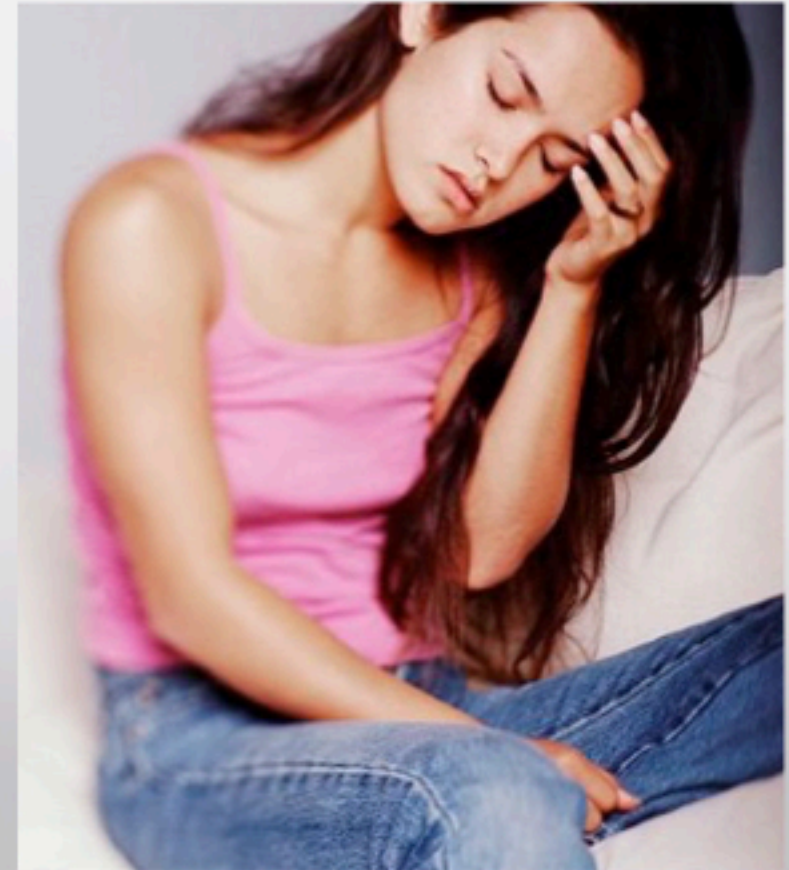


"The Trigger Point Manual"
Janet Travell, MD



5 Common Obstacles

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





Know Yourself

Know Your Work

Know Your Patient

Apply Your Knowledge

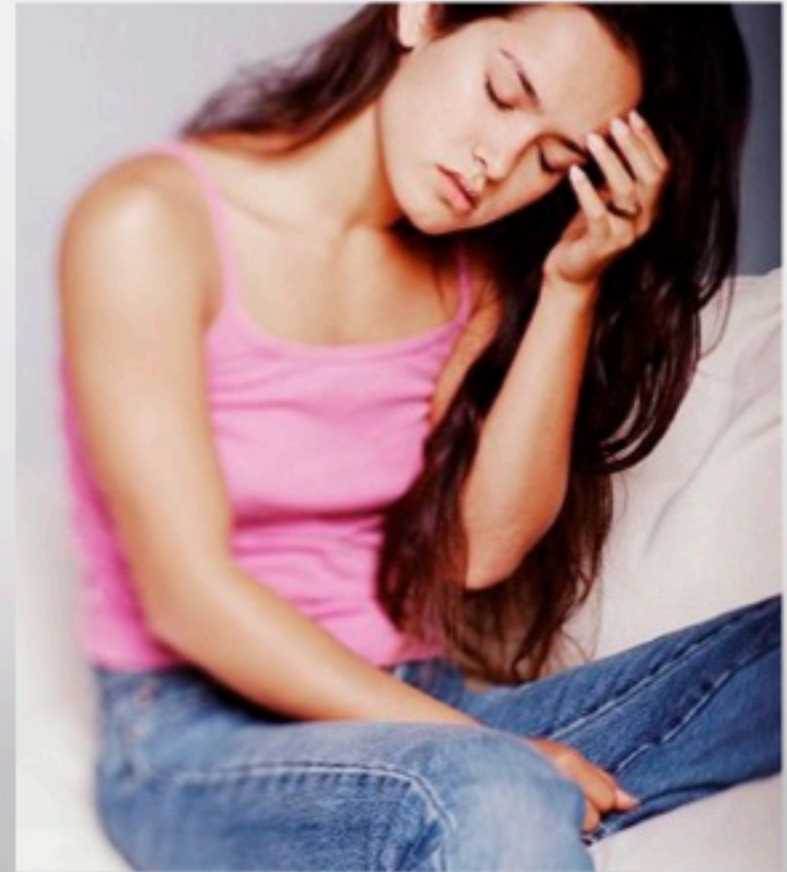
LD Pankey Institute

Write your Dream

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

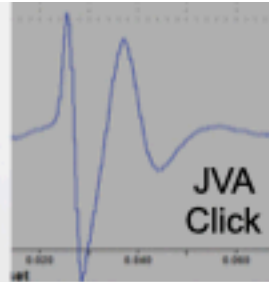
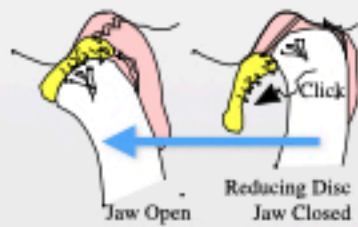
1 TMD that **usually** does not need therapy

TMJ Clicking

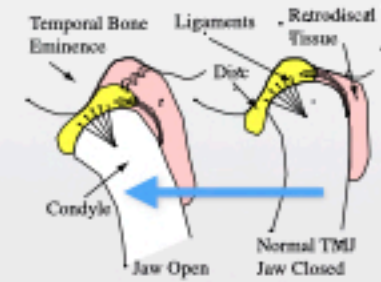


Differential Diagnosis of TMJ Clicking

Disc Reduction



Normal

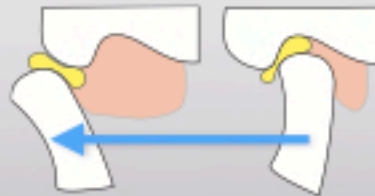


Adhesive Click



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

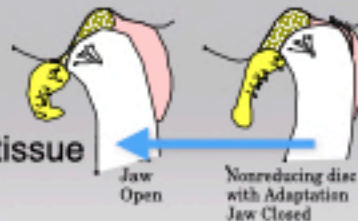
Eminence Thud



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

Adhesion Crackle

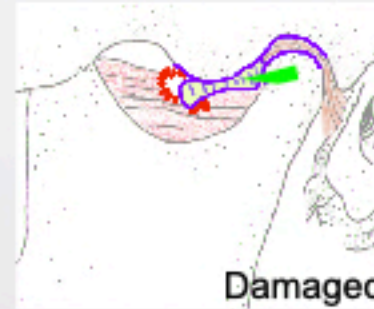
A small piece of fibrous tissue
4b joint is moved across



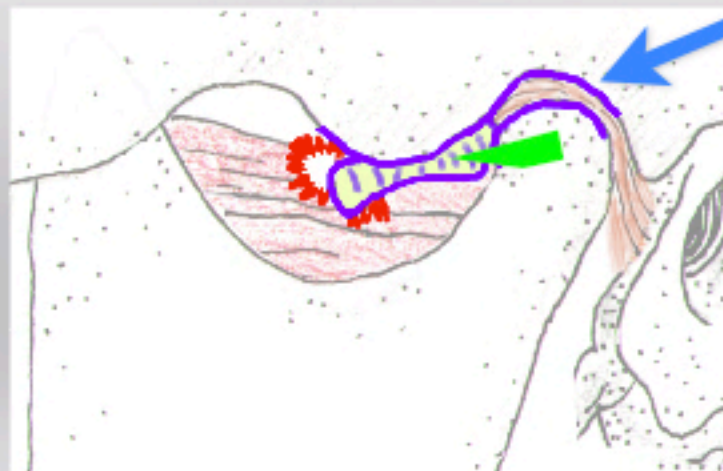
Basic Orthopedics

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

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

Leeuw, Boering, Stegenga, Bont,

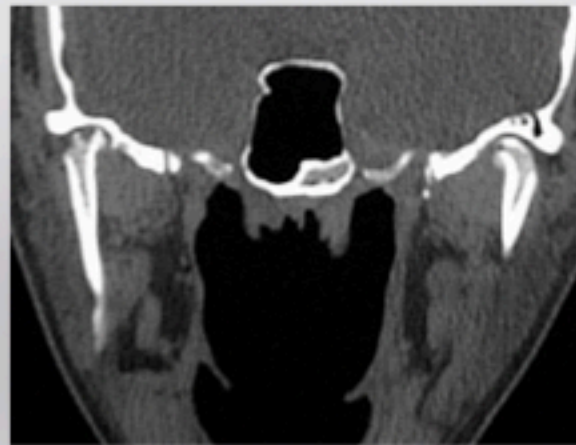
Journal of Craniomandibular Practice, April 1995, vol. 13, No. 2

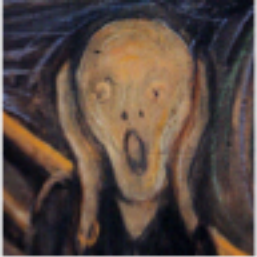
- University Hospital, Netherlands: 134 TMD patients, 30 year follow up
- Patients received good clinical work up and diagnosis 30 years ago, but basically no treatment
 - (Reassurance, PT, exercise, limited occlusal adjust)
- 70% satisfied with results
- 25% still had pain on movement
- 15% not able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

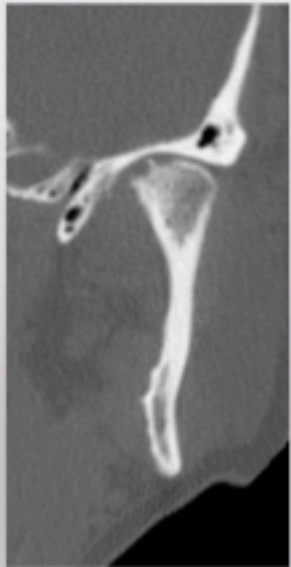
There is no love sincerer than the love of food.

G. B. Shaw





Damaged TMJs



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



Occlusal Muscle Dysfunction
Osteoarthritis



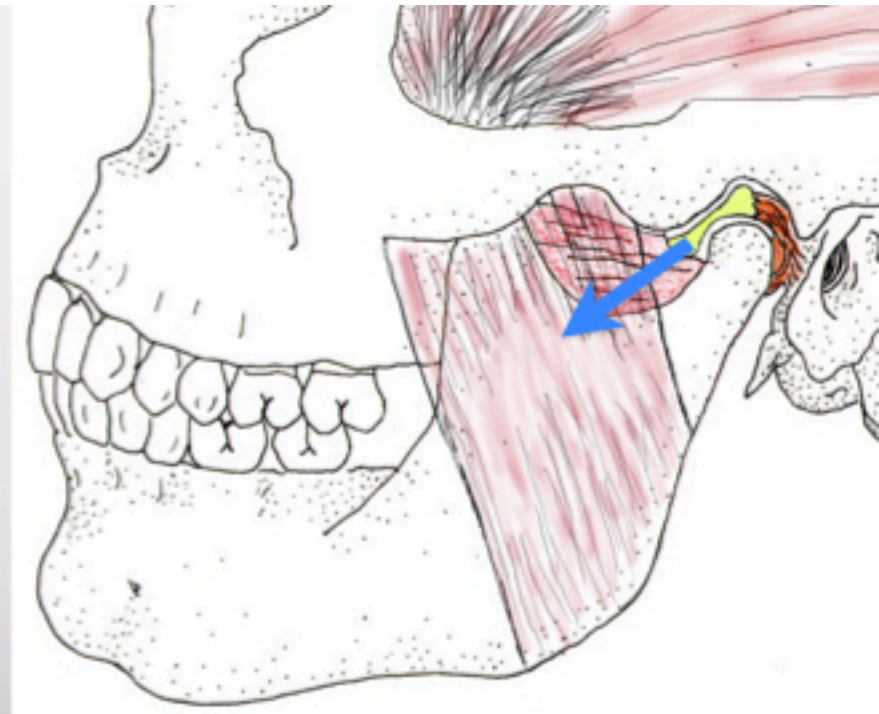
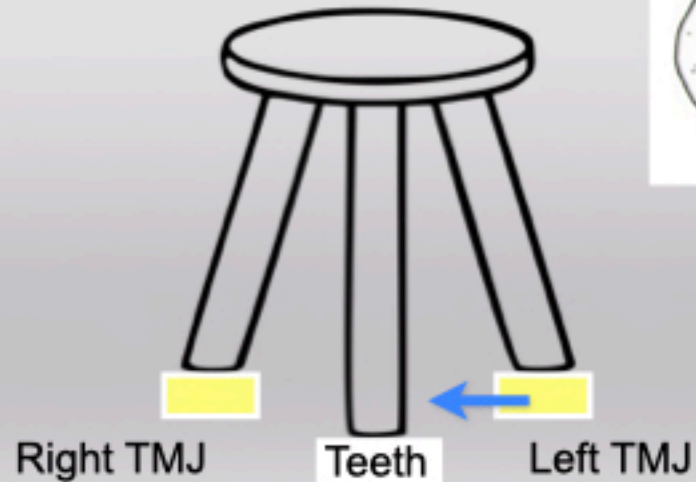
Avascular Necrosis
Progressive Condylar Resorption

*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?



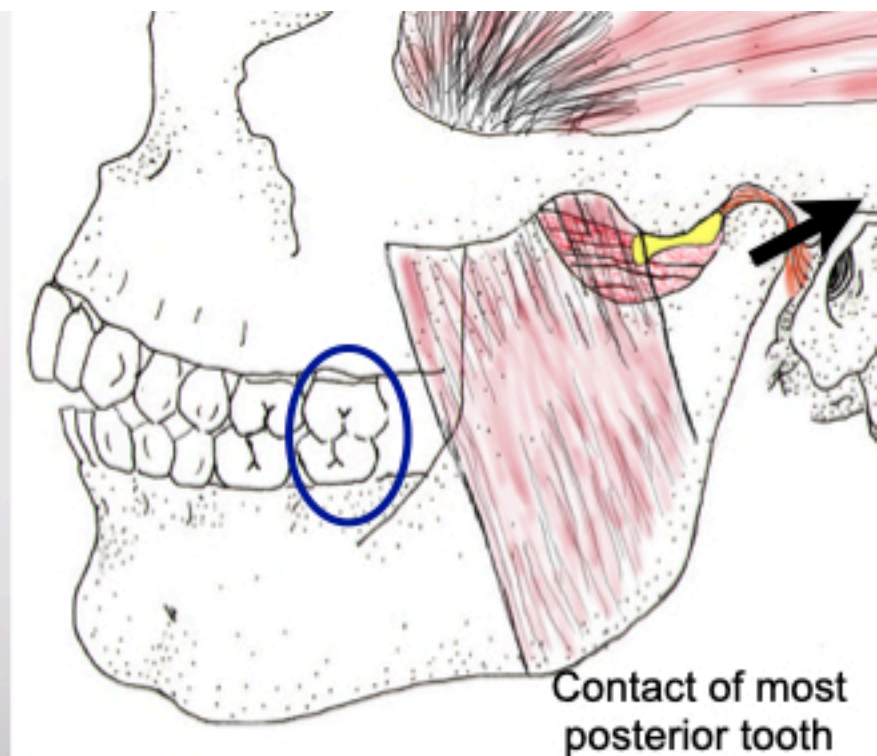
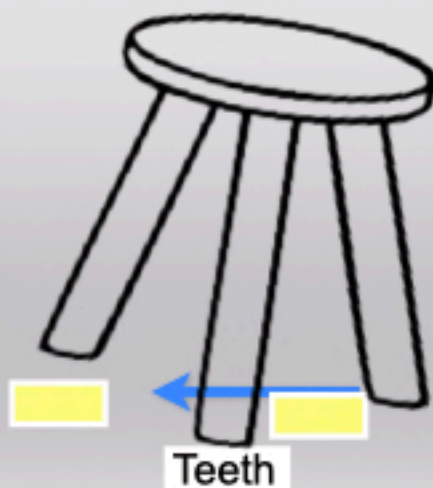
Damaged Joint with Malocclusion

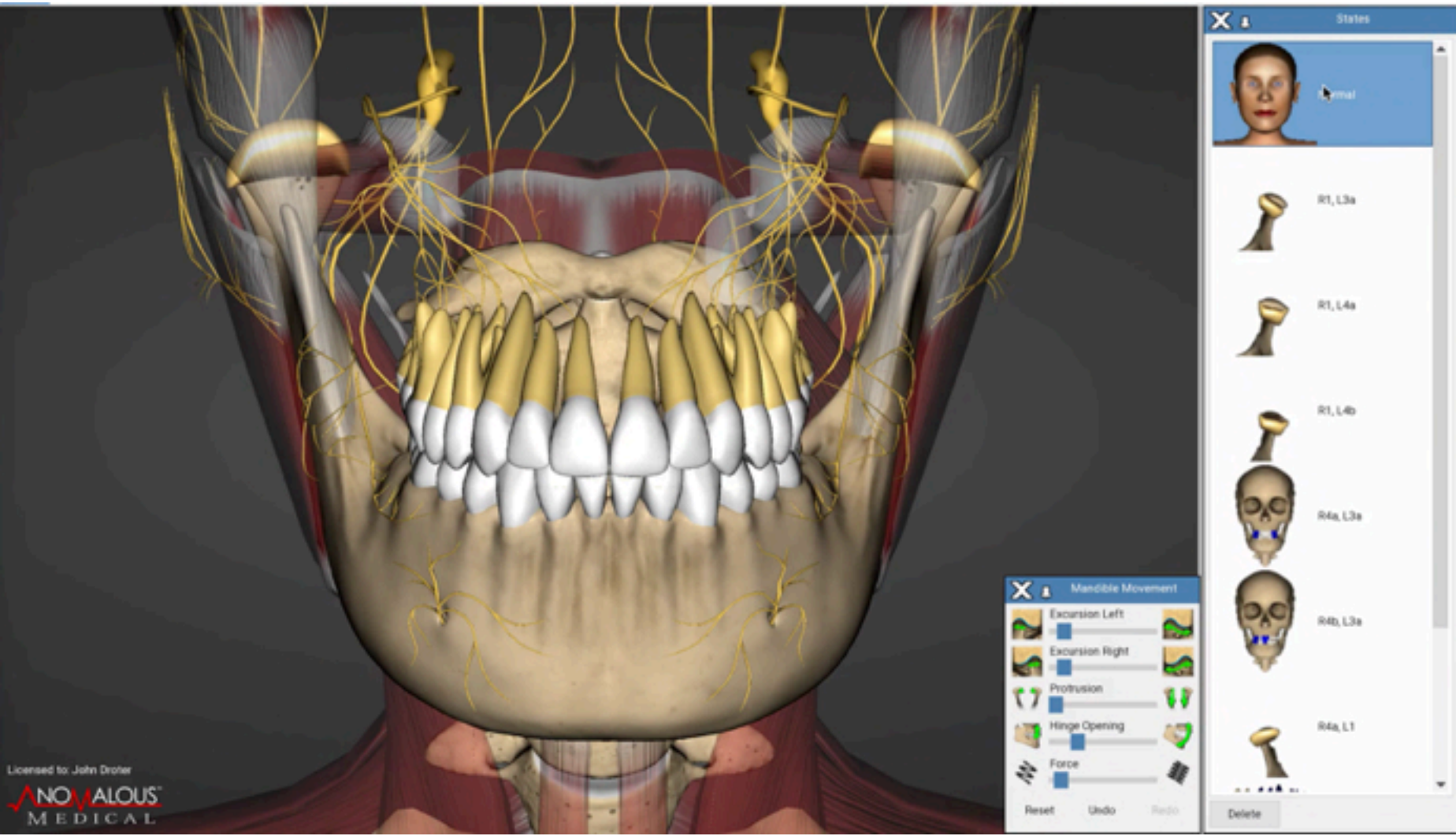
85% damaged joints adapt favorably with respect to the TMJ.

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.
(Horizontal 2mm)
If >2mm something else is going on.

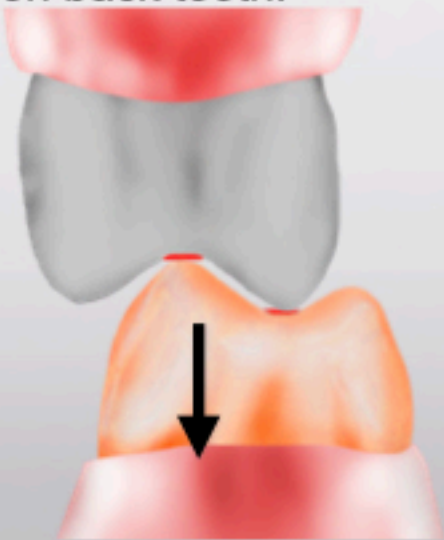




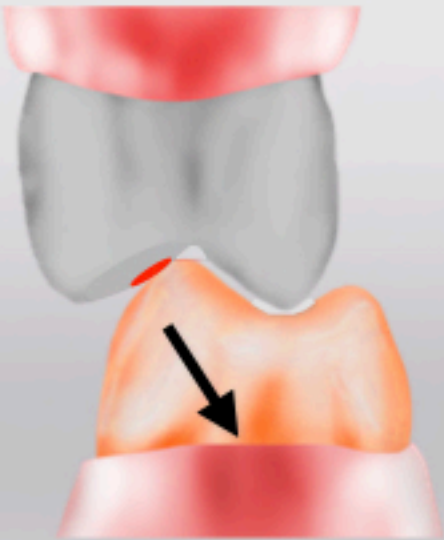
Occlusal Shift

Ideal Occlusion for Comfortable Muscles

Ideal
No sideways forces
on back teeth.



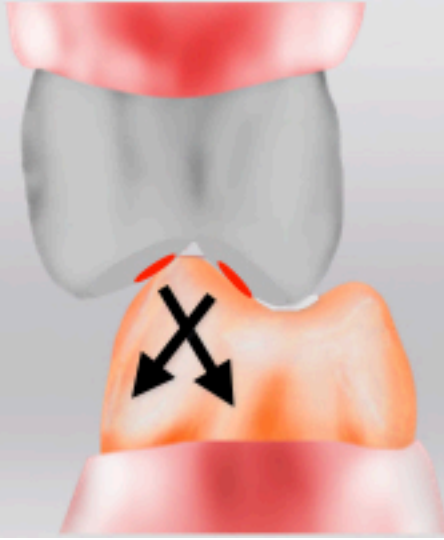
Not Ideal
Tense Muscles
Teeth can fracture



Sideways forces can fracture teeth

Not Ideal
Tense Muscles

Back teeth will have
sideways force
when the jaw moves
left or right.



Not Ideal
This is now a
functionless tooth.
Other teeth now
have more force.

Occlusal Sculpting

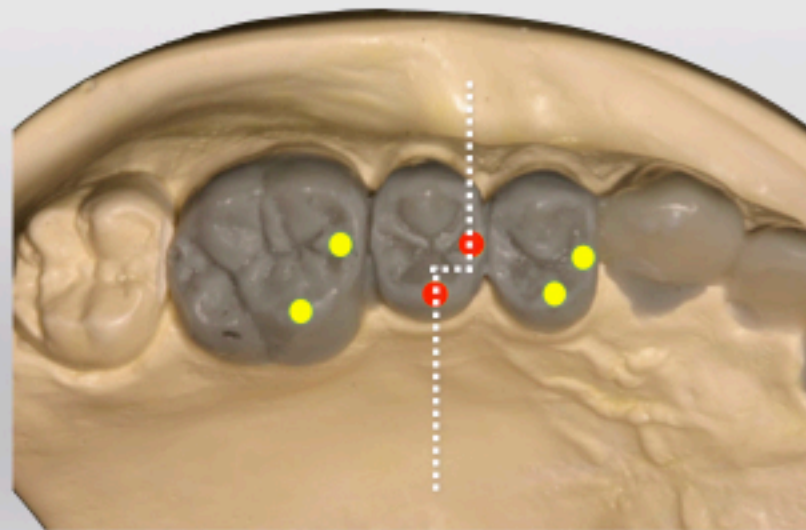
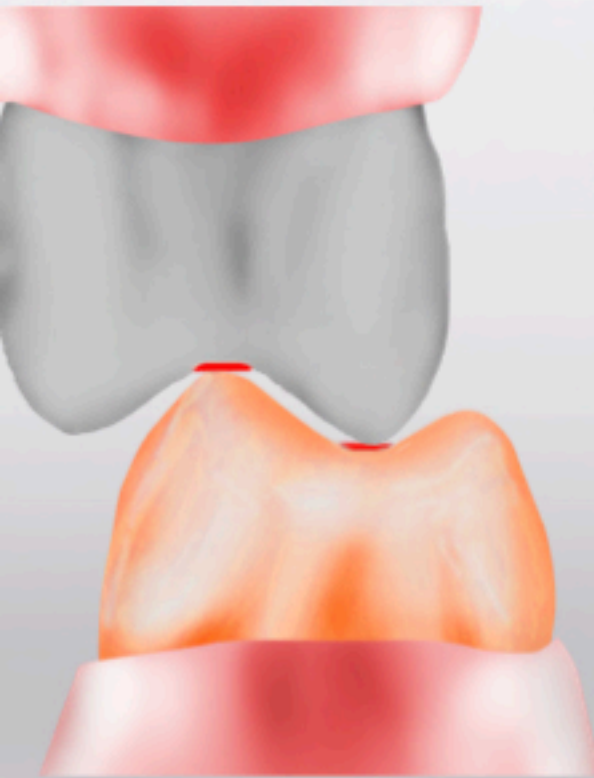
Reshape

The image illustrates the process of occlusal sculpting through several stages and components:

- Initial State:** On the left, a diagram shows a tooth with a red arrow pointing to the initial contact point on the occlusal surface.
- Reshaping Process:** The central part features two clinical photographs showing a dentist using a handpiece with a bur to reshape the tooth. Below these are two images of different dental burs: a long, thin one and a shorter, wider one.
- Final State:** On the right, a diagram shows the tooth after sculpting, with a black arrow pointing to the new, more defined occlusal contact point.
- Polishing:** A diagram below the burs shows a circular bur being used on a tooth. To the right, a polishing wheel is shown with the word "Polish" written above it.

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 by Dr Jim Kessler

6 Common TMDs

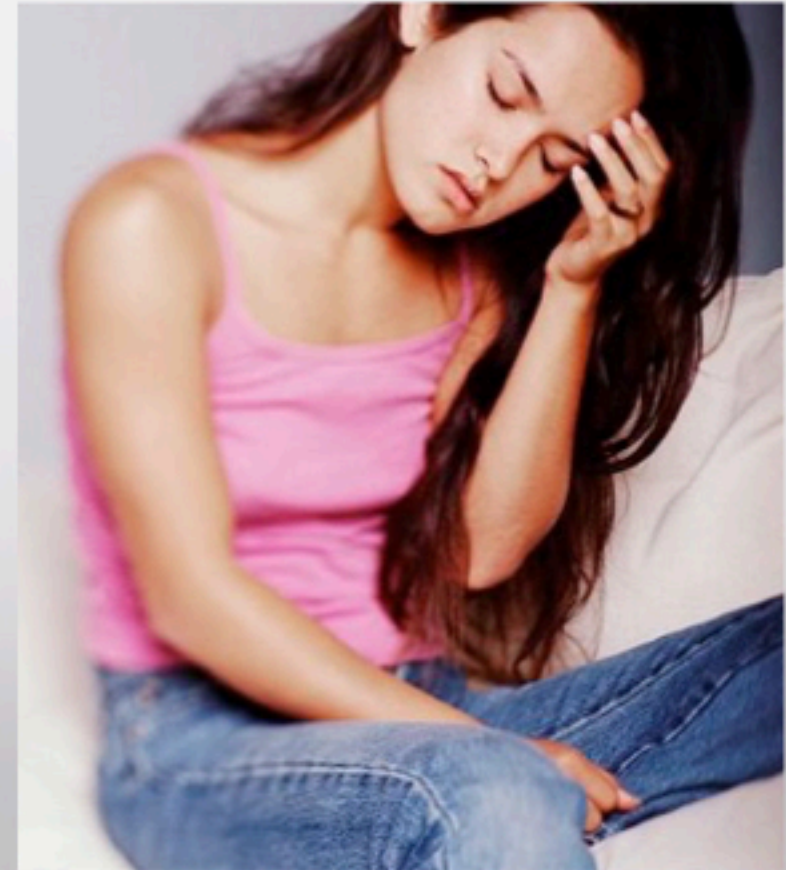
- Parafunctional Clenching
- Parafunctional Grinding
- Occlusal Muscle Dysfunction
- Osteoarthritis
- Acute Sprain
- Acute Closed lock of TMJ disc

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





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

Facial Pain Diagnosis

Diagnostic Tools

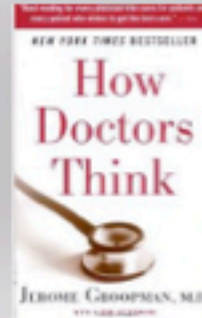
- 1 **Written and Oral History**
- 2 **Observation**
- 3 Physical Exam
 - Muscle Palpation
 - Joint Palpation
 - Joint Auscultation
 - Joint Motion
- 4 Anterior Stop Test
- 5 Sleep Airway Screening
- 6 CT Scan
- MRI
- Blood Tests


Most Important is the history. You have a good idea of what is going from this alone.

You can also observe speech, jaw movements, neck movements, demeanor, body posture during the oral history.

Need to resist the temptation to zero in on one diagnosis.

Still need make a Differential Diagnosis. It appears to be, but what else could it be?





 John R. Brooker, D.D.S.
 4550, Rockledge Blvd., Suite 108
 Orlando, Maryland 21715
 410-851-9491
 drbrooker@oro.com
 Fax-803-851-0142

Facial Problem Questionnaire


I. Name _____ Age _____
 Date _____ Referred by _____

II. Which of the following do you have (circle all that apply)
 Headaches Neck Pain Jaw Pain Ear Pain
 Facial Pain Eye Problems Damaged Teeth
 Other _____


III. Please shade in where your pain is located:






jawline



forehead



neck


IV. How long have you had this pain? _____
 Is the pain constant? _____
 Is the pain worse at (circle all that apply) Arising During
 Waking Sleep Exit Other _____
 Is the pain worse in the circles all that apply)
 Morning Afternoon Evening Night
 What makes the pain better? _____
 What makes the pain worse? _____

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

No Pain | _____ | Worst Pain

Date _____

Facial Problem Questionnaire




Facial Problem Questionnaire

John R. Droter, D.D.S.
 4000 Massachusetts Rd., 12708
 Bowie, Maryland, 21718
 301-505-9450


Please do not write in this space.
Date _____


1. Name _____ Age _____
 Date _____ Referred by _____
 Referring Doctor: Please Print Name _____

2. Which of the following do you have (circle all that apply):
 Headaches Neck Pain Jaw pain Ear Pain
 Facial Pain Bite Problems Damaged teeth
 Other _____






Open bite





Overbite

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

4. If pain, How long have you had this pain? _____
 Is the pain constant? _____
 Is the pain (circle all that apply) Aching Burning
 Stabbing Sharp Dull Other _____
 Is the pain worse in the (circle all that apply)
 Morning Afternoon Evening Night
 What makes the pain better? _____
 What makes the pain worse? _____

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

No Pain	_____	Worst Pain Ever
------------	-------	-----------------------

016

Pt fills out FPQ and mails in prior to appointment being made
 It is reviewed and type of appointment is determined.

FPQ is a combination of:
 Parker Mahan, DDS
 Henry Gremillion, DDS
 Mark Piper, MD
 John R Droter, DDS

Feel free to download and use
www.jrdroter.com
 Patient Download

All patients fill out whether they have pain or not

Question 20 is the most important of all

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

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

What would you like to accomplish with treatment here?



Start Reading here when you first look at form

What we want to know first, is best answered by the patient last. Patient's memory has been focused on the details of the problem for the previous 5 pages. Now when they answer, it is a much more focused answer.



FAB
Feature
Advantage
Benefit

All treatment discussions are made in reference to the benefit to the patient

Nobody ever wants to own a feature: an occlusal adjustment, a crown, or a root canal.
The first step to achieving(Benefit for patient).... is
The cost to(Benefit for patient).... is \$\$

Anterior Stops

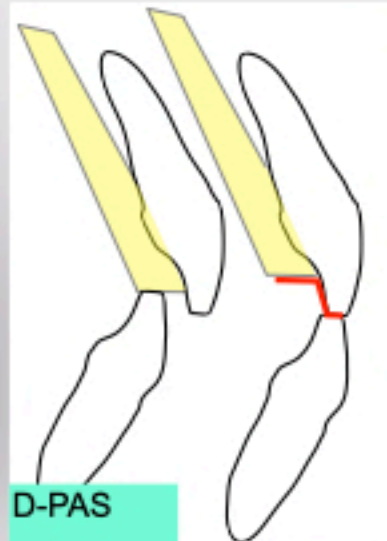
John R Droter DDS
Annapolis, Maryland

Annapolis, Maryland
John R Droter DDS

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 Stop Orthotics



NTI



Pankey Anterior Stop



APS Airway Bite



APS In Office Anterior Stop



Lucia Jig



Kois Deprogrammer



Modified Quick Splint



APS D-Pas



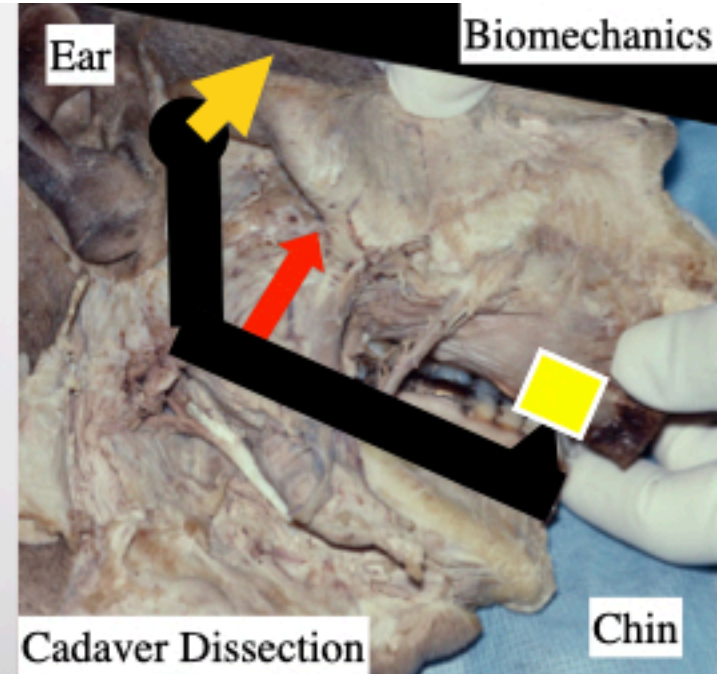
APS Temp Anterior Stop



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

Anterior Stop Orthotic 3 Effects

1. Allows Maxilla, Mandible, and Temporal bones to align.
2. Major decrease in muscle contraction force, most patients.
3. Breaks muscle engram avoidance and bracing patterns.

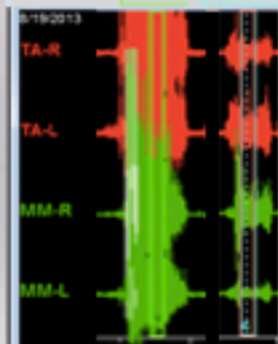


Cadaver Dissection

Chin



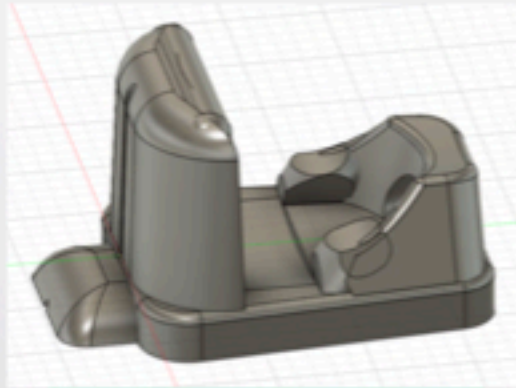
	μV	μV
TA-R	100.6	15.7
TA-L	108.9	25.3
MM-R	115.4	25.5
MM-L	70.5	6.8



Major decrease in muscle power with D-PAS

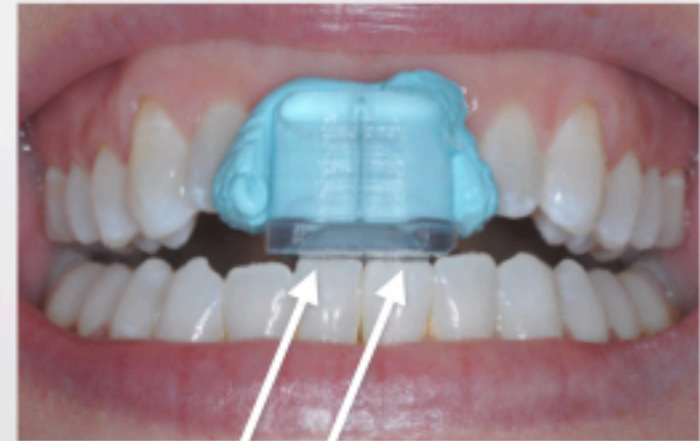


Anterior Stop Orthotic In Office Diagnostic Test

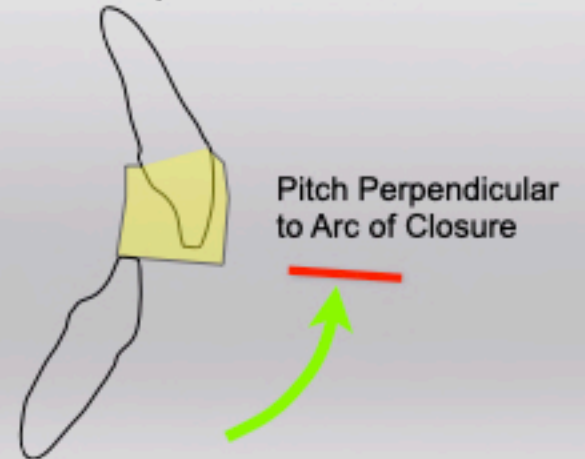


APS Anterior Stop 2.5mm

- Easy to hold and align
- Built in undercuts
- Long enough for class 2 and class 3
- Is bondable to composite



2 points of contact



Pitch Perpendicular
to Arc of Closure

Reline with Parkell Blu-Mousse Super Fast



Can do 2nd reline over
top of the first if needed

Anterior Stop Orthotic In Office Diagnostic Test



ArrowPath Sleep
Anterior Stop



Deprogram Muscle Engrams

If pain reduces, Occlusion/ Cranial Alignment and/or Muscle Engrams are part of the problem

With anterior stop in place:

5-10x wide open solid tap, open tap far left, open tap far right

2nd round same except Dr unexpectedly accelerates closing a few times

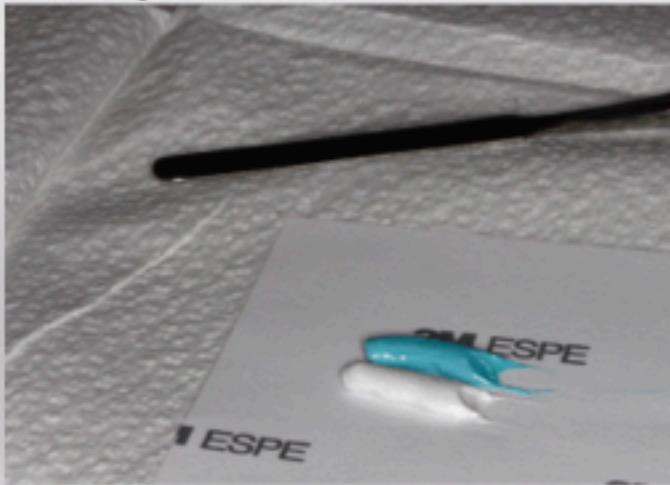
Occipital Lift with 3 deep breaths. Posterior neck opening muscle massage.

3rd round same as first except less taps each position

Office USE ONLY Do not send home with patient

Anterior Stop Orthotic In Office Diagnostic Test

Can do 2nd mix to
overlay 1st if needed



Anterior Stop Orthotic In Office Diagnostic Test

Does the occlusion, cranial alignment, and/or muscle bracing have anything to do with the dysfunction or pain?

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



ArrowPath Sleep
Anterior stop 2.5 mm

>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

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

19 yo F Limited opening for past year 30-2 mm

Not able to eat solid foods for past 6 months
and scheduled for TMJ surgery next month



Anterior stop placed:
5 minutes of jaw manipulation
Pain level went from 8/10 to 0
Opening went from 30-2 to 48-3



Pankey Anterior Stop
relined with bis-gma resin

Working Diagnosis:
Protective Muscle Bracing
Occlusal Muscle Dysfunction
Anterior Openbite

Anterior Stop Orthotics

Diagnostic Test

Patient Awareness

Disease Management

Bite Recording Tool



APS In Office
Anterior Stop
2.5 mm



Pankey In Office
Anterior Stop

***Do not send patient home with small anterior stops that can be aspirated.

Anterior Stop Orthotics

Basically a relined upper Hawley retainer with anterior stop, no wire, no buccal restrictions.



The D-PAS Diagnostic Palatal Anterior Stop



Diagnostic Palatal Anterior Stop

D-PAS Test: Wear 2 weeks for sleep, and occasional daytime

Better- Decrease in Symptoms

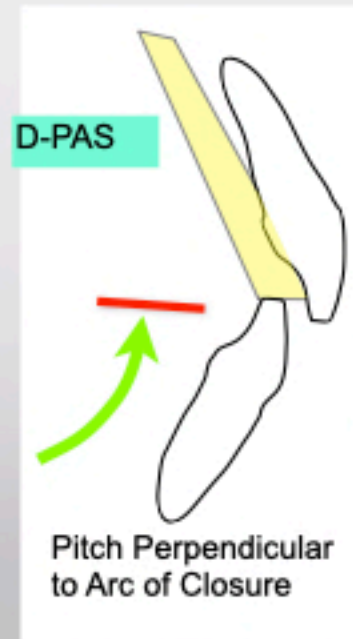
Sleep Clenching Inhibited: Wear D-PAS as night guard
Orthotic Improved Airway: D-PAS as night guard
Occlusal Muscle Disharmony: Occlusal Adjust

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

APS Home Trial Anterior Stop

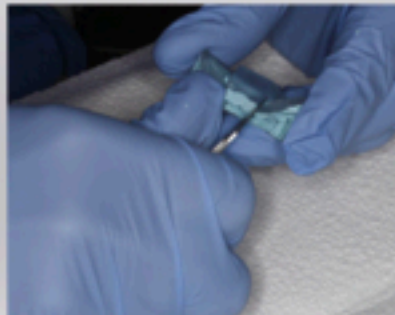
Hard material that gets very soft when heated



Place in hot water then mold in mouth



Reline with blue mousse
Trim excess



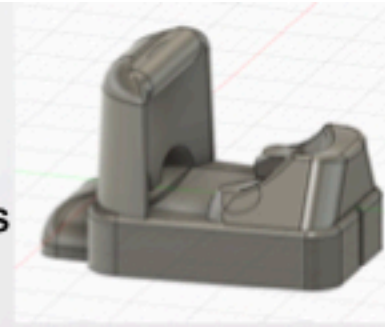
ArrowPath Sleep Airway Bite

Try in anterior stop before reline.
Verify where patient occludes in full range of excursions

APS Airway Bite Anterior Stop 4mm



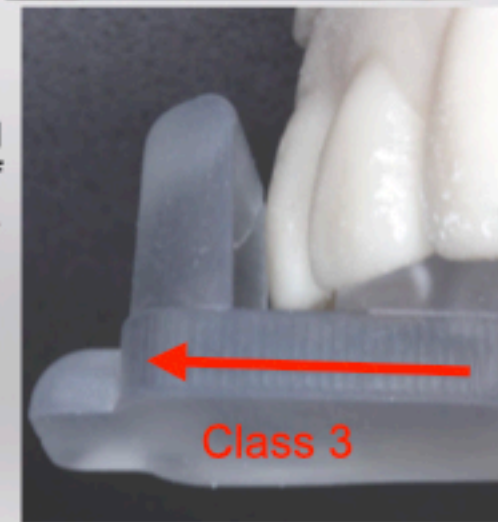
Reline with Parkell Blu-Mousse Super Fast
Can do 2nd reline over top of the first if needed



Device shifted back so
flush with buccal surface
of front teeth

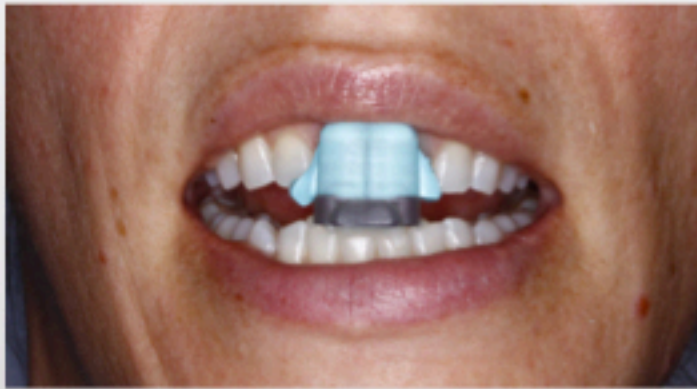


Device shifted forward
so lingual surface of
front teeth touch device.

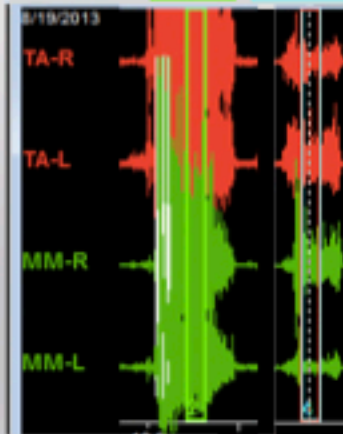


Use anterior stop and an EMG to choose style of sleep device:

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



Will sleep airway device have an anterior stop or posterior contact?

ArrowPath Sleep Airway Bite



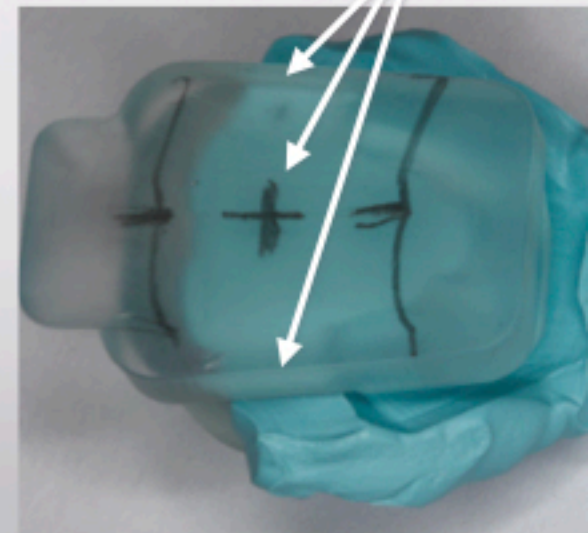
Mark furthest forward and back jaw position and midline with sterile disposable pencil



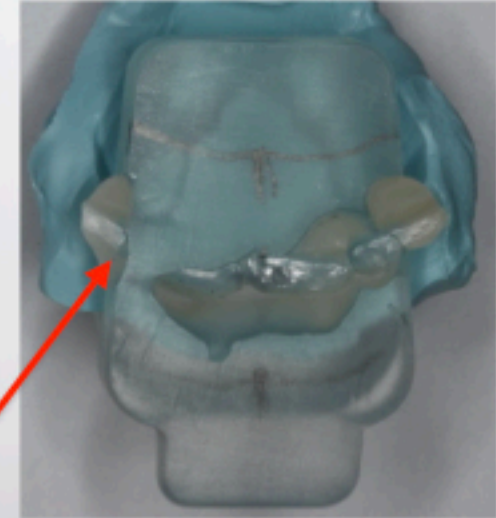
Measure and mark the amount of protrusive you want to build into the Mandibular Advancement Device

50% is typically a good place to start

Place bonding agent



ArrowPath Sleep Airway Bite



Move jaw into position, verify with tap tap, then flow flowable composite in front of lower incisors, cure.



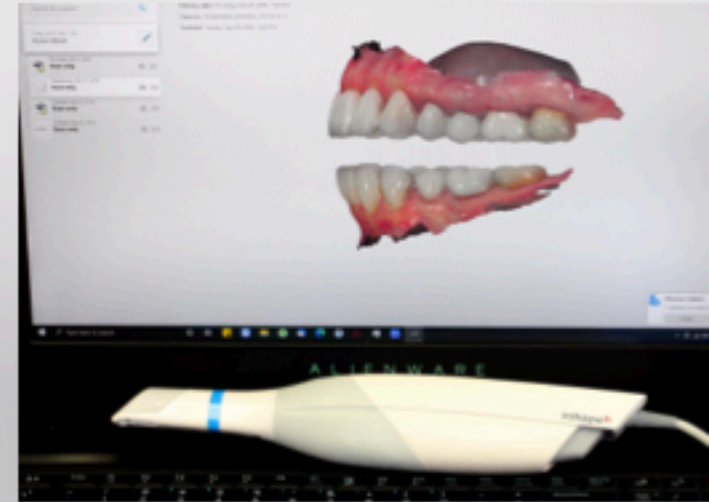
At edge of anterior stop
flow some composite
behind teeth and cure.

Jaw is now held stable in forward position.

ArrowPath Sleep Airway Bite

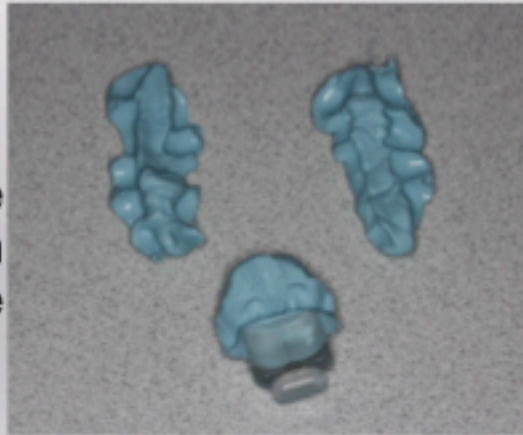


or take digital scan with
anterior stop in place and
jaw positioned forward



Jaw is held stable in forward position.

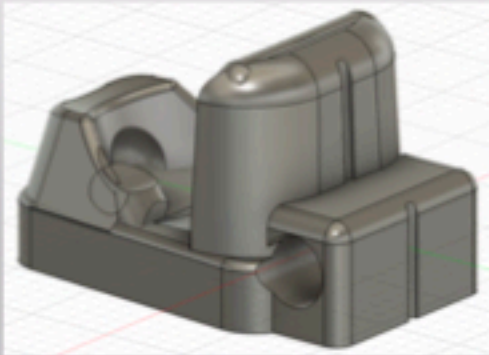
Silicone bite
registration
of airway bite





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

ArrowPath Sleep
3.9 mm Anterior Stop
Muscle Deprogrammer
Airway bite
Facial Analyzer



Facial Analyzer



Airway bite



Facial Pain Diagnosis

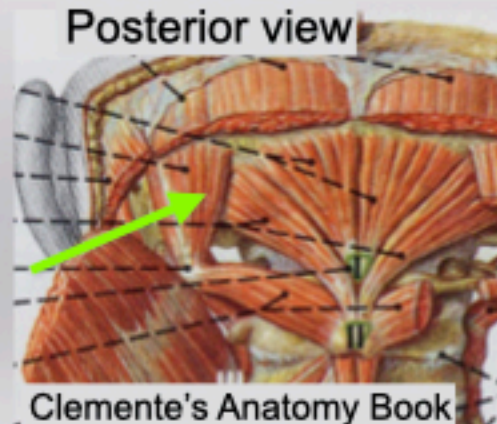
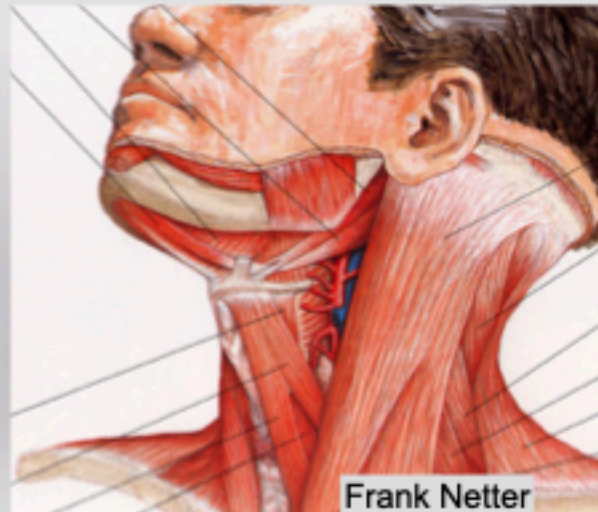
While I palpate many muscles, the ones I find key are:

Diagnostic Tools

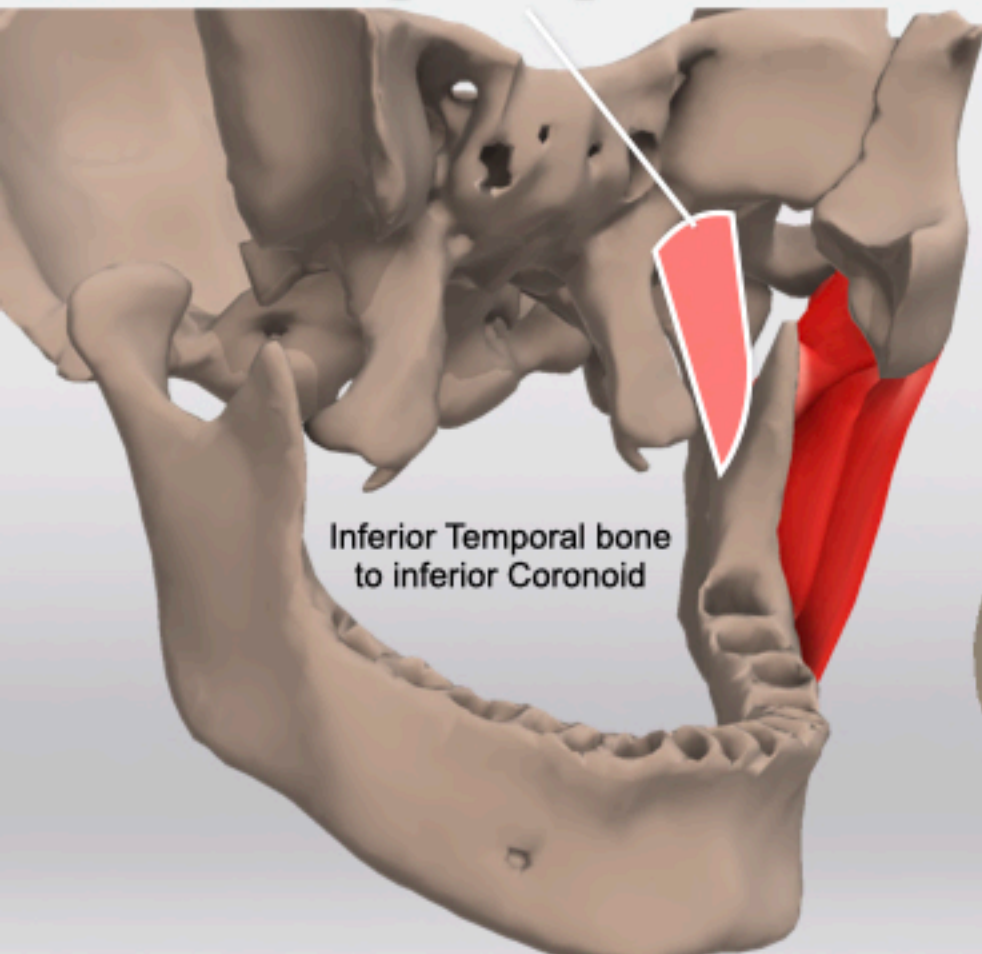
- 1 Written and Oral History
 - 2 Observation
 - 3 **Physical Exam**
 - Muscle Palpation**
 - Joint Palpation
 - Joint Auscultation
 - Joint Motion
 - 4 Anterior Stop Test
 - 5 Sleep Airway Screening
 - 6 CT Scan
- MRI
Blood Tests

Also palpate:
TMJ Lateral
TMJ Posterior

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

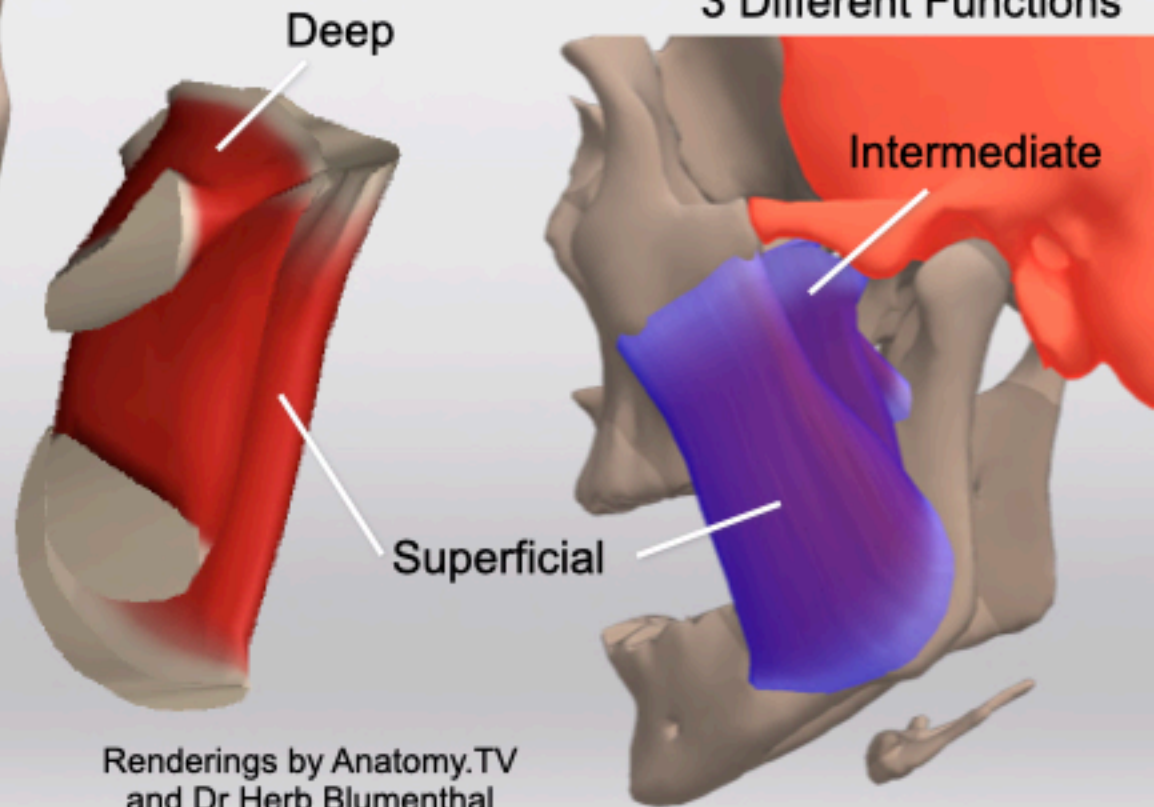


Deep Temporalis

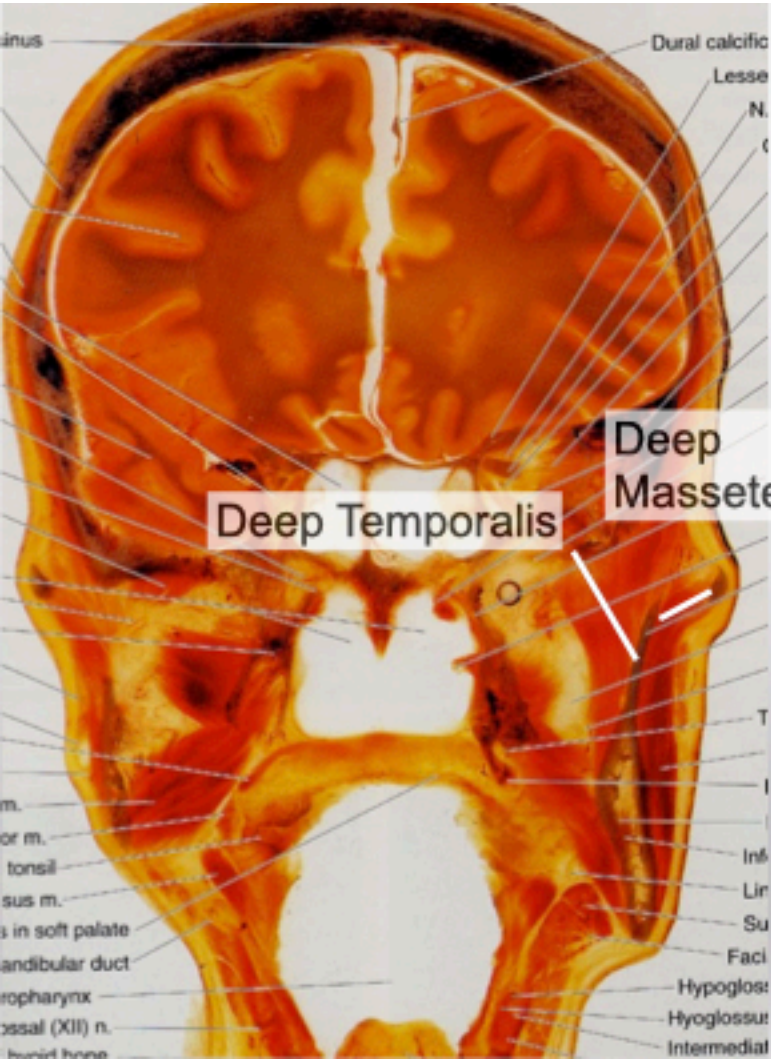


Masseter Muscle is Complex

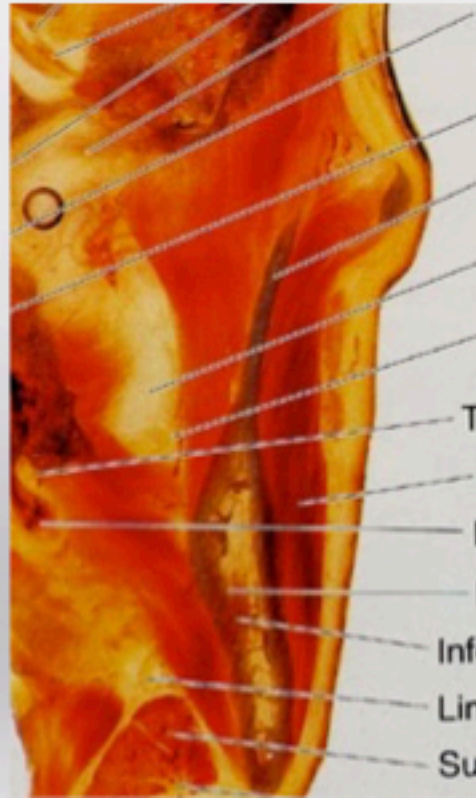
Complex Muscle
3 Different Portions
3 Different Functions



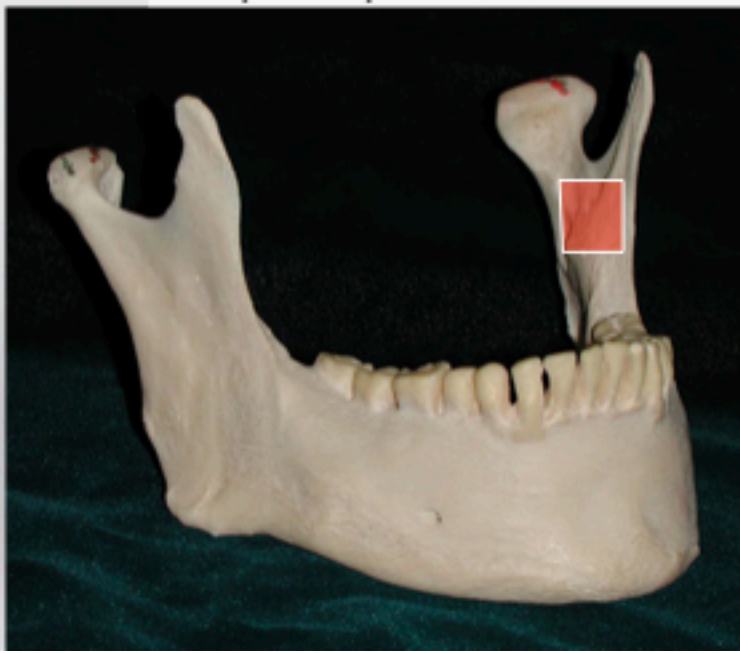
Renderings by Anatomy.TV
and Dr Herb Blumenthal



Deep Temporalis and Deep Masseter
 Stabilizes TM joint side to side
 Sore in "Wobbly Joints"



Deep Temporalis Attachment





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

John R Droter, DDS

To get today's lecture slides:
go to www.drdroter.com

Seminar Download

Pankey TMD

The screenshot shows a web browser window with the URL www.drdroter.com/seminar-downloads/. The page title is "John R. Droter, DDS" and the main heading is "SEMINAR DOWNLOADS". The navigation menu includes "HOME", "PATIENT DOWNLOADS", "NEW PATIENT EXAMS", "ABOUT TMD", "SEMINAR DOWNLOADS", and "CONTACT". The "SEMINAR DOWNLOADS" link is highlighted in green. The "Upcoming Seminars" section lists several events, including "Pankey TMD Week, Key Biscayne FL" with dates "October 23-27, 2016" and "October 22-26, 2017". The "Most Popular and Common Downloads" section lists "TMD Supersheet Download" and "SuperTMDx13.11".

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

HOME PATIENT DOWNLOADS NEW PATIENT EXAMS ABOUT TMD **SEMINAR DOWNLOADS** CONTACT

SEMINAR DOWNLOADS

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](http://LDPankeyInstitute.com) 305.428.5500

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

Most Popular and Common Downloads

TMD Supersheet Download
[SuperTMDx13.11](#)

Brux supersheet Download

CBCT

John R Droter DDS
Annapolis, Maryland

Annapolis, Maryland
John R Droter DDS

www.jrdroter.com

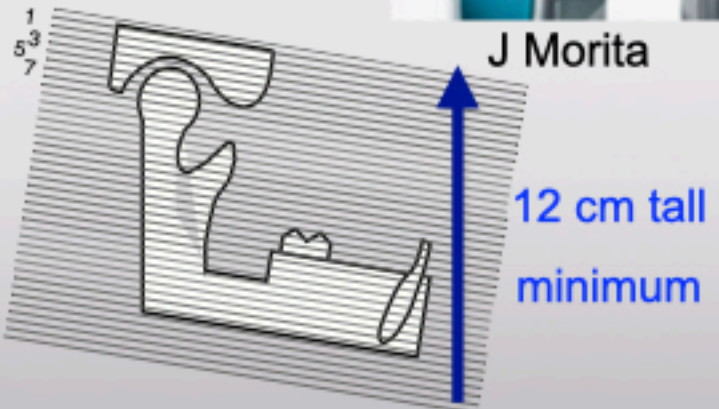
Key Features for TMJ Images

**Large Field of View 15cm Tall (12cm is minimum)
Excellent raw image quality**



Recommend Best Raw Image Quality:
 3D Accutomo 170 J Morita 12cm
 VaTech i3D Premium 19cm

Most important is service behind the product
 Benco vs others



VaTech

Not recommend:
 Any Sirona including Galileos: Marginal raw image quality, motion artifact

Green = LOW Contrast

Making a Great TMJ Scan

Rx for CBCT

Adding a chair vastly improves image quality



Can get from JRDroter.com

1. Large Field of View

15cm tall field of view or greater

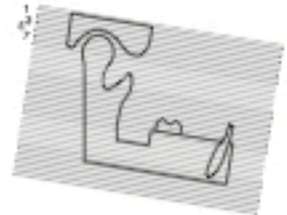
At 12cm tall you will miss some joints. 15cm and up is better

Note: 17cm x 12 cm is 12 cm tall. The smaller # is the height, and is listed last

2. Scan Area

Scan Area to include 1cm above condylar head,

1 cm behind condylar head and 1 cm below chin.



3. KVP and AMP

Use highest KVP and Amperage the machine allows to get best contrast.

4. Voxel Size

Lesser scan time minimizes movement artifact. 0.3 voxel will give a better image than

0.1 voxel

5. No Metal-

No hair ties/clips, facial piercings, partials, glasses, etc.

6. Natural Neck Posture

Side view: Neck in natural postural alignment, and Frankfurt horizontal plane parallel to the floor. Avoid reaching for chin-rest with head forward posture.

Align head frontal view: Laser aligner down middle of face, can see both ears equally

7. Hold Still

Goal: Patient to hold very, very still for 20 seconds while scan is being taken

Sitting is more stable than standing. A hard chair works well.

Practice swallowing, back teeth touching, tongue lightly resting back of front teeth.

Practice lightly breathing.

Give patient a 7 second warning before you take the scan so they can swallow, get back teeth touching, and have tongue lightly resting back of front teeth.

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

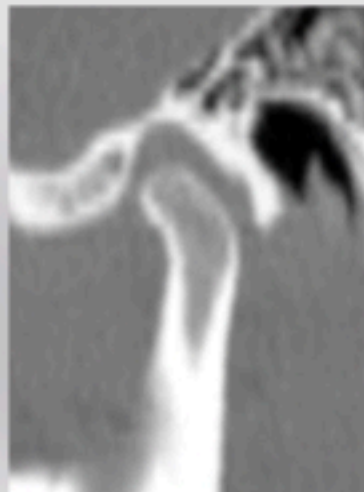
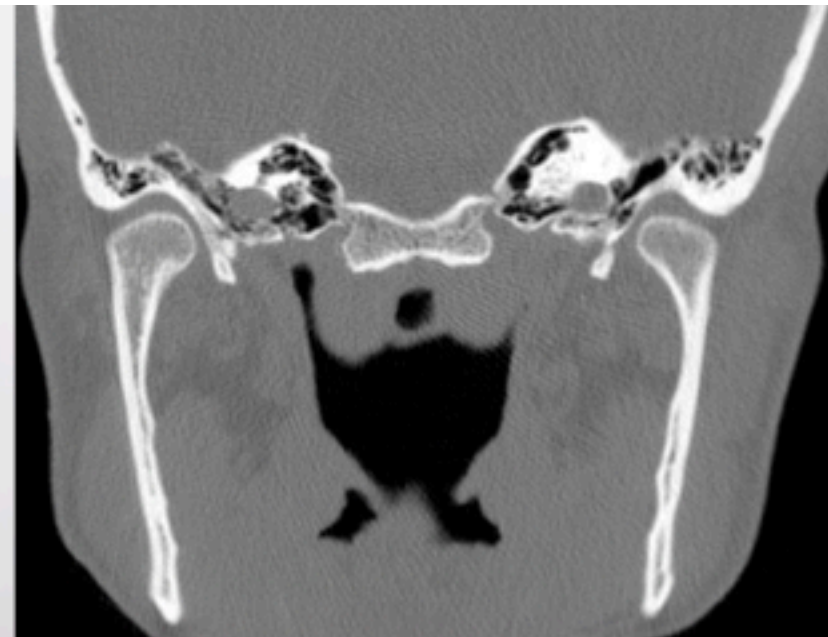
Coronal and Sagittal

Room for Disc

Stable CR load Zone

Condyle closest to fossa

CT Scan
Coronal View



CT Scan
Sagittal View

Interpreting CBCT

www.jrdroter.com

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 Hypertrophy

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 Hypertrophy

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: _____

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 hypertrophy 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, 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 hyperactive "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 the 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 single 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.

3a This 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 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.

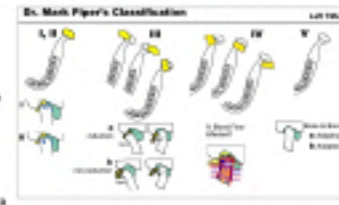
3b Same as above except non-reducing and therefore no clicking vibration. CT is normal

4a 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 audible range some may not be. These will be detected with JN. 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. Hypertrophy 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 |
|----|----|-----|-----|-----|-----|-----|-----|

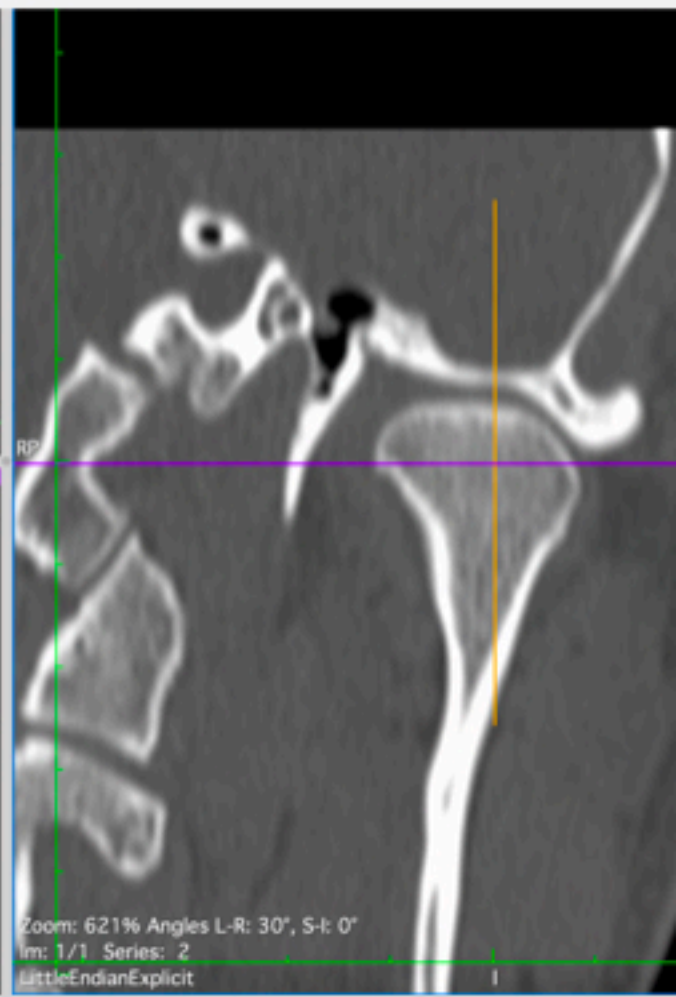
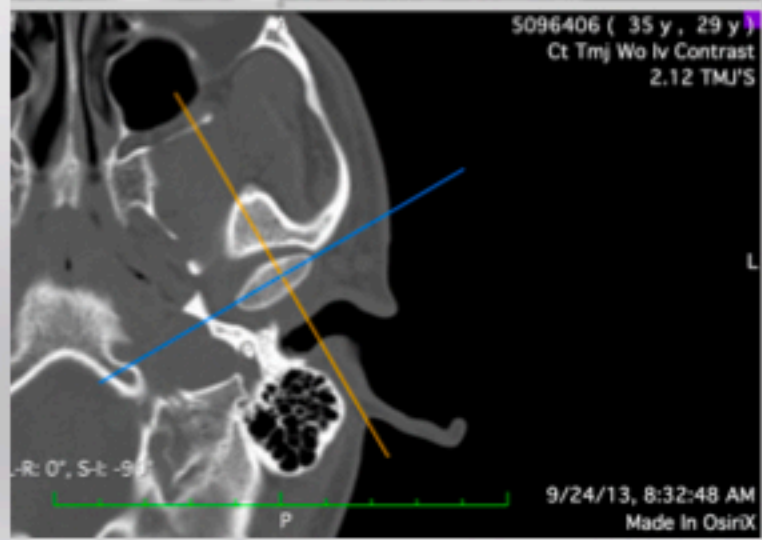
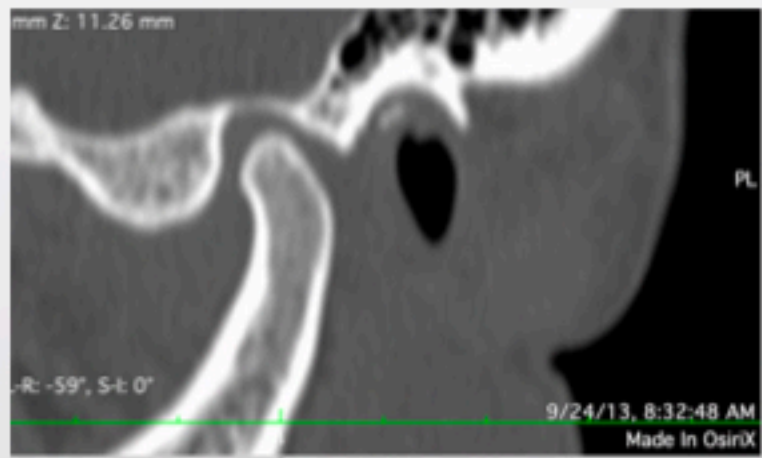
Right TMJ Health:

- | | | |
|----------------------------------|-----------------------------------|--|
| <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



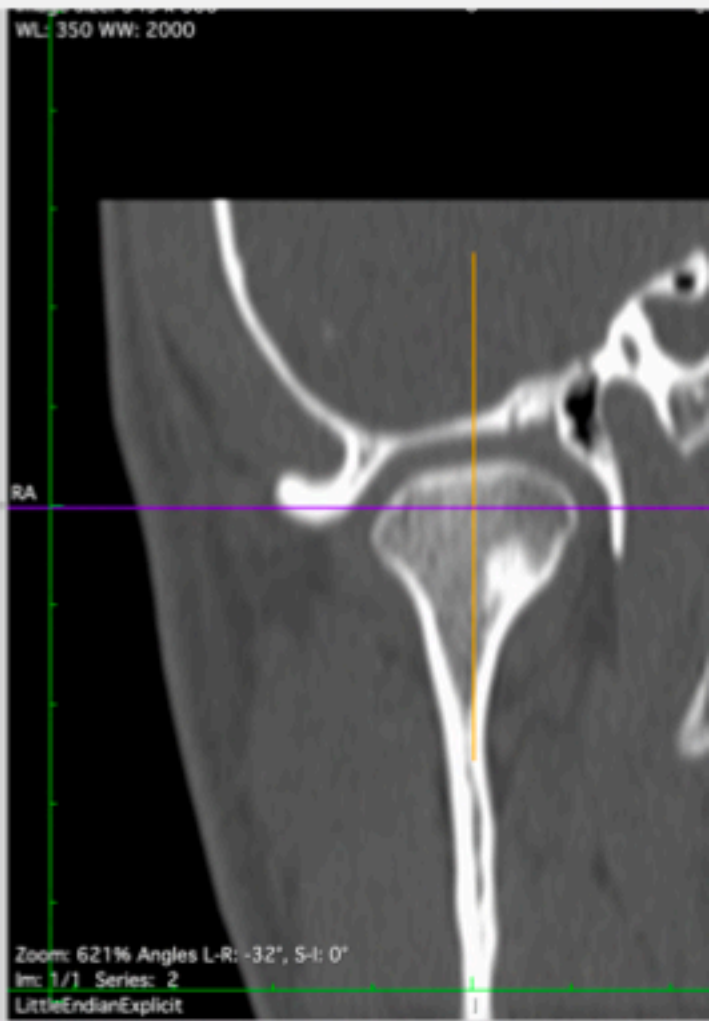
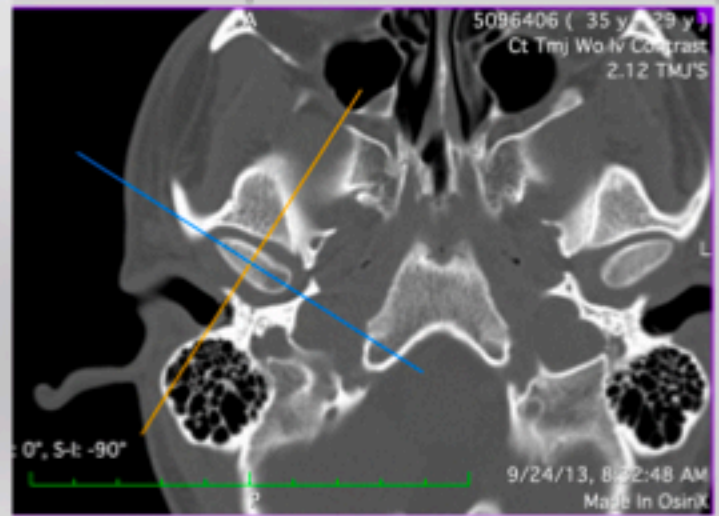
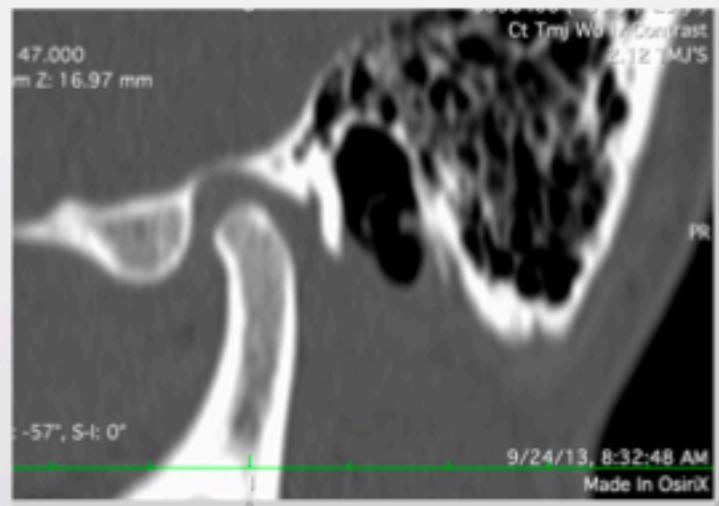
CT Right Piper 4a-e from MRI

- 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

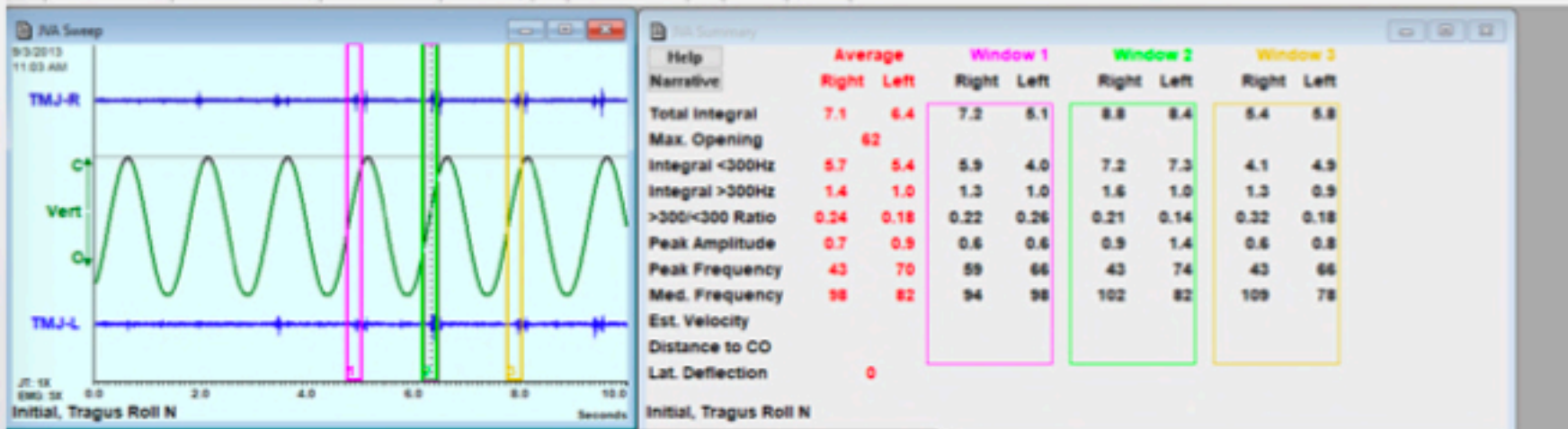
Superior Lateral

Note: Large joint space



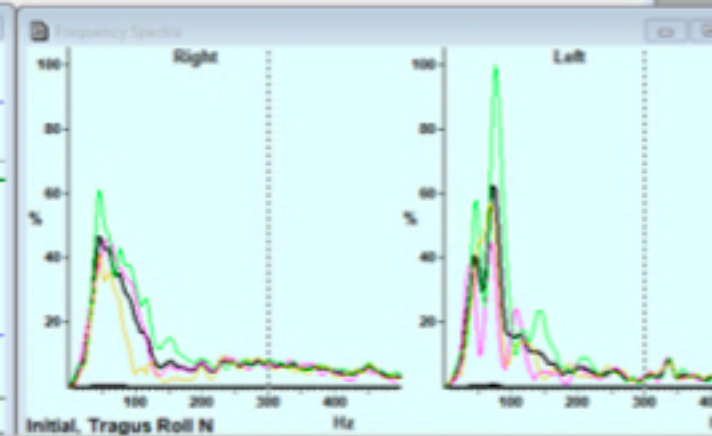
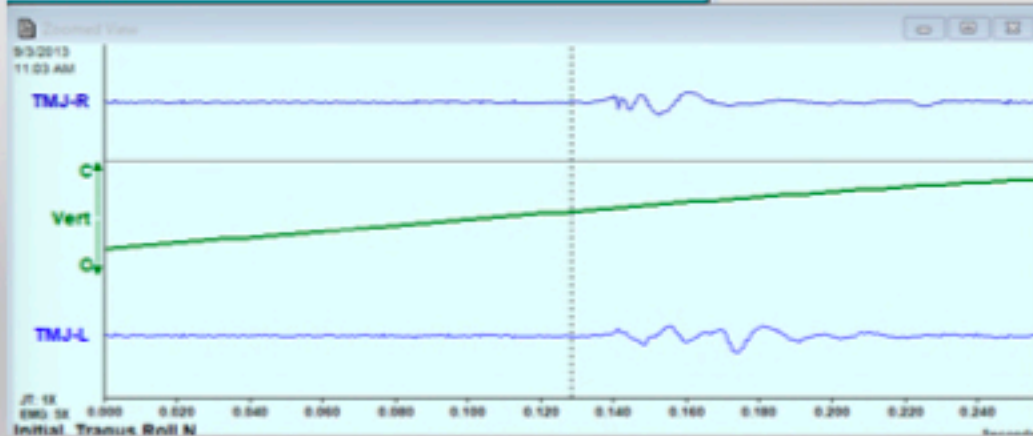
Slight Wobble
before tooth
contact

Joint
subluxation
on movement



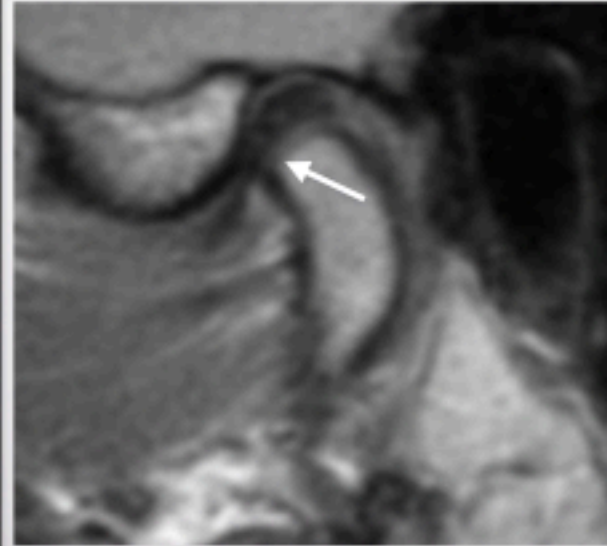
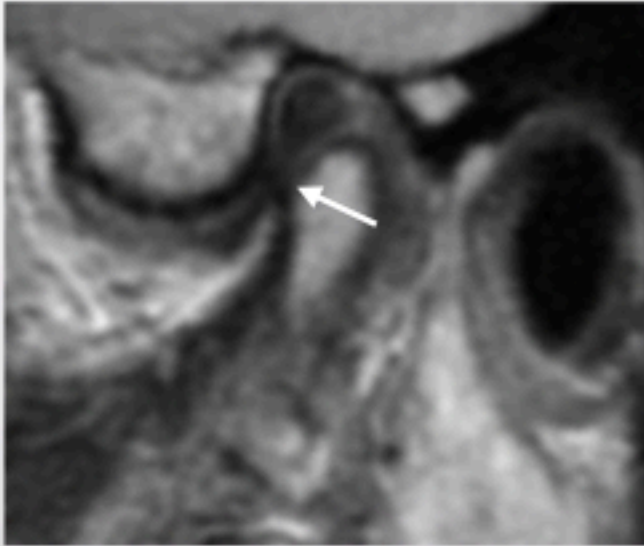
Clinical
Relevance?

Early damage
from
parafunction



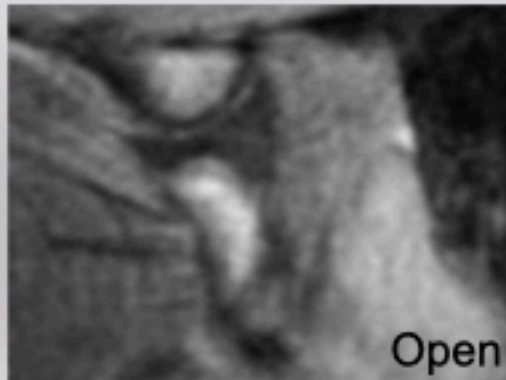
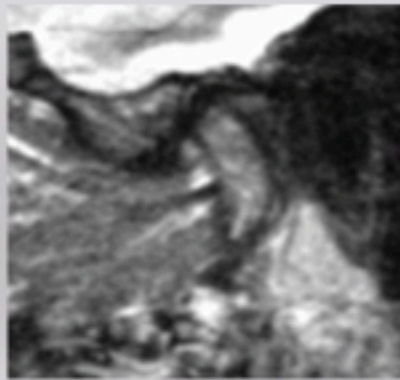
MRI
R4a-e, L2

Right
PD Closed

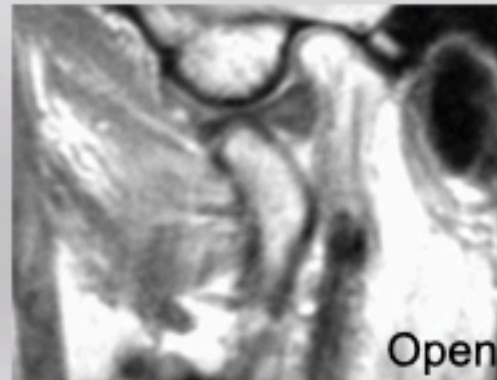


Left
PD Closed

Stir



Stir



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

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

A joint that does not move is also quiet.

Stethoscope

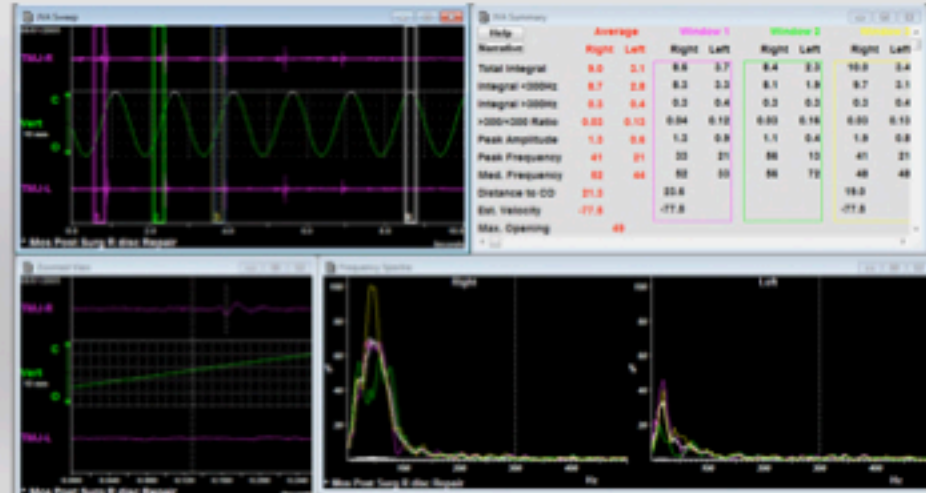
Doppler - Landmark Healthcare 800-334-5618
 Huntleigh Mini Dopplex 5hz
 Great Lakes Orthodontics 800-828-7626

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

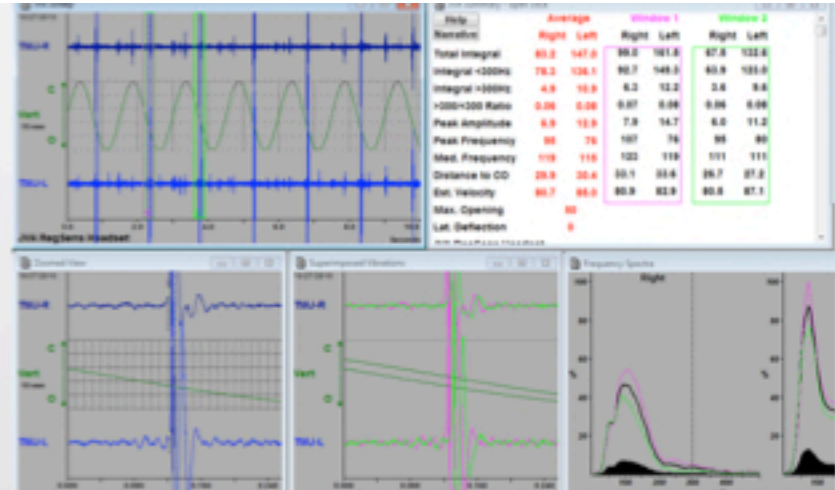
crackle
crunchy
squeaky
scratch

negative joint movement
minimal joint movement

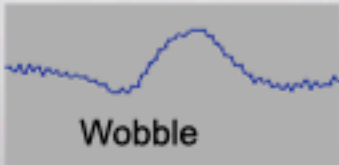
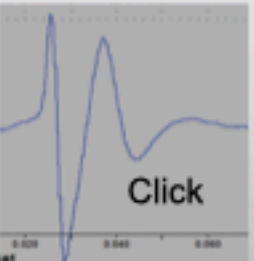
Click
soft
crisp
squishy
early
late
100%
75%
50%
25%
sporadic
??

Joint Vibration Analysis

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



Three main types of sounds



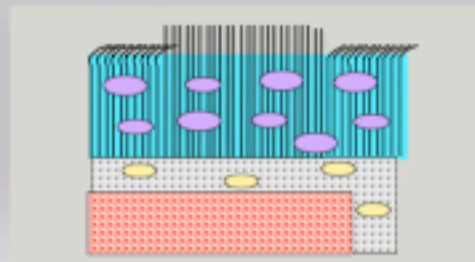
Disc Reduction
Disc Dislocation
Adhesion crackle
tooth tap

Osteoarthritis
Pseudo Disc
Damaged Cartilage

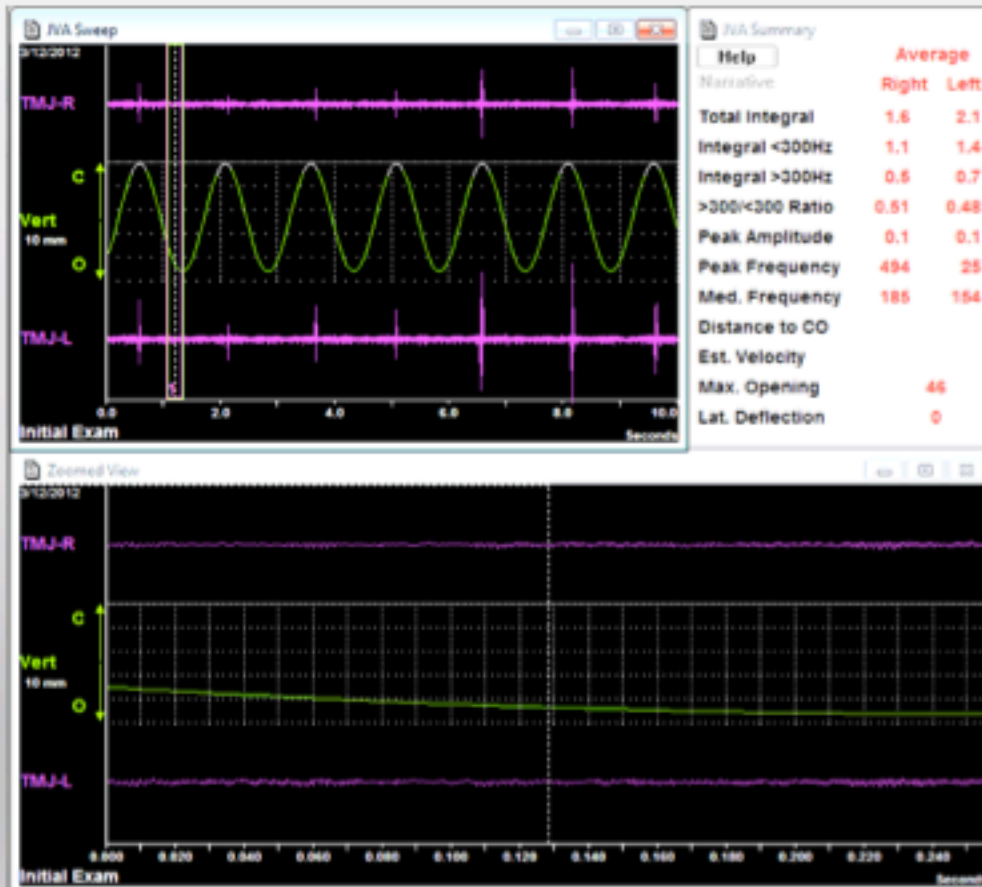
Disc Subluxation
Joint Subluxation
Disc Reduction
Disc Dislocation

Based on Sonar.
It is not a microphone

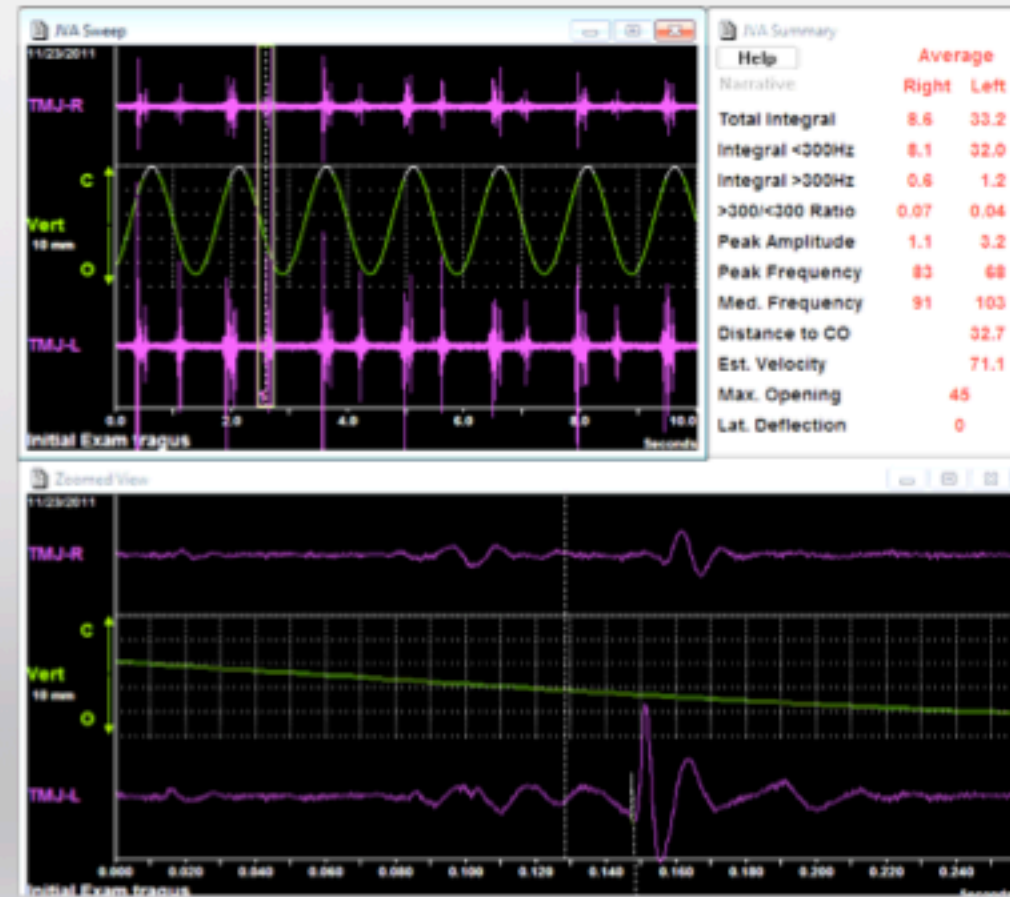
JVA measures the health of the cartilage



Healthy or Damaged?



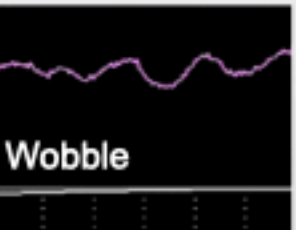
Healthy or Damaged?



Why is Joint making this vibration?



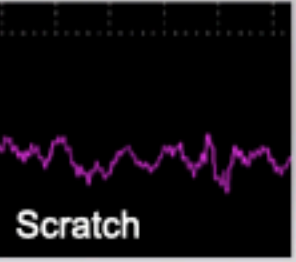
Good Vibrations
Healthy Cartilage
No Movement



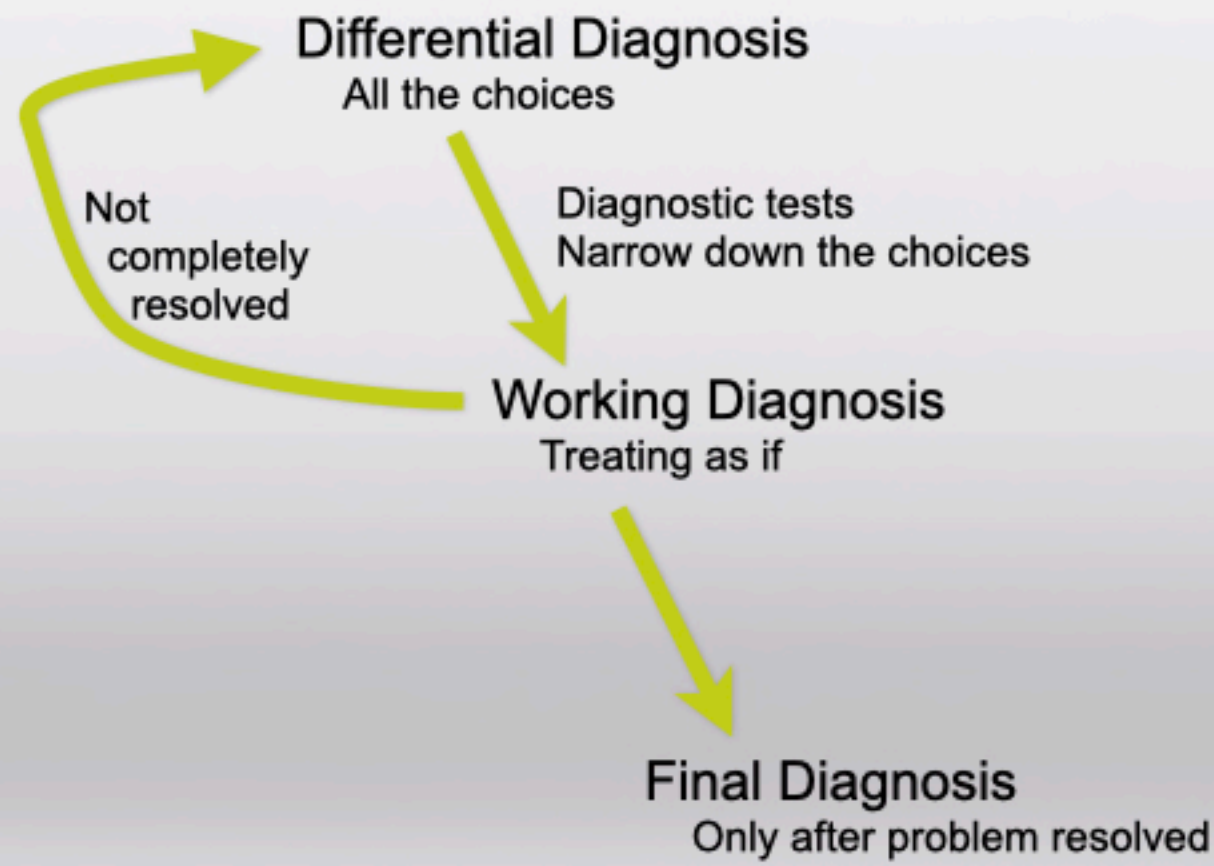
Wobble
Disc Dislocation
Disc Reduction
Disc subluxation
Joint subluxation
Condyle bumps Disc
Sensor roll on face



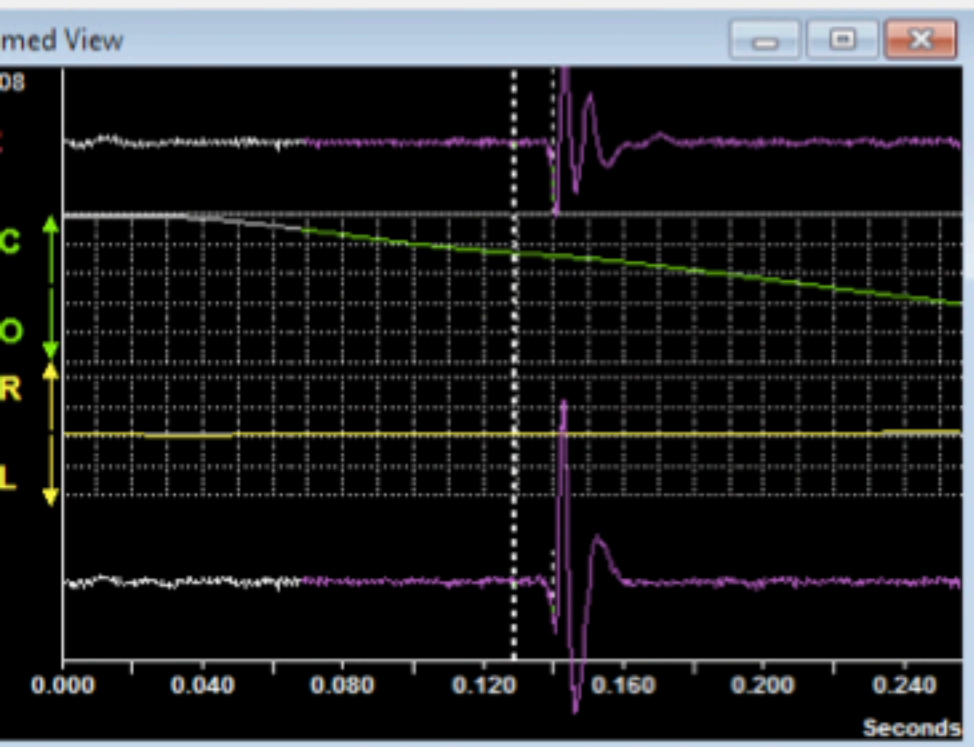
Click
Disc Reduction
Disc Dislocation
Adhesion Crackle
Tooth Tap
Contralateral Transference



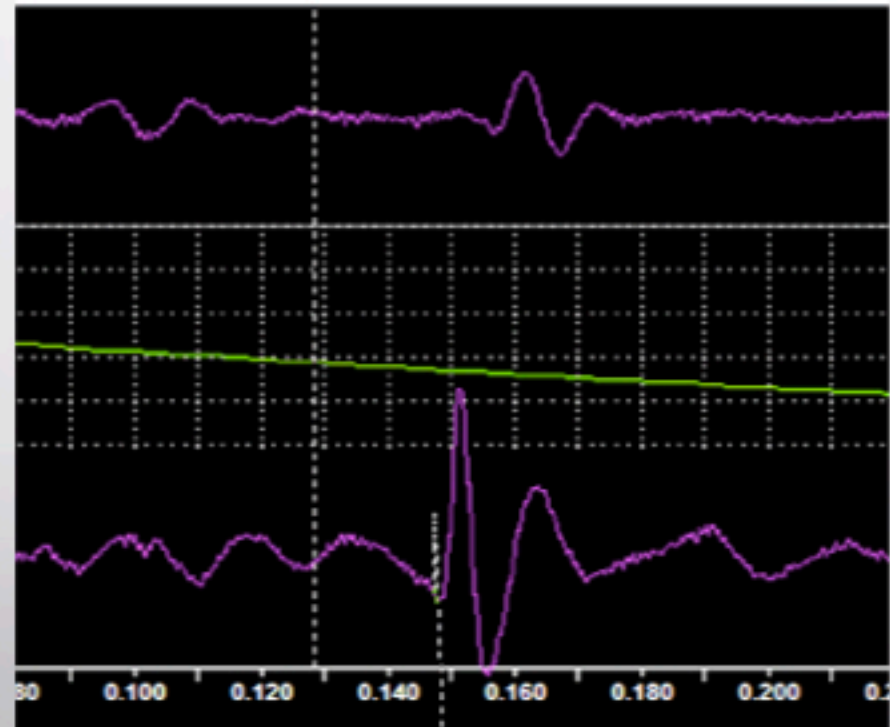
Scratch
Cartilage Fibrillation
Cartilage against tissue
Bone against bone
Velcro Noise



Simple or Complex



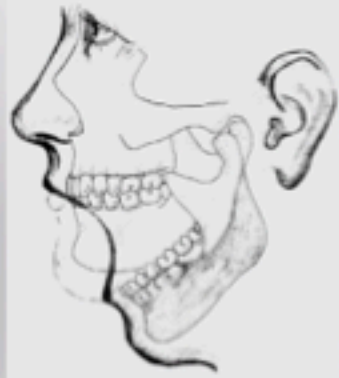
Simple left click with transference vibration to right
L4a



Complex Click
L3a, R4b

Magnetic Resonance Imaging

MRI gives you the start and finish
You have to infer what happened in between



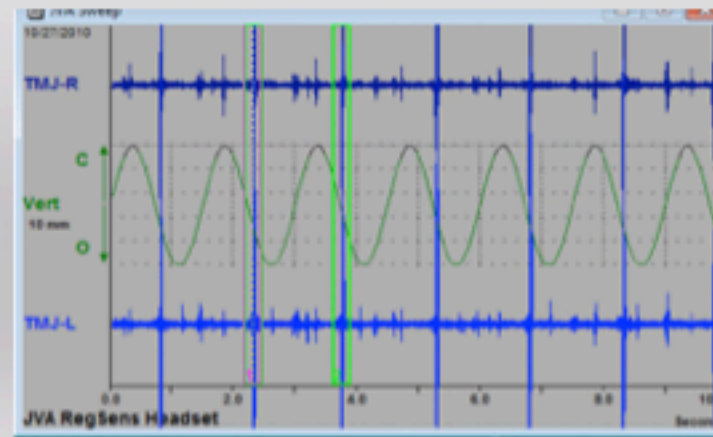
Joint Vibration Analysis

JVA gives you what happens in between
open and closed. It records "motion".
You then infer the start and finish



JVA records Objectively the vibrations of
the TMJ as you open and close.
Ability to compare from year to year.

JVA allows you to view
the joint in function





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

TMD 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: Postural Restoration Therapy
Refer to Physical Therapy: Various Muscle Therapies
Refer to Physical Therapy: Rocabado mobilization

Refer to Chiropractic: Atlas Orthogonist
 Refer to Osteopathic MD: Body alignment
 Breathe, Walk , Exercise

Postural
Restoration
Therapy



Dr Mariano Rocabado

If no access to professionals.
 Do it yourself PT.
 Strengthen weak opposing muscles



TMD Therapies

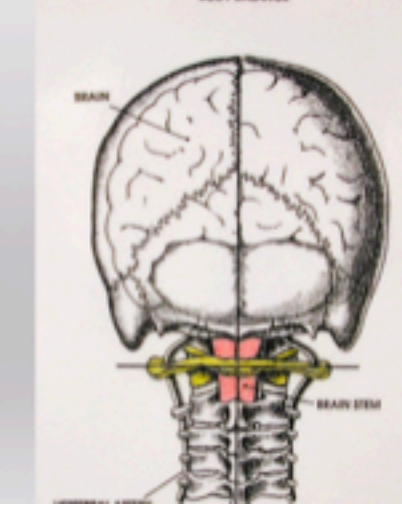
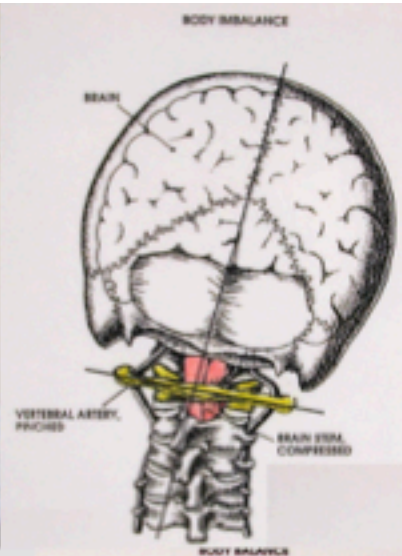
Physical

- 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 DO: Body alignment

Breathe, Walk , Exercise

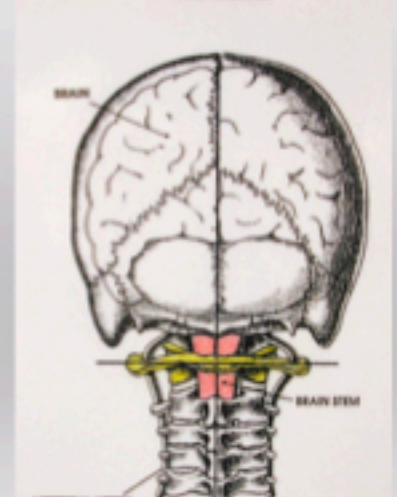
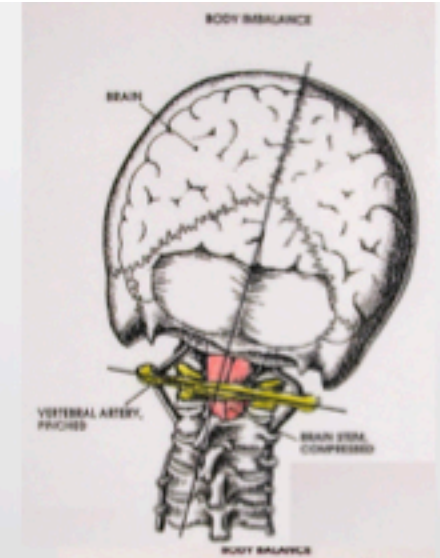
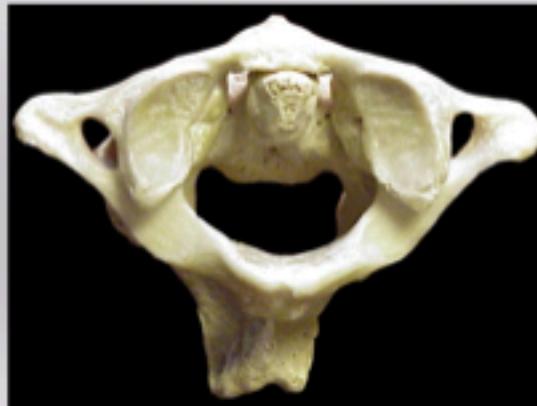
Atlas Alignment



Atlas Orthogonist
Branch of Chiropractic Medicine



Uses sound wave to move atlas,
disrupts muscle bracing



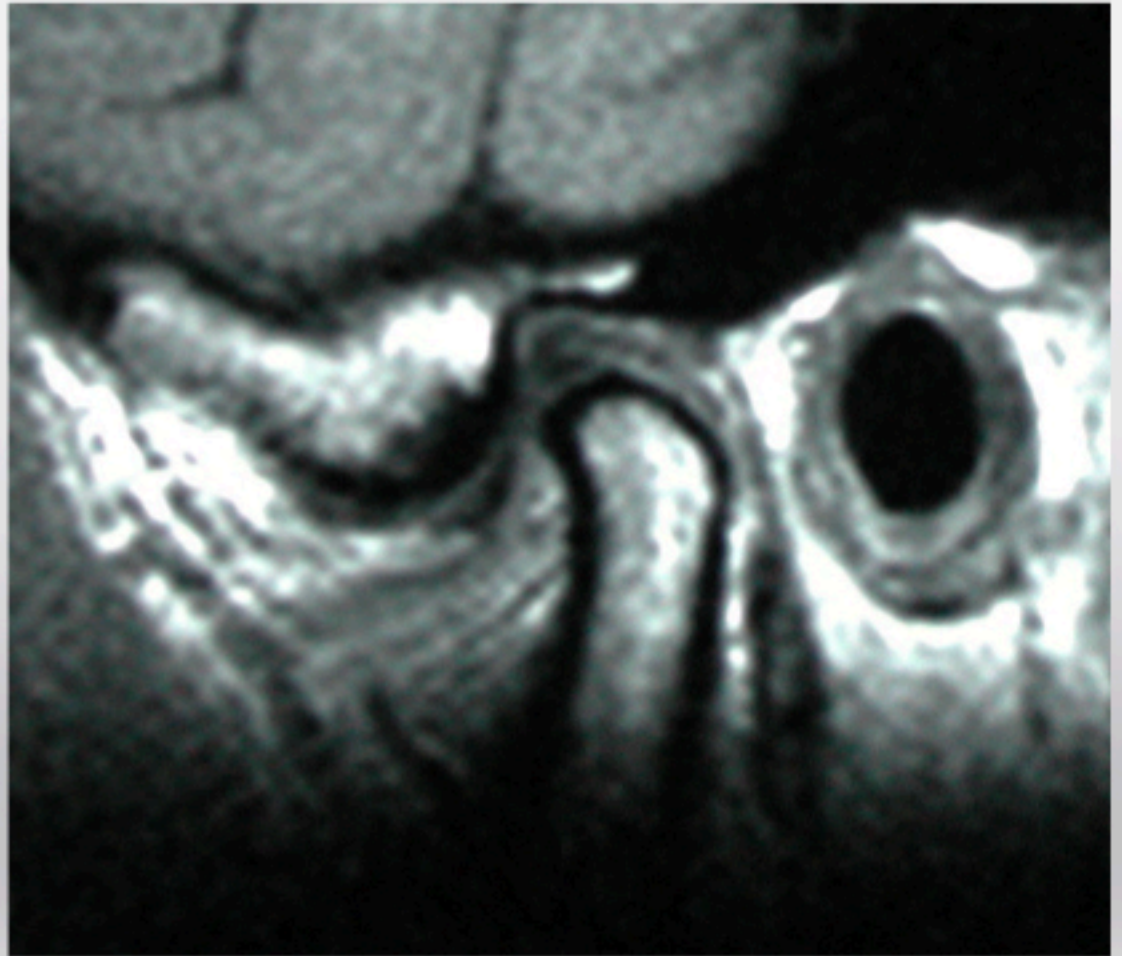
Facial Pain Diagnosis

Diagnostic Tools

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- 2 Observation
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 - Muscle Palpation
 - Joint Palpation
 - Joint Auscultation
 - Joint Motion
- 4 Anterior Stop Test
- 5 Sleep Airway Screening
- 6 CT Scan

MRI

Blood Tests

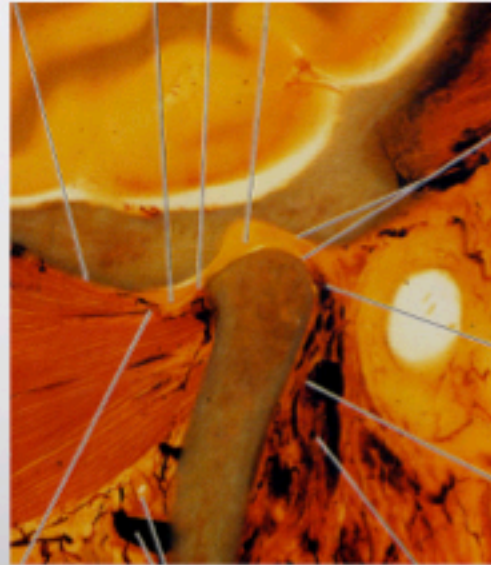
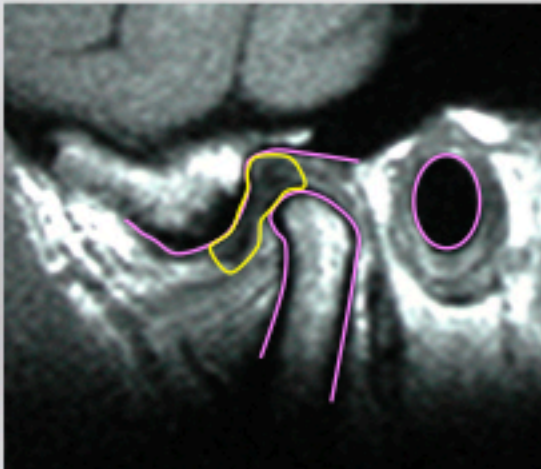


Short

T1 Inverted

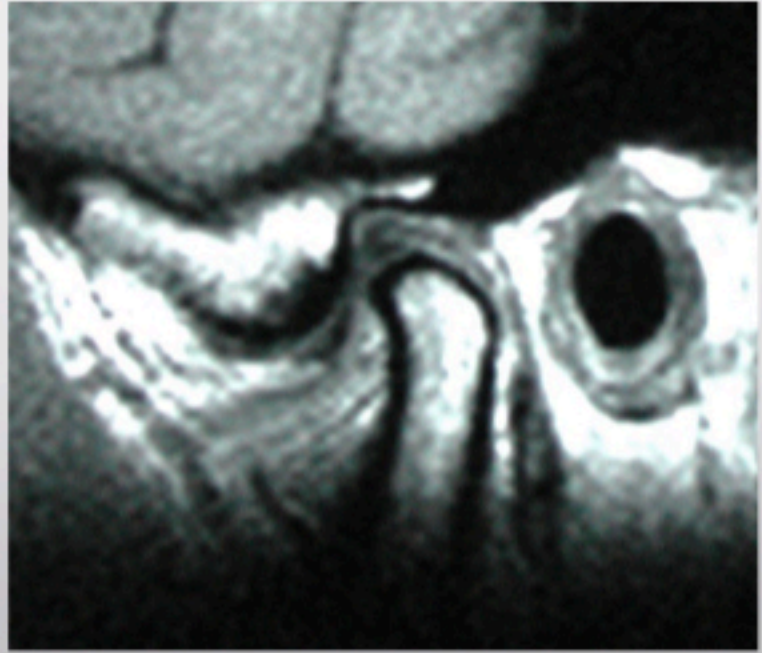


T1 Sagittal Closed



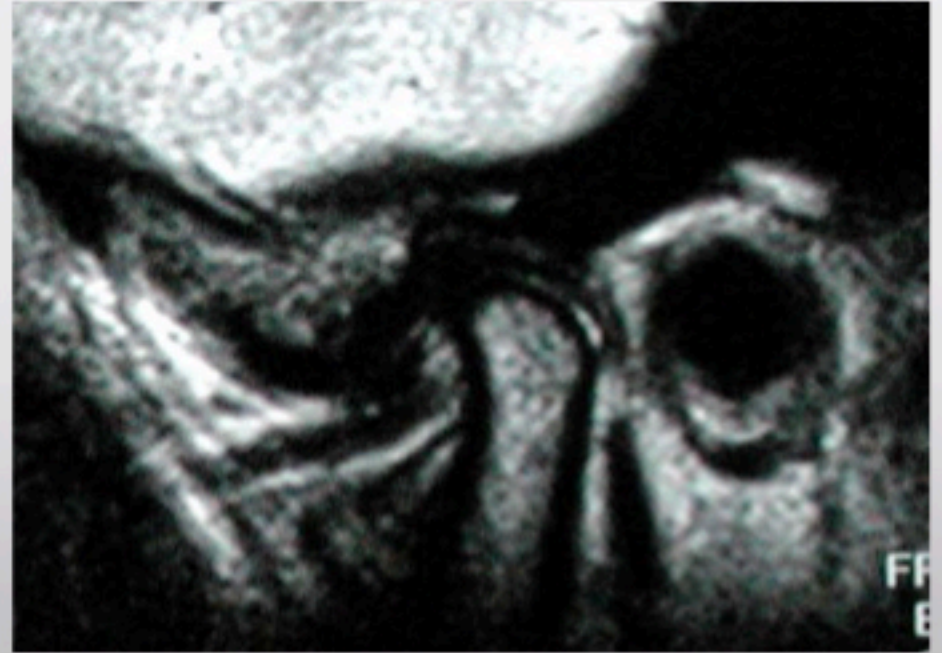
Normal MRI T1 and T2

T1 Sagittal Closed



T1 shows more fat

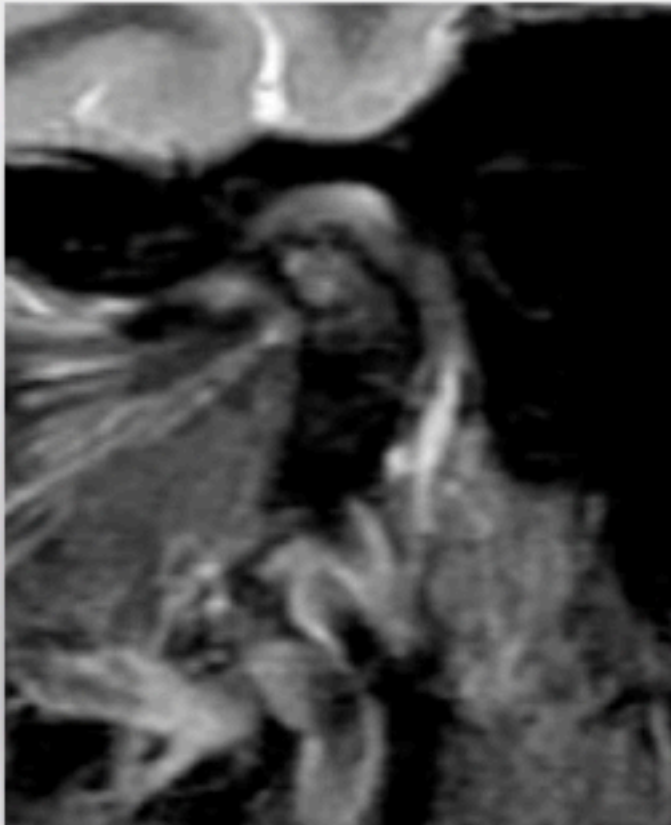
T2 Sagittal Closed



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



Know Yourself

Know Your Work

Know Your Patient

Apply Your Knowledge

LD Pankey Institute

Write your Dream

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