Big Sky Tanner
Feb 2022

John R Droter DDS
Annapolis, Maryland

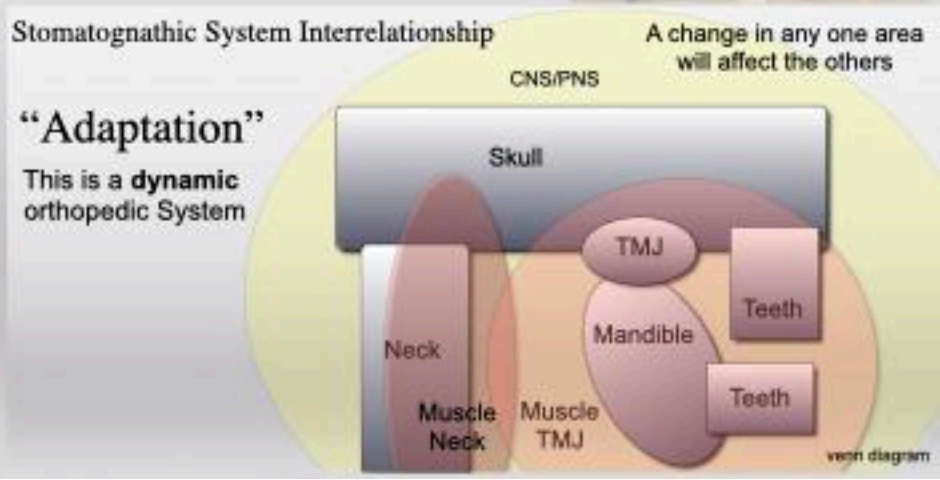
John Droter DDS
Herb Blumenthal DDS
Matt Stensrud PT

TMD 1 Hands on: John, Herb, and Matt

March 24, 25, 26, 2022
Annapolis, Maryland

2nd date:
June 9, 10, 11 2022
Bozeman, Montanna

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

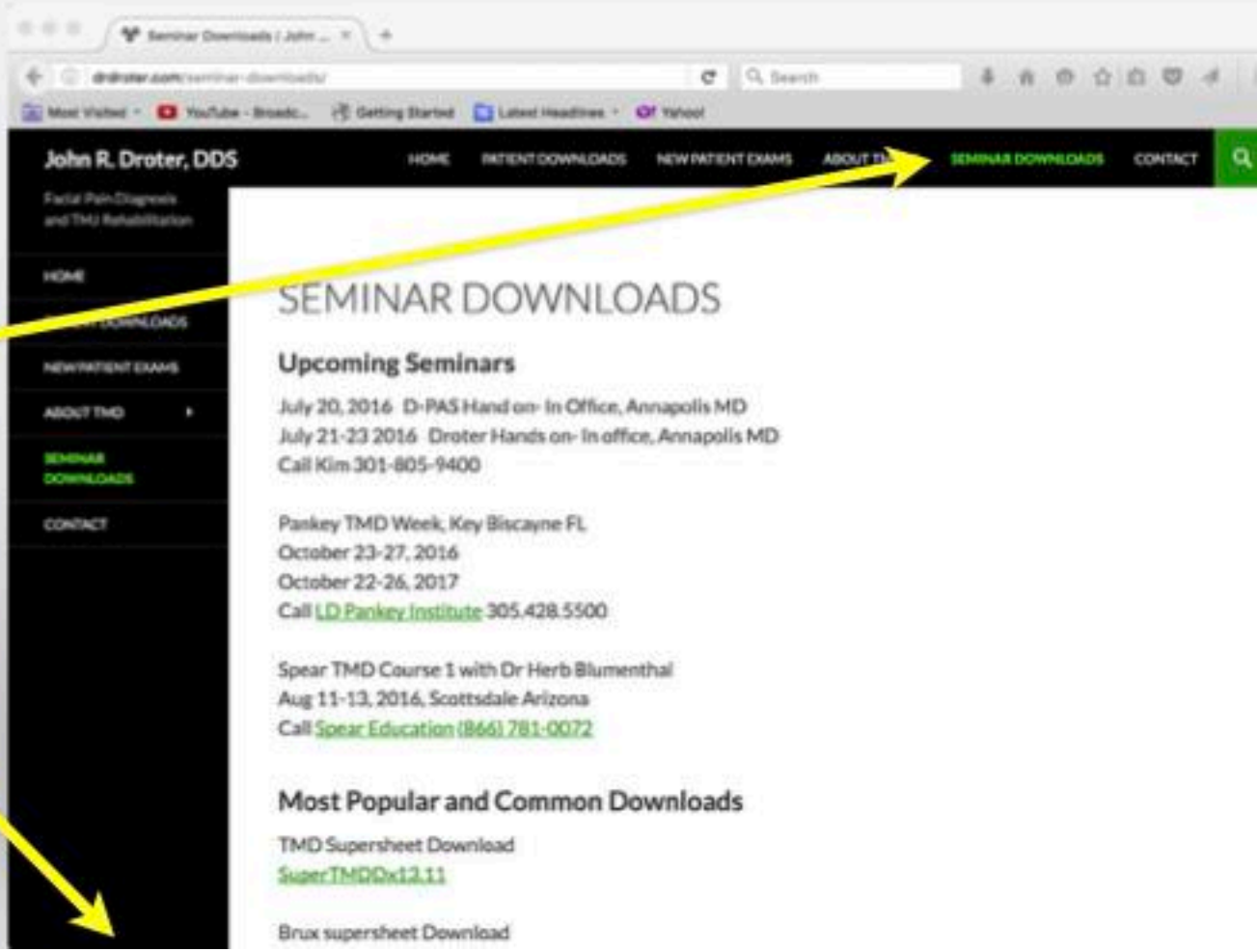


John R Droter, DDS

To get todays lecture slides:
go to www.jrdroter.com

Seminar Download

Big Sky Tanner



Hello. I am:

John R Droter DDS
Annapolis, Maryland

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
(3,100 images and rising)

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

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

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
Lower soft sectional orthotic
Condylar distraction
Sectional orthodontics
Expansion orthopedics/ orthodontics
Restorative Dentistry
Occlusal Adjustment with DTR, TekScan

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
Diagnostic Palatal Anterior Stop
Brux Checker
Lower full coverage CR
BiArch Posterior Deprogrammer
Upper full coverage hard CR guard
Temporary home use anterior stop
Myobrace
Aqualizer
Lower Soft Sectional
Lower posterior deprogrammer
Lower TMJ Rehab flat plane
Lower postured indexed
Lower CR Indexed
Mandibular Advancement Device
Lateral Bruxing Device

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

Different Diagnoses have Different Therapies

Specific Diagnosis

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

1. TMJ Damage
2. Muscles of the TMJ
3. Cranial Alignment/Occlusion
4. Cervical Damage
5. Parafunction
6. Whole Body / Systemic
7. Other

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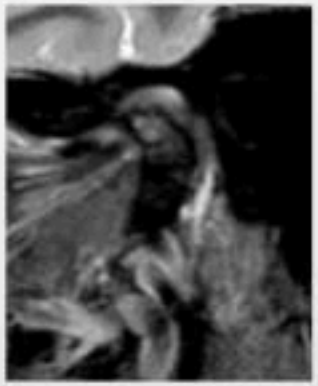
Facial Pain Diagnosis

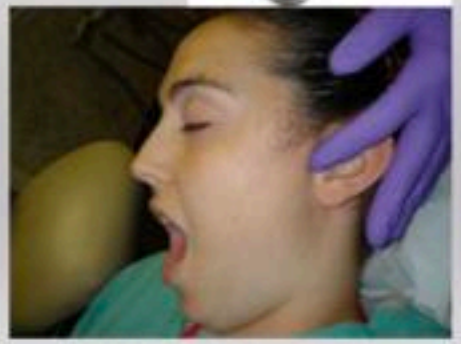
Diagnostic Tools

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

<u>Biometrics</u>
- Joint Vibration
- Jaw Tracker
- Electromyography
- T-Scan

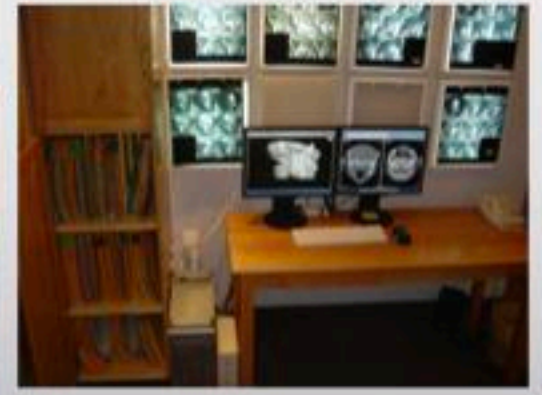
- Occlusion: CR Mounted Study Models
- Complete Dental Exam
- Clinical Photographs
- Dx Blocks
- Dx Orthotics- Brux Checker, CR Orthotic





Dr Guy Haddix
had been taking CT
scans since 1990

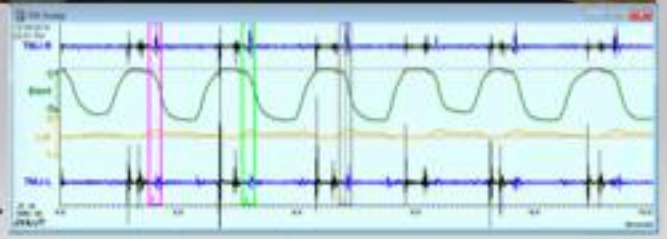
CT and MRI Scans in
my practice since 1992.



Closet full of printed
scans just as digital
appeared!!

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

JVA since 2004

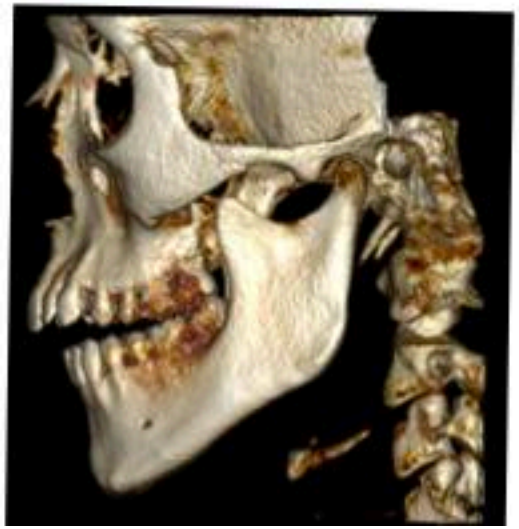


Lingual Light Wire- Crozat Arch Expansion

Age 29 Start

7 months LLW Age 30

Anterior Openbite Non Surgical Treatment: Moving the Maxilla



Anterior Openbite with Active TMJ Bone Loss

Non Surgical Therapies

Condylar Distraction

Meloxicam and Doxycycline

Restorative Dentistry

Pathological Occlusion

??Airway Related Bruxing?

Restore Function

Composite Trial Occlusion

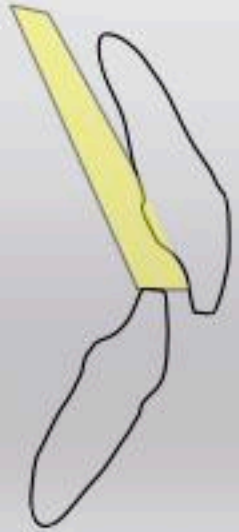
AHI + 26 CPAP

Anterior guidance

or group function?

The D-PAS
Diagnostic Palatal Anterior Stop

Inhibits Sleep Clenching



APS

ArrowPath Sleep

www.APSleep.com
info@apsleep.com

APS In Office Anterior Stop 2.5mm

APS Airway Bite 4mm

APS Home Trial Anterior Stop

APS D-PAS

APS Lat-Brux

Disclosures:

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

Atomic Skis- Sponsored.
I got stuff.

LD Pankey Institute- I am paid
a small honorarium for lectures

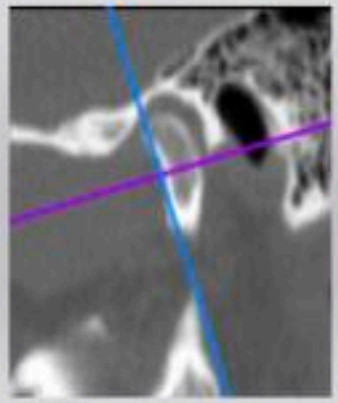
Spear Education- Paid
honorarium for lectures

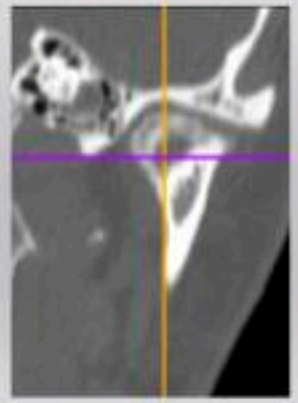
Patent on sleep device: LatBrux
Co-Owner of ArrowPath Sleep

APS
ArrowPath Sleep

All of my slides have been altered with
respect to cropping and exposure.
None have been "photoshopped" to misrepresent reality

I have chosen the most representative slice of and MRI and CT
scans to best represent what you would see if viewing all images





TMD Therapies

John R Droter DDS
Annapolis, Maryland

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
Osteoarthrosis- Inactive
Osteochondritis Dissecans TMJ
Osteolysis Mandibular Condyle, Active
Perforation Meniscus, TMJ
Perforation Pseudodisc, TMJ
Psoriatic Arthritis TMJ
Rheumatoid Arthritis Sero Negative TMJ

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 MaxIC 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
Hypersensitive 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
Neuroma Trigeminal Nerve
Obsessive-Compulsive Personality Disorder
Other
Otitis Ear Infection
Pain disorder exclusively related to psychological factors. Somatoform pain disorder
Pain disorder with related psychological factors
Peripheral Sensitization

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Planas Tracks
Lower soft sectional orthotic
Sectional orthodontics
Expansion orthopedics/ orthodontics
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Occlusal Adaptation

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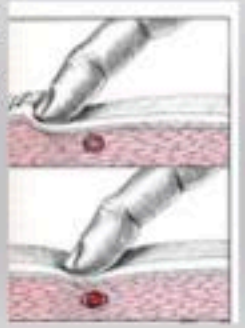
Wet Towel in Microwave
3 Min Hot
3 Min Hot

3 Min Cold

Ice Pack
15 min 3-5x a day

ThermoSafe
U-Tek Cold Pack
-23° C

Triggerpoint
in muscle



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Cold laser for sore joints, inflammation, muscle triggerpoints

3x week for 3 weeks

BioResearch MLS Laser 808, 905 pulsed Diode

Handheld TENS
Acupuncture Pen

Past Dry Needling and ischemic Pressure

BioResearch QuadraTENS

MLS Laser: BioResearch

808 nm Continuous, 905 nm Pulsed

Multiwave Locked System Laser

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

Osteoarthr**osis**

Minimize parafunction:
- If sleep grinding due to airway:
- CPAP or Dental Airway Device

Glucosamine 1500mg /Chondroitin 600 mg

Shea Brand CBD

Osteoarthr**itis**

All of the above plus eliminate inflammation……
- NSAIDs
- Cold Laser

If still inflamed arthrocentesis with Platelet Rich Plasma (PRP)

MLS Laser
3x week for 3 weeks

TMD Therapies

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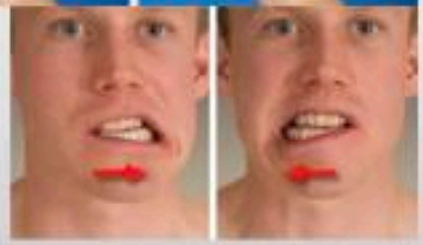
20 reps, 5x a day, non painful
Open close, side to side, front to back



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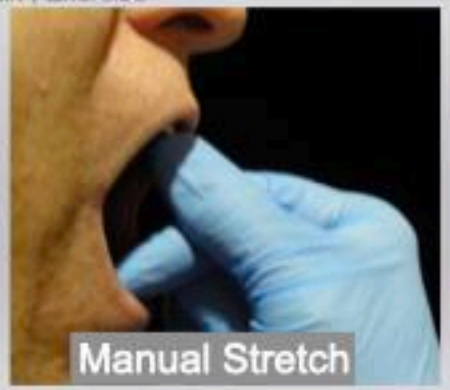
Danger,
Danger,
Danger.



Must have MRI for all active stretches.
You will be irreversibly tearing/stretching ligaments.

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

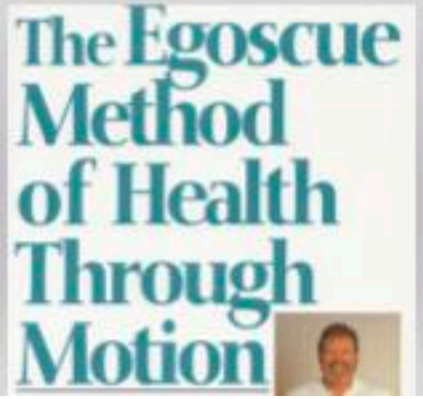
Postural Restoration Therapy

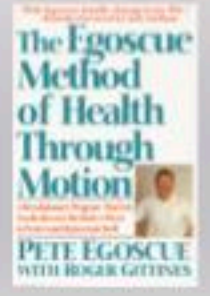
Dr Mariano Rocabado

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

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





TMD Therapies

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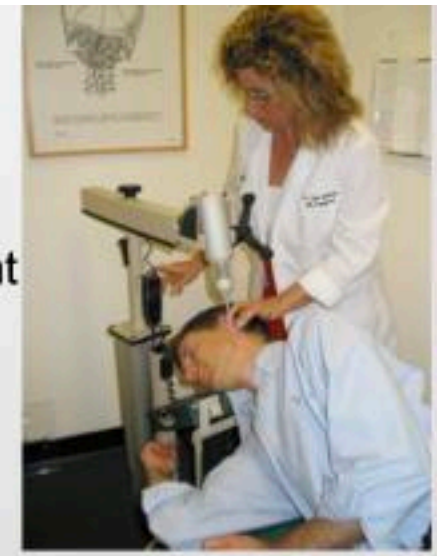
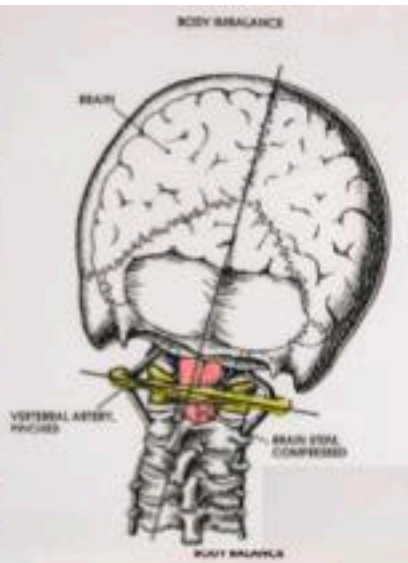
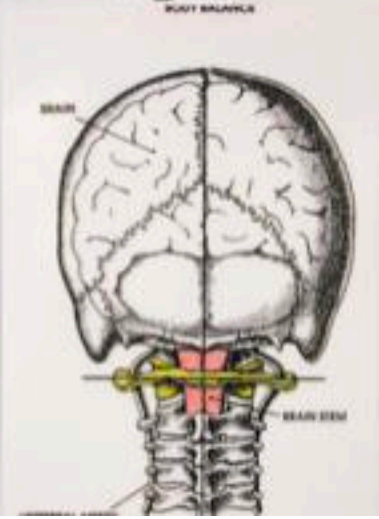
Refer to Chiropractic: Atlas Orthogonist
Refer to Osteopathic DO: Body alignment

Breathe, Walk , Exercise

Atlas
Alignment

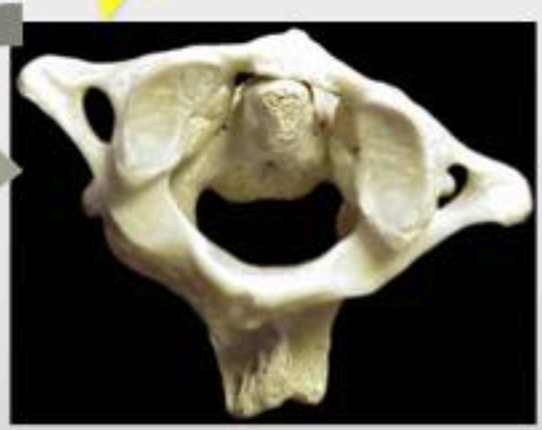


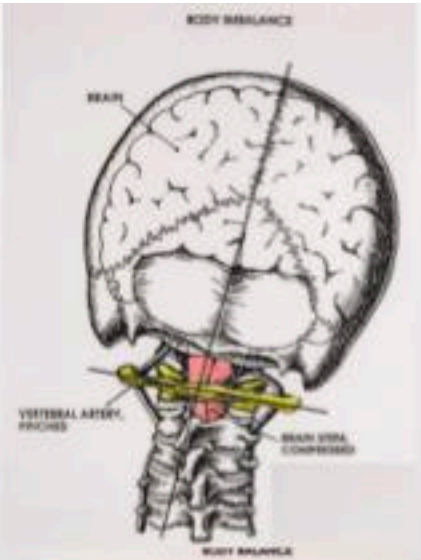


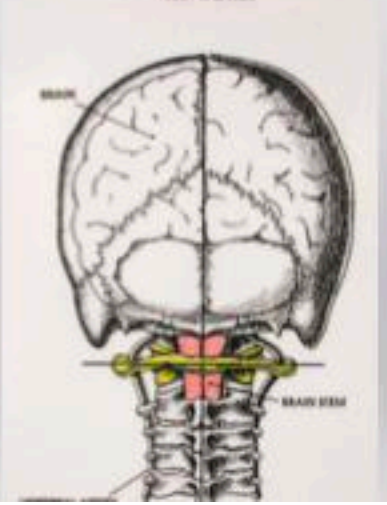


Atlas Orthogonist
Branch of Chiropractic Medcine

Uses sound wave to move atlas,
disrupts muscle bracing







TMD Therapies

Physical

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Refer to Osteopathic MD: Body alignment

Breathe, Walk , Exercise

Postural Restoration PT addresses these

TMD Therapies

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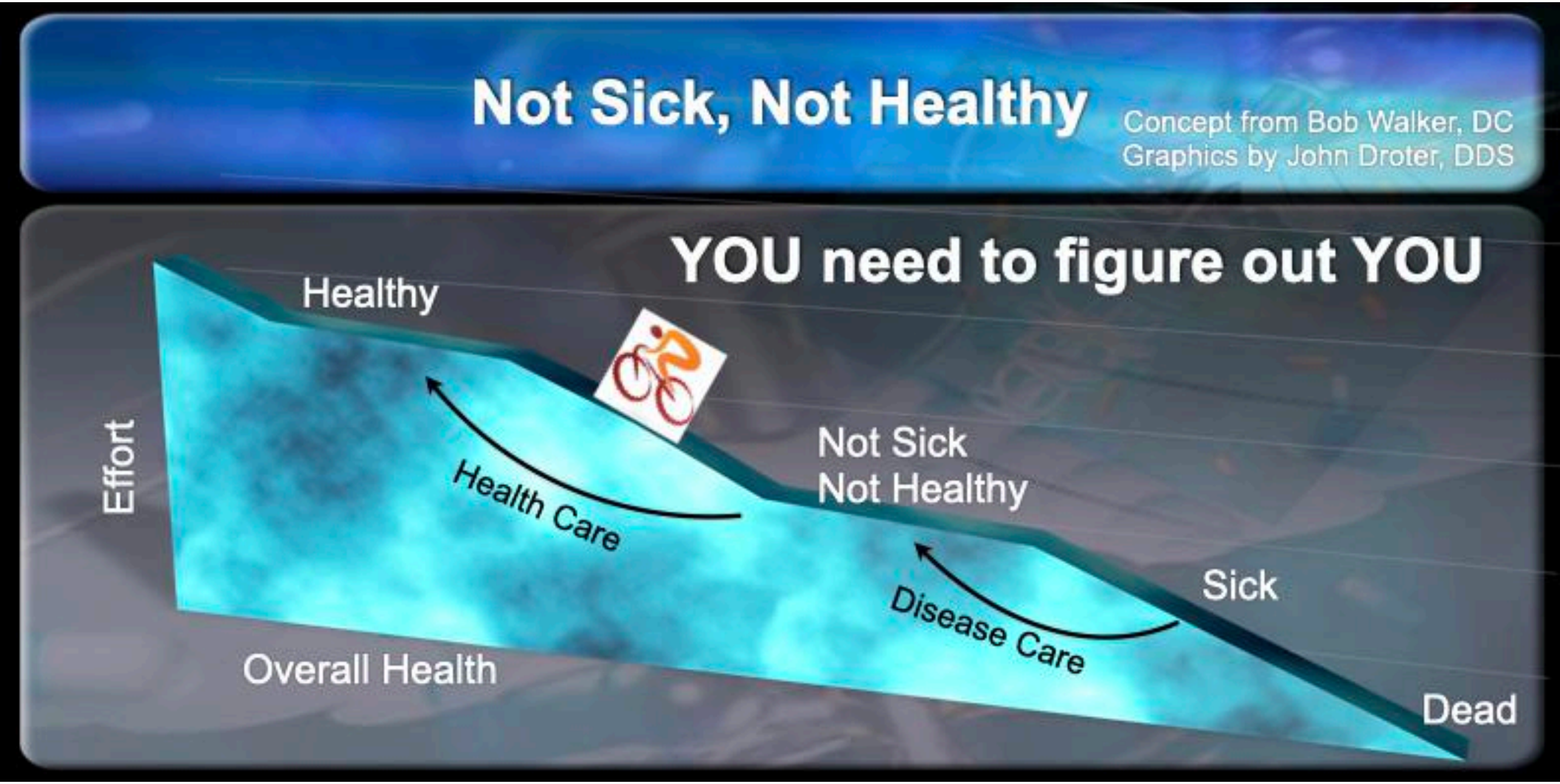
Breathe, Walk , Exercise

Diaphragmatic Breathing
Walk
Exercise


Not Sick, Not Healthy
Concept from Bob Walker, DC
Graphics by John Droter, DDS
YOU need to figure out YOU
Healthy
Effort
Health Care
Not Sick
Not Healthy
Sick
Disease Care
Overall Health
Dead

Which famous doctor published this?

A desire to take medicine separates man from animals. Why this appetite should have developed, how it could have grown to its present dimension, what it will ultimately reach, are interesting problems in psychology. We of the profession…..routinely administer nauseous mixtures on every possible occasion.

…..when we are able to say without fear of dismissal, that a little more exercise, a little less food, and a little less tobacco and alcohol may possible meet the indications of the case.

Sir William Osler, 1891

A desire to take medicine separates man from animals. Why this appetite should have developed, how it could have grown to its present dimension, what it will ultimately reach, are interesting problems in psychology. We of the profession…..routinely administer nauseous mixtures on every possible occasion.

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"Recent Advances in Medicine," Science, March **1891**

Founding father of Johns Hopkins Medical School
Father of modern medicine
"Greatest diagnostician ever to wield a stethoscope"

from book: William Osler, A life in Medicine. Michael Bliss

TMD Therapies: (70 therapies)

Physical

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

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
Myobrace
Aqualizer
Diagnostic Palatal Anterior Stop
Lower full coverage CR
Lower posterior deprogrammer
Lower TMJ Rehab flat plane
Lower Indexed
Brux Checker
Upper full coverage hard CR guard
BiArch Posterior Deprogrammer
Mandibular Advancement Device
Lateral Bruxing Device

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

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
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TMD Therapies

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Food

Meloxicam 15mg qd
Doxycycline 20mg bid
Need Blood work CMP

No Sulfur Allergy

No women pre-menopause

TMD Therapies

Medicinal

Anti Inflammatory:
NSAIDs,
Doxycycline low dose

CBD Topical

Glucosamine/Chondroitin MSM

Vitamins: Vit C, Vit D, Vit B12
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Food

Shea Brand CBD

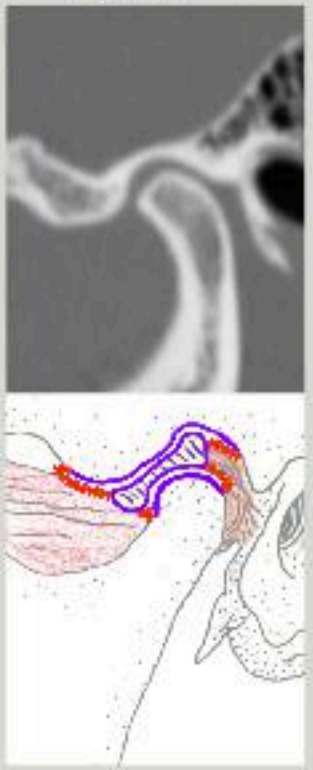
No Shellfish allergy

Vegan

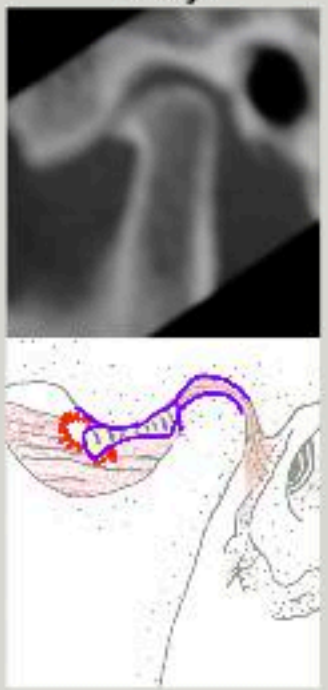
Osteoarthrosis/Osteoarthritis

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.

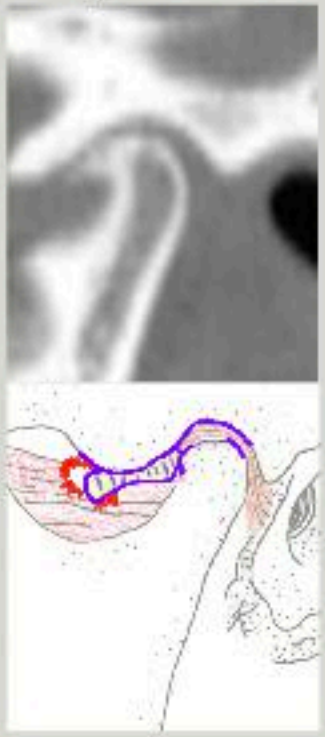
Normal



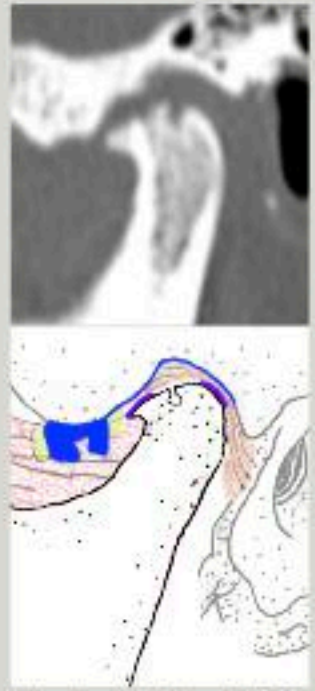
Early



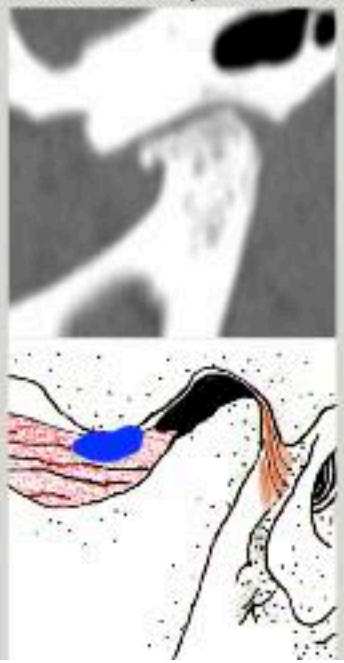
Early/ Moderate



Moderate



Severe OA, Eburnation



Representative examples of OA
in different patients

Drawings by Gretta Tomb DDS and John Droter DDS

Treatment OA

Osteoarthr**osis**

Minimize parafunction:
- If sleep grinding due to airway:
- CPAP or Dental Airway Device

Glucosamine 1500mg /Chondroitin 600 mg

Shea Brand CBD

Osteoarthr**itis**

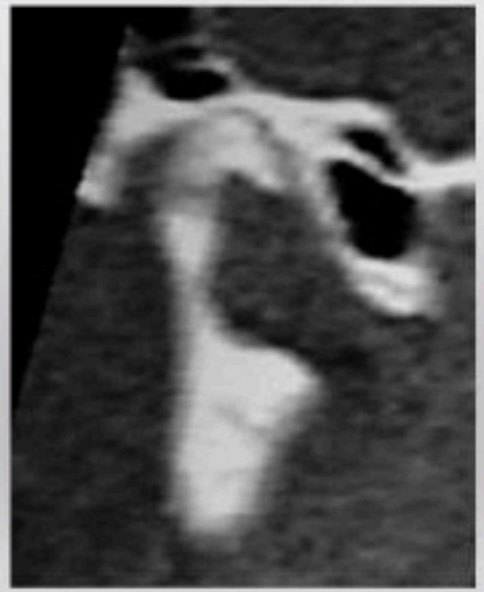
All of the above plus eliminate inflammation……
- NSAIDs
- Cold Laser

If still inflamed arthrocentesis with Platelet Rich Plasma (PRP)

MLS Laser
3x week for 3 weeks

Adaptation Chronic Bilateral Osteoarthrosis

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



OA Right and Left Bone Loss
#8 Ankylosed

TMD Therapies

Medicinal

Anti Inflammatory:
- NSAIDs,
- Doxycycline low dose

CBD Topical
Glucosamine/Chondroitin MSM

Vitamins: Vit C, Vit D, Vit B12
Minerals: Magnesium, Electrolytes
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Refer to MD for Lyme therapies
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Refer Botox Masseter injections
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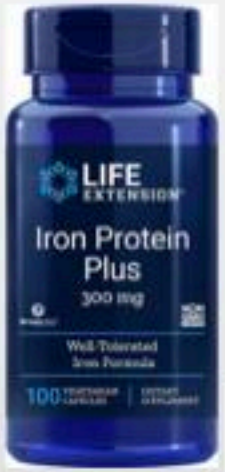
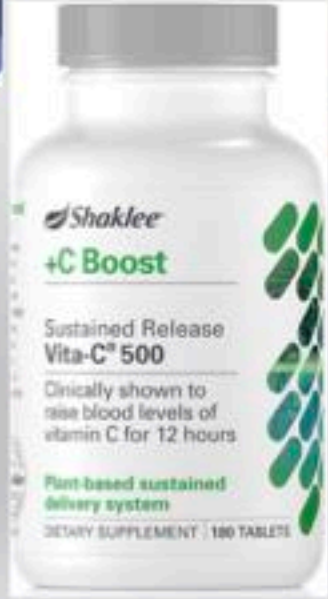
Food



Women add iron

Mother Earth Ionic Angstrom
Magnesium 2 oz bottle
0.5 teaspoon sublingual

Vit C 1,500 mg
before exercise



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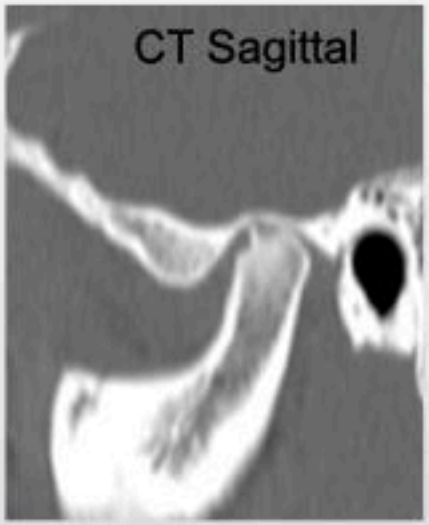
Food

MRI STIR
Disc Lysis
Joint infection



Spikey = Rheumatoid Arthritis

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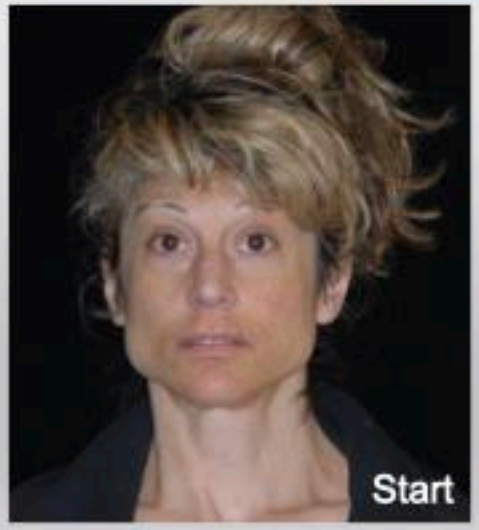
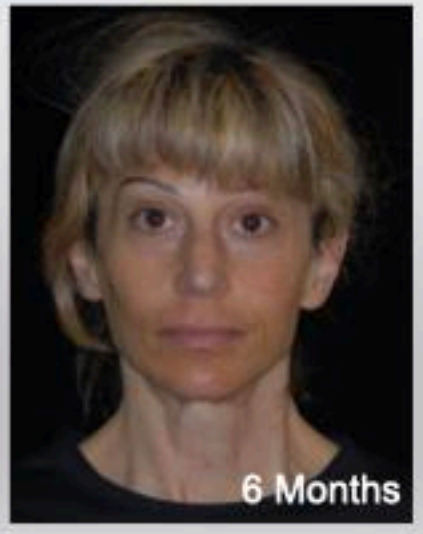
Botox for Hypertrophic Masseters from chronic clenching





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Food

Anti- Inflammatory Diet

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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
Myobrace
Aqualizer
Diagnostic Palatal Anterior Stop
Lower full coverage CR
Lower posterior deprogrammer
Lower TMJ Rehab flat plane
Lower Indexed
Brux Checker
Upper full coverage hard CR guard
BiArch Posterior Deprogrammer
Mandibular Advancement Device
Lateral Bruxing Device

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
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Refer: Total Joint Replacement
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Lateral Bruxing Device

Dental Orthotics

Diagnostic

ArrowPath Sleep Anterior Stop

D-PAS

Management

Posterior Stop Night Guard

D-PAS

Therapeutic

Indexed Orthotic

Centric Relation Orthotic

Protective

Upper Hard Centric Relation Night Guard

TMD Therapies

Dental Orthotics

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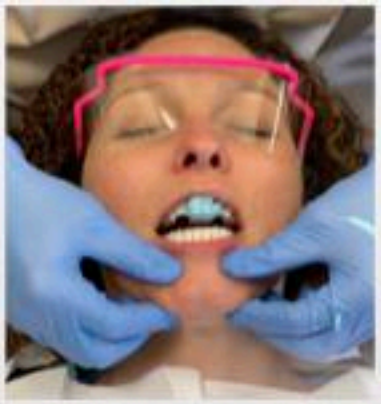
ArrowPath Sleep
Anterior Stop

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

<u>With anterior stop in place:</u>

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

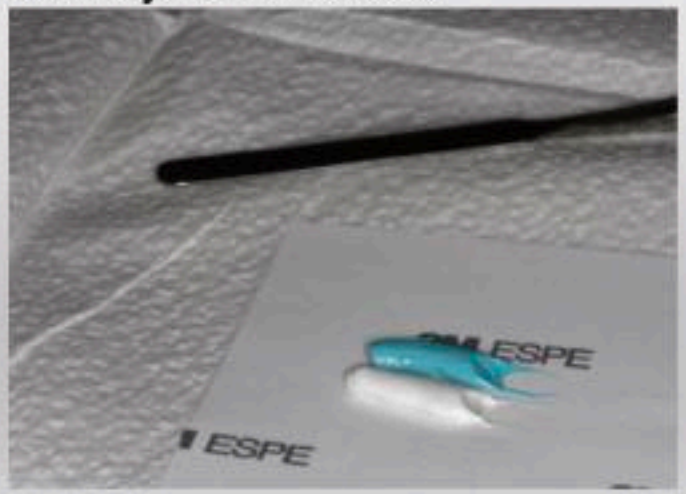
Occipital Lift with 3 deep breaths. Posterior neck opening muscle massage.

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



TMD Therapies

Dental Orthotics

In Office Trial Anterior Stop

Temporary home use anterior stop

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Aqualizer
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Lower posterior deprogrammer
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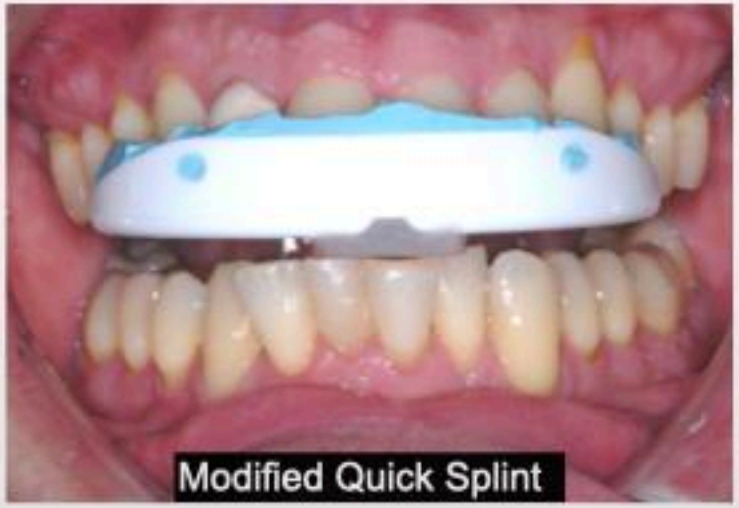
Upper full coverage hard CR guard
BiArch Posterior Deprogrammer
Mandibular Advancement Device
Lateral Bruxing Device


Modified Quick Splint


APS Temp Anterior Stop

Reline with
Blue Mousse

TMD Therapies

Dental Orthotics

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Temporary home use anterior stop

Myobrace
Aqualizer
Diagnostic Palatal Anterior Stop
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Lower Indexed
Brux Checker
Upper full coverage hard CR guard
BiArch Posterior Deprogrammer
Mandibular Advancement Device
Lateral Bruxing Device

APS Temp Anterior Stop

Form on teeth

Reline with Blue Mousse

TMD Therapies

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Myobrace

Aqualizer
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Lower TMJ Rehab flat plane
Lower Indexed
Brux Checker
Upper full coverage hard CR guard
BiArch Posterior Deprogrammer
Mandibular Advancement Device
Lateral Bruxing Device

Protect sleep grinding

Manage Airway: Lower jaw forward

Trains Breathe through nose, swallow
Expands Maxilla

MyoBrace
A1

MyoBrace
TMJ

TMD Therapies

Dental Orthotics

In Office Trial Anterior Stop
Temporary home use anterior stop
Myobrace

Aqualizer

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Lower posterior deprogrammer
Lower TMJ Rehab flat plane
Lower Indexed
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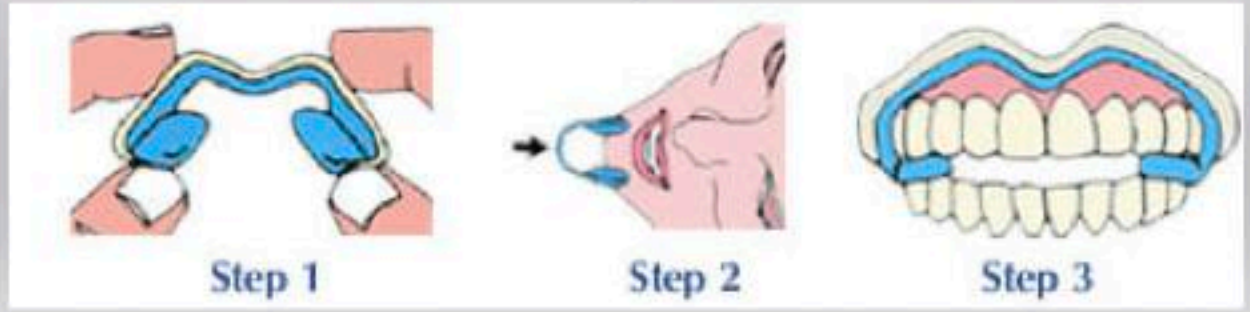
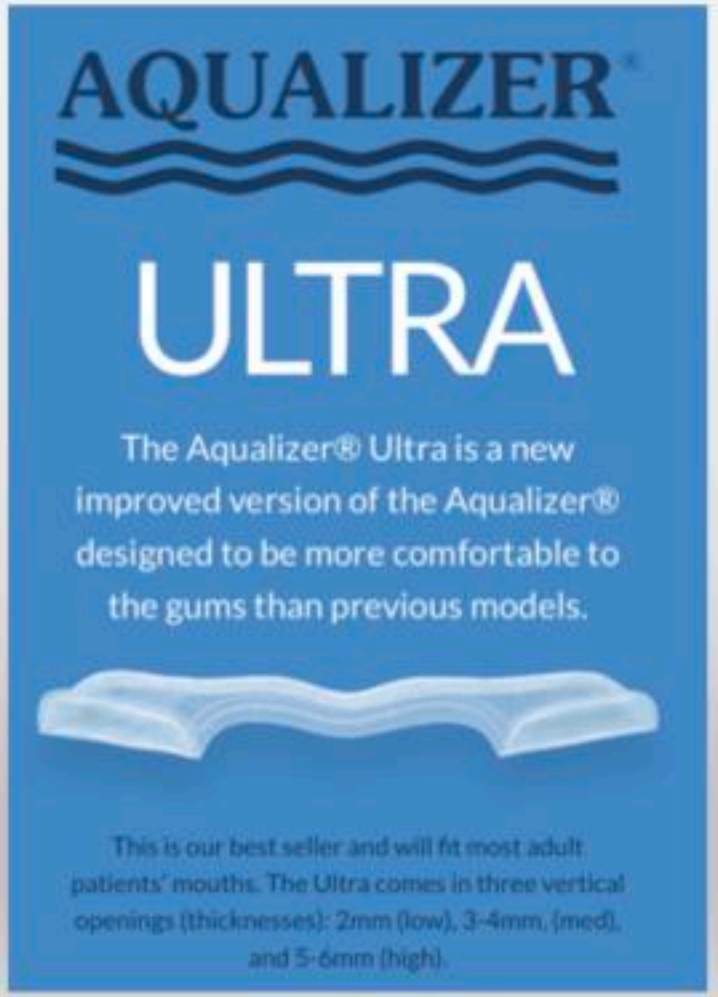
BiArch Posterior Deprogrammer
Mandibular Advancement Device
Lateral Bruxing Device

Water cushion for the teeth

I use the low and medium thickness.

Keep in Freezer





TMD Therapies

Dental Orthotics

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Myobrace
Aqualizer

Diagnostic Palatal Anterior Stop

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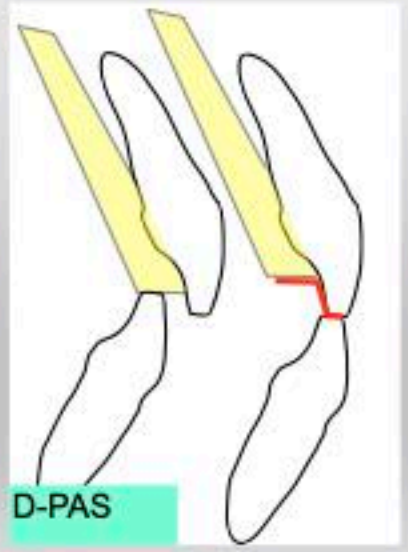
Mandibular Advancement Device
Lateral Bruxing Device



Diagnostic Palatal Anterior Stop

D-PAS Test: Wear 3 nights, then 2 days

Better- Decrease Symptoms

Sleep Clenching: Wear D-PAS as night guard

Occlusal Muscle Disharmony: Occlusal Adjust

Worse- Increase Symptoms

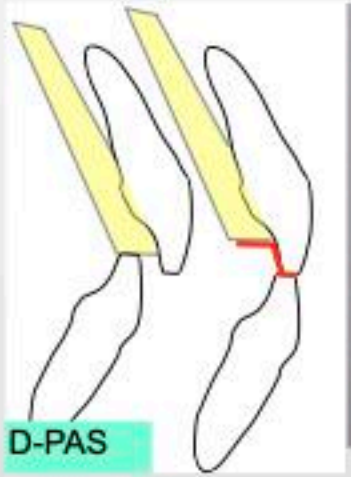
Mechanically Unstable TMJ, joint subluxation

Intracapsular Problem TMJ

Stays the Same- No Change in Symptoms

Damaged TMJ are mechanically stable

Pain not related to occlusion



TMD Therapies

Dental Orthotics

In Office Trial Anterior Stop
Temporary home use anterior stop
Myobrace
Aqualizer
Diagnostic Palatal Anterior Stop

Lower full coverage CR

Lower posterior deprogrammer
Lower TMJ Rehab flat plane
Lower Indexed
Brux Checker
Upper full coverage hard CR guard
BiArch Posterior Deprogrammer
Mandibular Advancement Device
Lateral Bruxing Device

3-6 weeks trial of an ideal occlusion

Dots in the back,
line in the front

3D Print Keysplint Soft with
durasplint added to anterior

TMD Therapies

Dental Orthotics

In Office Trial Anterior Stop
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Aqualizer
Diagnostic Palatal Anterior Stop
Lower full coverage CR

Lower posterior deprogrammer
Lower TMJ Rehab flat plane
Lower Indexed

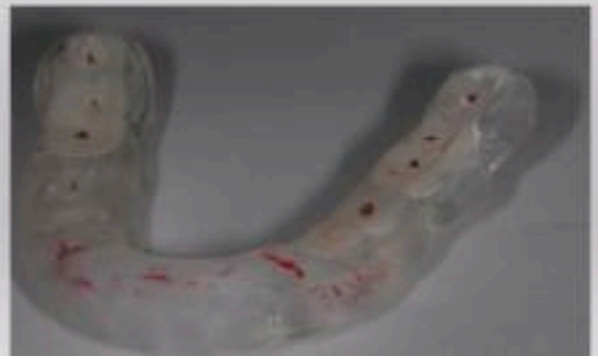
Brux Checker
Upper full coverage hard CR guard
BiArch Posterior Deprogrammer
Mandibular Advancement Device
Lateral Bruxing Device

Advanced TMD Orthotics

Lower Posterior Deprogrammer

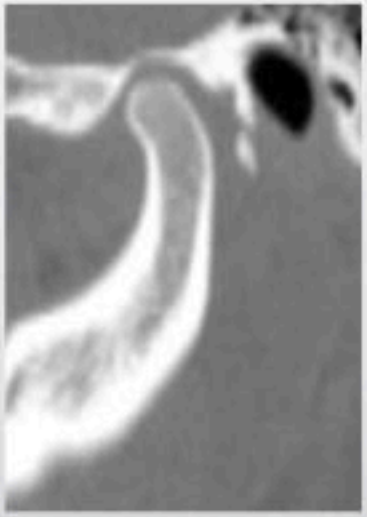
Indexed Orthotic

Centric Relation Orthotic



All roads lead to lower CR as final orthotic then occlusal adjustment with DTR

I use both Centric Relation and Non-Centric Relation Orthotics



Treatment Position vs Final Position: Do Not Confuse the Two

Treatment Position Creates Change (Adaptation)
- Treat: Painful CR Load Zone
  - Mechanically Unstable Centric Relation Loading
  - Cranial bones misaligned

Final Position Creates Stability (Centric Relation)
- When the forces are balanced, Adaptation Stops

TMD Therapies

Dental Orthotics

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Aqualizer
Diagnostic Palatal Anterior Stop
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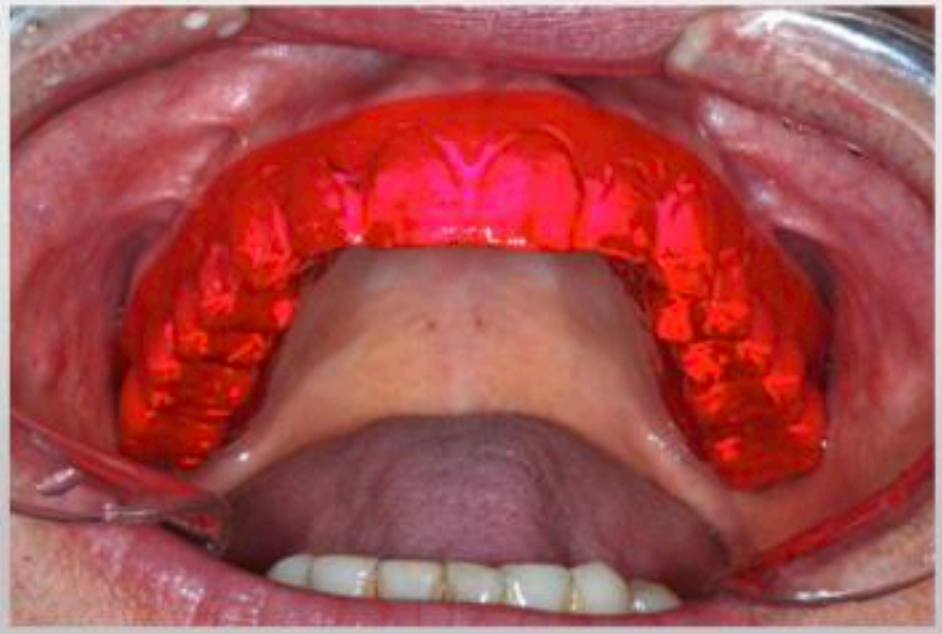
Lower posterior deprogrammer
Lower TMJ Rehab flat plane
Lower Indexed

Brux Checker

Upper full coverage hard CR guard
BiArch Posterior Deprogrammer
Mandibular Advancement Device
Lateral Bruxing Device

Brux Checker
Great Lakes Orthodontics

0.1mm Mylar: Same as mylar strip for composite



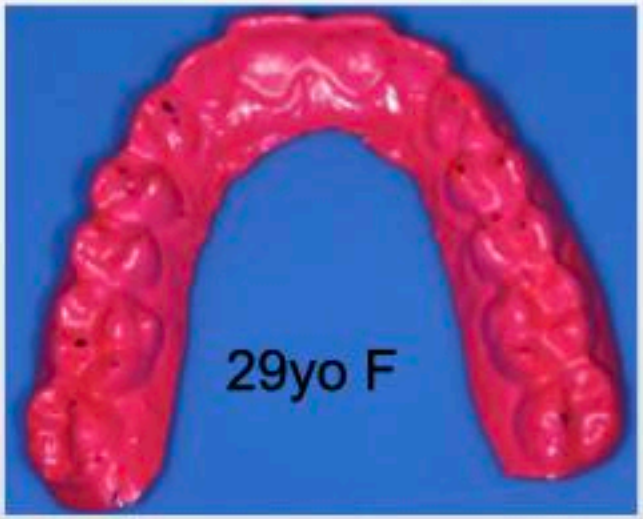
Made on Biostar Machine

Does grinding occur awake or asleep?

Brux Checker
Great Lakes Orthodontics

0.1mm Mylar

Made on Biostar Machine



TMD Therapies

Dental Orthotics

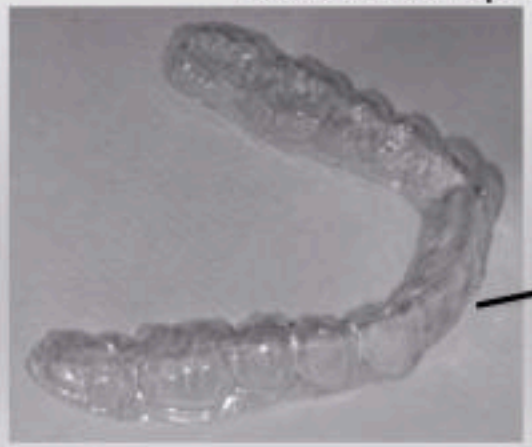
In Office Trial Anterior Stop
Temporary home use anterior stop
Myobrace
Aqualizer
Diagnostic Palatal Anterior Stop
Lower full coverage CR
Lower posterior deprogrammer
Lower TMJ Rehab flat plane
Lower Indexed

Brux Checker

Upper full coverage hard CR guard
BiArch Posterior Deprogrammer
Mandibular Advancement Device
Lateral Bruxing Device

Clear Brux Checker
Treats Daytime Clenching
Increases awareness to break habit
Takes 6 weeks

Very thin: Similar to mylar
used for composites



Great Lakes Orthodontics
Biostar Platzhalterfolie Item Ref 3202.1

Protective: Lower clear brux checker

Full Denture implant supported- Locator Attachments
E-max custom posterior denture teeth

clear brux checker
covers lower denture

Lasts about 3 weeks

TMD Therapies

Dental Orthotics

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

Upper full coverage hard CR guard

BiArch Posterior Deprogrammer
Mandibular Advancement Device
Lateral Bruxing Device

Upper hard full coverage
CR guard

Patient can place severe force on front teeth.

Upper teeth +2 mobility

TMD Therapies

Dental Orthotics

In Office Trial Anterior Stop
Temporary home use anterior stop
Myobrace
Aqualizer
Diagnostic Palatal Anterior Stop
Lower full coverage CR
Lower posterior deprogrammer
Lower TMJ Rehab flat plane
Lower Indexed
Brux Checker
Upper full coverage hard CR guard

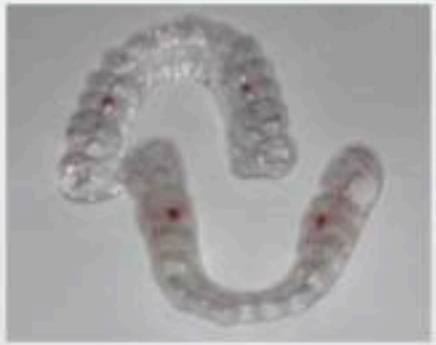
Posterior Stop Night Guard

Mandibular Advancement Device
Lateral Bruxing Device

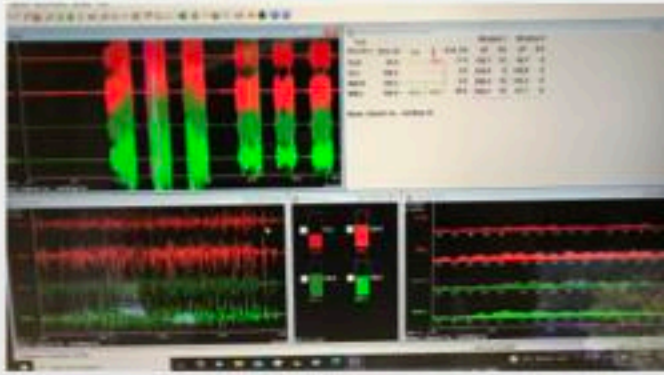
TMD Therapies

Dental Orthotics

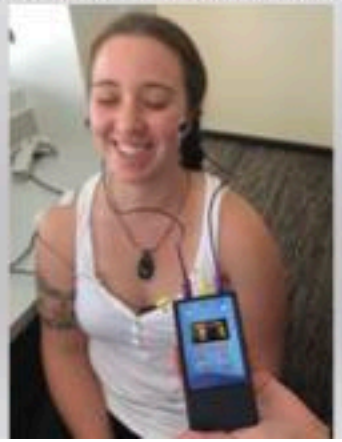
Posterior Stop Night Guard



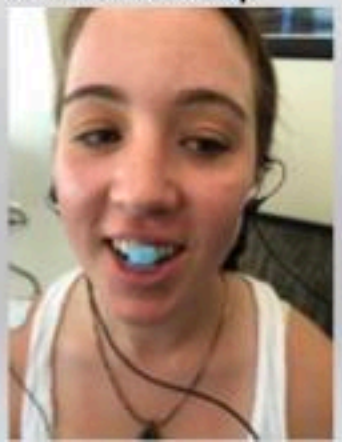
EMG BioResearch



Clench back teeth



Clench anterior stop



Can place moderate force on front teeth

<u>Clench</u>
Back teeth +250 µv
Front teeth +121 µv

M-Scan

TMD Therapies

Dental Orthotics

In Office Trial Anterior Stop
Temporary home use anterior stop
Myobrace
Aqualizer
Diagnostic Palatal Anterior Stop
Lower full coverage CR
Lower posterior deprogrammer
Lower TMJ Rehab flat plane
Lower Indexed
Brux Checker
Upper full coverage hard CR guard
BiArch Posterior Deprogrammer

Mandibular Advancement Device

Lateral Bruxing Device

MyTAP

Narval CC Nylon

D-SAD Panthera Dental

TMD Therapies

Dental Orthotics

In Office Trial Anterior Stop
Temporary home use anterior stop
Myobrace
Aqualizer
Diagnostic Palatal Anterior Stop
Lower full coverage CR
Lower posterior deprogrammer
Lower TMJ Rehab flat plane
Lower Indexed
Brux Checker
Upper full coverage hard CR guard
BiArch Posterior Deprogrammer
Mandibular Advancement Device

Lateral Bruxing Device

APS Lat-Brux Anterior Stop Elastomers

APS Lat-Brux Guide Plane

Add upper essix if not expanding upper arch

APS Lat-Brux Posterior Stop Elastomers

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

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
Myobrace
Aqualizer
Diagnostic Palatal Anterior Stop
Lower full coverage CR
Lower posterior deprogrammer
Lower TMJ Rehab flat plane
Lower Indexed
Brux Checker
Upper full coverage hard CR guard
BiArch Posterior Deprogrammer
Mandibular Advancement Device
Lateral Bruxing Device

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

TMD Therapies

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

TMD Therapies

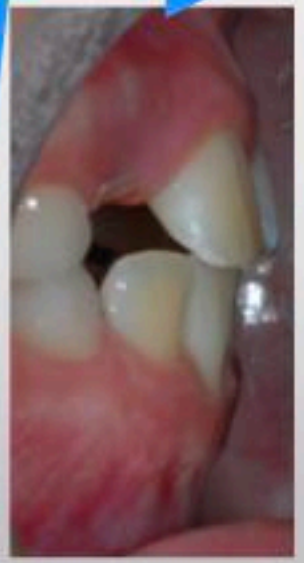
Occlusal Orthopedic

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

Lingual Light Wire
Planas Tracks

Start Age 7



Age 8
9 Months from start

TMD Therapies

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

Intrudes lower posterior teeth

Lower Soft Sectional

LSS and Lingual Light Wire

TMD Therapies

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

Start Age 50

Lingual Light Wire w/ Sectional Ortho

Post Occlusal Reshaping

TMD Therapies

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

Restorative Dentistry

Pathological Occlusion

??Airway Related Bruxing?

Restore Function

Composite Trial Occlusion

AHI + 26 CPAP

Anterior guidance

or group function?

TMD Therapies

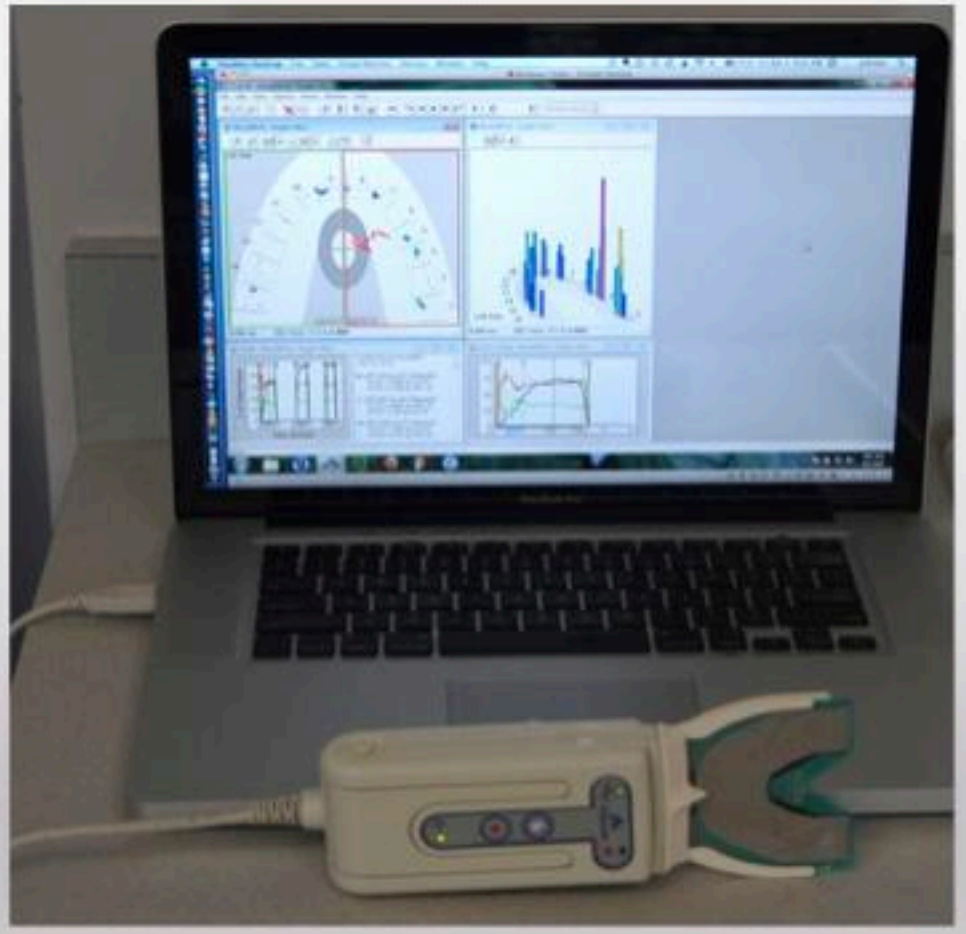
Occlusal Orthopedic

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

Disclusion Time Reduction with TekScan is more precise and more objective than occlusal adjusting with articulating paper/ribbon/film alone.

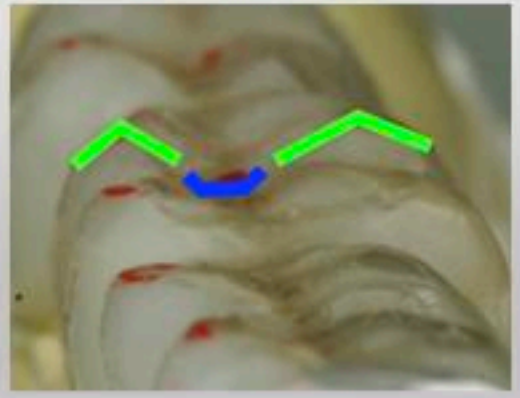


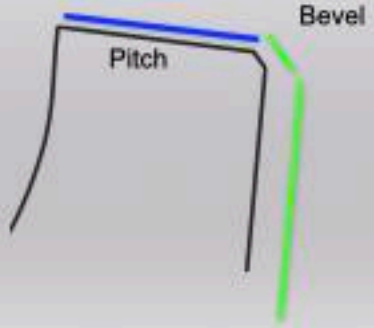
Occlusal Sculpting Tools, including Zirconia

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

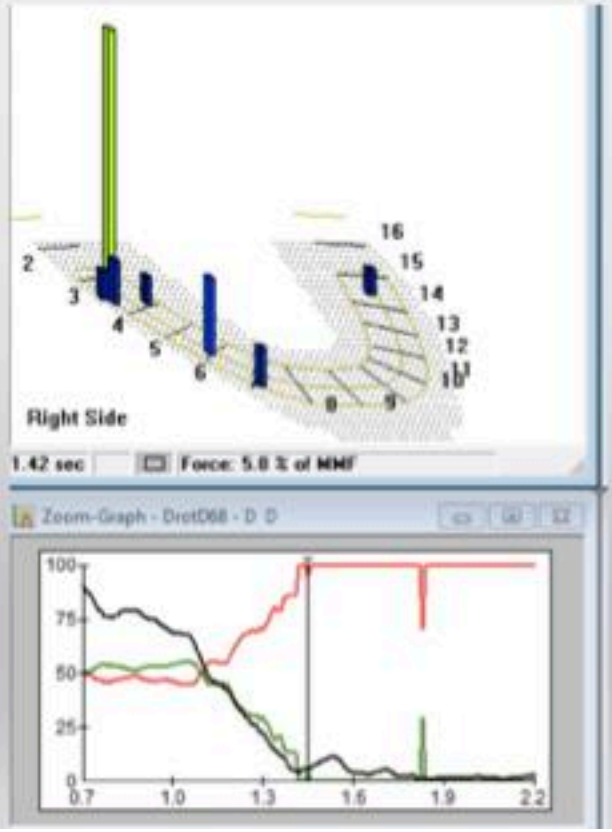




Premier 860.9 F Wheel Diamond
Premier 230 F Barrel Diamond
Neodiamond 1118.7F Roundend taper
Dedco Green Stone
White Arkansas stone
Filtek Supreme- B1B

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

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.

TMD Therapies

Occlusal Orthopedic

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

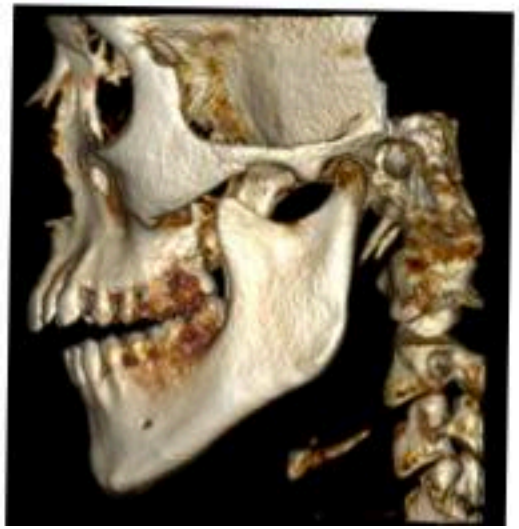
Occlusal Adaptation

Condylar distraction

Occlusal Adaptation

Orthopedically move the Maxilla

Anterior Openbite Non Surgical Treatment: Moving the Maxilla



Anterior Openbite with Active TMJ Bone Loss

Non Surgical Therapies

Condylar Distraction
Meloxicam and Doxycycline

TMD Therapies

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

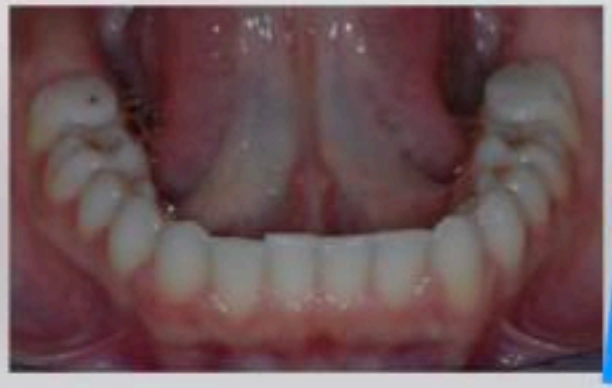
Occlusal Adaptation

Close Posterior Open Bites
Add Composite to 2nd Molars

Age 21
Post disc repair

Added Composite #18,31

Start Occlusal Adaptation



Age 22
3 Months Occlusal Adaptation

2 months later

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

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

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Occlusal Adaptation

Tongue Parafunction

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

Dental Orthotics

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Temporary home use anterior stop
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Aqualizer
Diagnostic Palatal Anterior Stop
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Lower posterior deprogrammer
Lower TMJ Rehab flat plane
Lower Indexed
Brux Checker
Upper full coverage hard CR guard
BiArch Posterior Deprogrammer
Mandibular Advancement Device
Lateral Bruxing Device

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


Know Yourself
Know Your Work
Know Your Patient
Apply Your Knowledge
LD Pankey Institute
Write your Dream

TMD Symptoms

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

The Diagnostic Process

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

Think!!

Differential Diagnosis
All the choices

Diagnostic tests (Observations)
Narrow down the choices

Working Diagnosis
Treating as if

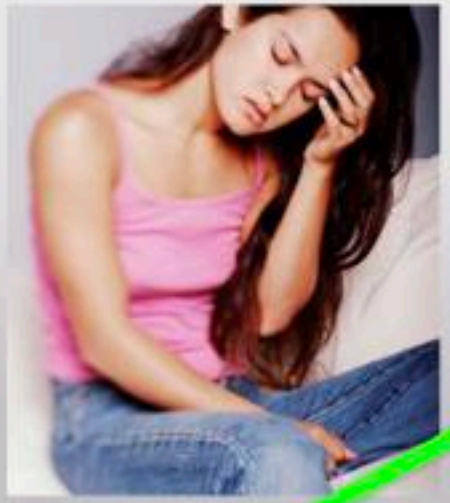
Not completely resolved

Final Diagnosis
Only after problem resolved

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

Diagnosis Treatment Flow Chart

From a patient perspective they want to go from symptoms to no symptoms

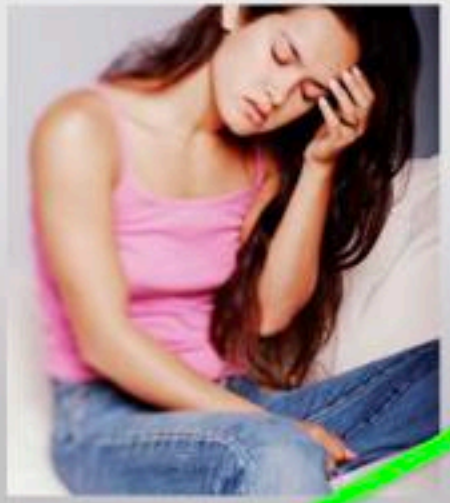


Symptoms

No Symptoms

Diagnosis Treatment Flow Chart

From a patient perspective they want to go from symptoms to no symptoms



Symptoms

History

Signs

Doctor Exam

Differential Diagnosis

Diagnostic Tests

Specific Working Diagnosis

Treatment

Doctor Re-Exam

If not resolved

No Signs

No Symptoms
Final Dx

Symptom Dx		Specific Dx
Tooth Pain	vs	Irreversible Pulpitis
Arthralgia	vs	Osteoarthritis

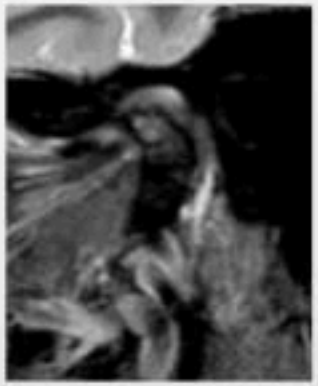
Facial Pain Diagnosis

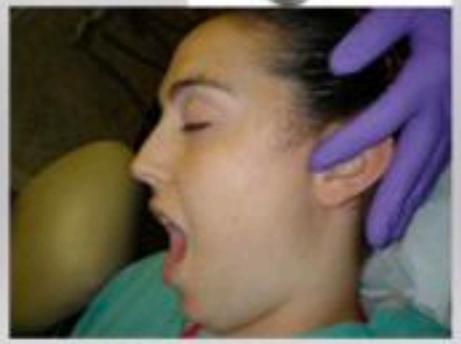
Diagnostic Tools

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

<u>Biometrics</u>
- Joint Vibration
- Jaw Tracker
- Electromyography
- T-Scan

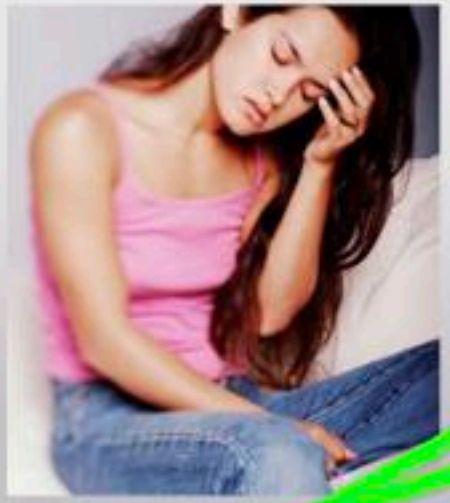
- Occlusion: CR Mounted Study Models
- Complete Dental Exam
- Clinical Photographs
- Dx Blocks
- Dx Orthotics- Brux Checker, CR Orthotic





Diagnosis Treatment Flow Chart

From a patient perspective they want to go from symptoms to no symptoms



Symptoms

Less Symptoms

No Symptoms

If you skip the exam, diagnostic tests, and diagnosis, you can give a therapy directed at symptoms. If you dull the symptoms the patient will perceive a benefit.

TMD: If only one Diagnosis, only need one Treatment

If only one Treatment, only need one Diagnosis

TMD is a symptom based (generalized) diagnosis


TOXIC PILLS
AND SURGERY
LIFESTYLE
CHANGE

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

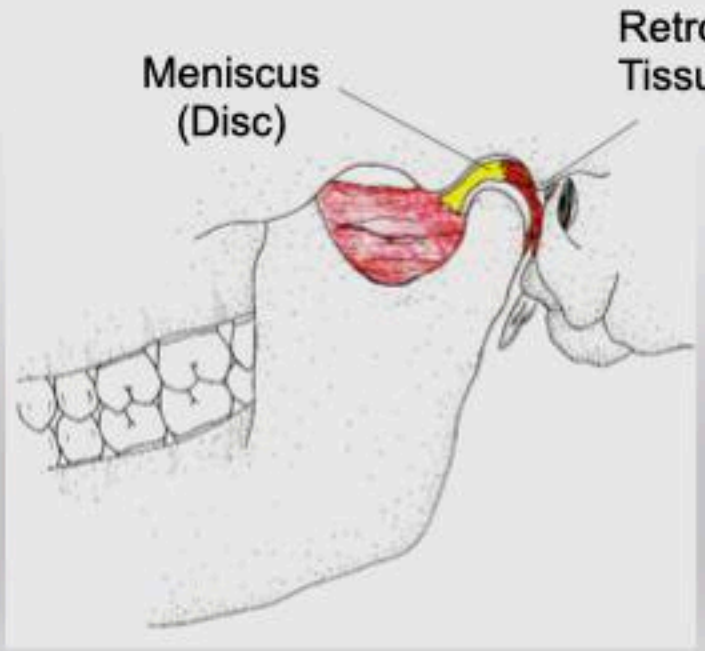
A joint joins two bones that allows movement between the two bones

TMJ has 2 Joint Compartments:

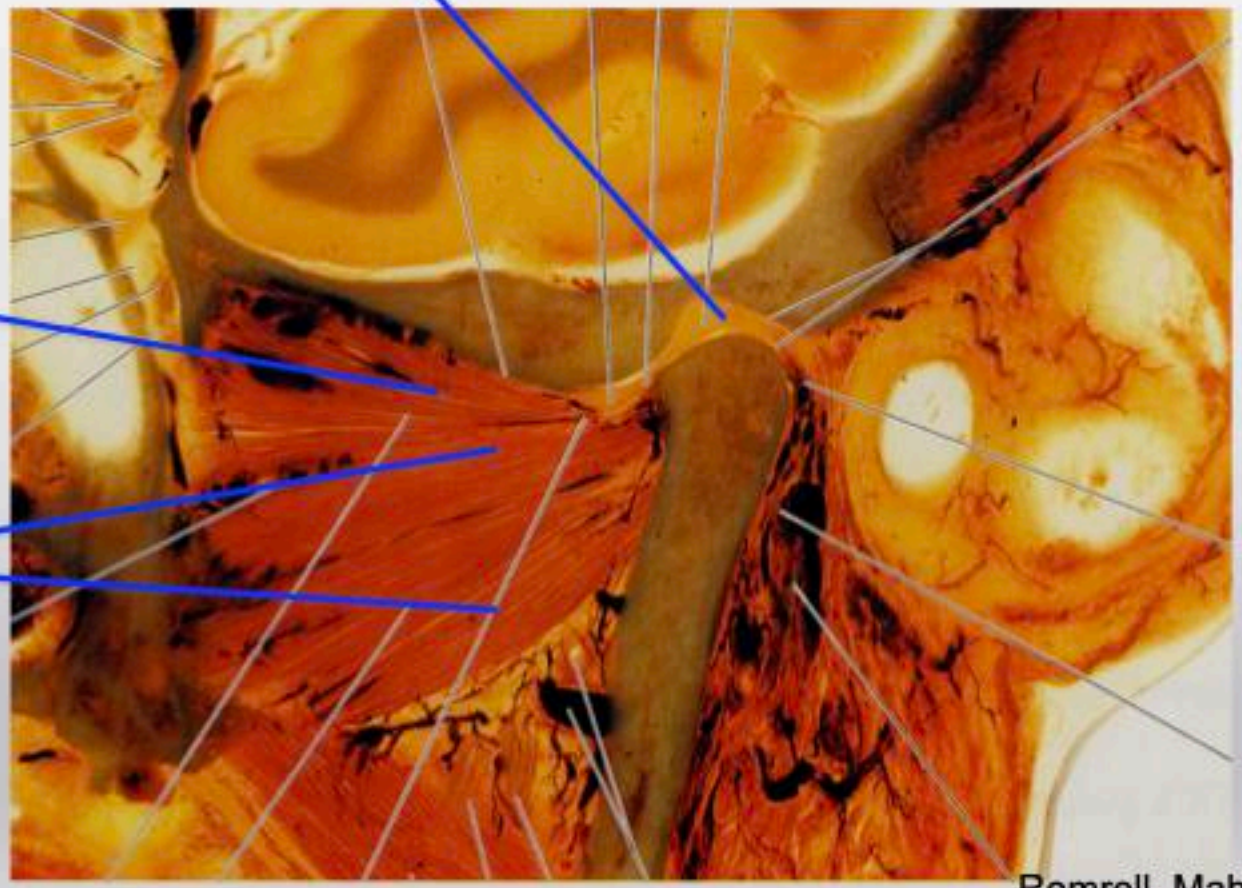
Upper- Translation
Lower- Rotation

Rotate
Slide
Pivot

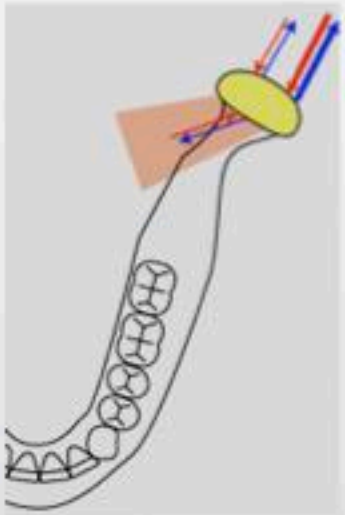
Solid end point closing
Ligamentous end point opening



Oblique Sagittal View



Axial View



Normal TMJ Blood Flow, Marrow

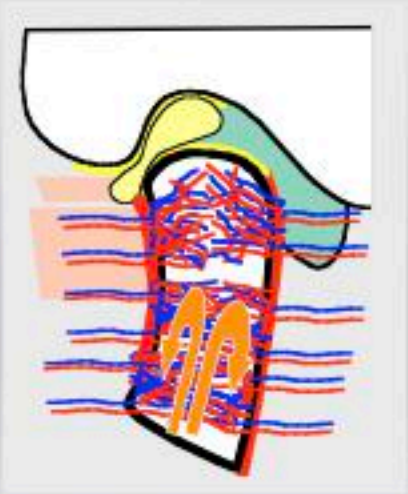
Condylar head limited collateral circulation

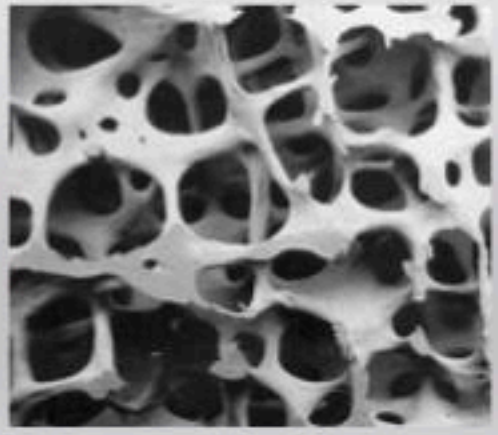
Epiphyseal growth center

Marrow is fatty tissue with blood vessels, containing the precursor for blood cells

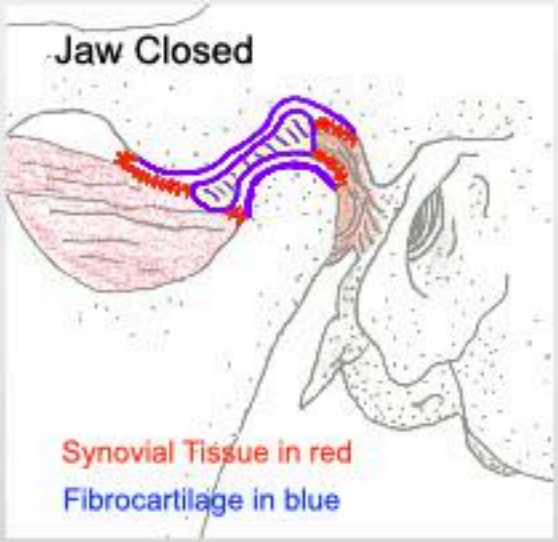
No Blood vessel inside joint

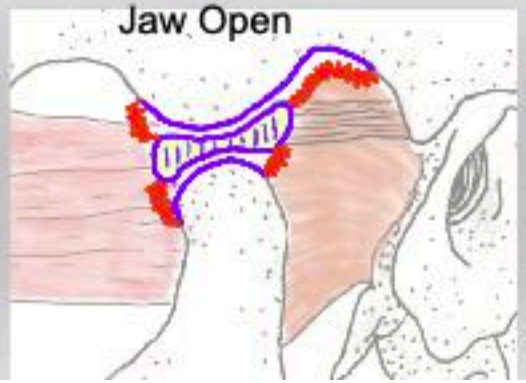
Closed Sagittal





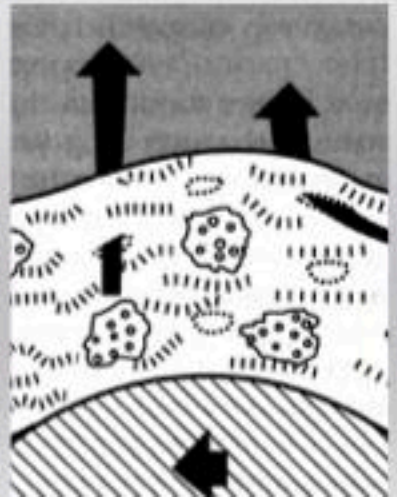
Normal TMJ- Synovium, Cartilage



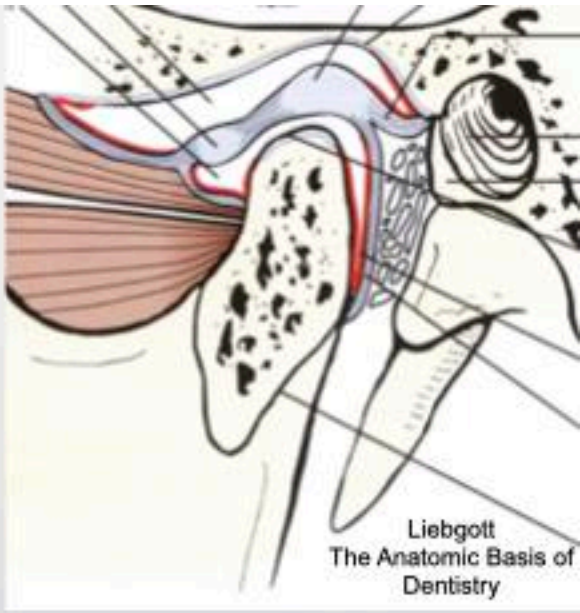


Fibrocartilage-
- Slope of Eminence
- Disc
- Top of Condyle

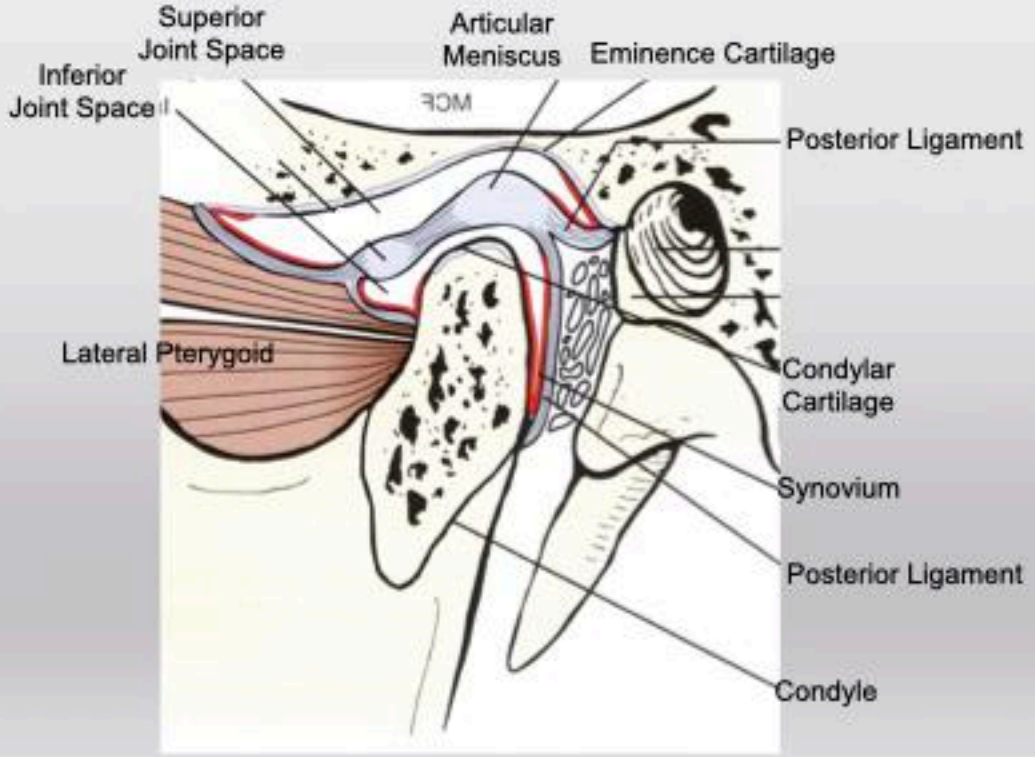
Synovial Tissue makes Synovial Fluid
- No blood vessels in a health joint
- Nutrition to the cartilage cells
- Lubrication- Hyaluronic Acid and Lubricin



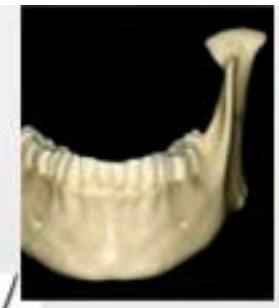
Fibrocartilage surface covered in fluid
- Cartilage is hydrophilic
- Proteoglycan negative charge
- Surface Active Phospholipids
- Fluid slides against fluid
- 5x slipperier than ice

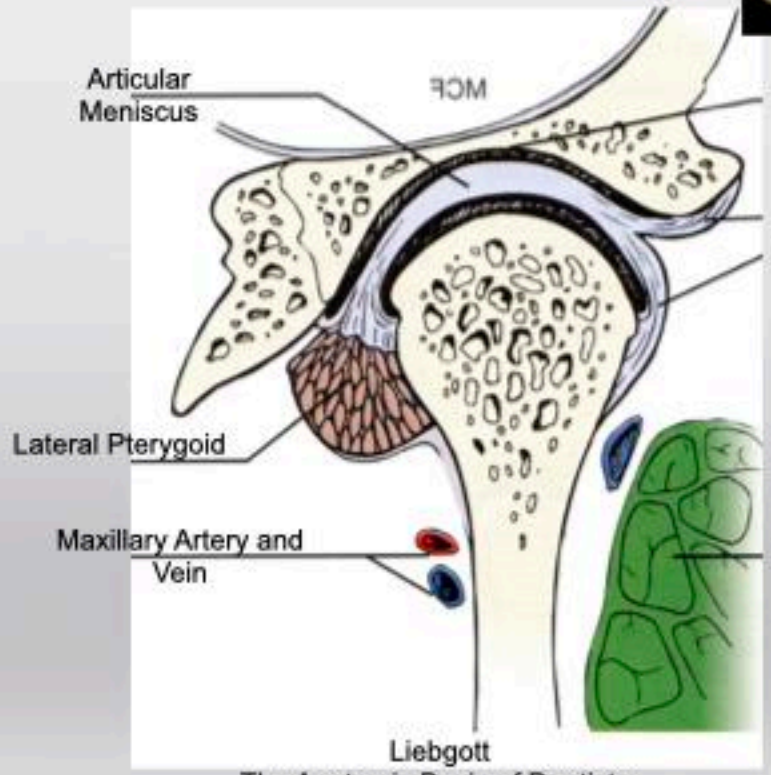


Left TMJ Sagittal View

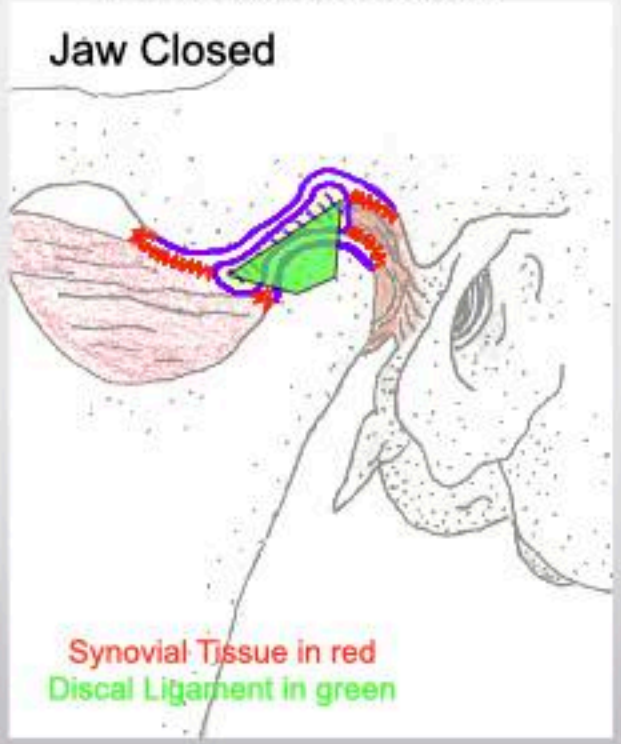


Left TMJ Coronal View





Normal TMJ



Discal Ligaments attach Disc to Condyle

Synovial Tissue
- Covers Front , Back and Sides
- Collapsed due to negative joint pressure

Disc viewed from above

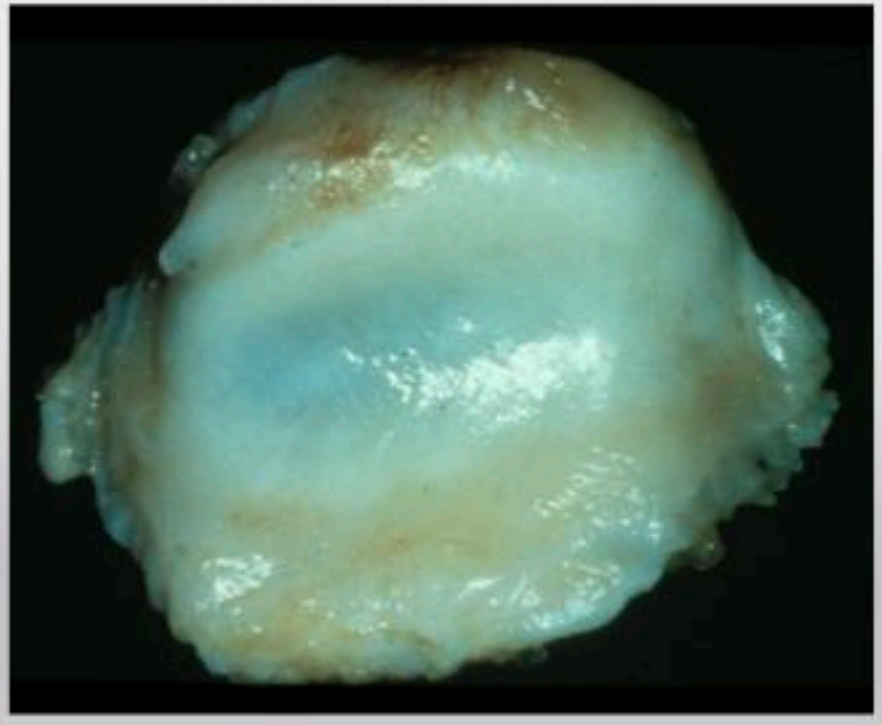
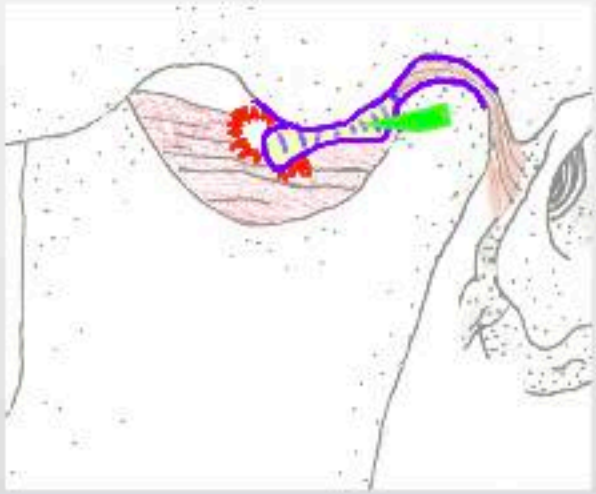


Photo Courtesy of Dr Henry Gremillion

Damaged TMJ- Anteriorly Dislocated Disc



Torn or stretched Meniscal ligaments

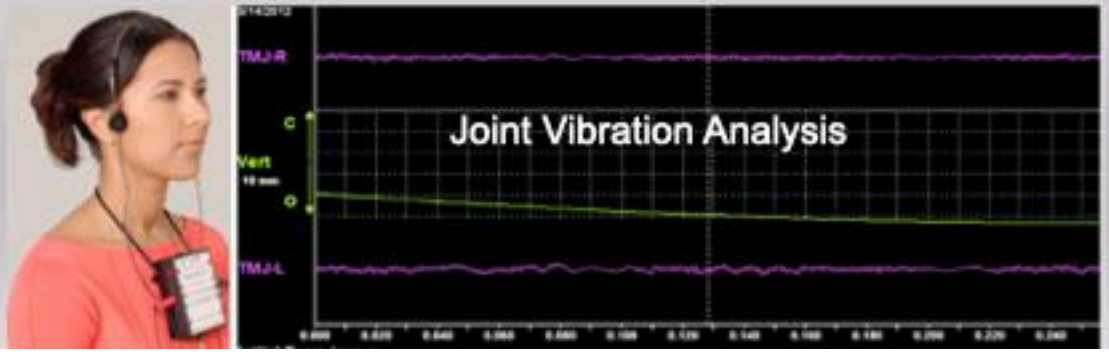
Anterior Dislocated Disc

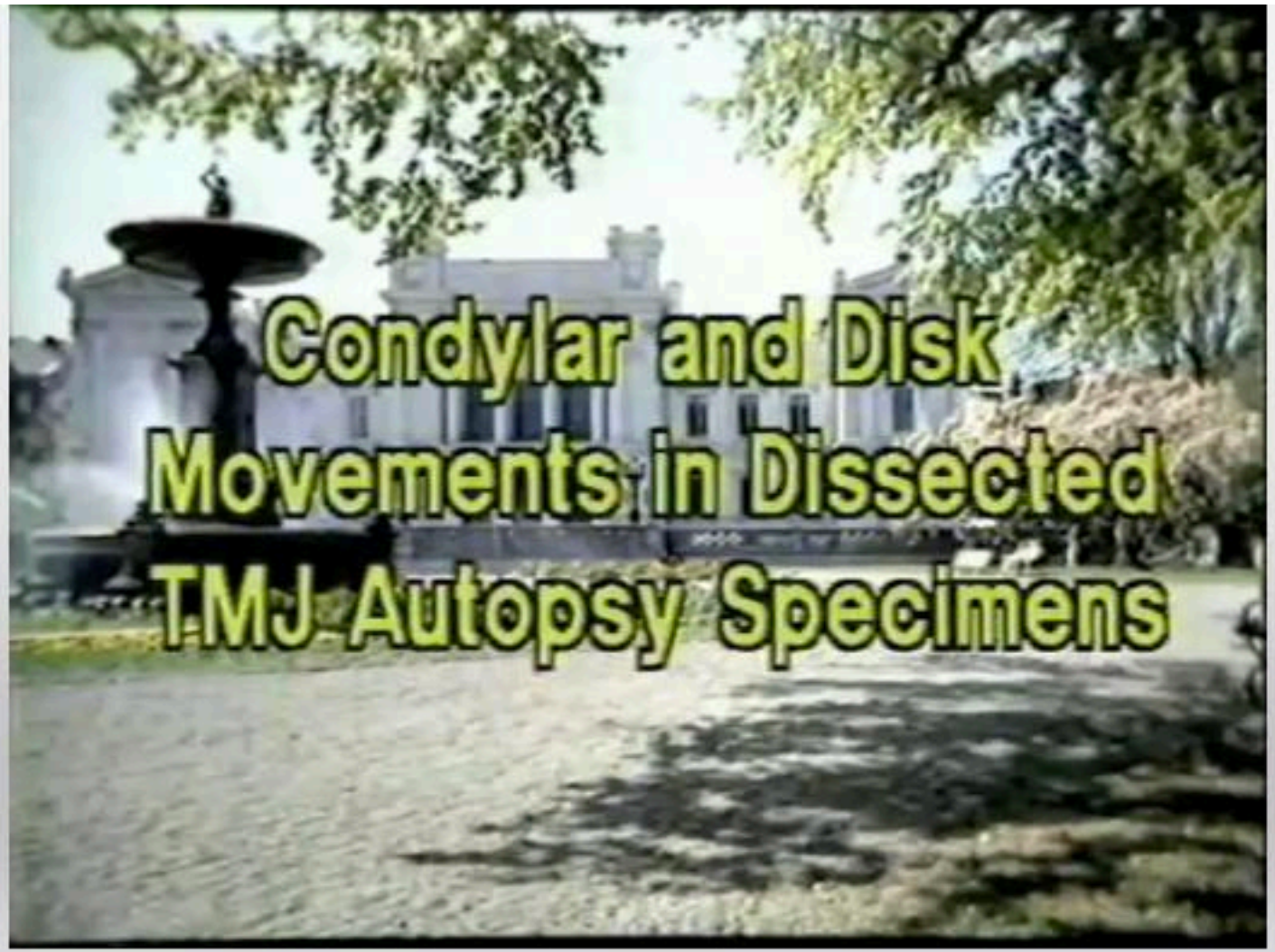
Damaged Synovium

Retrodiscal Tissue pulled up and over the condyle
- Retrodiscal tissue in direct contact with fibrocartilage
- Major Increase in friction
- Retrodiscal tissue adapts into fibrous "pseudodisc"

85% of all damaged joints adapt favorably without treatment

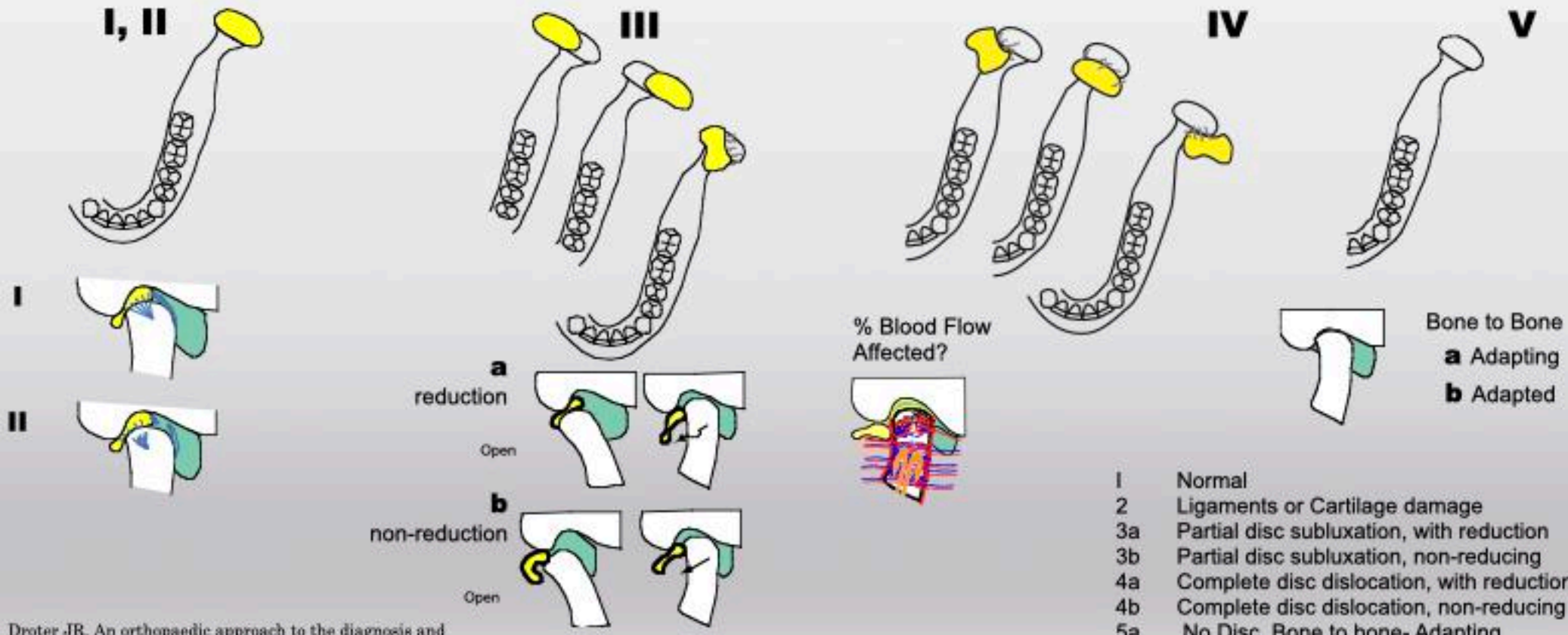
Cartilage sliding on tissue creates vibrations that can be detected




Condylar and Disk
Movements in Dissected
TMJ Autopsy Specimens

Dr. Mark Piper's Classification

Left TMJ

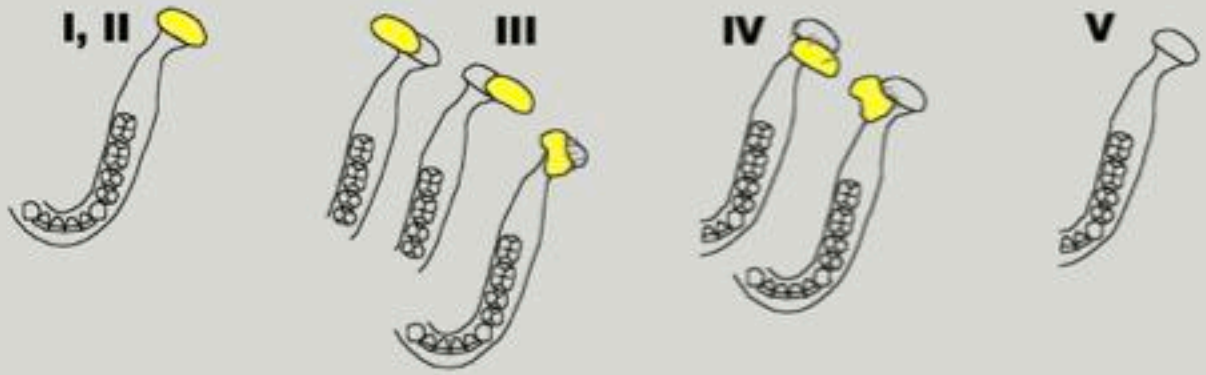


I	Normal
2	Ligaments or Cartilage damage
3a	Partial disc subluxation, with reduction
3b	Partial disc subluxation, non-reducing
4a	Complete disc dislocation, with reduction
4b	Complete disc dislocation, non-reducing
5a	No Disc, Bone to bone- Adapting
5b	No Disc, Bone to bone- Adapted

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

Distribution- 126 MRIs- 252 TMJs

- Patients presenting to my Restorative/Pain practice
- All patients with <u>any</u> indication of TMJ damage had scans



I&II-	32%
IIIa-	12%
IIIb-	3%
IVa-	18%
IVb-	30%
V-	5%

I&II- 32%

Both joints normal 14%

IIIa- 12%
IIIb- <u>3%</u>
15%

IVa- 18%
IVb- <u>30%</u>
48%

V- 5%

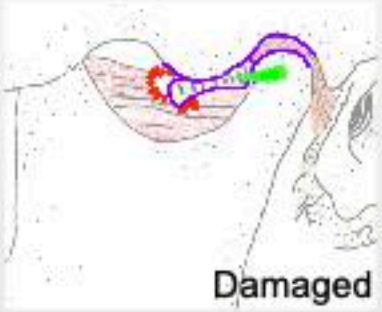
**III due mesial and III due lateral are new categories and not included in this study. Data thru 6/2003

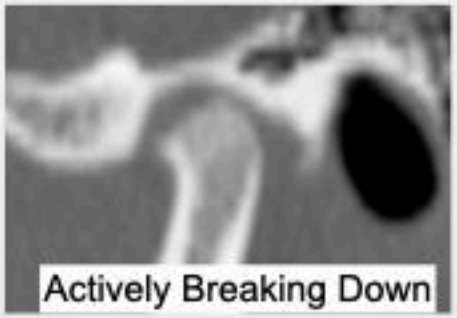
Basic Orthopedics

Joints are either
- Healthy or
- Damaged

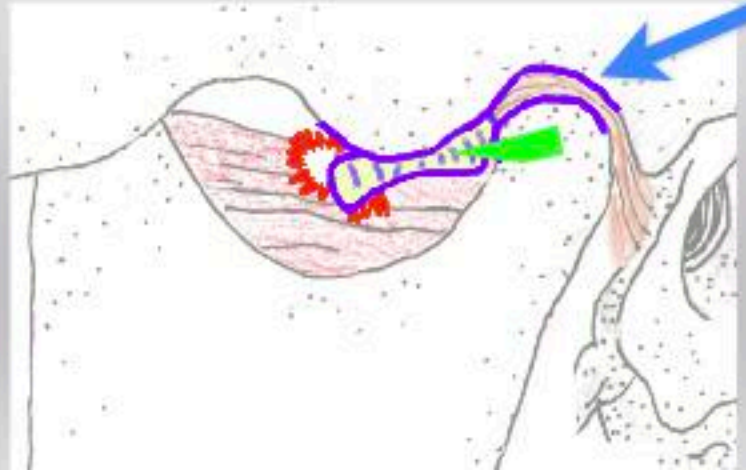
If damaged, joints will be either:
- Actively Breaking Down
- Adapting
- Adapted
  - Structurally, Mechanically
  - Favorably, Unfavorably


Healthy


Damaged


Actively Breaking Down

Majority of damaged TMJs adapt favorably



Posterior ligament, synovium, and retrodiscal tissue adapt to form a

Pseudo-disc

Tissue Fibrosis

Differential Diagnosis: Limited Joint Motion

Muscle Spasm

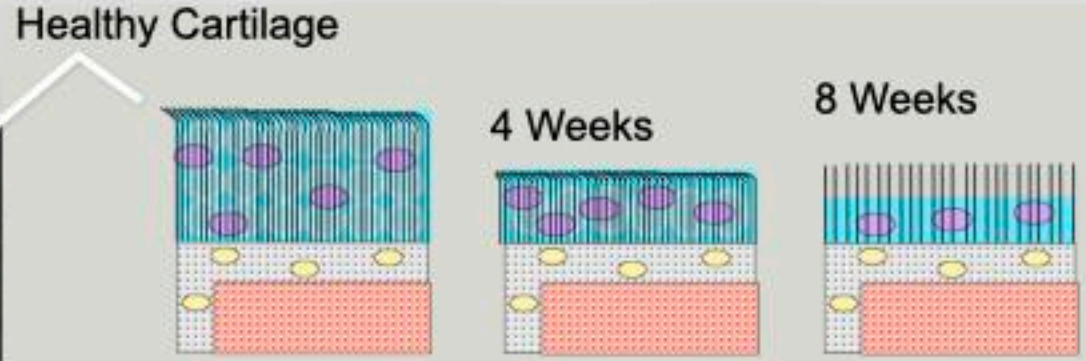
Painful to Move
- Joint Pain
- Muscle Pain

Mechanically Blocked
- 4b Acute
- Adhesion

Masseteric Space
- Infection
- Hematoma

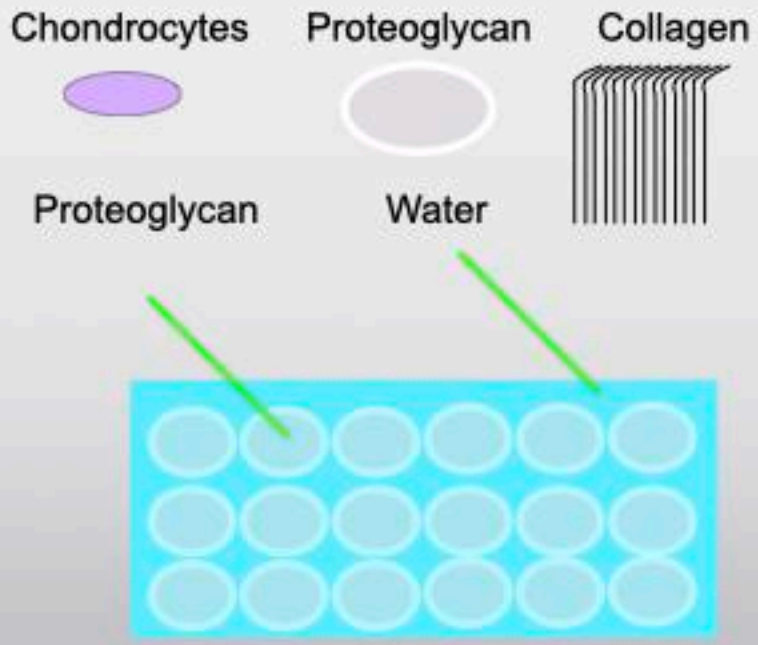
Lose 50% height of cartilage
Proteoglycans not being produced by Chondrocytes
Loss of 50% proteoglycans and water
Collagen still intact
Process is reversible
Move joint with light force/repetitive motion next 30 days

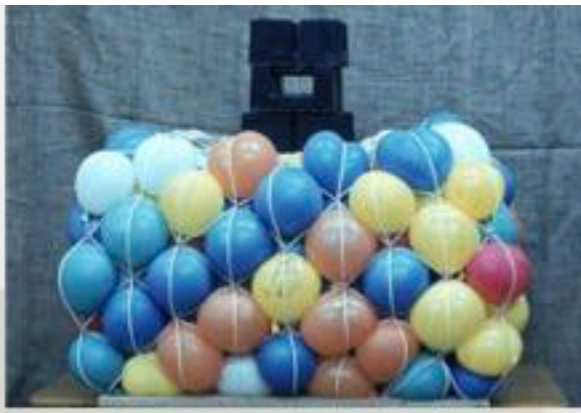
You have 6-8 weeks to get jaw moving before cartilage is irreversibly damaged, independent of the cause of the immobilization

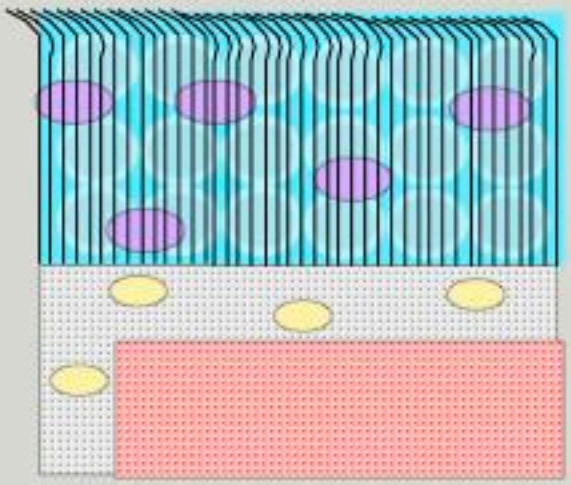


E.B. Evans, GWN Eggers, J.K. Butler, and J. Blumel, Experimental immobilization and remobilization of rat knee joints, J Bone Joint Surg Am, 1960 vol. 42 (5) pp. 737-758
Enneking WF, Horowitz M. The intra-articular effects of immobilization on the human knee. J Bone Joint Surg Am. 1972 Jul;54(5):973-85.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

Healthy Cartilage







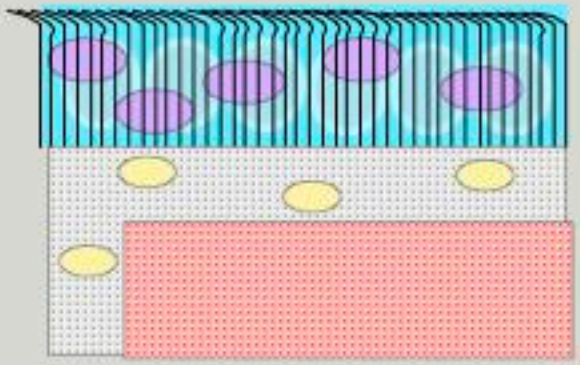
Enneking WF, Horowitz M. The intra-articular effects of immobilization on the human knee. J Bone Joint Surg Am. 1972 Jul;54(5):973-85. PMID: 5068717

Immobilization 4 weeks

Half as many "Balloons"
Still have "Ropes"

Proteoglycans not being produced by Chondrocytes
Collagen still intact
Process is reversible at 4 weeks
Move joint with light force/repetitive motion next 30 days

Half as many proteoglycans so
half as much water so
half as much cartilage height



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

Immobilization 8 weeks

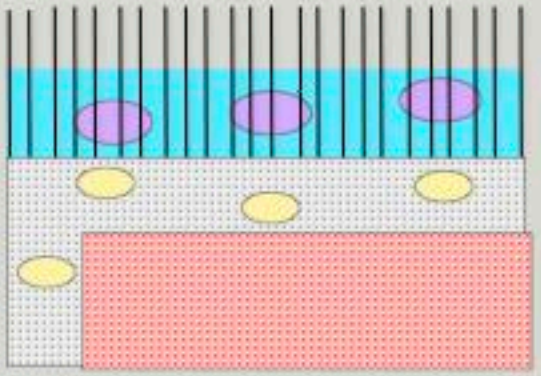
"Ropes" Degenerate

Permanent joint damage in previous healthy joints

The cartilage is irreversible damaged
- Collagen is irreversible damaged.
- The proteoglycans have no way to attach in the cartilage matrix

Adhesions form between the joint surfaces
Connective tissue proliferates into the joint
Fibrous contracture of the muscles and joint capsule

Key Point:
In a patient with limited opening, you have 4 weeks to get the jaw moving.
At 8 weeks, there is permanent damage to the TMJ, even if it was not the original cause of the limited opening



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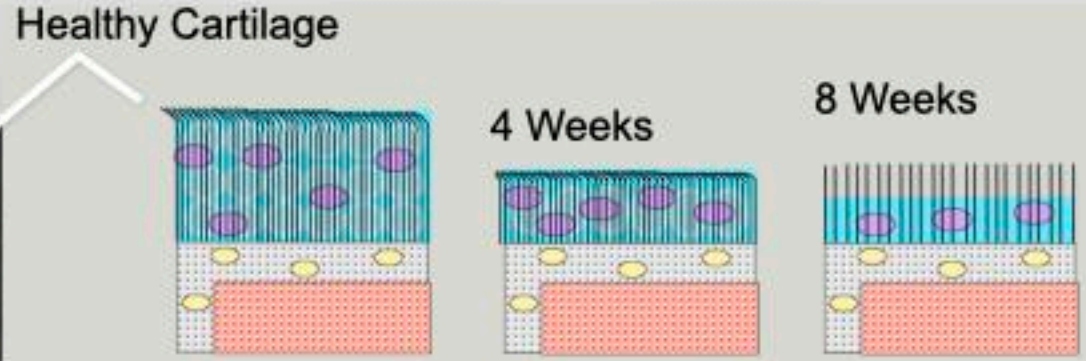

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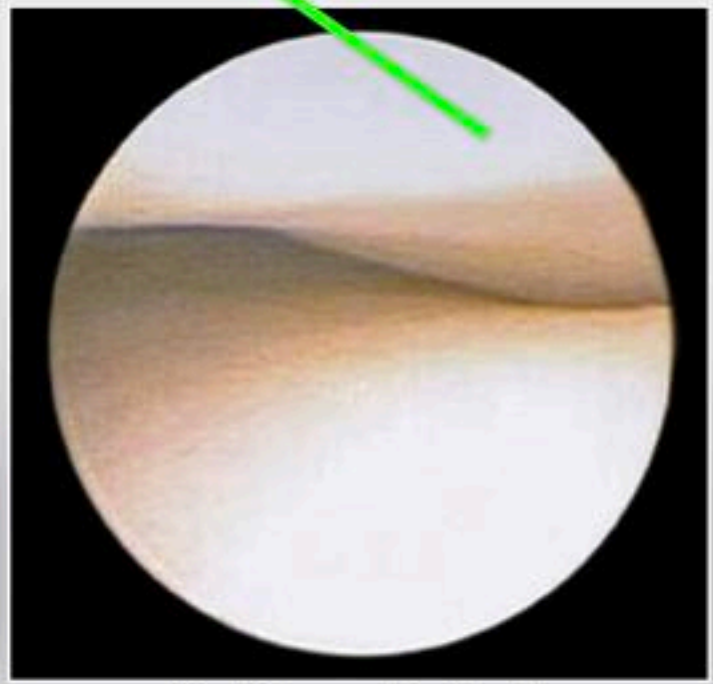
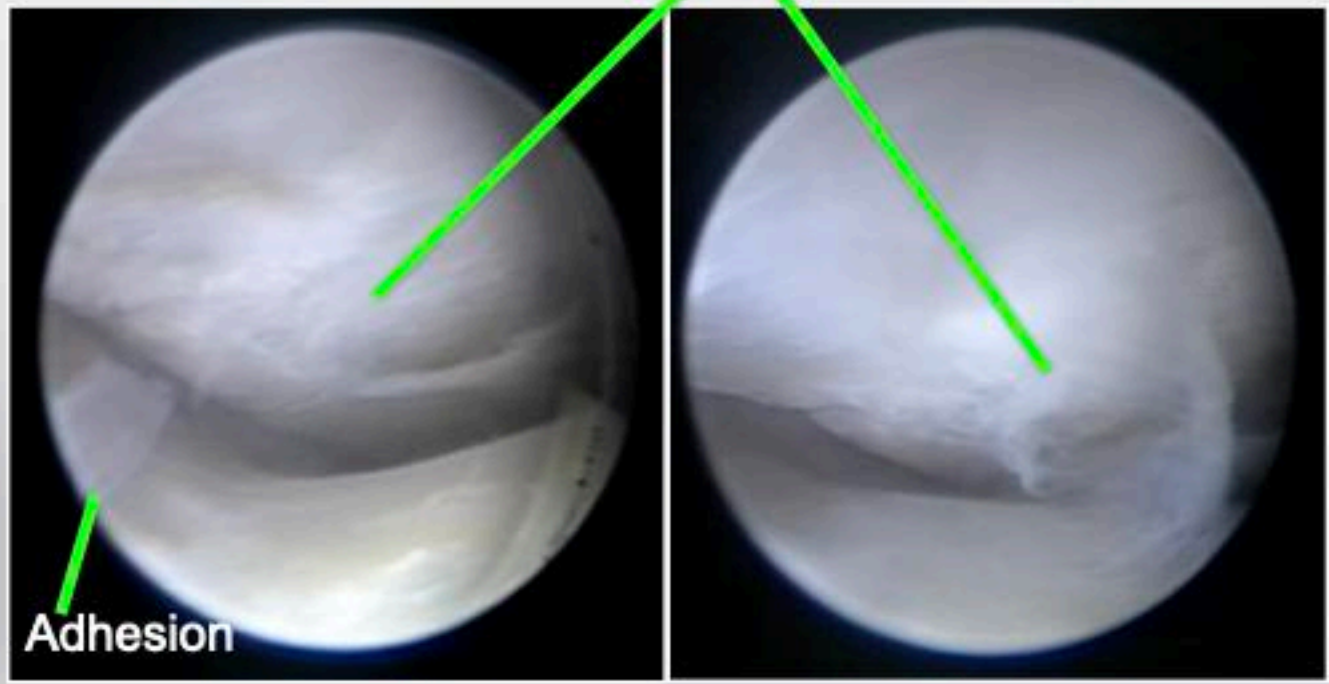
Enneking WF, Horowitz M. The intra-articular effects of immobilization on the human knee. J Bone Joint Surg Am. 1972 Jul;54(5):973-85. PMID: 5068717

Arthroscopic View Left TMJ

Eminence Healthy Cartilage

Eminence Necrotic Cartilage





Not Same Patient

Right TMJ

Open Joint Surgery

Cartilage Damage Movie

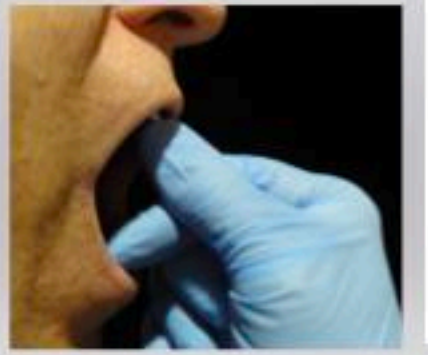
Limited Opening Algorithm

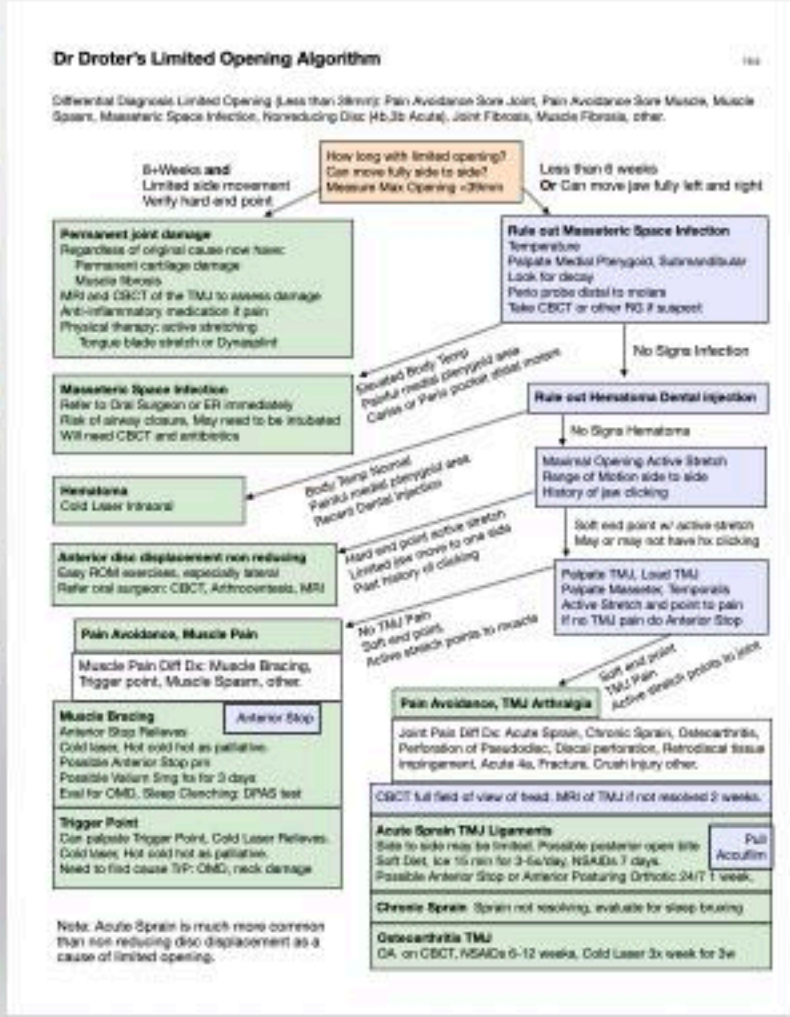
Differential Diagnosis Limited Opening:

- 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





Subjective:

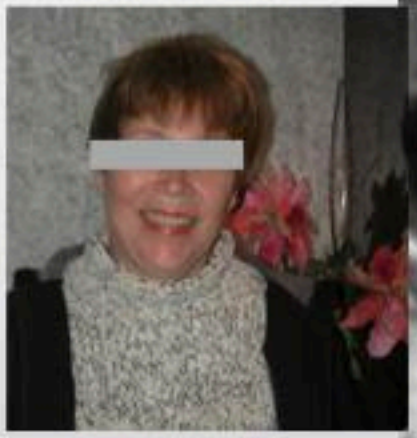
- Dentist doing crown prep #30 1 week ago
- Severe pain Right TMJ after moving jaw at end of appt
- Constant deep pain Right TMJ
- Limited opening

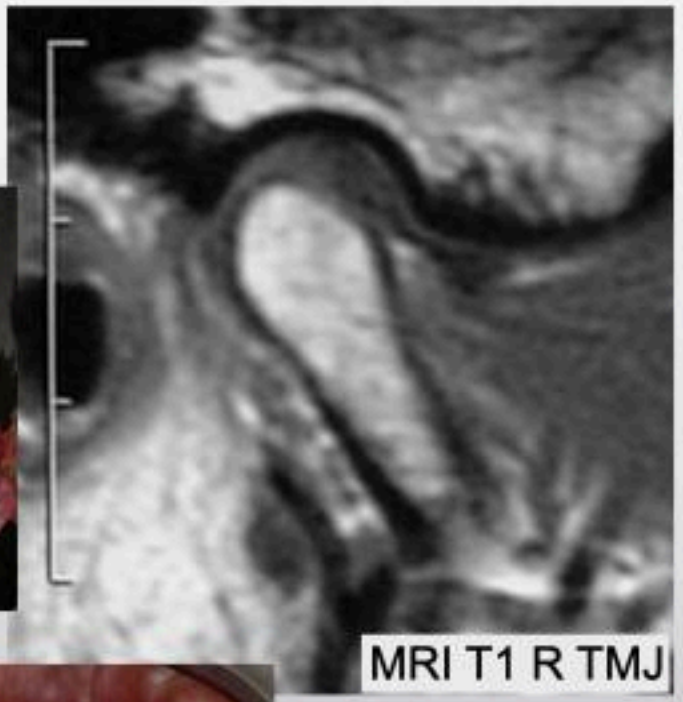
Objective:

- 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

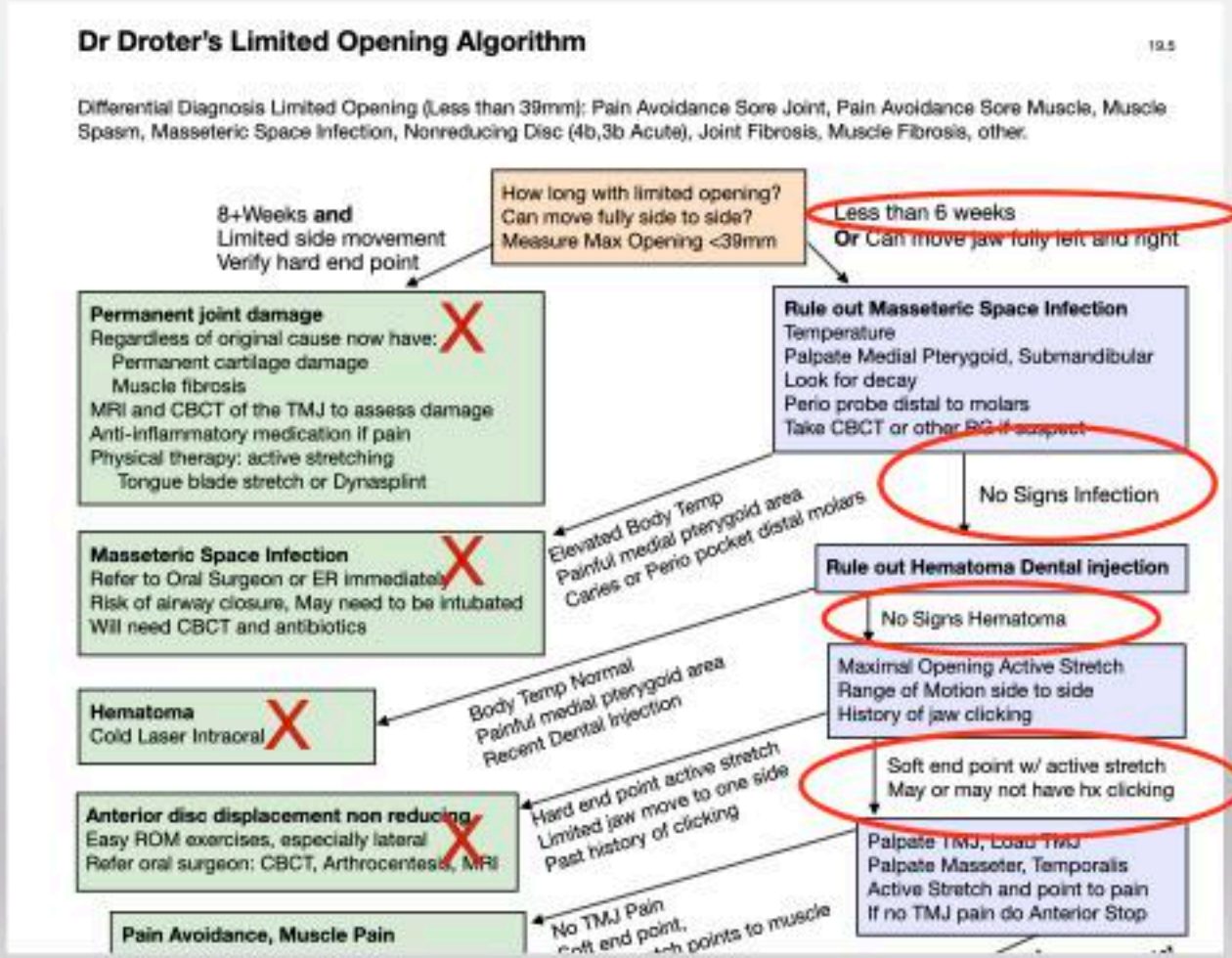
Assessment:

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





MRI T1 R TMJ



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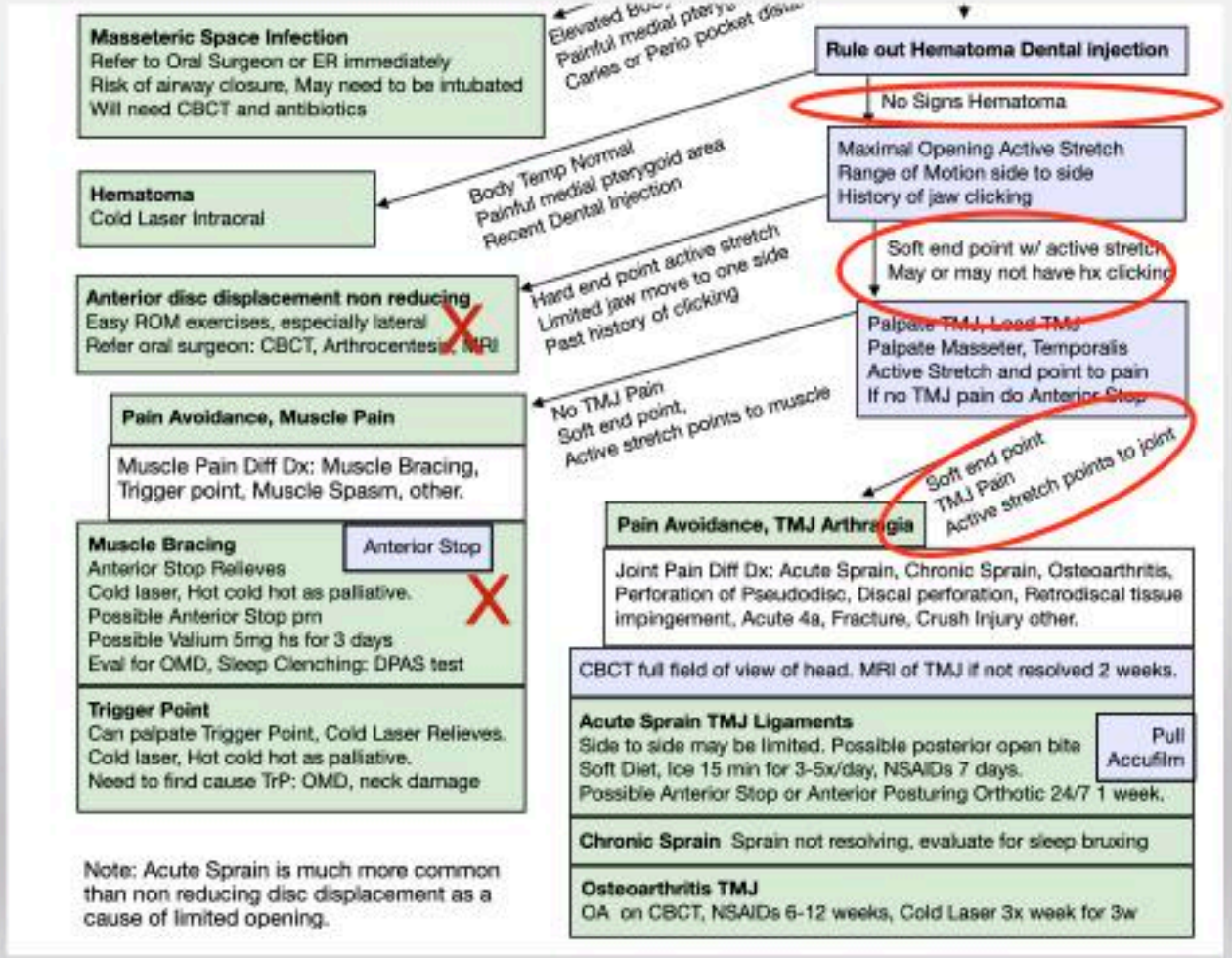

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Posterior openbite Right, does not hold Accufilm

Pain Avoidance, TMJ Arthralgia

TMJ
Active stretc

Joint Pain Diff Dx: Acute Sprain, Chronic Sprain, Osteoarthritis, Perforation of Pseudodisc, Discal perforation, Retrodiscal tissue impingement, Acute 4a, Fracture, Crush Injury other.

CBCT full field of view of head. MRI of TMJ if not resolved 2 weeks.

Acute Sprain TMJ Ligaments
Side to side may be limited. Possible posterior open bite
Soft Diet, Ice 15 min for 3-5x/day, NSAIDs 7 days.
Possible Anterior Stop or Anterior Posturing Orthotic 24/7 1 week.

Pull Accufilm

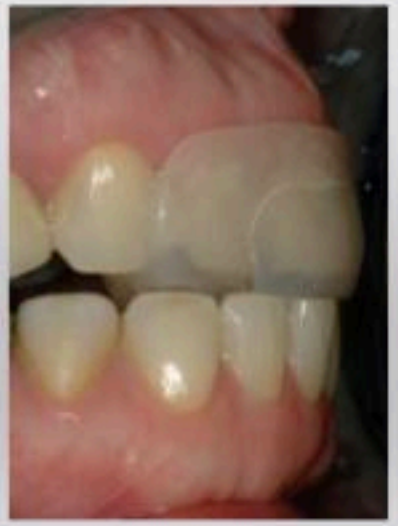
Chronic Sprain Sprain not resolving, evaluate for sleep bruxing

Osteoarthritis TMJ
OA on CBCT, NSAIDs 6-12 weeks, Cold Laser 3x week for 3w

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

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
Sleep with head elevated first week
Soft chew diet
At 1 week Anterior repositioning orthotic sleep only for second week
Week 3, no orthotic, reintroduce harder foods

Verify Orthotic does not rub lingual tissue of mandible



At 4 weeks patient had full ROM
No clicking

New addition to protocol
Cold Laser (MLS Laser- 1500 hz 15 seconds, 10 hz 30 seconds)

MLS Laser: BioResearch

808 nm Continuous, 905 nm Pulsed

Multiwave Locked System Laser

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.

Ms MY

TMD Symptoms

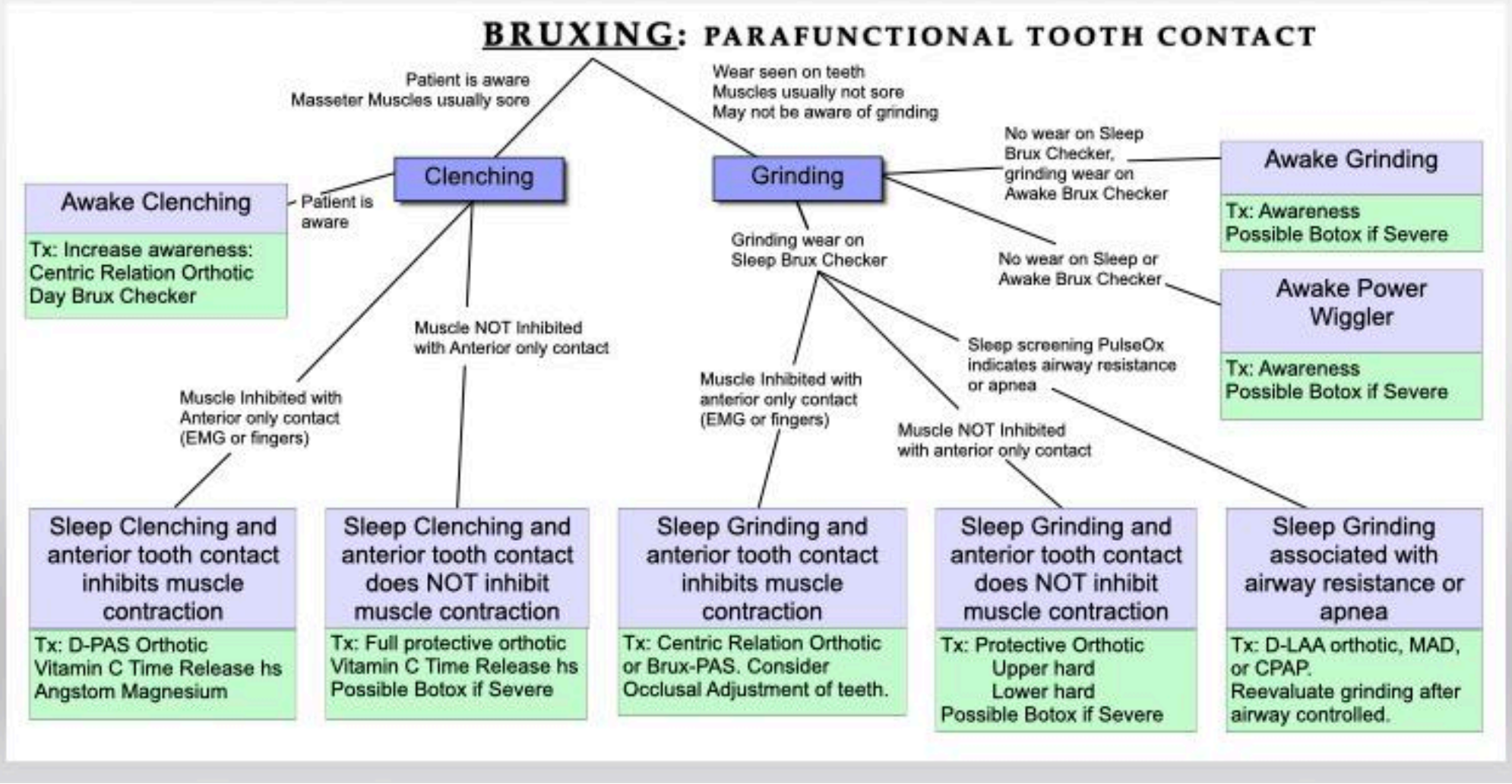
- Sore TMJ muscles
- TMJ clicking
- TMJ pain
- Jaw locking
- Limited opening
- Difficulty open jaw
- Difficulty closing jaw
- Difficulty chewing
- Headaches
- Eye pain
- Ear pain
- Anterior Open Bite

TMD Symptoms

Sore muscles on waking
AM Jaw clicking goes away

Diseases to consider and rule out:

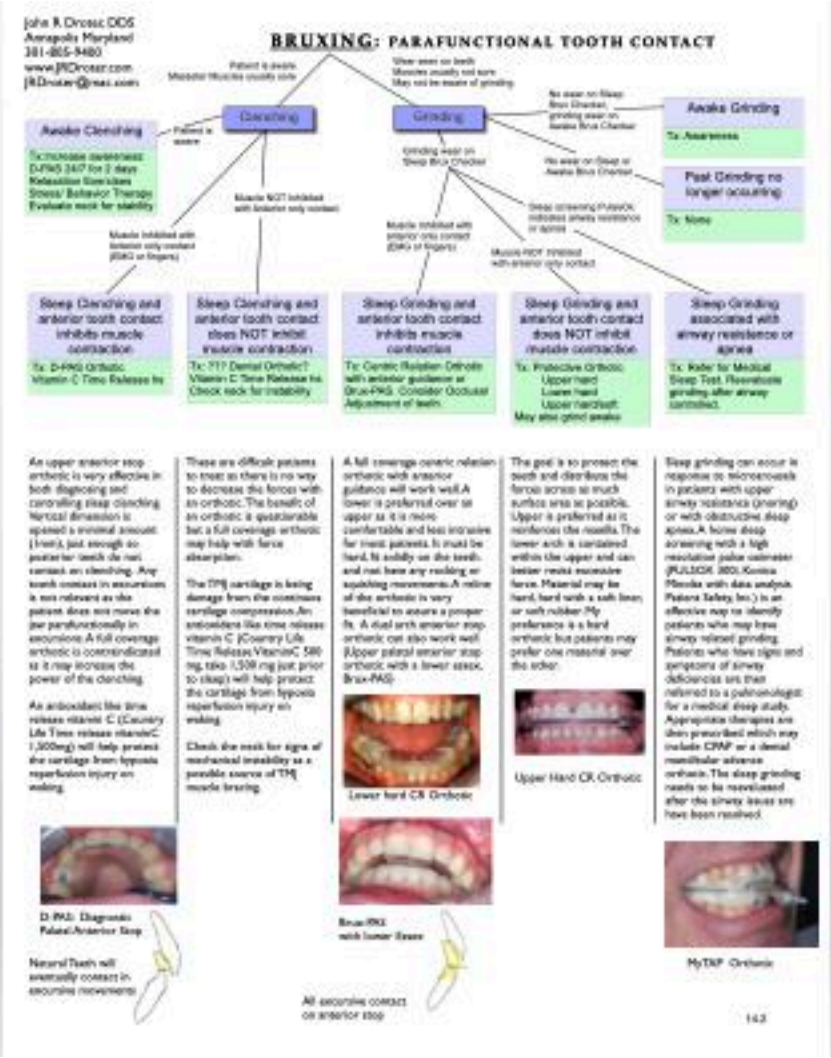
Parafunctional Sleep Clenching
Parafunctional Sleep Clench/Grind
Parafunctional Sleep Grinding
Other


BRUXING: PARAFUNCTIONAL TOOTH CONTACT
Patient is aware
Masseter Muscles usually sore
Wear seen on teeth
Muscles usually not sore
May not be aware of grinding
Clenching
Grinding
Awake Clenching
Patient is aware
Tx: Increase awareness:
Centric Relation Orthotic
Day Brux Checker
No wear on Sleep Brux Checker, grinding wear on Awake Brux Checker
Awake Grinding
Tx: Awareness
Possible Botox if Severe
Grinding wear on Sleep Brux Checker
No wear on Sleep or Awake Brux Checker
Awake Power Wiggler
Tx: Awareness
Possible Botox if Severe
Muscle Inhibited with Anterior only contact (EMG or fingers)
Muscle NOT Inhibited with Anterior only contact
Muscle Inhibited with anterior only contact (EMG or fingers)
Sleep screening PulseOx indicates airway resistance or apnea
Muscle NOT Inhibited with anterior only contact
Sleep Clenching and anterior tooth contact inhibits muscle contraction
Tx: D-PAS Orthotic
Vitamin C Time Release hs
Angstom Magnesium
Sleep Clenching and anterior tooth contact does NOT inhibit muscle contraction
Tx: Full protective orthotic
Vitamin C Time Release hs
Possible Botox if Severe
Sleep Grinding and anterior tooth contact inhibits muscle contraction
Tx: Centric Relation Orthotic or Brux-PAS. Consider Occlusal Adjustment of teeth.
Sleep Grinding and anterior tooth contact does NOT inhibit muscle contraction
Tx: Protective Orthotic
Upper hard
Lower hard
Possible Botox if Severe
Sleep Grinding associated with airway resistance or apnea
Tx: D-LAA orthotic, MAD, or CPAP.
Reevaluate grinding after airway controlled.

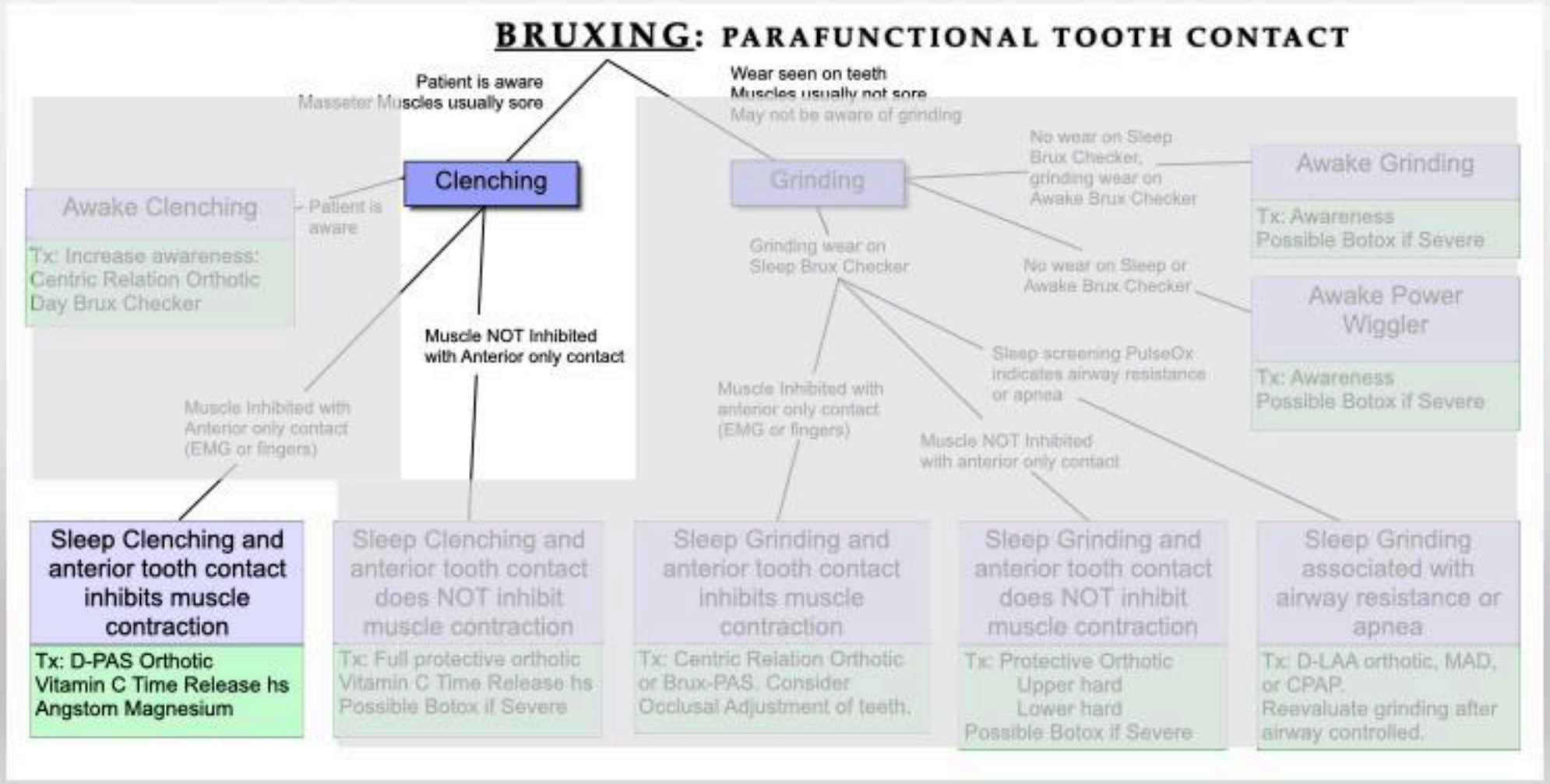
More Information on Bruxing:

www.JRDroter.com

Seminar Downloads
Bruxing SuperSheet



BRUXING: PARAFUNCTIONAL TOOTH CONTACT



1. Does the Patient Grind or Clench?

Clenching you squeeze your teeth together

Grinding you rub your teeth together

16 yo

Clenchers destroy the joint,
Grinders destroy the teeth

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

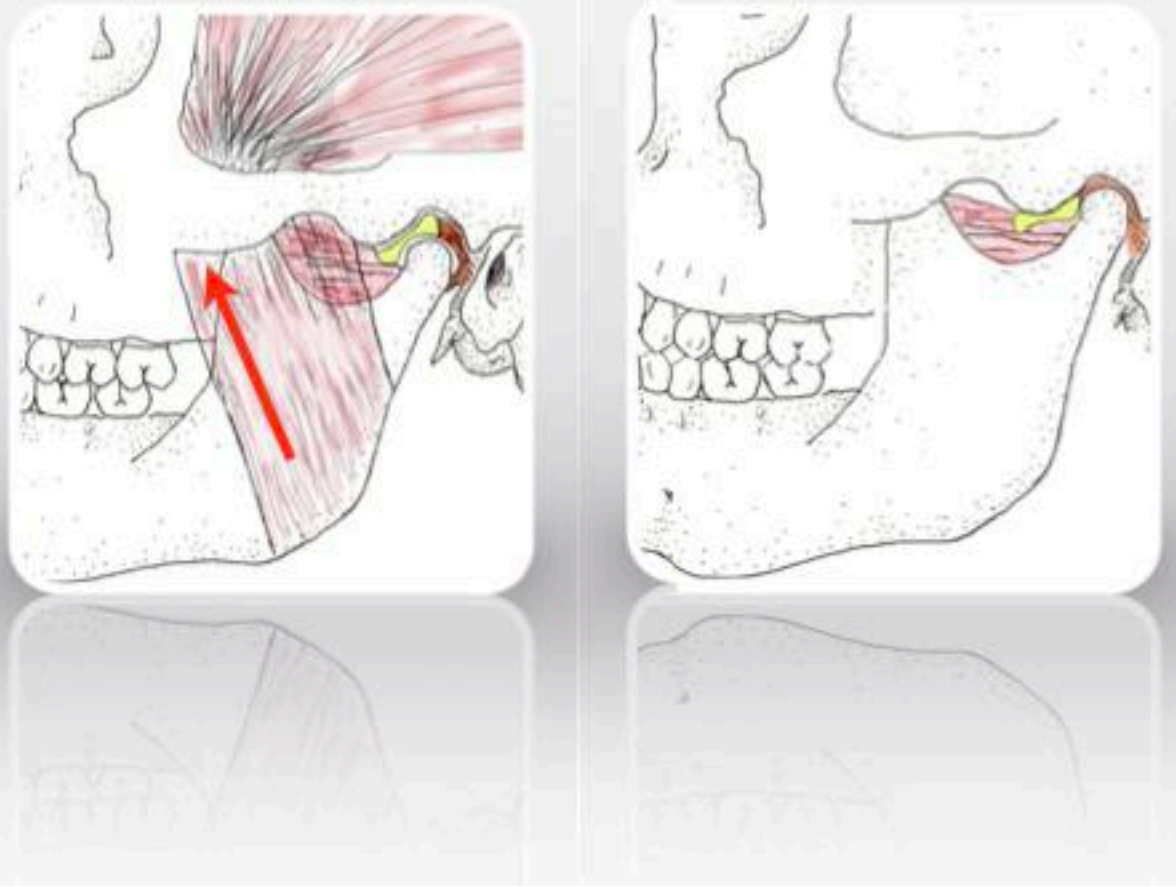
If patient is unaware of clenching-
Plant seed at hygiene visit
Do you clench?

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

Parker Mahan-
"Women Hurt, Men destroy"

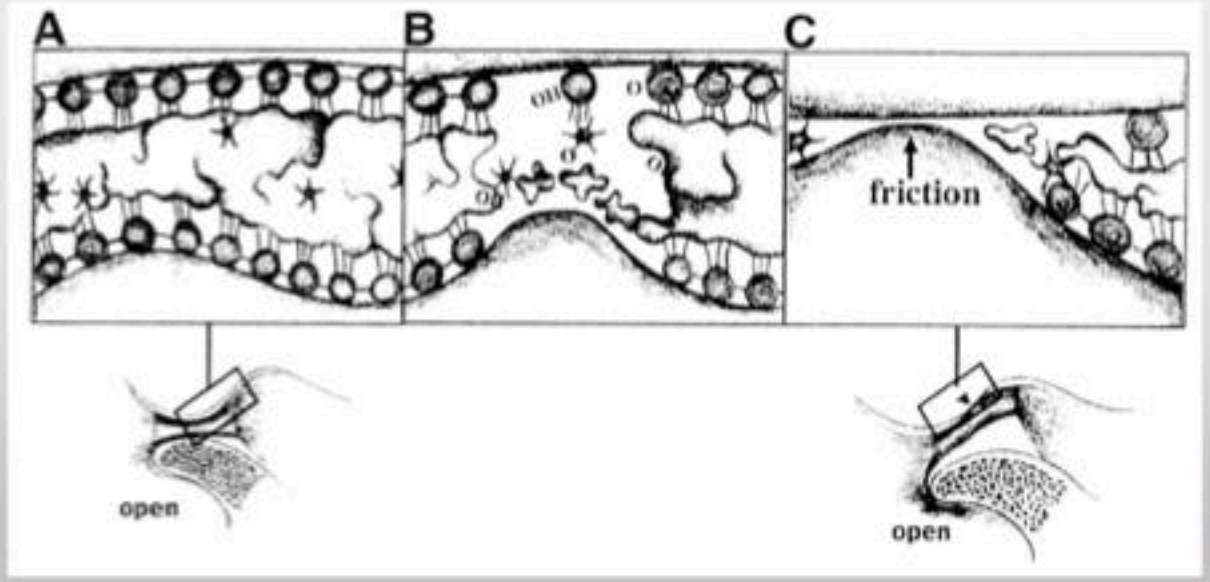
Clenching can cause disc subluxation

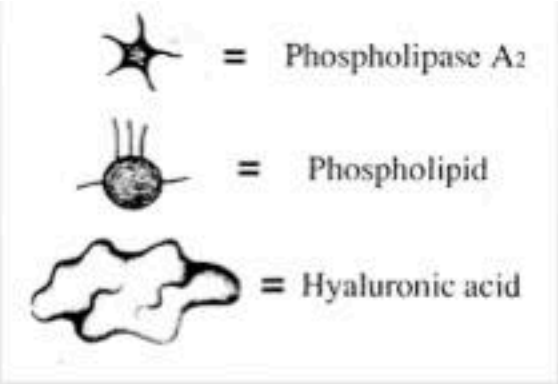
Chronic Micro Trauma from clenching



Clenching breaks down Hyaluronic Acid and Phospholipids

Creates "Sticky disc"





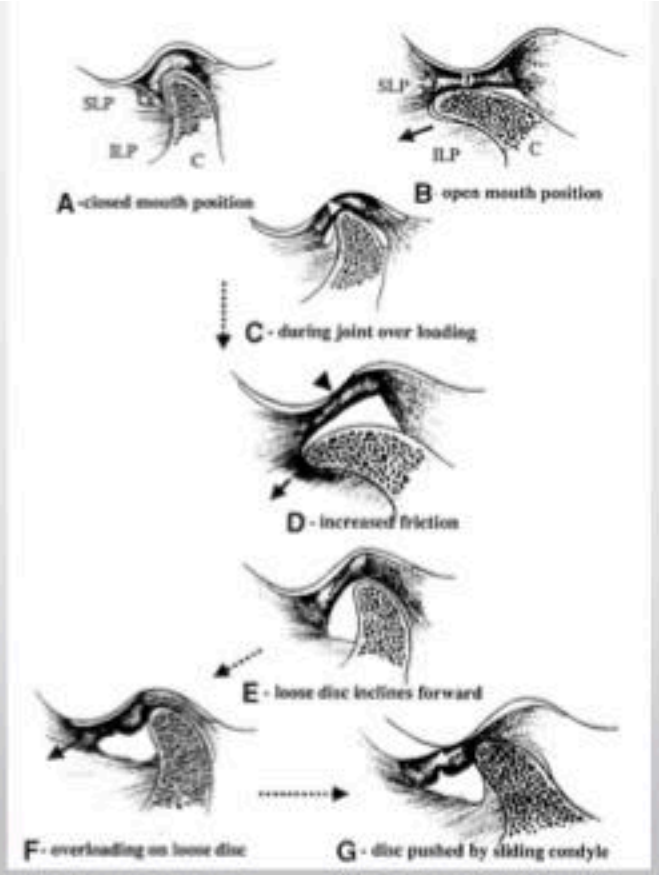
Nitzan, DW, The Process of lubrication impairment and its involvement in temporomandibular joint disc displacement: a theoretical concept, J Oral Maxillofac Surg. 59:36-45, 2001

Sticky Disc sticks as mandible moves

Ligaments loosen

Disc Distorts

Eventually ADD

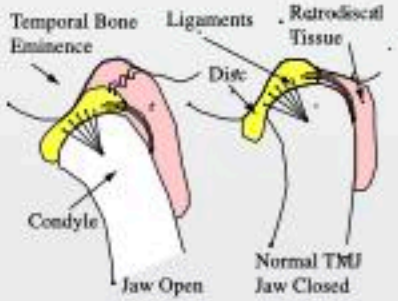


Dr. Dorit Nitzan

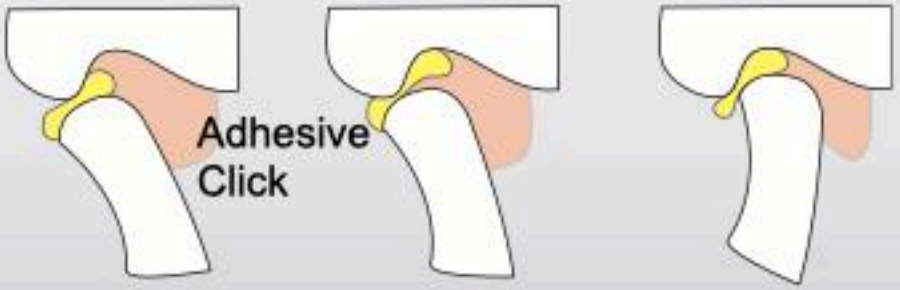
Nitzan, DW, The Process of lubrication impairment and its involvement in temporomandibular joint disc displacement: a theoretical concept, J Oral Maxillofac Surg. 59:36-45, 2001

Clenching can lead to disc dislocation

Normal

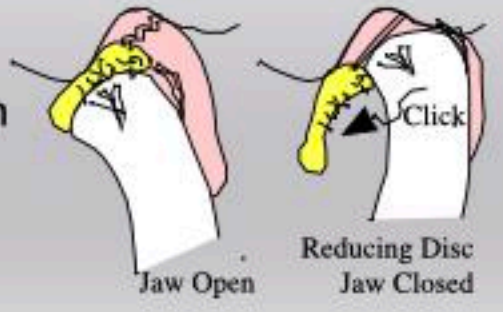


"Sticky Disc" - Clenching causes disc to stick in upper joint compartment. As condyle moves forward, disc distorts and eventually releases, making a clicking sound. On closing disc is slow to return, stretching discal ligaments.



Adhesive Click

Over time can lead to Anterior Disc Dislocation with Reduction



Nitzan, DW, The Process of lubrication impairment and its involvement in temporomandibular joint disc displacement: a theoretical concept, J Oral Maxillofac Surg. 59:36-45, 2001

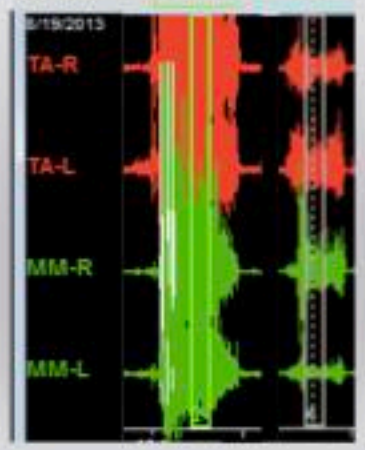
Are the TMJ muscles inhibited from full contraction with anterior only tooth contact?

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

Diagnostic
Palatal Anterior Stop
Orthotic

Patient with muscles
<u>inhibited by anterior only contact</u>

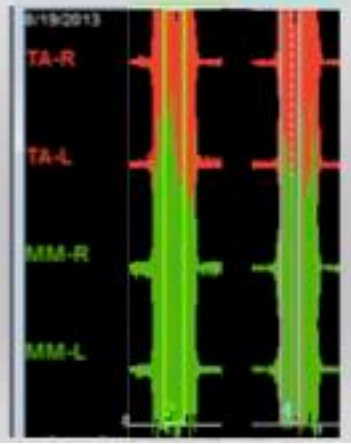
	Clench MaxIC	Anterior Stop D-PAS
	µV	µV
TA-R	100.6	15.7
TA-L	108.9	25.3
MM-R	115.4	25.5
MM-L	70.5	6.8



Major decrease in muscle power with D-PAS

Another Patient with muscles NOT
<u>inhibited by anterior only contact</u>

	Clench MaxIC	Anterior Stop D-PAS
	µV	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

Anterior Stop Orthotics

4 Different Uses
- Diagnostic Test
- Disease Management
- Patient Education
- Bite Record Tool

Modified Quick Splint
w/ Triad Trans Sheet

Test for Sleep Clenching
with anterior inhibition

ArrowPath Sleep
Anterior stop 2mm

In Office Dx Test for
- Occlusion/Cranial Alignment problem
- Tooth/Muscle Inhibition

Bite Record Tool

D-PAS
Diagnostic Palatal Anterior Stop

Test for
- Sleep Clenching
- Occlusal Muscle Dysfunction
- Mechanical Stability TMJ
- Tooth/Muscle Inhibition

Manage
- Sleep clenching w/ anterior inhibition

Anterior Stop Orthotics

Diagnostic Test
Patient Awareness
Disease Management
Bite Recording Tool

The D-PAS
Diagnostic Palatal Anterior Stop

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

Diagnostic Palatal Anterior Stop

D-PAS Test: Wear 3 nights, then 2 days

Better- Decrease Symptoms

Sleep Clenching: Wear D-PAS as night guard

Occlusal Muscle Disharmony: Occlusal Adjust

Worse- Increase Symptoms

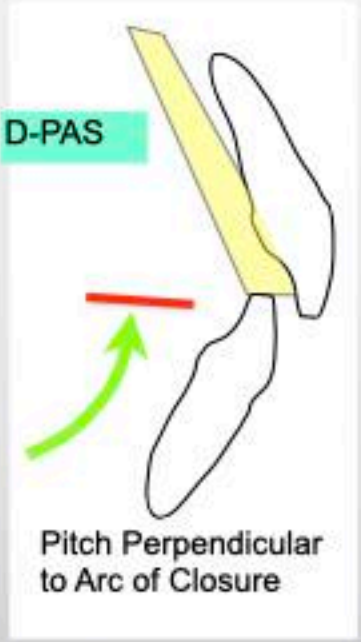
Mechanically Unstable TMJ, joint subluxation

Intracapsular Problem TMJ

Stays the Same- No Change in Symptoms

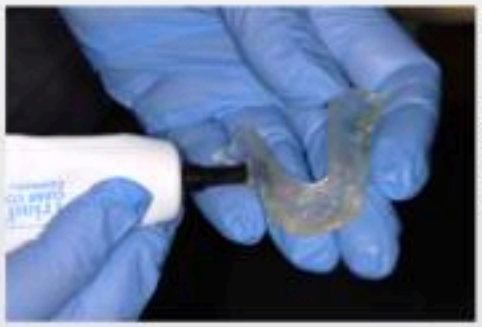
Damaged TMJ are mechanically stable

Pain not related to occlusion



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

Reline D-PAS



Dentsply/Sirona Eclipse and Triad materials no longer made

Keysplint Soft 3D Printed

Reline Pentron TempSpan Temporary Material dual cure

Seat in mouth

Wipe away Excess

Careful Cure 0.25 seconds

Reline will get very hot if cured too fast. Keep the light moving so no one area has light for more than 0.25 seconds at a time. All surfaces are exposed including the palate and distal to the molars.

How to create a D-PAS

Make your own

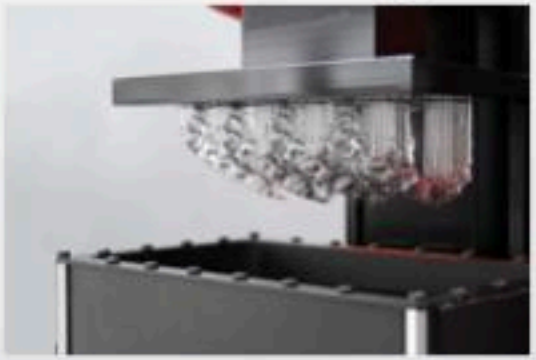
DuraSplint- Great Lakes Ortho
Methyl Methacrylate Acrylic

www.APSleep.com

Seminar Download

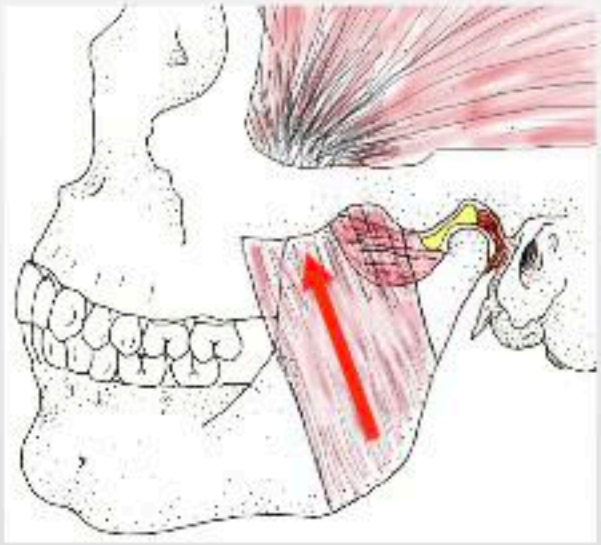
DPAS Construction

Digitally Printed D-PAS
www.APSleep.com



APS
ArrowPath Sleep

Hypoxia Re-perfusion Injury



Clenching: Static Loading No Oxygen/Hypoxia
On waking with joint motion get re-perfusion of Oxygen
Oxygen Free Radicals cause Oxidative Damage

If antioxidants (Vitamin A, C, E) around:
- Protects tissue from damage
- Vitamin C 1000 mg at dinner with other vitamins
  - NOW Vitamin C Sustained Release 1000 mg
  - Shaklee Vitamin C Sustained Release 500 mg x2

Tx for Clenchers: Vitamin C at dinner, possible add Mg++ at 8pm , D-PAS

Blake DR, Merry P, Unsworth J, Kidd BL, Outhwaite JM, Ballard R, Morris CJ, Gray L, Lunec J. Hypoxic-reperfusion injury in the inflamed human joint. Lancet. 1989 Feb 11;1(8633):289-93.

McAlindon TE, Jacques P, Zhang Y, Hannan MT, Do antioxidant micronutrients protect against the development and progression of knee osteoarthritis?, Arthritis Rheum. 1996 Apr;39(4):648-56.

Magnesium Nutritional Supplementation

Magnesium is the “Muscle Relaxation” mineral- used in ER and Obstetrics
Magnesium deficiency may increase clenching
Most Magnesium is intracellular so blood test may not detect deficiency

Supplemental Magnesium
Take 2h before bed (8pm).
Too much will cause Diarrhea. Right amount will loosen stools.
Need to be sure kidneys are healthy

Natural Calm Magnesium Citrate- 1 teaspoon (162mg)
Mother Earth Ionic Angstrom Magnesium- 0.5 teaspoon sublingual (5mg)

www.naturalvitality.com

www.meminerals.com

Muscle Nerve. 2014 Apr 8. doi: 10.1002/mus.24260. Extracellular magnesium and calcium reduce myotonia in isolated ClC-1 inhibited human muscle. Skov M1, de Paoli FV, Lausten J, Nielsen OB.

Gynecol Endocrinol. 2007 Jul;23(7):368-72. Magnesium ion inhibits spontaneous and induced contractions of isolated uterine muscle. Tica VI1, Tica AA, Carlig V, Banica OS.

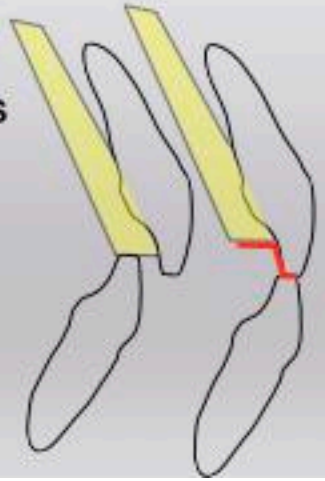
Studies on magnesium deficiency in animals: i. symptomatology resulting from magnesium deprivation. H. D. Kruse, Elsa R. Orent and E. V. McCollum. J. Biol. Chem. 1932, 96:519-539.

Treating Common TMDs in a General Practice

Diagnosis	Pattern	Management Treatment
Sleep Clenching with anterior tooth contact inhibition	Sore masseters on waking Morning TMJ clicking that resolves Sleep D-PAS Relieves Symptoms	D-PAS Night Guard Time Release Vitamin C hs Magnesium

Patient is usually aware of clenching
Strong Masseters, Sore Masseters
See slight wear around tooth contacts
Damage TMJ cartilage

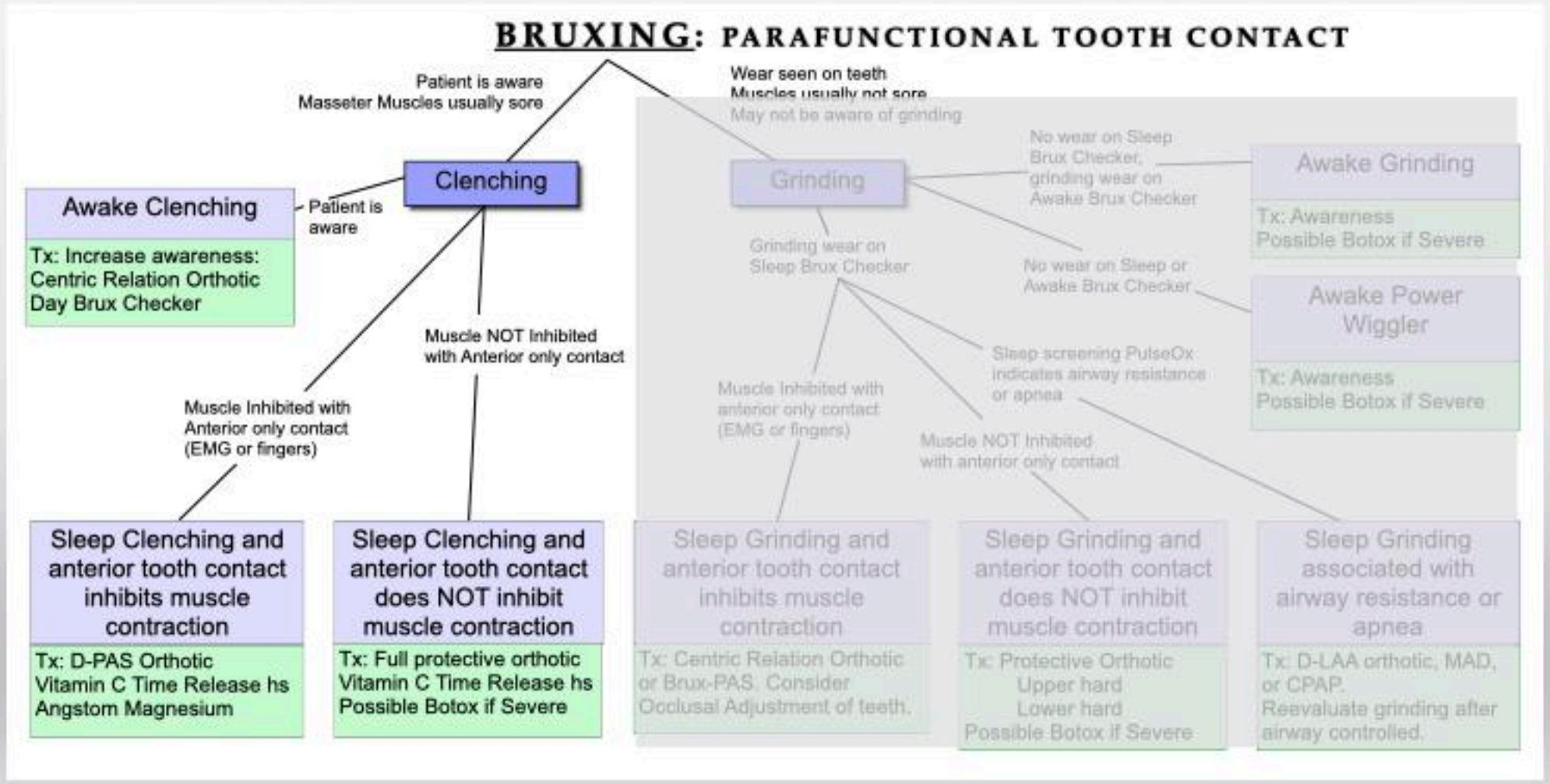
If sleep D-PAS eliminates sore masseters, this becomes this becomes their sleep orthotic.



Palatal Anterior Stop Orthotic

Caution:
Make sure power muscles are inhibited with D-PAS in place.
If no inhibition, do not use D-PAS as management orthotic.

BRUXING: PARAFUNCTIONAL TOOTH CONTACT

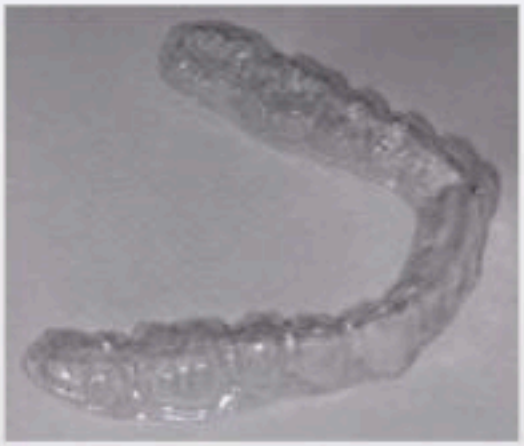


Daytime Clenching- Clear Brux Checker

Increase awareness to break habit

Very thin: Similar to mylar used for composites

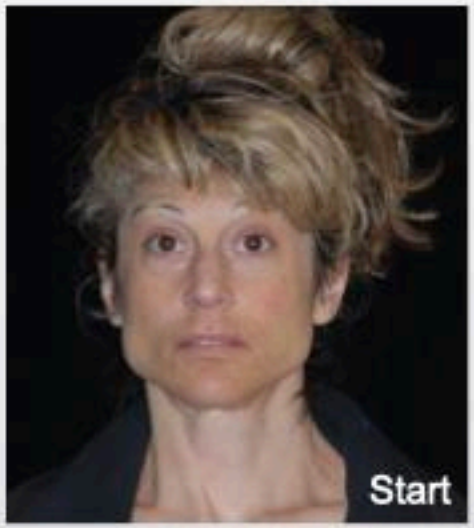
50 µm thick

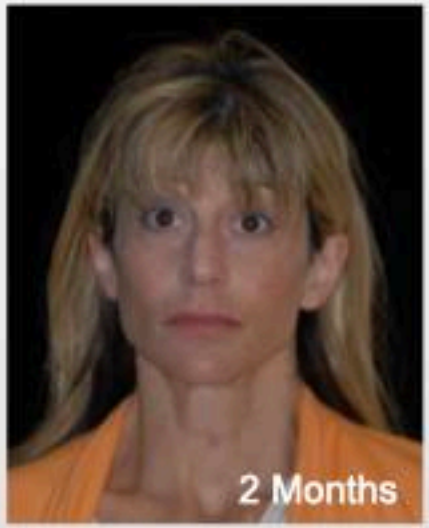


Great Lakes Orthodontics
Biostar Platzhalterfolie
Item Ref 3202.1

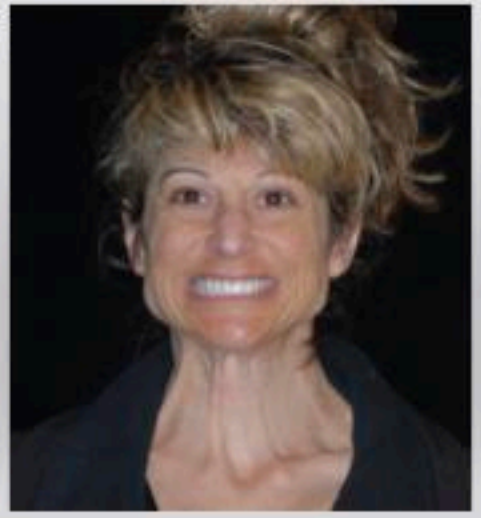
Clenching with no Muscle Inhibition

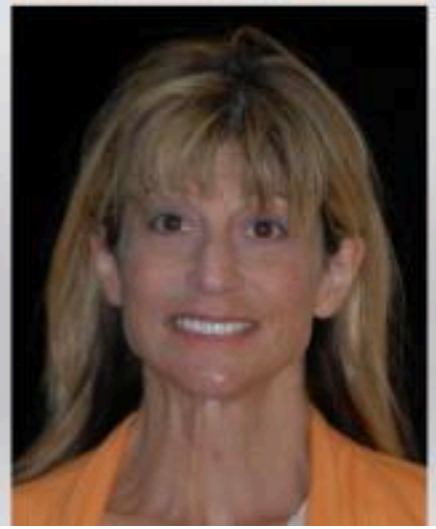
Botox injection
Masseter
Muscles

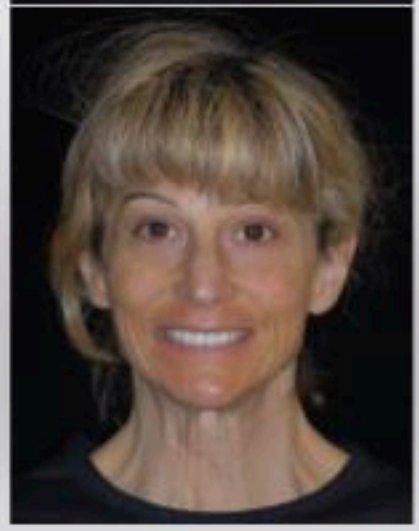




Botox will decrease strength of bruxing contraction. Decrease Masseter Hypertrophy







J Plast Reconstr Aesthet Surg. 2010 Dec;63(12):2026-31. Evaluation and selecting indications for the treatment of improving facial morphology by masseteric injection of botulinum toxin type A. Gaofeng L1, Jun T, Bo P, Bosheng Z, Qian

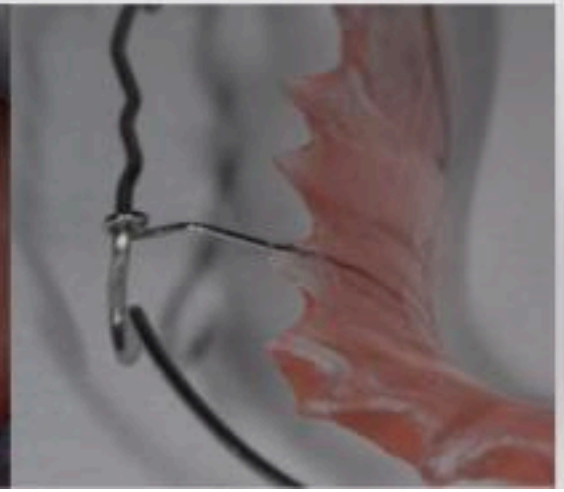
Invisalign or Essex Retainers and Clenching

Unless parafunctional tongue habit, wearing nightly will cause posterior intrusion

Heavy Anterior contact, patient will squeeze, clench to get back teeth together

Treatment: Occlusal Adjust verses Occlusal adaptation composite on 2nd molars

Hawley Retainers with thin trans-occlusal wires




Know Yourself
Know Your Work
Know Your Patient
Apply Your Knowledge
LD Pankey Institute
Write your Dream

myobrace makes
OTC Shock Doctor Braces- silicon

Observations:

PURE Observations- No thinking
Trust your observations
Critical, logical thinking, not biased

Explanations (beliefs):

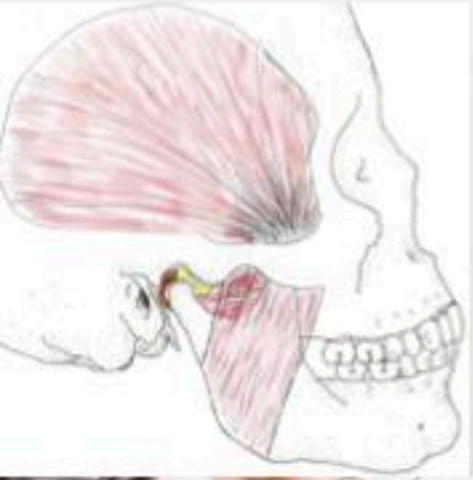
Not always accurate
Best at the time
Passed on from others
Can alter your observations

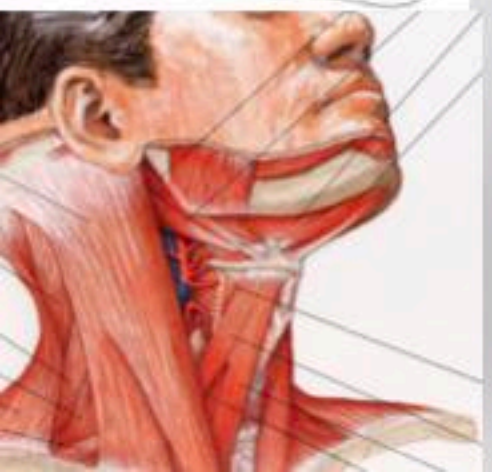
Do not become emotionally attached to explanations

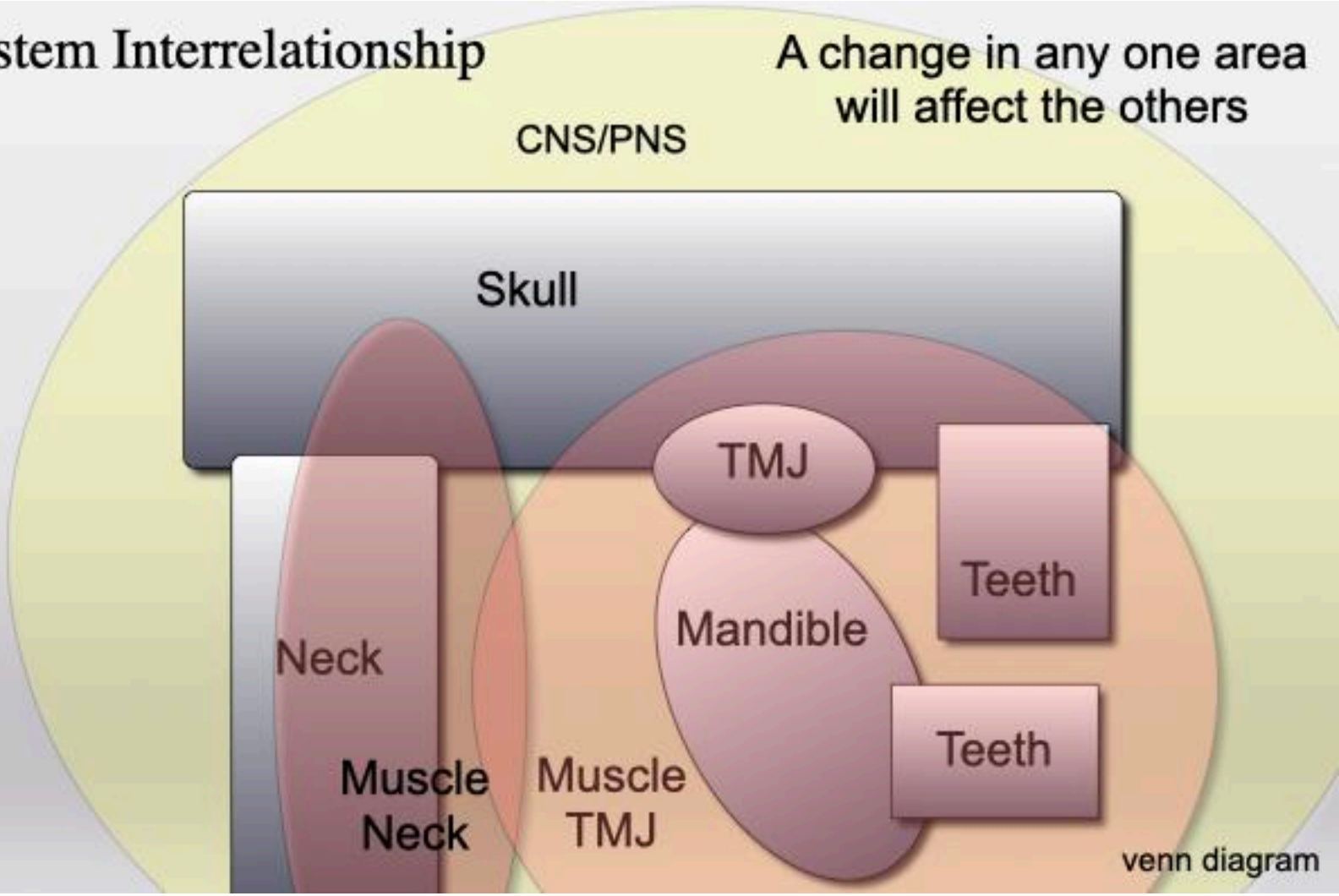
3 ways……..

Stomatognathic System Interrelationship

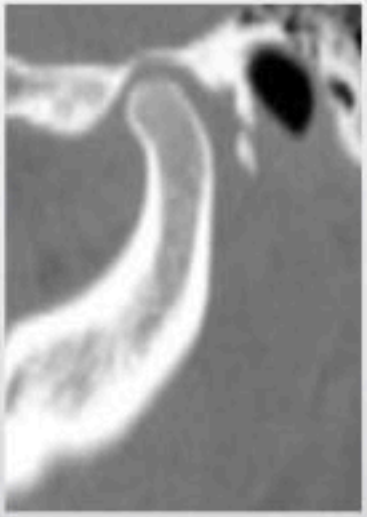
A change in any one area will affect the others







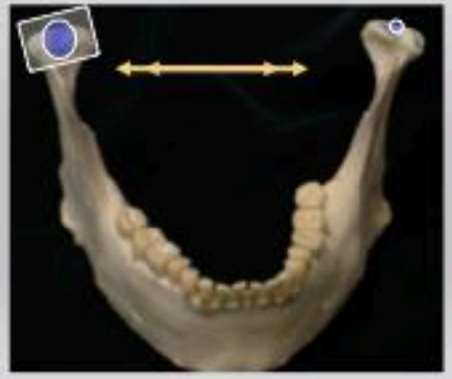
I use both Centric Relation and Non-Centric Relation Orthotics



Treatment Position vs Final Position: Do Not Confuse the Two

Treatment Position Creates Change (Adaptation)
- Treat: Painful CR Load Zone
  - Mechanically Unstable Centric Relation Loading
  - Cranial bones misaligned

Final Position Creates Stability (Centric Relation)
- When the forces are balanced, Adaptation Stops

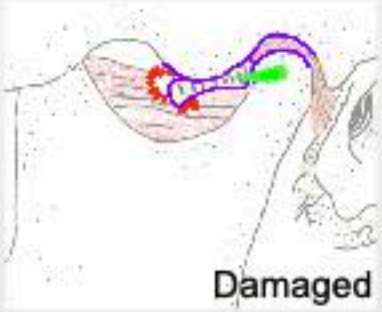


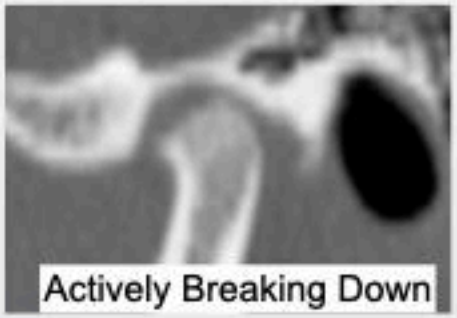
Basic Orthopedics

Joints are either
- Healthy or
- Damaged

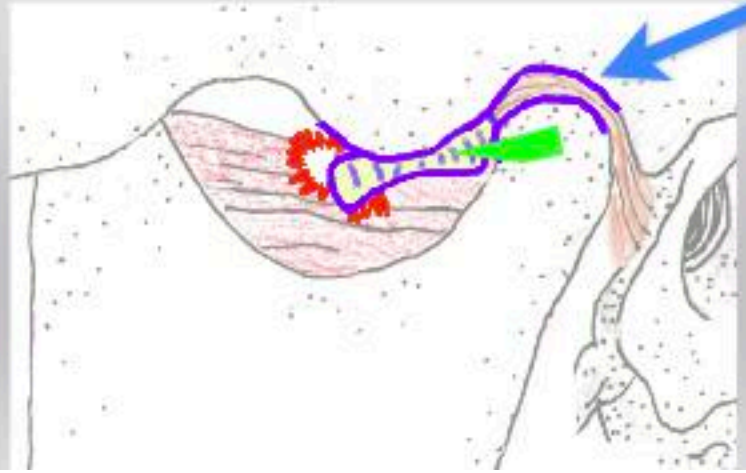
If damaged, joints will be either:
- Actively Breaking Down
- Adapting
- Adapted
  - Structurally, Mechanically
  - Favorably, Unfavorably


Healthy


Damaged


Actively Breaking Down

Majority of damaged TMJs adapt favorably

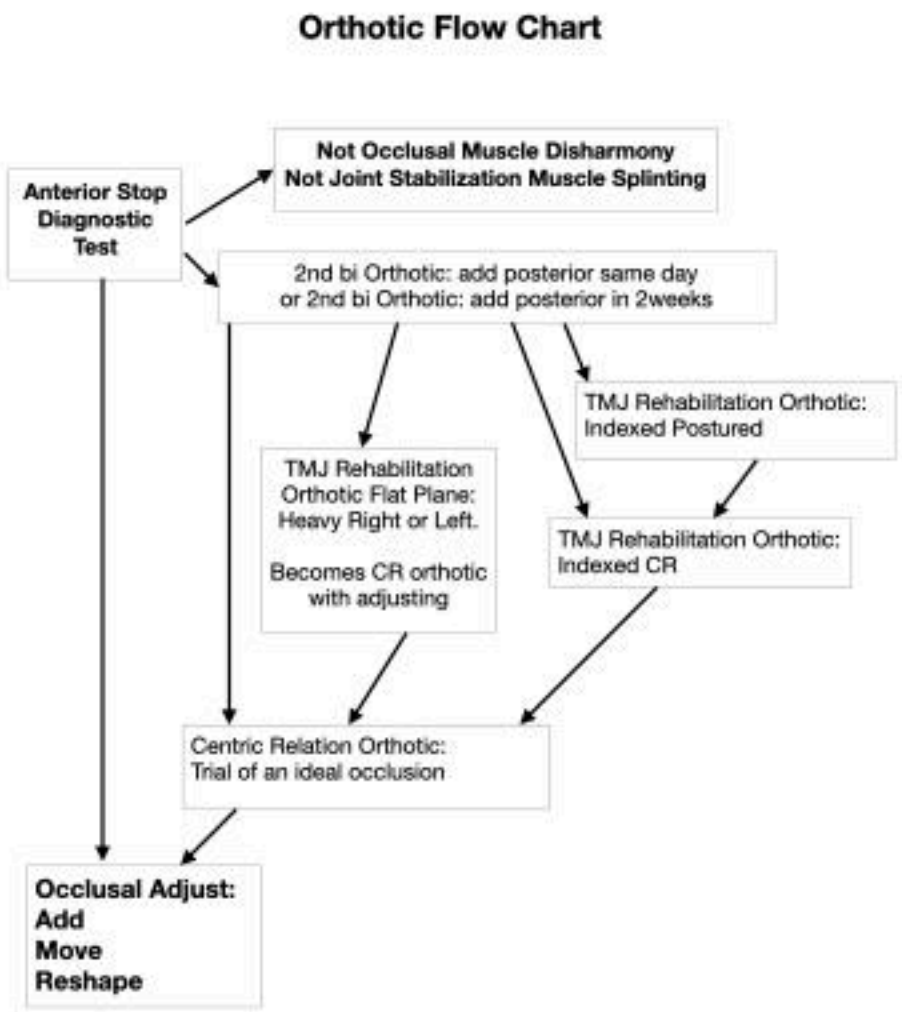


Posterior ligament, synovium, and retrodiscal tissue adapt to form a

Pseudo-disc

Tissue Fibrosis

Orthotic Flow Chart



Exam and Diagnostic Tests

John R Droter DDS
Annapolis, Maryland

Different Diagnoses have Different Therapies

Specific Diagnosis

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

1. TMJ Damage
2. Muscles of the TMJ
3. Cranial Alignment/Occlusion
4. Cervical Damage
5. Parafunction
6. Whole Body / Systemic
7. Other

Specific Therapy

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

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
Lower soft sectional orthotic
Condylar distraction
Sectional orthodontics
Expansion orthopedics/ orthodontics
Restorative Dentistry
Occlusal Adjustment with OTR, TekScan

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
Diagnostic Palatal Anterior Stop
Brux Checker
Lower full coverage CR
BiArch Posterior Deprogrammer
Upper full coverage hard CR guard
Temporary home use anterior stop
Myobrace
Aqualizer
Lower Soft Sectional
Lower posterior deprogrammer
Lower TMJ Rehab flat plane
Lower postured indexed
Lower CR Indexed
Mandibular Advancement Device
Lateral Bruxing Device

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

70

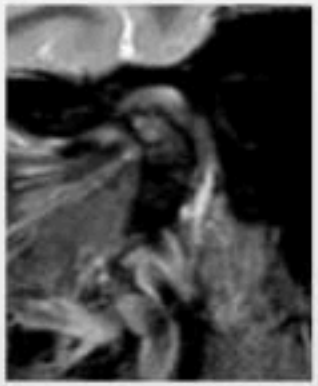
Facial Pain Diagnosis

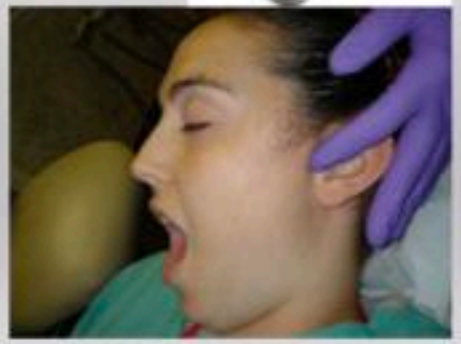
Diagnostic Tools

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

<u>Biometrics</u>
- Joint Vibration
- Jaw Tracker
- Electromyography
- T-Scan

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





Facial Pain Diagnosis

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.

Diagnostic Tools

1. **Written and Oral History**
2. **Observation**
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   - Joint Palpation
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   - Joint Motion
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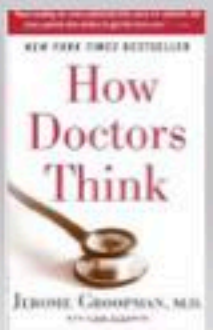
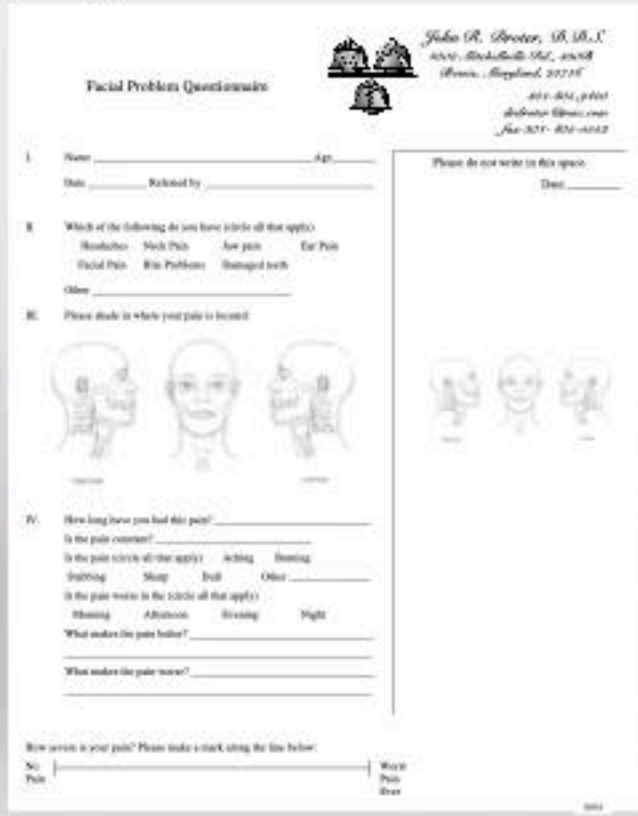
6. CT Scan
   MRI
   Blood Tests

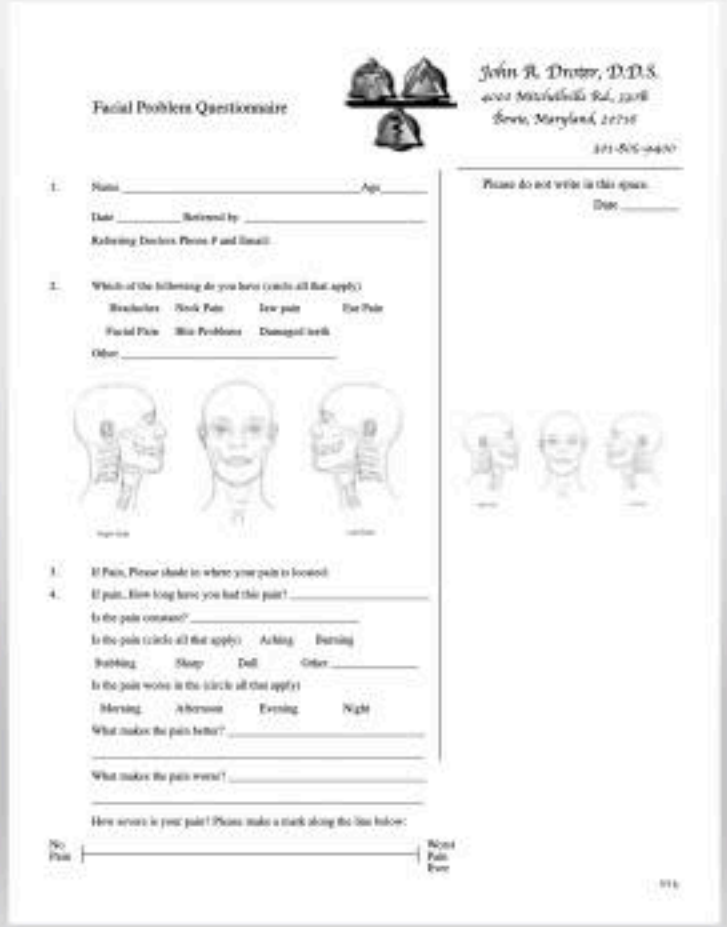
Need to resist the temptation to zero in on one diagnosis.

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





Facial Problem Questionnaire



Facial Problem Questionnaire

John R. Droter, D.D.S.
4101 Mitchellville Rd., 3208
Bowie, Maryland, 20716
301-805-0400

Please do not write in this space.
Date _____

1. Name _____ Age _____
Date _____ Referred by _____
Referring Doctors Phone # and Email:

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

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

111

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 wether they have pain or not

Question 20 is the most important of all

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

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.

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

FAB
- Feature
- Advantage
- Benefit

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

What would you like to accomplish with treatment here?

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 $$

Facial Pain Diagnosis

Diagnostic Tools

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   - Joint Palpation
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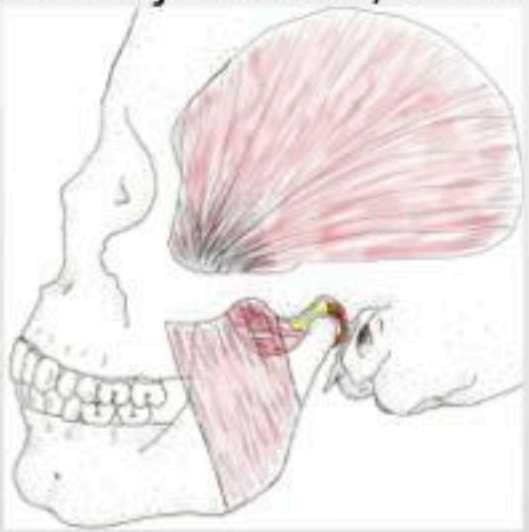
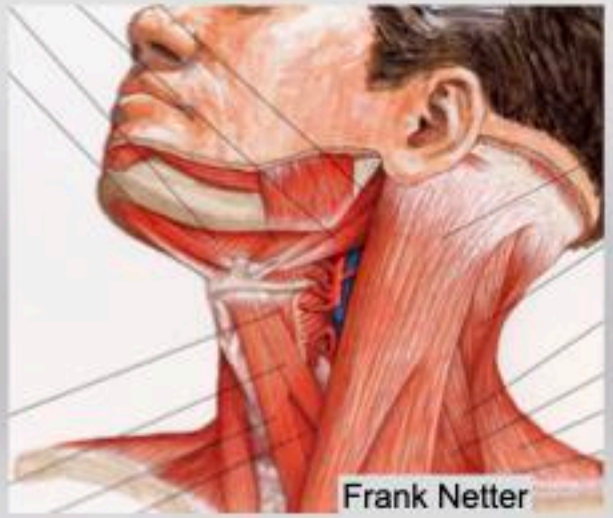
6. CT Scan
   - MRI
   - Blood Tests

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

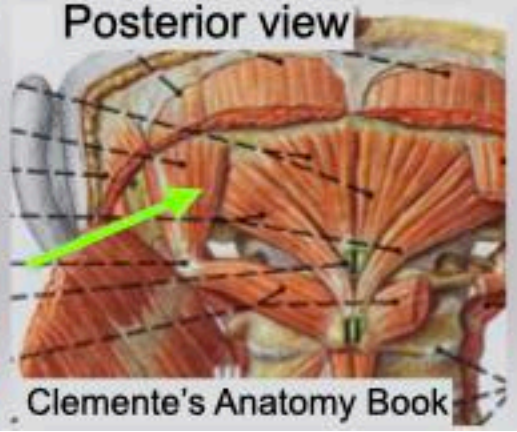
Anterior Temporalis
Masseter
Posterior Digastric
Superior Oblique Capitus
Deep Temporalis
Lateral Pterygoid





Frank Netter

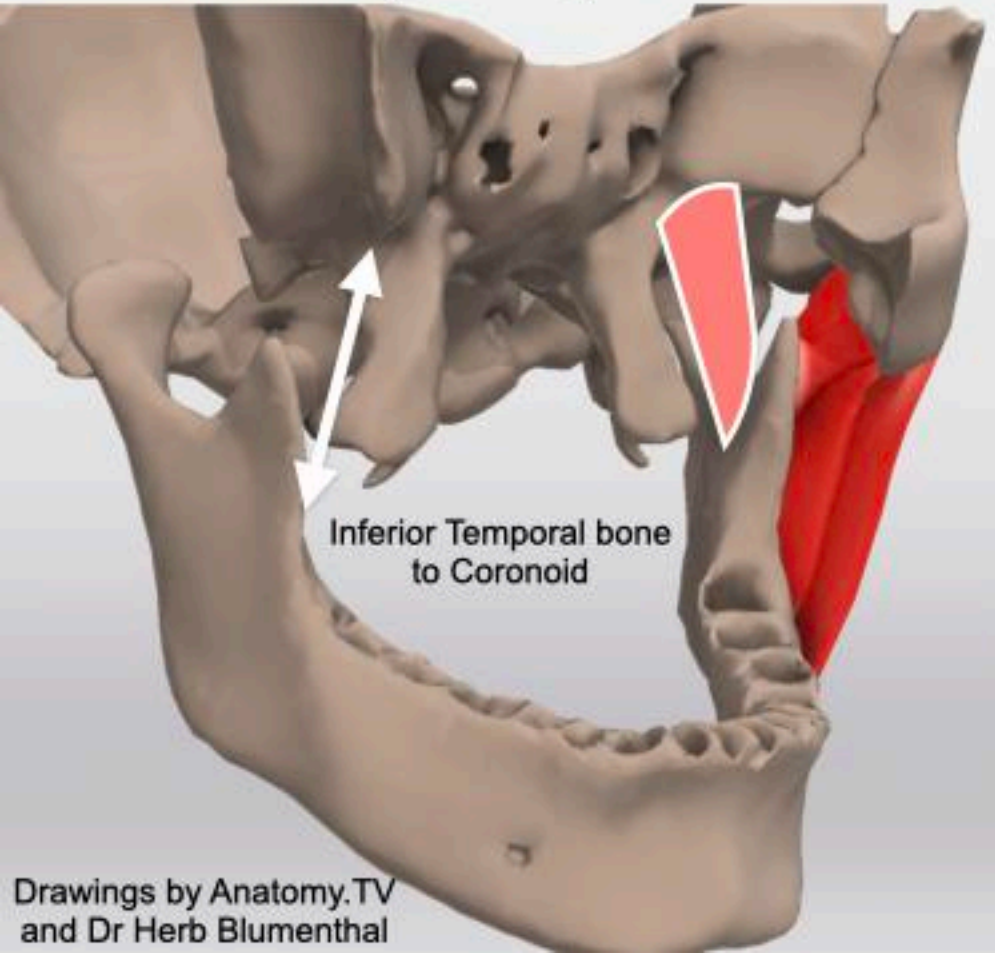
Posterior view



Clemente's Anatomy Book

Anatomy TV

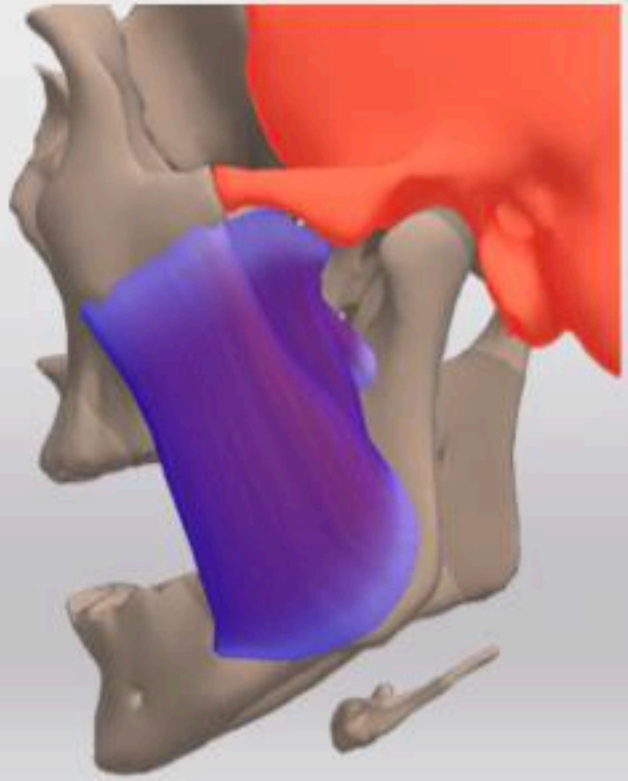
Deep Temporalis



Drawings by Anatomy.TV
and Dr Herb Blumenthal

Masseter Muscle is Complex

Complex Muscle
3 Different Portions
3 Different Functions



Sternocleidomastoid, Trapezius, Omohyoid

Trapezius

Omohyoid

Sternal Head

Clavicular Head

Facial Pain Diagnosis

Diagnostic Tools

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   - **Joint Palpation**
   - Joint Auscultation
   - Joint Motion
4. Anterior Stop Test
5. Sleep Airway Screening
6. CT Scan

   MRI

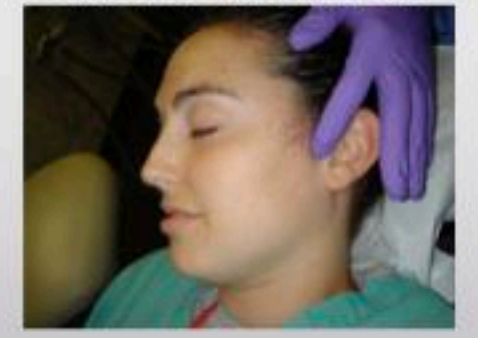
   Blood Tests

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

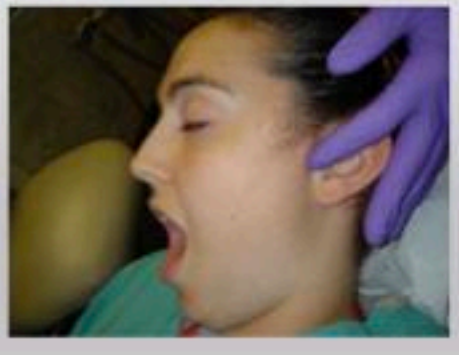
Palpation and Load

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

Anterior Lateral Pole



Posterior Lateral Pole



Indirect through Ear

Load Testing

No pain does not mean stable

Reviewed 600 cases (MRI and CT Scans) at my practice of facial pain:

6.5% cases had structurally unstableTM joints. 39/600
(A general practice will have less % structurally unstableTM joints)

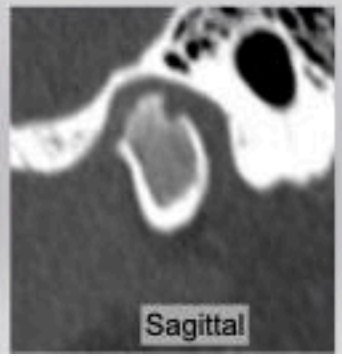
CR Load test on these 39 joints:
CR Load Positive Soreness 22/39 (56%)
Missed 17/39 structurally unstable joints (44%)

CR and Lateral Load test on these 39 joints:
Positive Soreness of one or both test 33/39 (85%)
Missed 6/39 structurally unstable joints (15%)

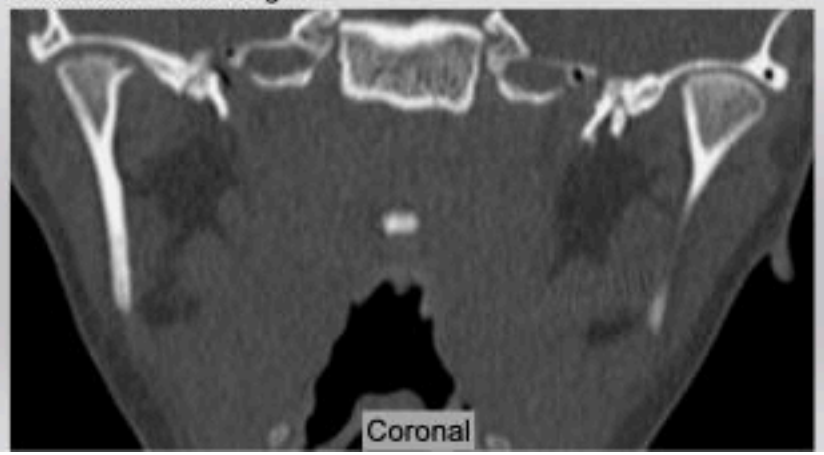
Load Test Bimanual Manipulation

46yo F
CR Load Normal
Excursion Load Normal

40yo F
CR Load Normal
Excursion Load Slight



12yo F- CR Load Normal
Excursion Load Slight

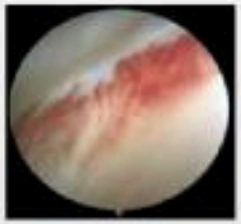


Differential Diagnosis: Painful TMJ

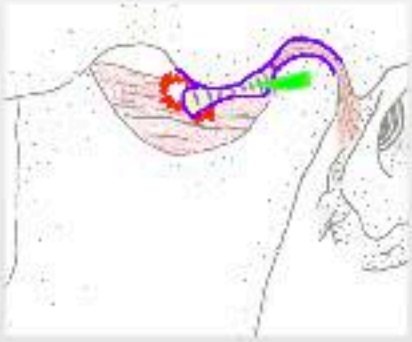
Inflamed Tissue
- Acute Ligament Sprain
- Synovitis/Capsulitis
- Pannus
- Retrodiscal Tissue Impingement
- Retrodiscal Tissue Inflammation
- Inflammatory Tissue Bone Resorption
- Deep Masseter inflammation
- Ear Inflammation

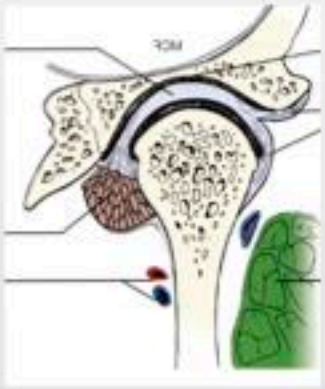
Inflamed Bone
- Osteoarthritis
- RhA
- Hypoxic Progressive Condylar Resorption
- Lyme Arthritis
- Psoriatic Arthritis
- AVN

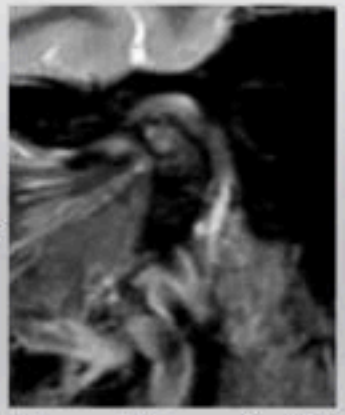
Synovitis



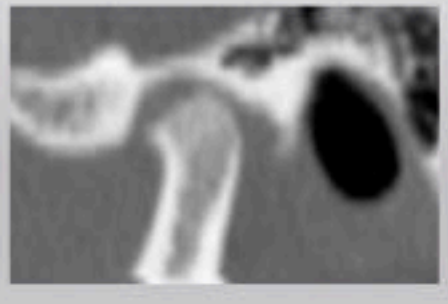
Retrodiscal impingement







Inflamed tissue in joint



Missing cortex

OA cyst

Facial Pain Diagnosis

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- Joint Palpation
- **Joint Auscultation**
- Joint Motion

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

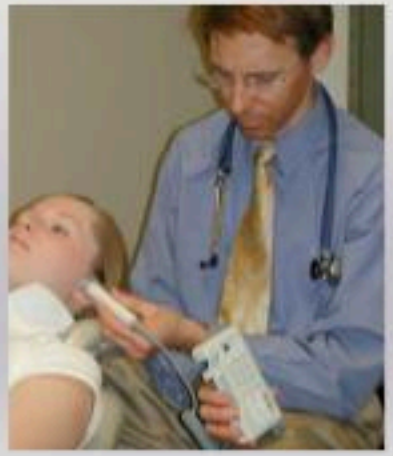
A healthy joint is quiet,
A damage joint is not.
A joint that does not move is also quiet.

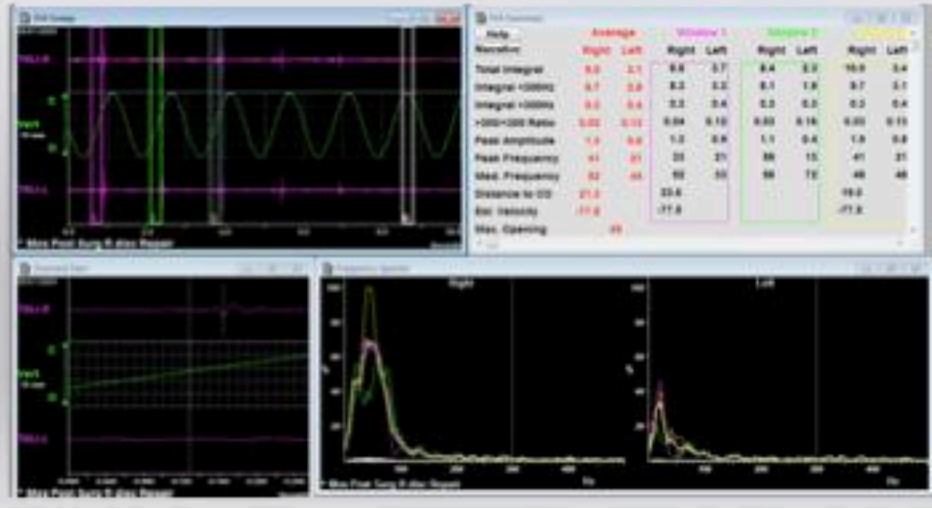
Sounds/ Vibrations

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
Stethoscope

Use Bell side, not Diaphragm side, over the TMJ

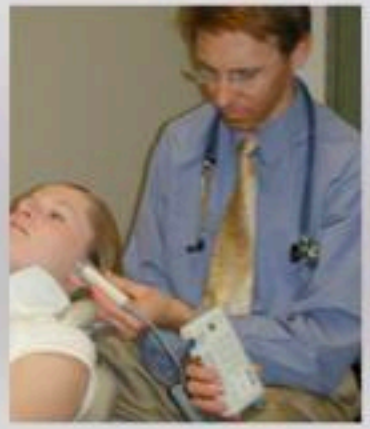
3M Littmann Classic II S.E. Stethoscope

My Subjective Description of Joint Sounds

smooth	fine	crackle	<u>Click</u>
paper	med	crunchy	soft
sand	coarse	squeaky	crisp
pebbles		scratch	squishy
rocks			early
glass			late
			100%
			75%
negative joint movement			50%
minimal joint movement			25%
			sporadic
			??

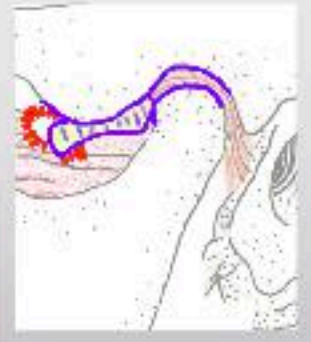
Sounds/ Vibrations
Doppler

Doppler measures motion toward or away from the source



A Health Joint is Quiet

Find Superficial Temporal Artery
Listen for Retrodiscal Expansion
Cavernous Vein Expansion
Pin back Tragus, Aim for eye
Rapid velocity to find best location
Diagnostic velocity jaw movement



Skin Movement causes errors

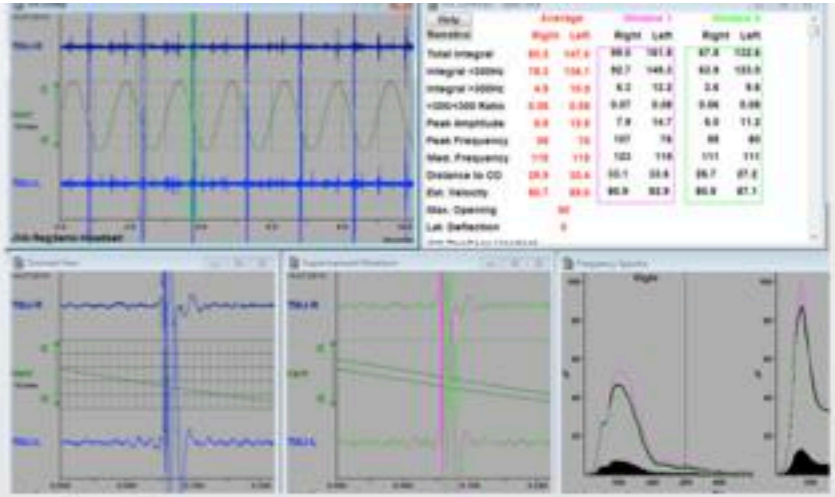
Doppler only hears what occurs at lateral portion of condyle.
Small degenerated condyles are quiet.

All dopplers generate different sounds for different motions

Landmark Medical, Inc. 800-334-5618
Huntleigh Mini Dopplex 5hz
Great Lakes Orthodontics 800-828-7626

Joint Vibration Analysis

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



Based on Sonar.
It is not a microphone

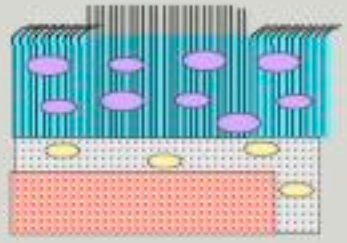
Three main types of sounds

Disc Reduction
Disc Dislocation
Adhesion crackle
tooth tap

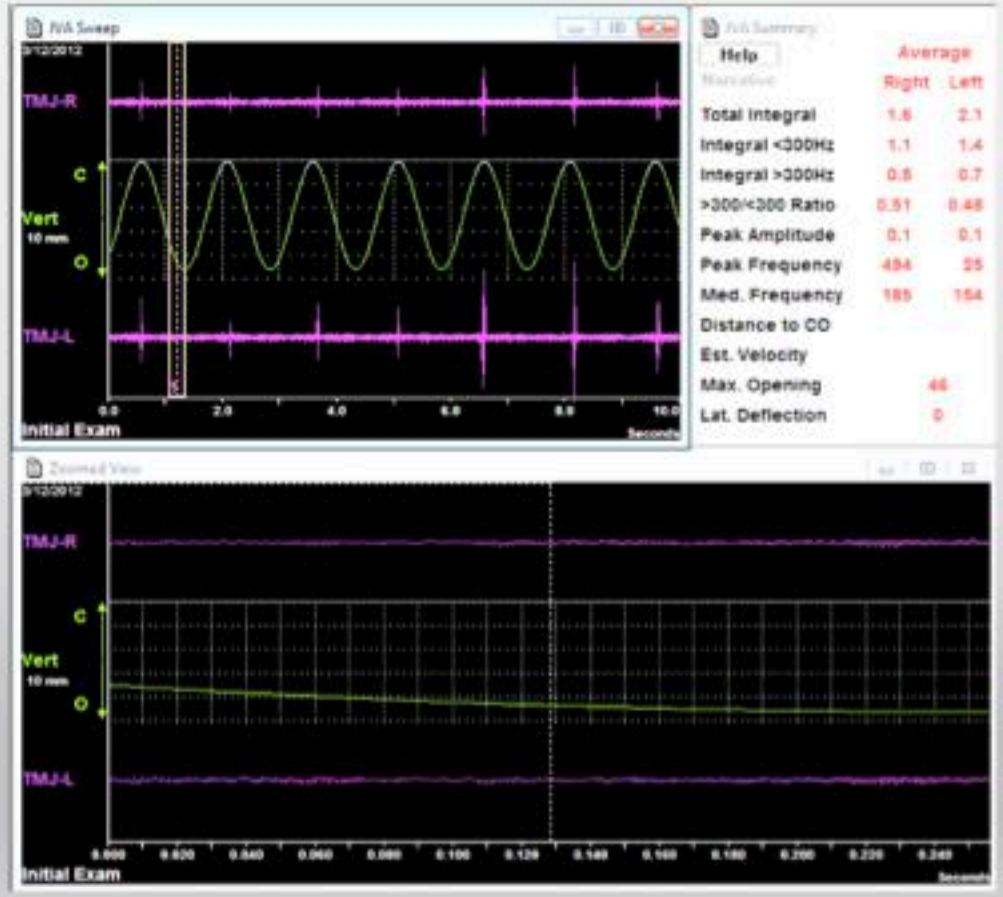
Osteoarthritis
Pseudo Disc
Damaged Cartilage

Disc Subluxation
Joint Subluxation
Disc Reduction
Disc Dislocation

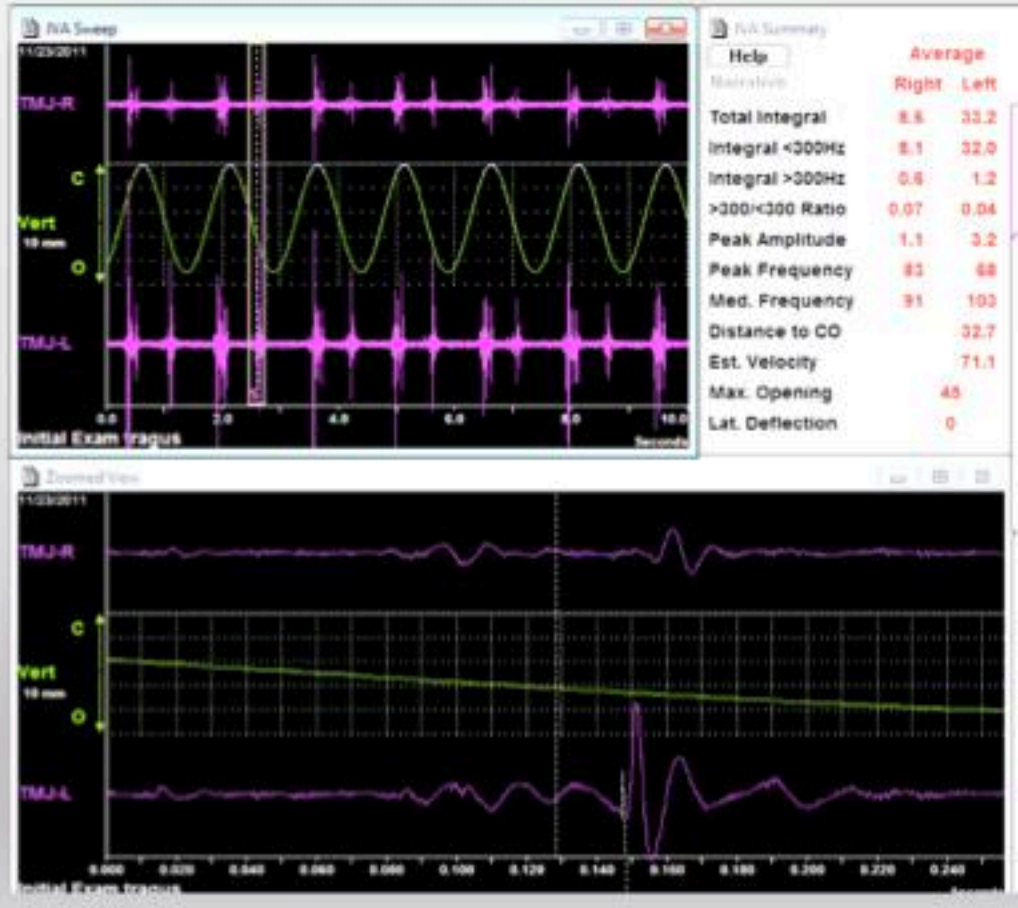
JVA measures the health of the cartilage



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

Differential Diagnosis
All the choices

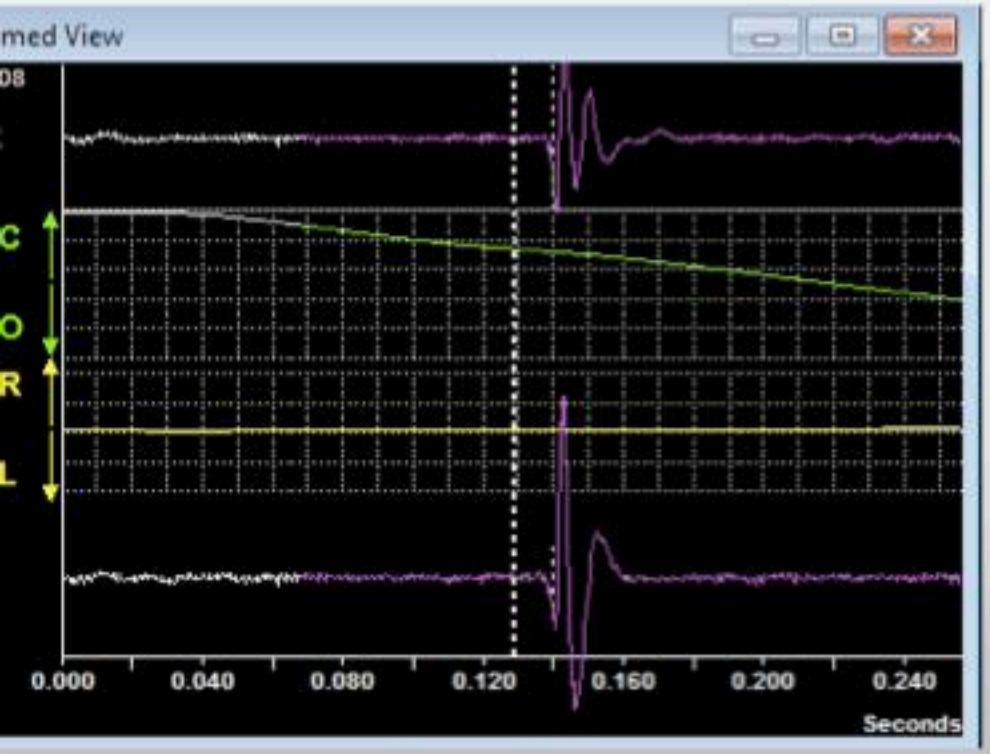
Diagnostic tests
Narrow down the choices

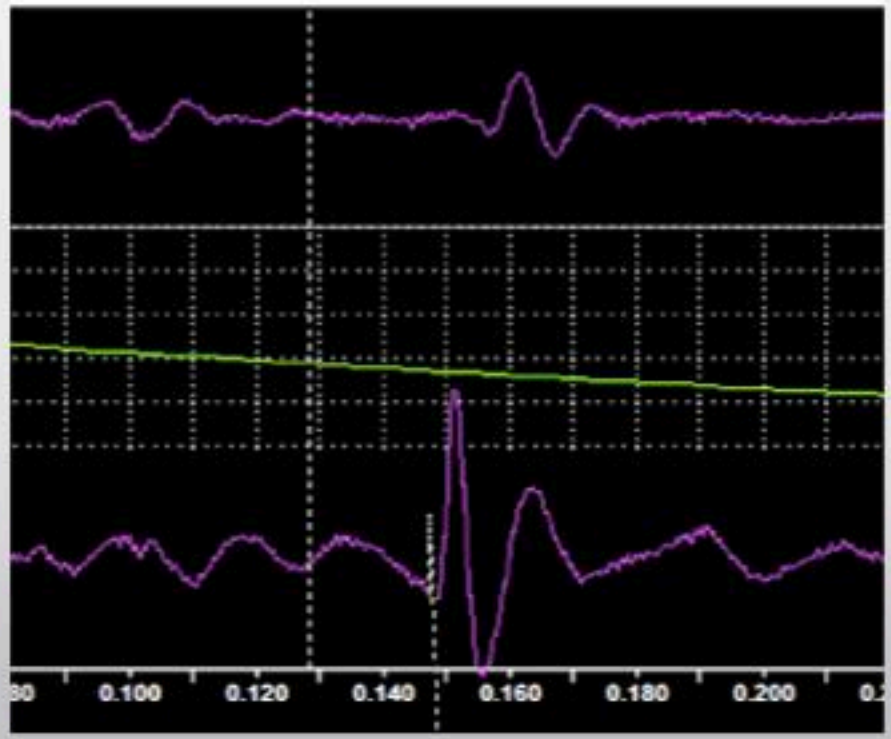
Working Diagnosis
Treating as if

Not completely resolved

Final Diagnosis
Only after problem resolved

Simple or Complex





Simple left click with transference vibration to right
L4a

Complex Click
L3a, R4b

Magnetic Resonance Imaging

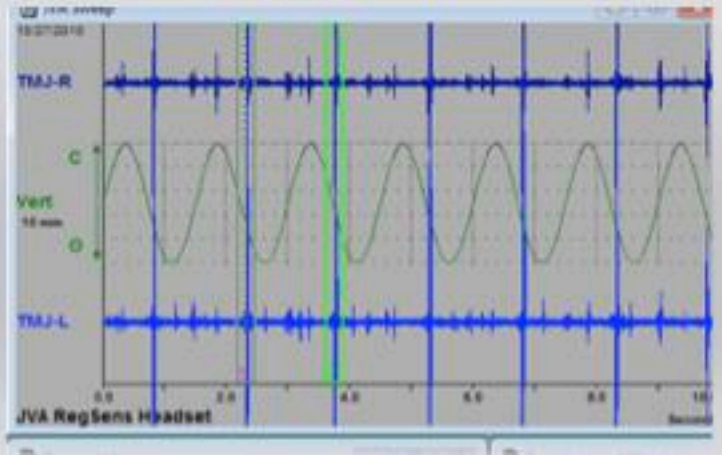
MRI gives you the start and finish
You have to infer what happened in between

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



Facial Pain Diagnosis

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   MRI

   Blood Tests

Evaluate for Full, Smooth Range of Motion

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

Take 4 Measurements:

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

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

Normal excursion are 25% of the max open

Evaluate Smoothness:
Light hold on chin as patient moves jaw

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

TMJ Movement/Function History

No Clicking, no Pain,
no Limited opening, no Trauma

Can They Chew?

Has the clicking changed?

Download Facial Problem Questionnaire
www.jrdroter.com

6.	Does it hurt to move your jaw?	Y	N
	Does it hurt to chew?	Y	N
	Any discomfort upon chewing hard foods like carrots?	Y	N
	Do your jaw muscles get tired from chewing?	Y	N
	Does it hurt to open wide?	Y	N
	Which side of your jaw makes a clicking/popping noise?	R	L
	Which side of your jaw makes other noises?	R	L
	What Noises? _____		
	When did you first notice the noises or clicking? _____		
	Have you noticed any changes in noises or clicking?	Y	N

7.	Have you ever not been able to open your jaw all the way?	Y	N
	Have you ever had to wiggle your jaw to get it open?	Y	N
	Has your jaw ever been stuck open and you could not close it?	Y	N
	When did this first happen? _____		
	When did this last happen? _____		

12. Have you ever injured or sustained any form of trauma or whiplash to your (circle all that apply) Jaw Head Neck

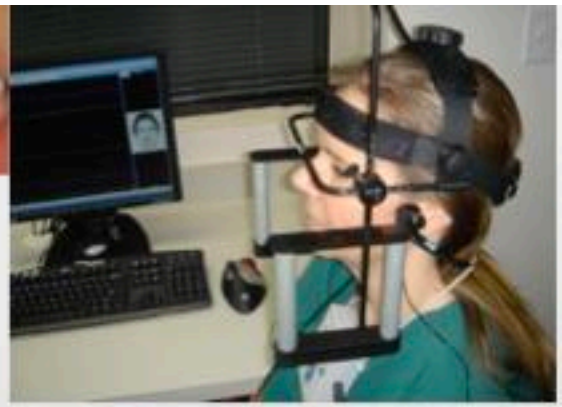
None of the above

(If any past trauma, please complete the trauma questionnaire)

Have you ever had stitches to your chin?	Y	N
Do you feel there is any connection between the trauma you have had and the problems you are having?	Y	N

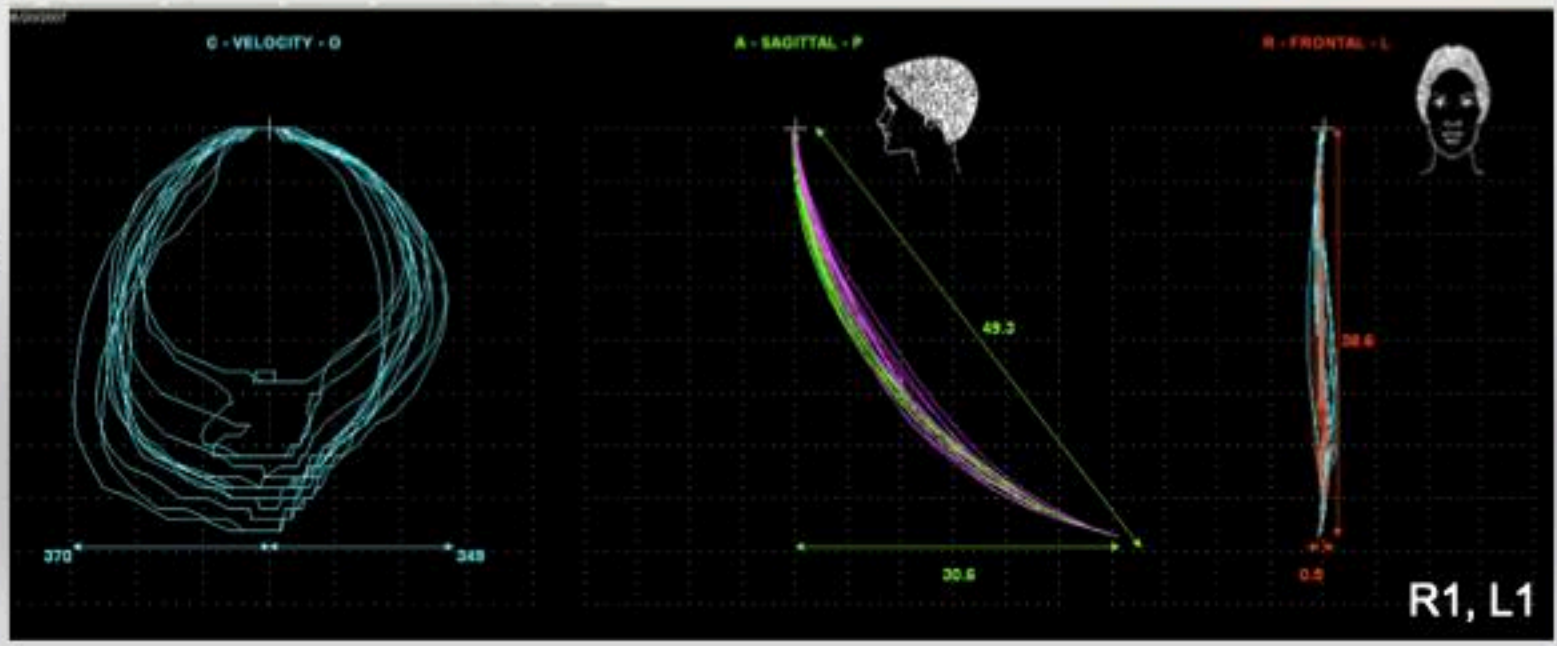
Jaw Tracker- Normal TMJ Motion

Analysis of the jaw in motion
Testing the function of the CNS, muscles, TMJ



Velocity:
Open and Close fast

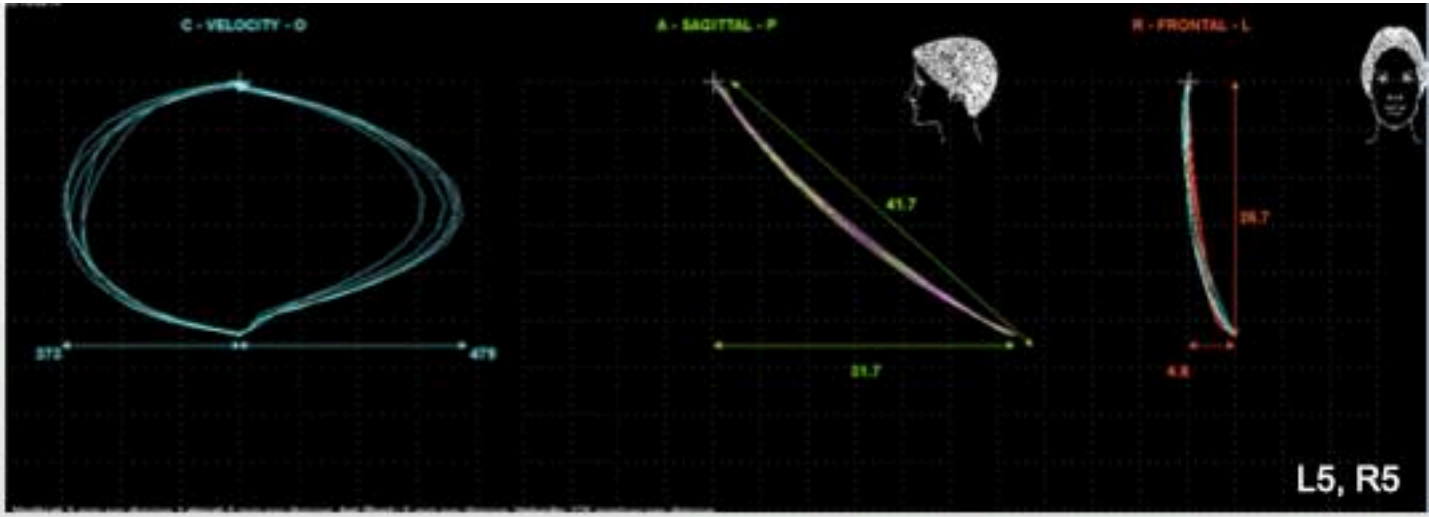
ROM- 40-55mm
Velocity 300+mm/sec
Consistent arc open/close sagittal path
Straight frontal path



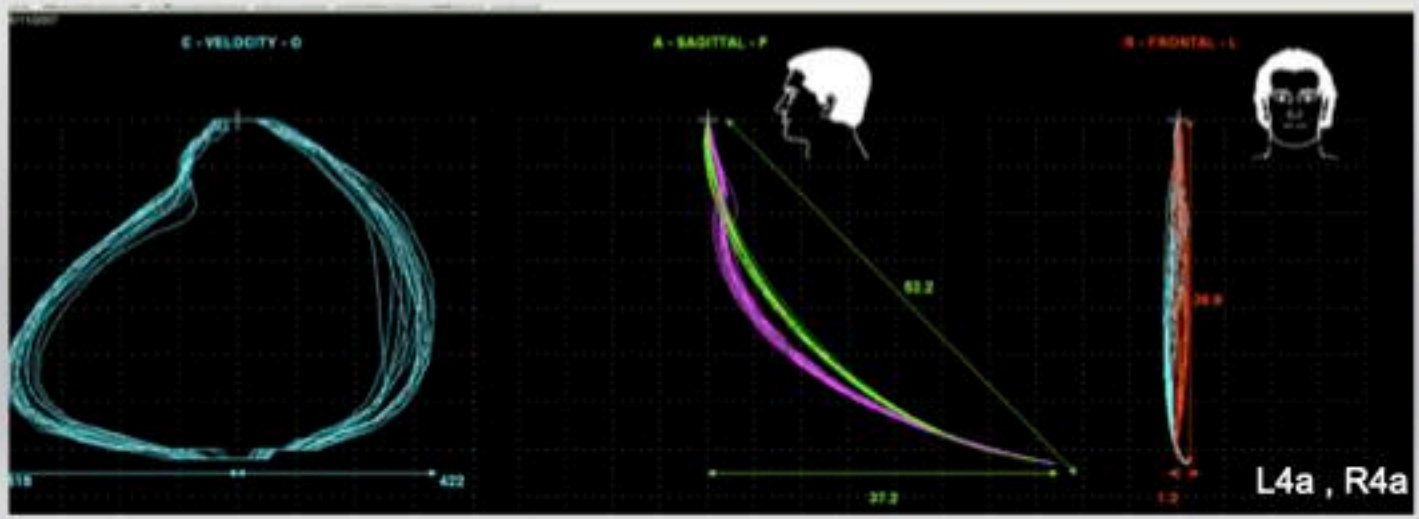
Jaw Tracker

What are the muscles having to do to create this motion?

TMJ Damage
L5a , R5a
Normal Velocity



TMJ Damage
L4a, R4a
Good ROM
Abnormal Arc of Closure
Abnormal Velocity



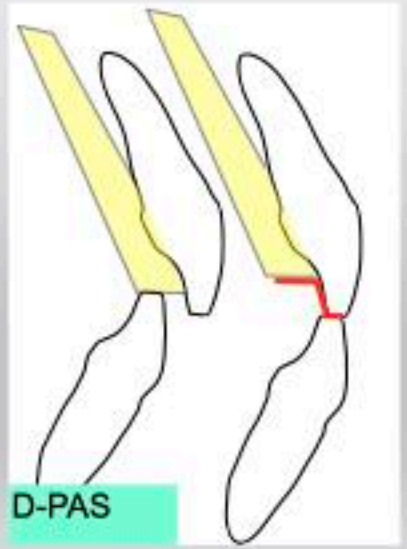
Facial Pain Diagnosis

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

Short



Anterior Stop Orthotics Utilization

- Diagnostic Test
- Patient Awareness
- Disease Management
- Bite Recording Tool

Palatal Anterior Stop

APS In Office Anterior Stop

APS Home Trial
Temporary Anterior Stop

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

Anterior Stop Orthotics

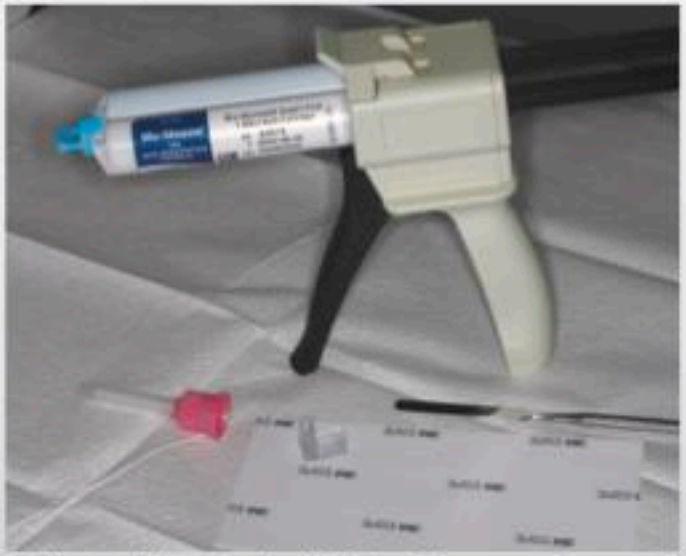
- Diagnostic Test
- Patient Awareness
- Disease Management
- Bite Recording Tool

APS In Office
Anterior Stop
2.5 mm

Pankey In Office
Anterior Stop

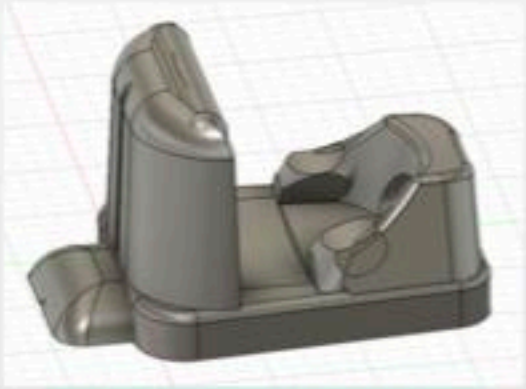
***Do not send patient home with small anterior stops that can be aspirated.

Anterior Stop Orthotic
In Office Diagnostic Test



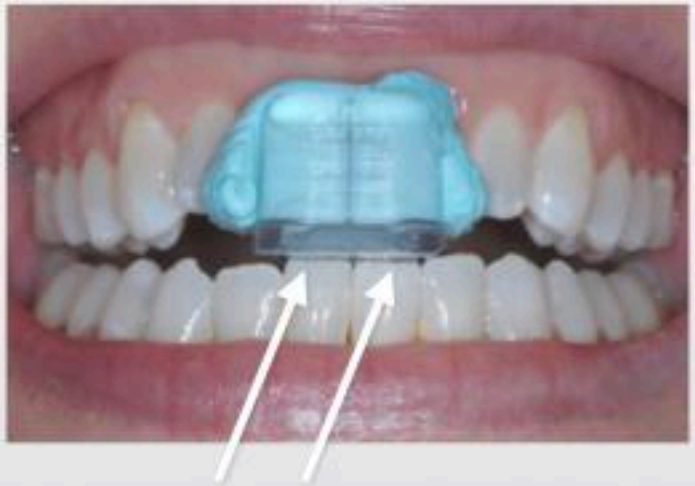
Reline with Parkell Blu-Mousse Super Fast

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



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

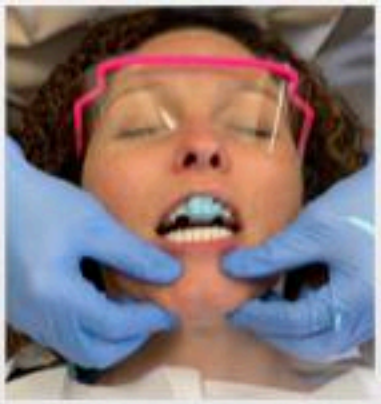


2 points of contact

Pitch Perpendicular
to Arc of Closure

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

<u>With anterior stop in place:</u>

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

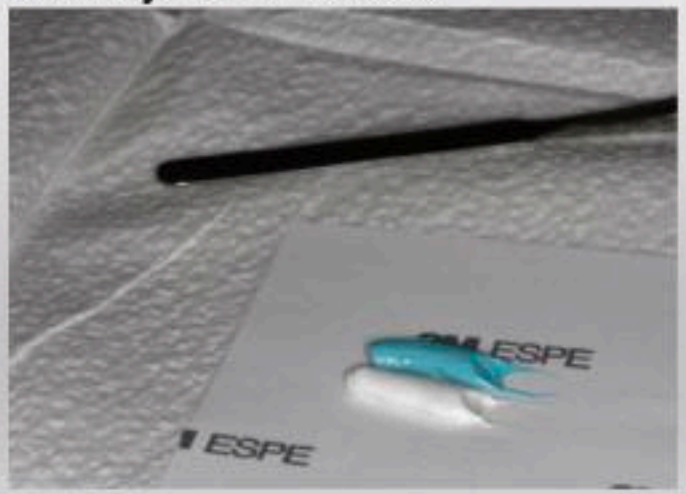
Occipital Lift with 3 deep breaths. Posterior neck opening muscle massage.

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

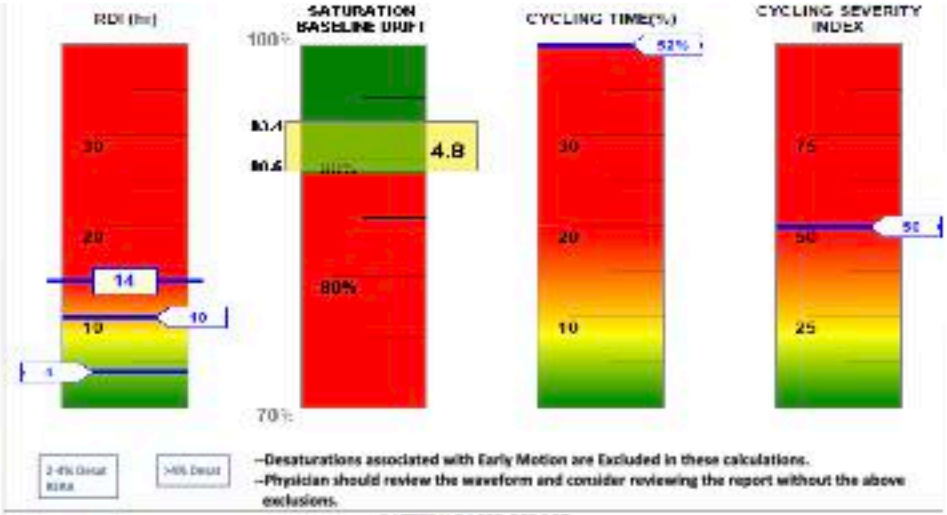
Working Diagnosis:

Protective Muscle Bracing
Occlusal Muscle Dysfunction
Anterior Openbite

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



--Desaturations associated with Early Motion are Excluded in these calculations.
--Physician should review the waveform and consider reviewing the report without the above exclusions.

PATTERN BASED REPORT

OXYGEN SATURATION BASELINE ANALYSIS

Oxygen Saturation Baseline Drift(OSBD) (normal <= 3)	5
Initial Saturation Baseline	93
Lowest Saturation Baseline	89
Highest Saturation Baseline	93

Baseline is determined by the Mean SpO2 during 2 Minute window without Artifact and without Events.

SPO2 CYCLING

% Time in Cycling (Duration)	52%	(02:50:14)
Cycling Frequency	45	
96% - Lowest Sat	12	
Cycling Severity Index	50	

The total time oxygen saturation was <= 88% was 00:13:39

TRADITIONAL REPORT

ODI4:	11
Total ODI4 Events:	58
Time in ODI4 Events:	00:29:26
Avg ODI4 Event Duration:	00:00:28
<=88% ODI4 Events:	23
<=88% Longest Duration:	00:01:21
Minimum SpO2:	84
Avg Low 10% SpO2:	86
Avg Low SpO2:	89
Avg Low SpO2 <=88%:	87

Definition of ODI4 Event: a fall in oxygen saturation of at least 4% and persisting greater than 3 seconds.

%SpO2	DURATION	%TOTAL
94-100	00:16:37	5%
88-94	04:57:26	91%
80-88	00:13:39	4%
70-80	00:00:00	0%
<= 70	00:00:00	0%
Total	05:27:42	100%
Motion Artifact	00:00:07	0.04%
Error Signal	00:00:05	0.03%

Obstructive Sleep Apnea

Normal Airway

Upper Airway Resistance
Snoring in men, purring in women

Obstructed Apnea

Images from Somnodent. https://somnomed.com/us

Is there an airway issue?
(Upper Airway Resistance or Obstructive Sleep Apnea)

"Sleep Airway Screening"

High Resolution
Pulse Oximetry

Data every 1
second average
over 3 seconds

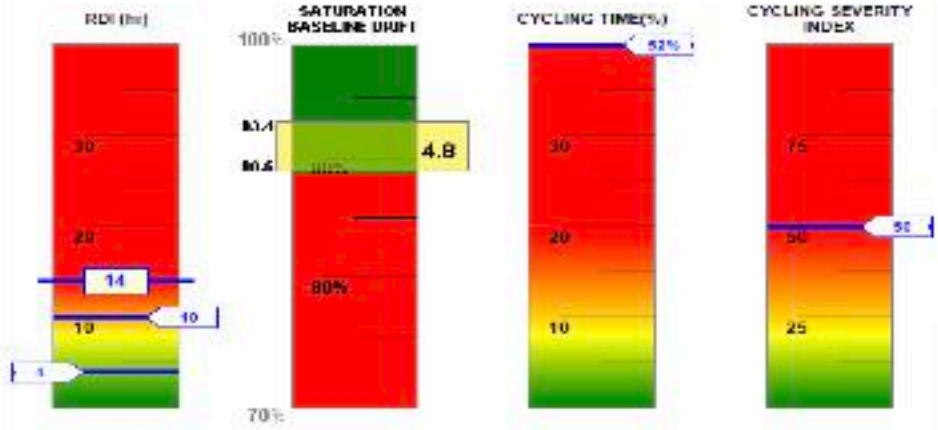
Patient Safety Inc.

SLEEPSAT

SATSCREEN

Order Pulse Ox and Software: Go to my website or
www.patientsafetyinc.com

Sleep SAT is the replacement for
PULSOX 300i, Konica Minolta no longer made



PATTERN BASED REPORT

OXYGEN SATURATION BASELINE ANALYSIS	
Oxygen Saturation Baseline Drift(OSBD) (normal <= 3)	5
Initial Saturation Baseline	93
Lowest Saturation Baseline	89
Highest Saturation Baseline	93

Baseline is determined by the Mean SpO2 during 3 Minute window without Artifact and without Events.

SPO2 CYCLING		
% Time in Cycling (Duration)	52%	(02:50:14)
Cycling Frequency	45	
96% - Lowest Sat	12	
Cycling Severity Index	50	

The total time oxygen saturation was <= 88% was 00:13:39

TRADITIONAL REPORT

ODI4:	11
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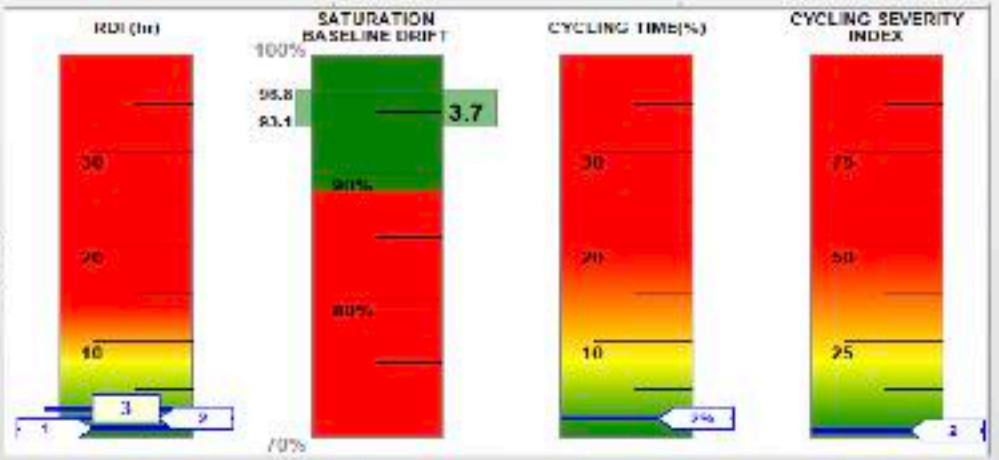
%SpO2	DURATION	%TOTAL
94-100	00:16:37	5%
88-94	04:57:26	91%
80-88	00:13:39	4%
70-80	00:00:00	0%
<= 70	00:00:00	0%
Total	05:27:42	100%
Motion Artifact	00:00:07	0.04%
Error Signal	00:00:05	0.03%

Does the dental orthotic make the airway better or worse?

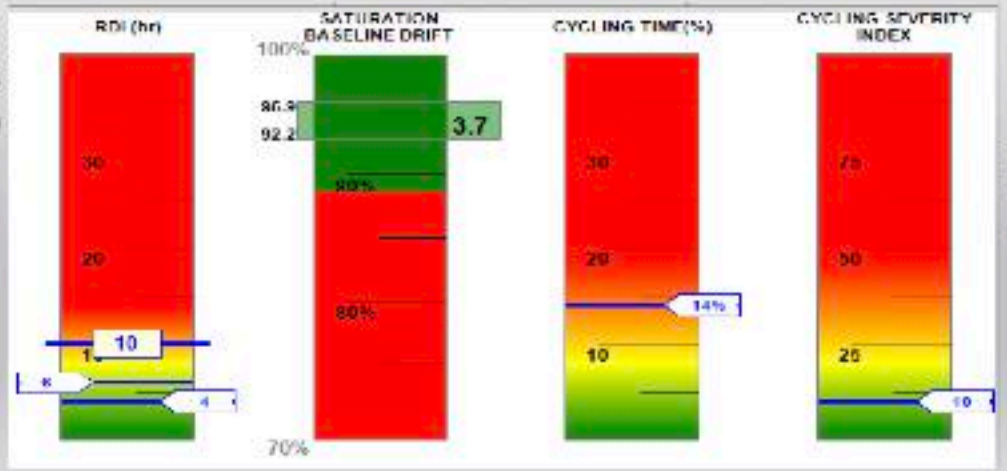
RDI= Respiratory Distress Index

Sometimes D-PAS makes airway better, sometimes worse

No dental orthotic
RDI = 3



Dental Orthotic:
Anterior Stop: D-PAS
RDI =10



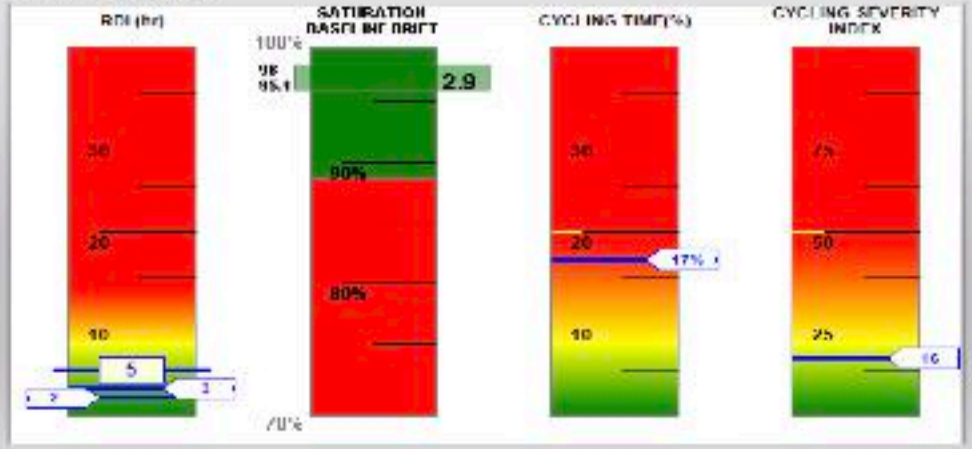
High Resolution Pulse Oximetry

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

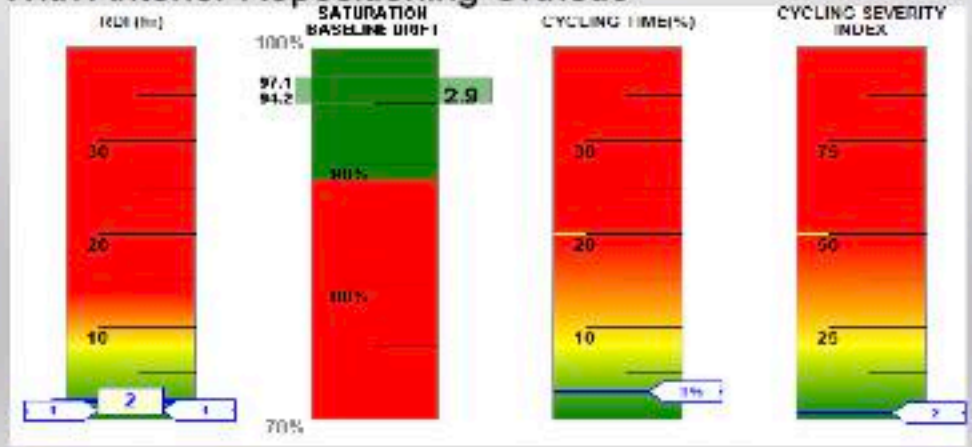
Anterior Repositioning Orthotic

Minolta Pulse Ox

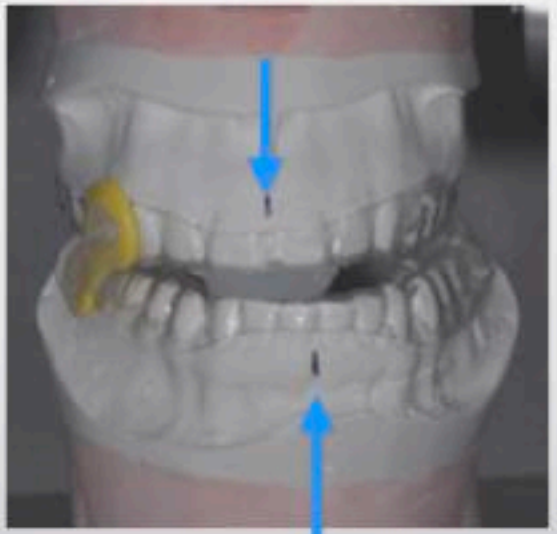
No Orthotic



With Anterior Repositioning Orthotic



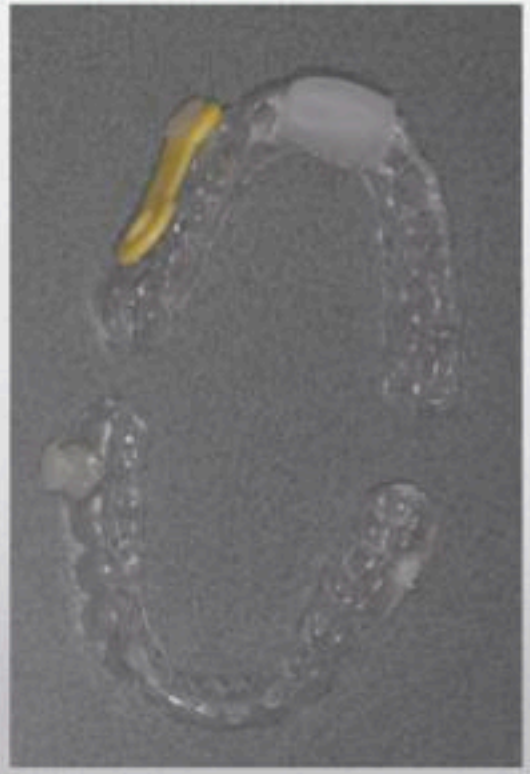
D-LatBrux Lateral Bruxing Orthotic



Elastomer Pulls Right condyle forward out of fossa.
Moves the jaw to the **Left.**

Anterior Occlusal Stop opens the bite and provides vertical support.

D-LatBrux Lateral Bruxing Orthotic



Pull Left

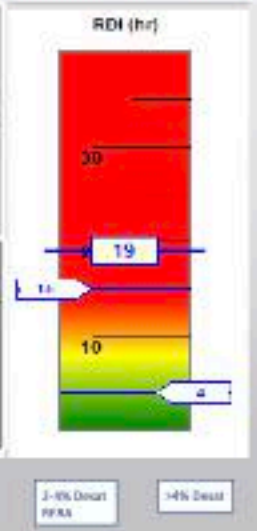
Pull Right

Only one joint is strained at night. Alternating nights wearing Right then Left gives an extra 24 hours of adaptation time to the system, minimizing permanent bite changes.

Note- simulated Left image reverse of Right

Management

Diagnosis	Pattern	Treatment
Obstructive Sleep Apnea	Variable……..	Mandibular Advancement Appliance (after MD approves)



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

Pulse Ox Screening

Refer to Medical Sleep Doctor

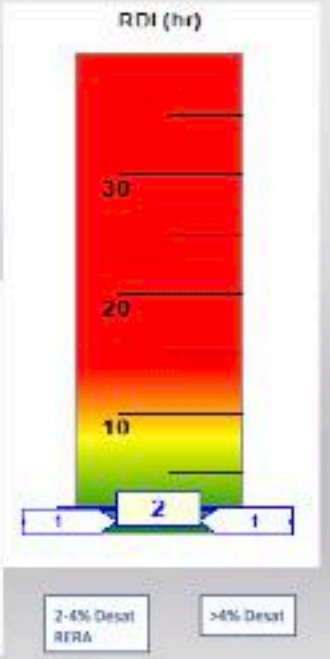
Get approval for Mandibular Advancement Appliance

Verify Airway Improves

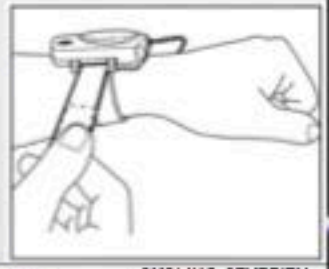
19 events/hr before

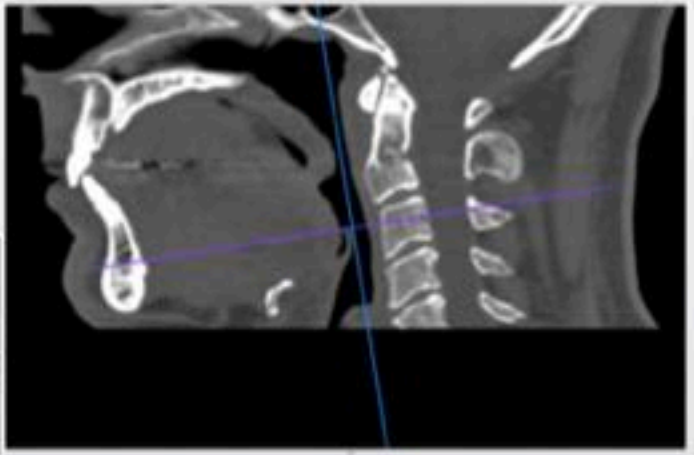
2 events/hr with Orthotic

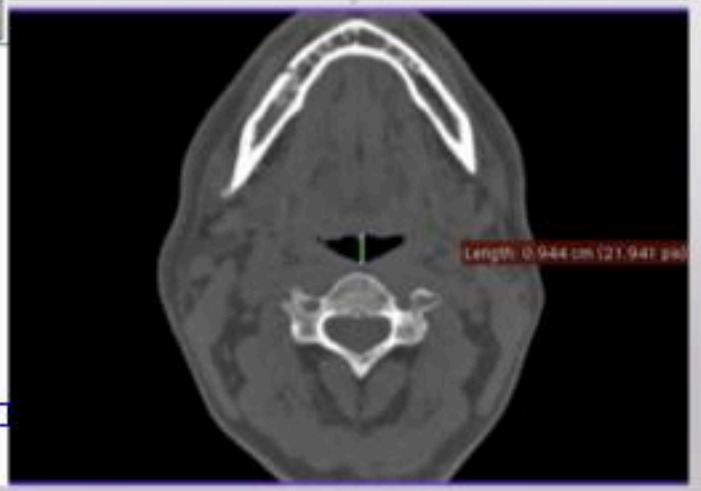
Narval CC
Great Lakes Ortho

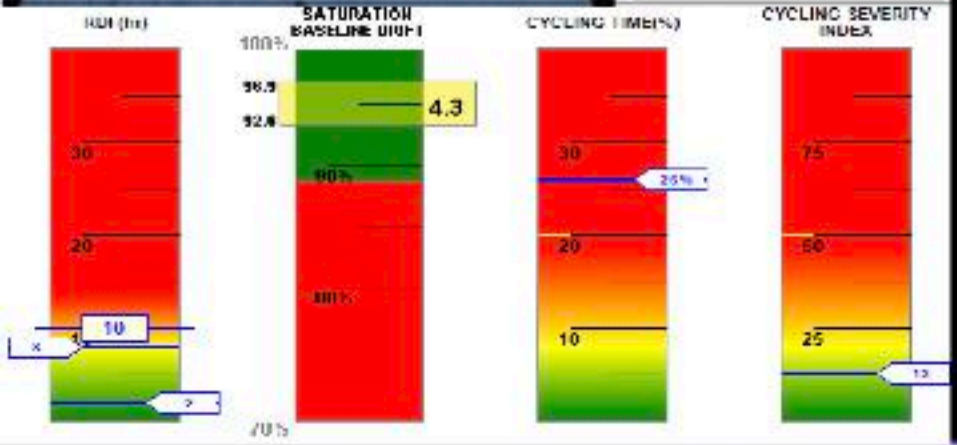


Mild Obstructive Sleep Apnea









Referred to pulmonologist
Medical Sleep Study
PSG- Polysomnogram
RDI 10

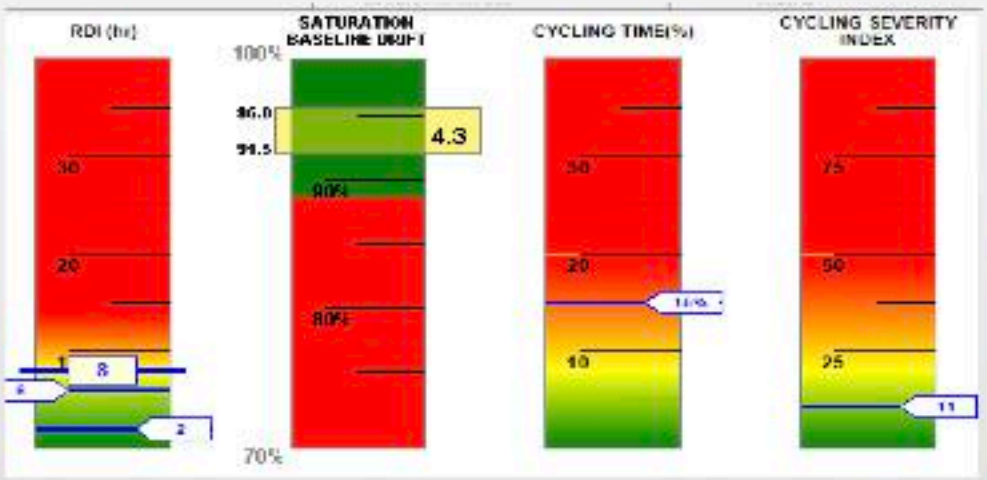
Home Sleep Airway Screening- RDI 10

RDI= Respiratory Distress Index

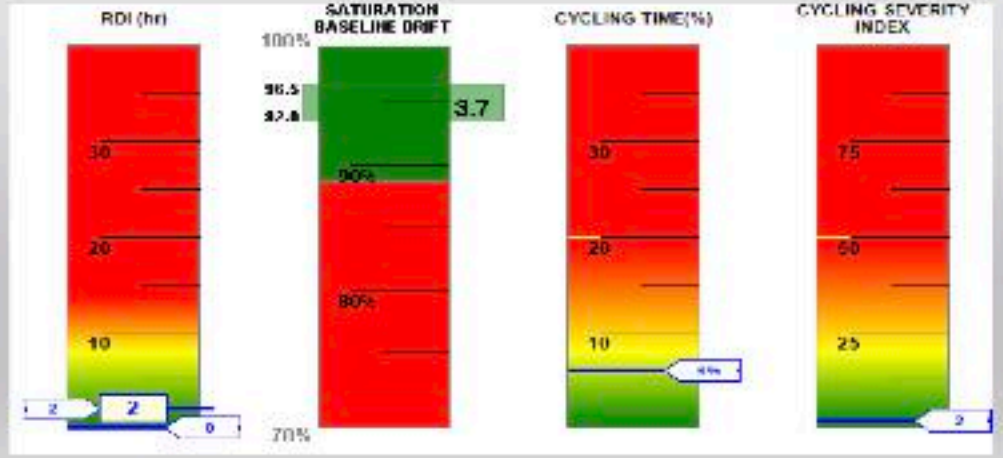
Mild OSA = 5-15 Apnea/hr

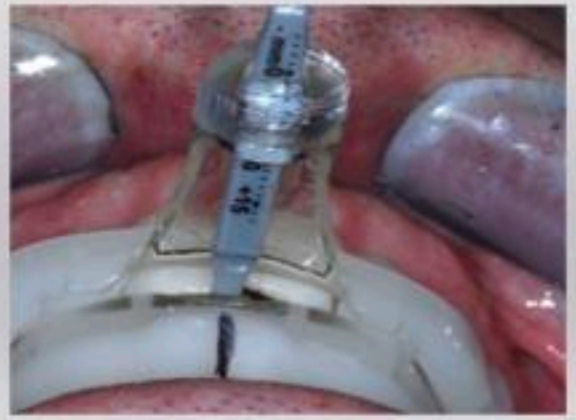
RDI= Respiratory Distress Index

MyTAP Mandible Advanced 4mm RDI 8



MyTAP Mandible Advanced 5mm RDI 2





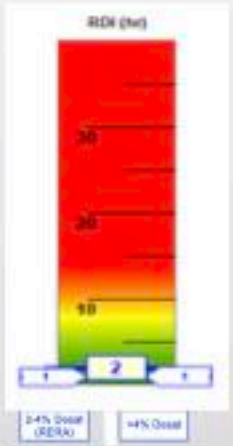
Age 16F
cc: Facial Pain, Excessive Daytime Fatigue

Age 16F
cc: Facial Pain, Excessive Daytime Fatigue

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

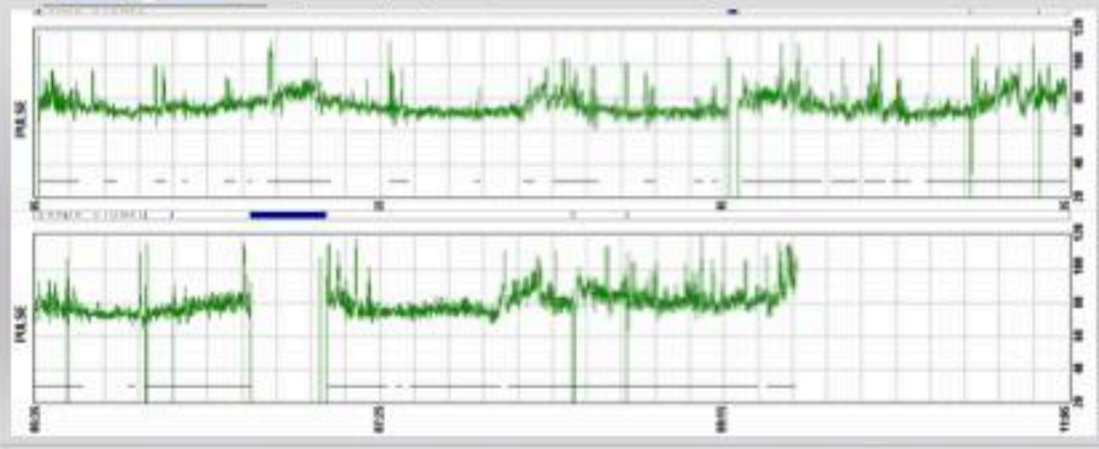
Sleep Latency Test
Dx: Narcolepsy
Recommend daytime medication

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



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

Heart Rate
>90 bpm
for 35 min



Disordered Breathing Disease Progression

Disease Stage 1

Predisposing Factors

Small Airway

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

Disease Stage 2

Compensation:
Airway Maintained

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

Symptoms
- Facial Ache
- Not Waking Rested
- Daily Fatigue
- Neck Soreness

Disease Stage 3

Sleep
Airway Partial Collapse

Signs
- All of stage 1 and 2 plus…..
- Upper Airway Resistance
- 2-4% Drop O_2 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 O_2 Saturation
- Apnea
- Cardiovascular Damage
- Elevated BP
- GERD

Symptoms
- All of stage 2, 3 plus….
- Worn Teeth

John R. Droter DDS

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+% O_2 Desaturation

AHI 1-4	AHI 5-15	AHI 15-30	AHI 30+
"Normal" ??	Mild OSA	Moderate OSA	Severe

Signs

Apnea

4% drop O_2 Saturation

Cardiovascular Damage

Elevated BP

GERD

Symptoms

Not Waking Rested, Daily Fatigue

Cognitive Impairment

Irreversible Damage

John R. Droter DDS

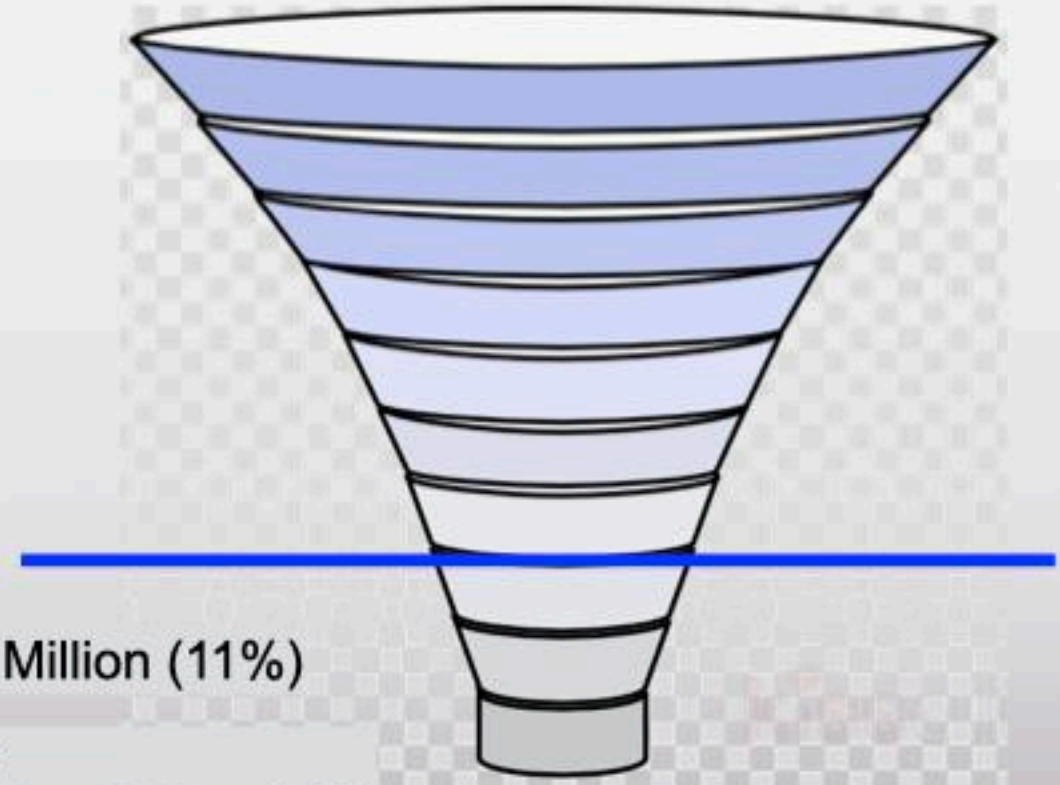
Disordered Breathing USA 2008

Stage 1

Stage 2

Stage 3

Stage 4



Mild OSA- 35 Million (11%)

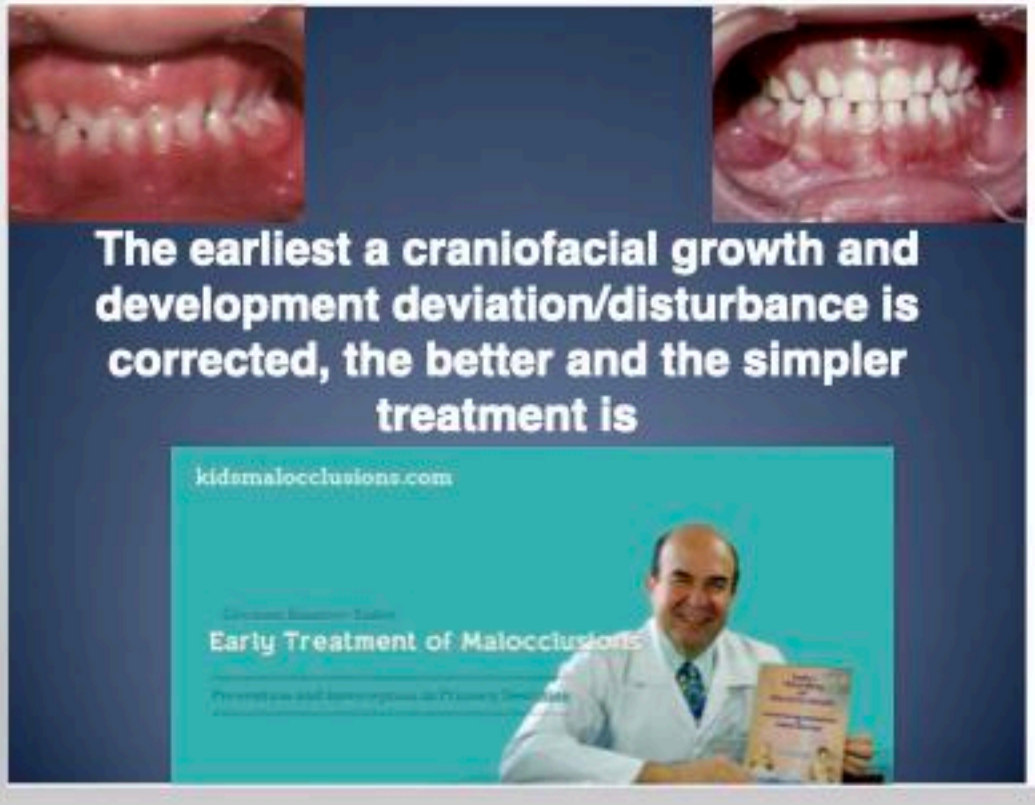
Moderate and
Severe OSA 19.5 Million (6%)

Young, T., Finn, L., Peppard, P. E., Szklo-Coxe, M., Austin, D., Nieto, F. J., et al. (2008). Sleep disordered breathing and mortality: eighteen-year follow-up of the Wisconsin sleep cohort. *Sleep*

US Pop 325 Million

Dr German Ramirez-Yanez

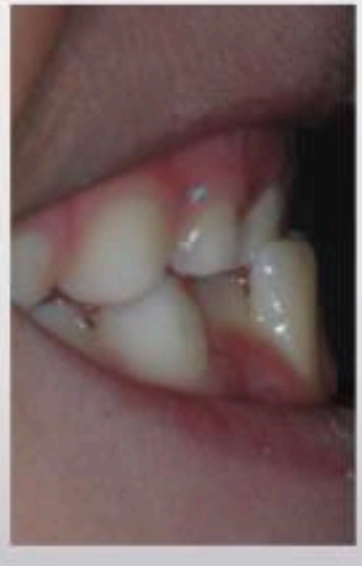
Get his **Free** Textbook on how to do this
kidsmaloccusions.com

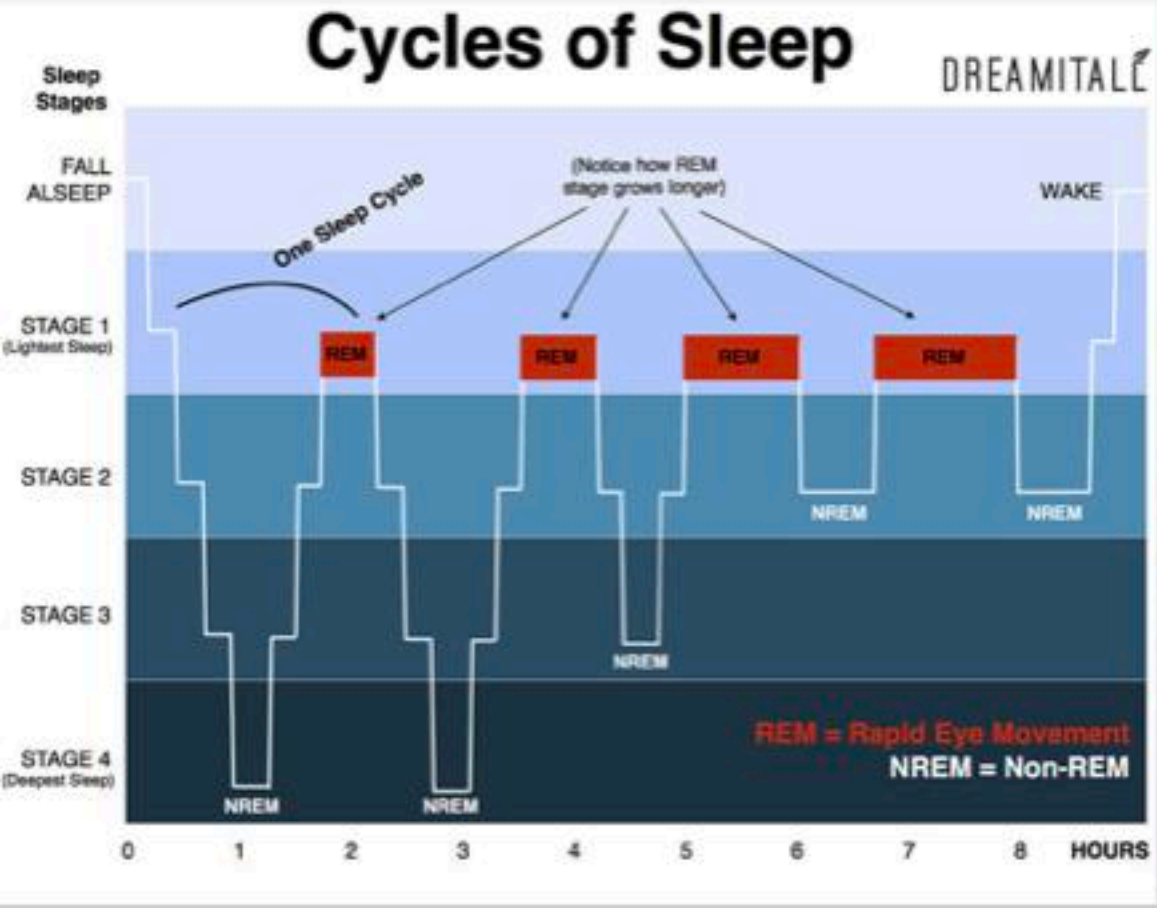


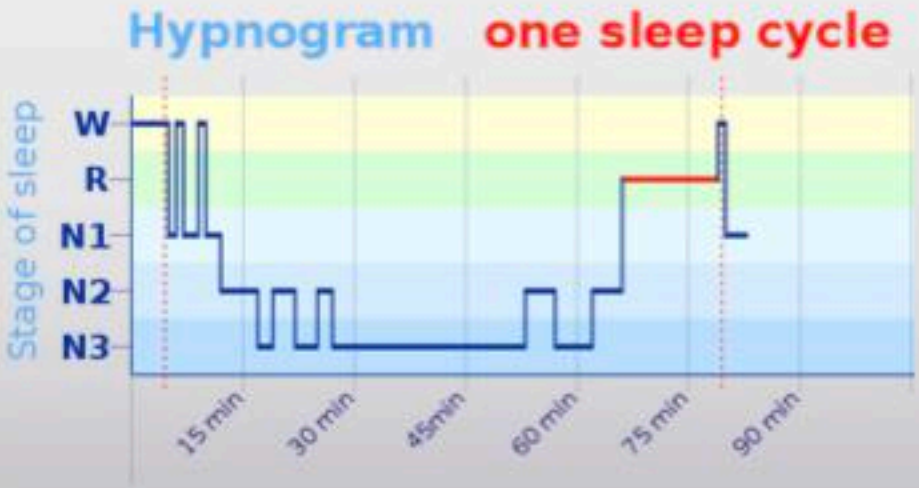
Start Age 7

Planas Tracks
Lingual Light Wire

Age 8
9 Months from start

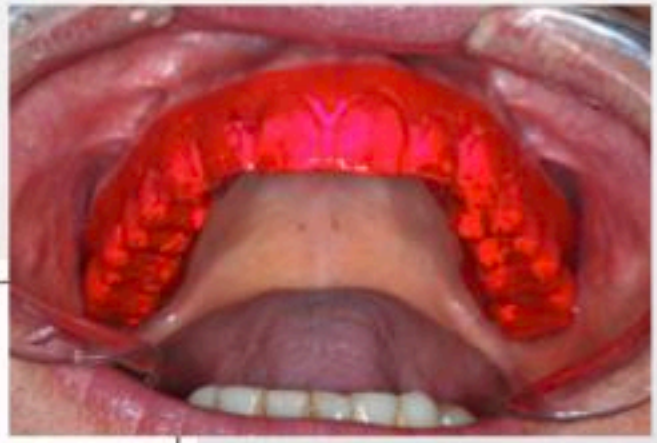



Cycles of Sleep
DREAMITALE
Sleep Stages
FALL ALSEEP
STAGE 1 (Lightest Sleep)
STAGE 2
STAGE 3
STAGE 4 (Deepest Sleep)
One Sleep Cycle
(Notice how REM stage grows longer)
WAKE
REM
NREM
REM = Rapid Eye Movement
NREM = Non-REM
0 1 2 3 4 5 6 7 8 HOURS

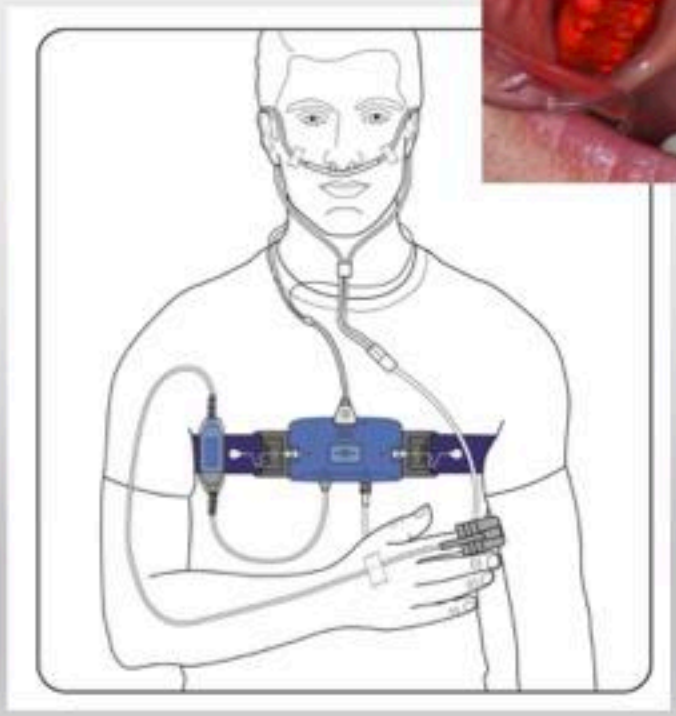

Hypnogram
one sleep cycle
Stage of sleep
W
R
N1
N2
N3
15 min
30 min
45min
60 min
75 min
90 min

zMachine

zMachine + Brux Checker
+ Snore Lab



GENERAL sleep



Call (888) 330-4424

Use Code: DROTER to receive special offer

Patient: M Y
Study Date: 2018-09-27 Study ID: 1124990976
3% Threshold

AHI: 8.9
AHI is how many times an hour your blood oxygen goes down.

RDI: 8.9
RDI is how many times an hour your sleep is disturbed due to respiration

Date of Birth: 1998
Age: 20
Sex: F

Height: 63 Inches
Weight: 105 Pounds
BMI: 18.60

Note:

General sleep
Zmachine® Synergy
Home Sleep Test Report
Study Ordered by:
John R. Droter, DOS
Scored by: Computer

Study Details: Computer Generated Scoring
The following parameters were recorded using a Zmachine Synergy (General Sleep Corporation): EEG for sleep staging & arousals; respiratory inductance plethysmography for thoracic respiratory effort; pressure transducer for respiratory airflow & snore; pulse oximeter for SpO2, pulse, & optical plethysmograph; and tri-axis accelerometer for body position. Hypopneas were scored per AASM recommended definition of 3% desaturation.

Times and Durations	
Lights off	2018-09-27 01:47:32
Lights on	2018-09-27 08:42:54
Total Recording Time (TRT)	936.8 min.
Time in Bed (TIB)	414.0 min. (81.7% of TRT) | 6 hours 54 minutes
Total Sleep Time (TST)	396.8 min. (95.9% of TIB)
Sleep Efficiency (SE)	95.9 % of TIB
Latency to Persistent Sleep (LPS)	8 min
Latency to Deep Sleep (LDEEP)	19 min
Latency to REM Sleep (LREM)	8.5 min
Total Light Sleep Time N1+N2	207.9 min. (52.4% of TST)
Total Deep Sleep Time N3 SWS	85.7 min. (34.1% of TST)
Total REM Time	83.2 min. (33.5% of TST)
SpO_2 < 89% cumulative time	0 min.
SpO_2 < 89% longest span	0 min.

Awakenings During Sleep	
Wake After Sleep Onset (WASO)	13 min
≥ 1-Epoch Awakenings	18 (2.7 per sleep hour)
≥ 3-Epoch Awakenings	0 (0 per sleep hour)

WASO is the cumulative wake time following LPS; ≥ 1-Epoch Awakenings is the number of times the patient woke for one epoch (i.e. 30 seconds) or more after LPS; and ≥ 3-Epoch Awakenings is the number of times the patient woke for three epochs or more after LPS (this is a subset of ≥ 1-Epoch

Sleep Study Ranges of Normal
Sleep Latency 10-20 min
Latency to REM 90 min
Sleep Efficiency >85%

N1 2% - 5%
N2 45% - 55%
N3 Deep Sleep 10% - 20%
If 8h: then: 48 min. to 96 min
REM Sleep 20% - 25%
If 8h: then 96 min to 120 min

REM to REM is about 90 min
4-5 cycle per night
REM time longer as night goes on

Deep N3 SWS slow wave sleep in first third of night. Less as we age

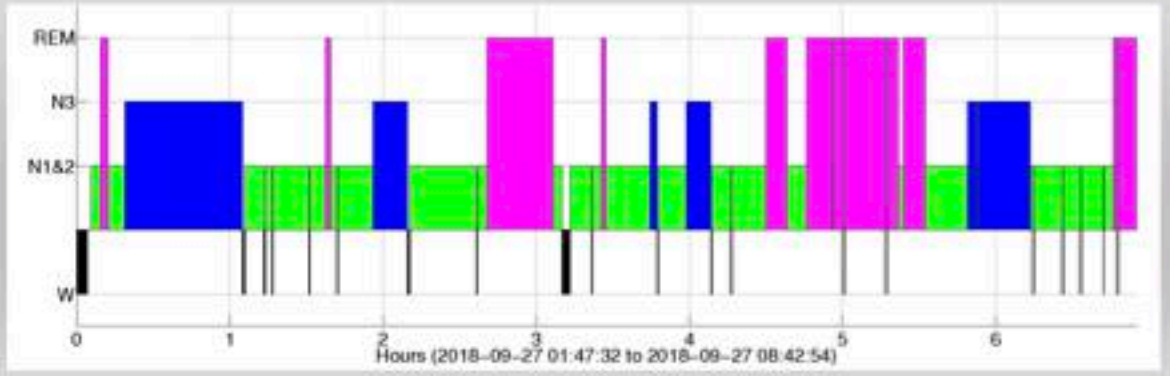
TRT is the total duration of the recording, TIB is the elapsed time from lights off to lights on; TST is the cumulative time scored as any stage of sleep; SE is 100x(TST÷TIB) expressed as a percentage; AHI is apneas + hypopneas per hour of sleep time; RDI is apneas + hypopneas + RERAs per hour of sleep time; and REI is apneas + hypopneas + RERAs per hour of recording time.

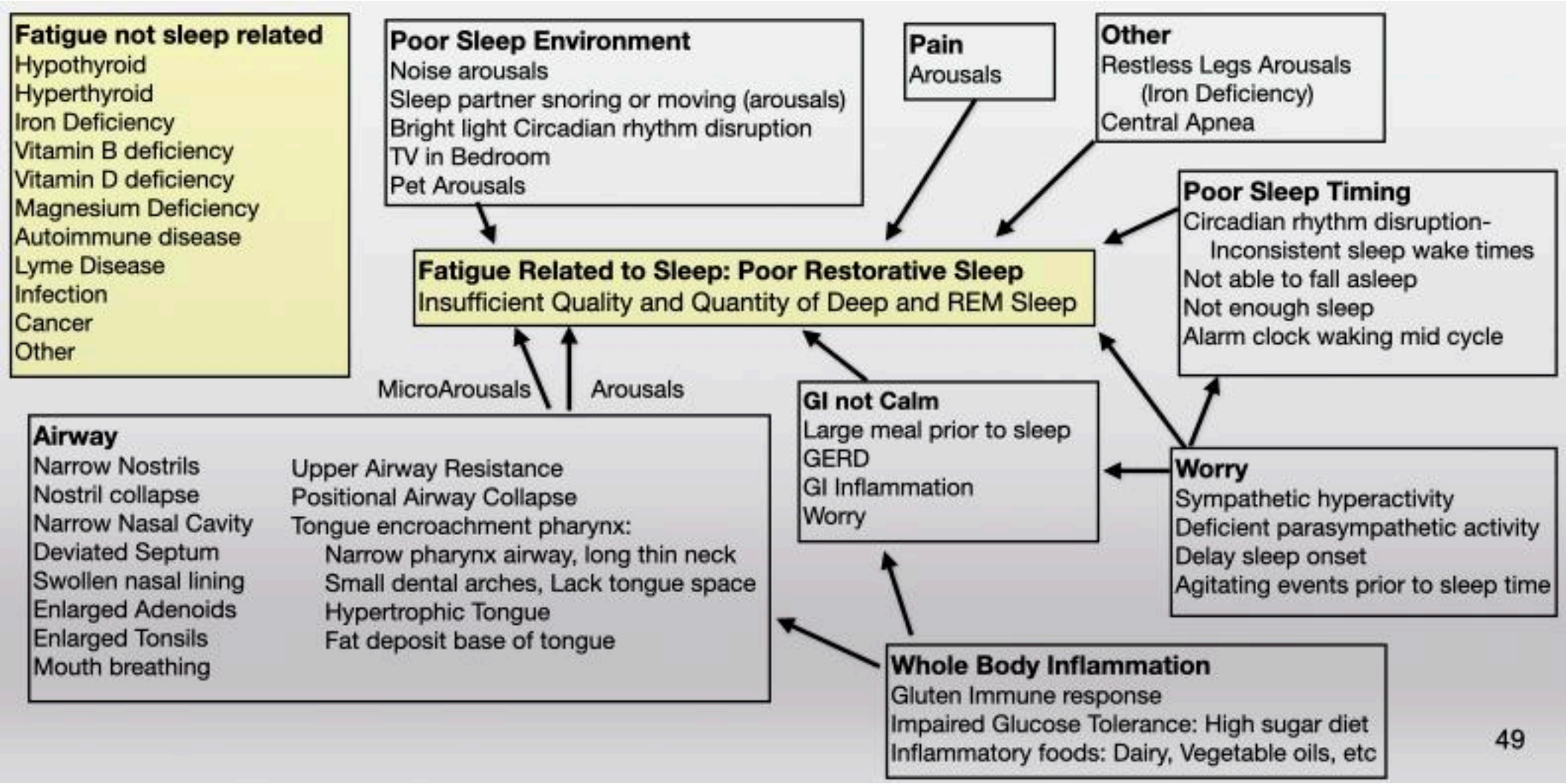
LPS is the elapsed time to the beginning of the first period in which 10 of 11 minutes are scored as any stage of sleep (i.e. the start of persistent sleep); LDEEP is the elapsed time to the beginning of first epoch of Deep Sleep; and LREM is the elapsed time to the beginning of first epoch of REM.

Respiratory Events

Body Position		
72.1%	Supine/hr	9.0
0%	Prone/hr	0
12.9%	Left/hr	4.5
14.8%	Right/hr	9.8

Sleep Stages




Fatigue not sleep related
Hypothyroid
Hyperthyroid
Iron Deficiency
Vitamin B deficiency
Vitamin D deficiency
Magnesium Deficiency
Autoimmune disease
Lyme Disease
Infection
Cancer
Other
Poor Sleep Environment
Noise arousals
Sleep partner snoring or moving (arousals)
Bright light Circadian rhythm disruption
TV in Bedroom
Pet Arousals
Pain
Arousals
Other
Restless Legs Arousals
(Iron Deficiency)
Central Apnea
Poor Sleep Timing
Circadian rhythm disruption-
Inconsistent sleep wake times
Not able to fall asleep
Not enough sleep
Alarm clock waking mid cycle
Fatigue Related to Sleep: Poor Restorative Sleep
Insufficient Quality and Quantity of Deep and REM Sleep
MicroArousals
Arousals
GI not Calm
Large meal prior to sleep
GERD
GI Inflammation
Worry
Worry
Sympathetic hyperactivity
Deficient parasympathetic activity
Delay sleep onset
Agitating events prior to sleep time
Airway
Narrow Nostrils
Nostril collapse
Narrow Nasal Cavity
Deviated Septum
Swollen nasal lining
Enlarged Adenoids
Enlarged Tonsils
Mouth breathing
Upper Airway Resistance
Positional Airway Collapse
Tongue encroachment pharynx:
Narrow pharynx airway, long thin neck
Small dental arches, Lack tongue space
Hypertrophic Tongue
Fat deposit base of tongue
Whole Body Inflammation
Gluten Immune response
Impaired Glucose Tolerance: High sugar diet
Inflammatory foods: Dairy, Vegetable oils, etc

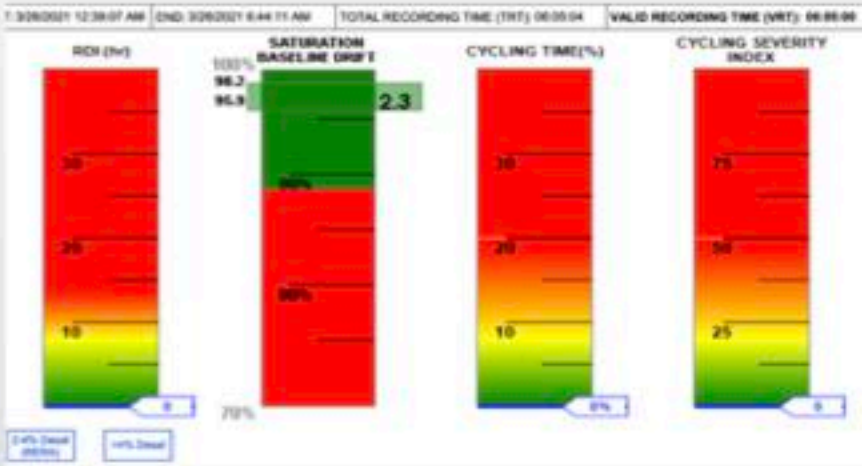
Sleep Simplified

1. Need adequate Deep and REM Sleep every night.
2. Need to get oxygen through the nose to lungs, unimpeded, all the time.
3. Parasympathetic Dominance in non REM Sleep

Sleep Complexity:
- Problems are Numerous.....
- Tests are Numerous.....
- Therapies are Numerous.....

Always go to the back to basics:
- 60+min Deep and 90+min REM
- Air from Nose to Lungs
- Large periods of calm, steady heart rate

Sat Screen by Patient Safety Inc



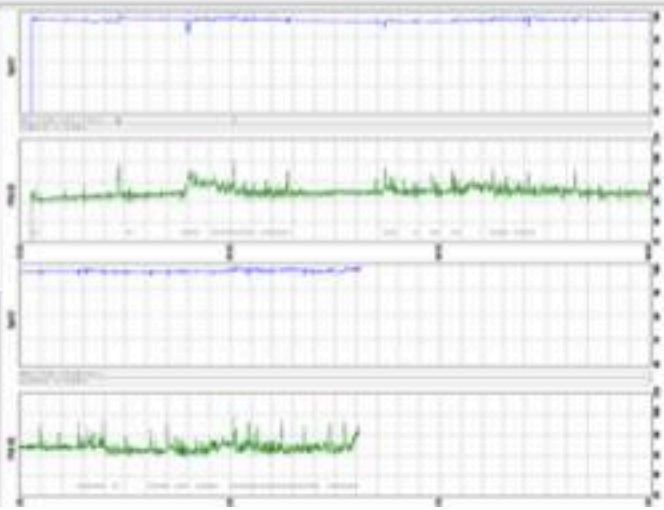
PULSE RATE DATA

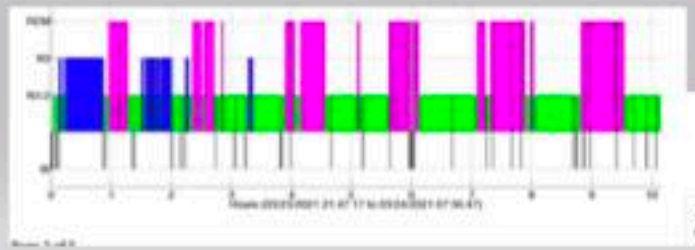
Autonomic Arousals

Index (#/hr): 23

Pulse Rate Range

Mean:	69
Min:	58
Max:	102





AHI: 0.5

AHI is how many times an hour your blood oxygen goes down.

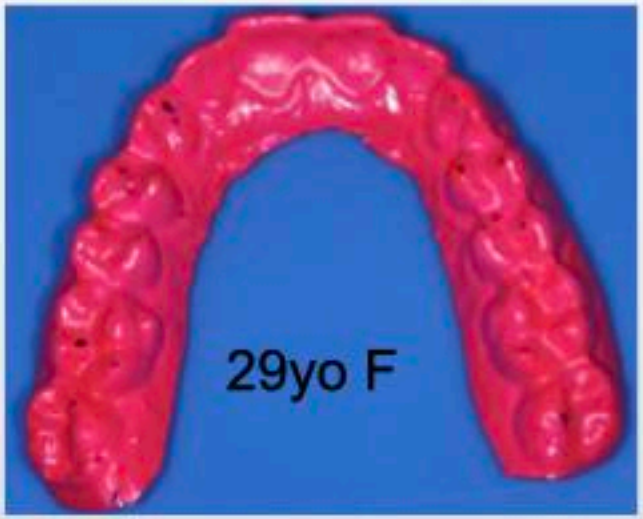
zMachine: Interrupted Deep and REM

Does grinding occur awake or asleep?

Brux Checker
Great Lakes Orthodontics

0.1mm Mylar

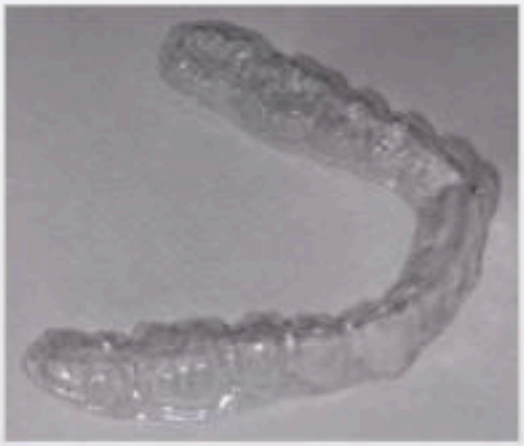
Made on Biostar Machine



Daytime Clenching- Clear Brux Checker

Increase awareness to break habit

Very thin: Similar to mylar used for composites



Great Lakes Orthodontics
Biostar Platzhalterfolie
Item Ref 3202.1


Know Yourself
Know Your Work
Know Your Patient
Apply Your Knowledge
LD Pankey Institute
Write your Dream

Centric Relation Load Zone Mechanical Stability

John R Droter DDS
Annapolis, Maryland

The TMJ:What You need to Know

Mechanical Stability

Mechanical Joint Stability

Shape condyle/disc/fossa provides stability when loaded

Capsular Ligaments provide stability when not loaded so pieces will be aligned and ready for loading.

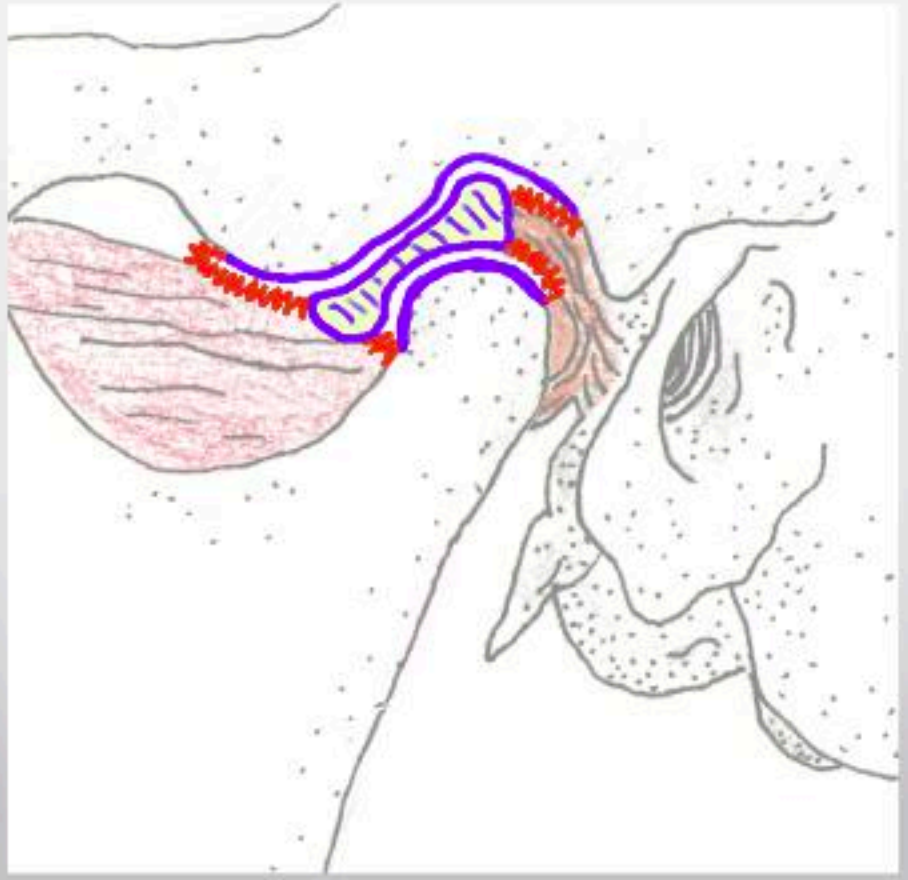
Capsular Ligaments other roles are to provide end point of joint movement and proprioception

Mechanical Joint Stability

Shape condyle/disc/fossa provides stability when loaded

Ligaments provide stability when not loaded so pieces will be aligned and ready for loading.

Ligaments other role is to provide end point of joint movement

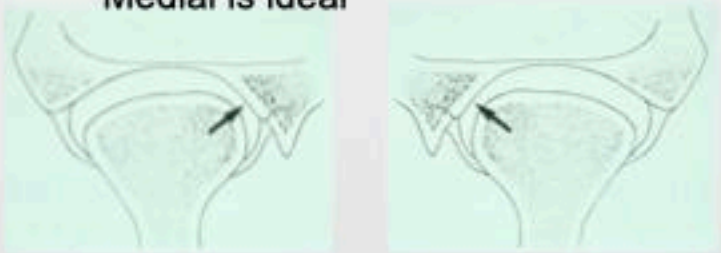


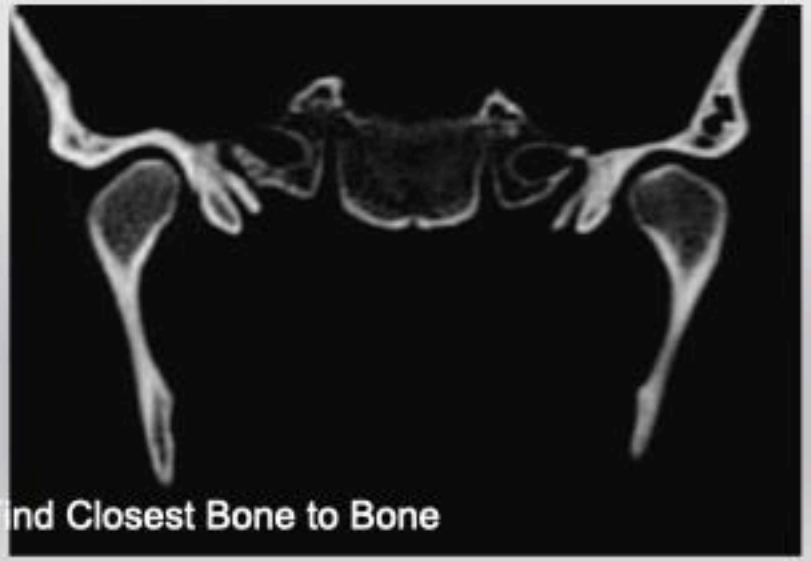
Key word is shape- which you can see on scans

CR Load Zone

When the masseter fires and seats the joint, where do the condyles load?

Medial is ideal

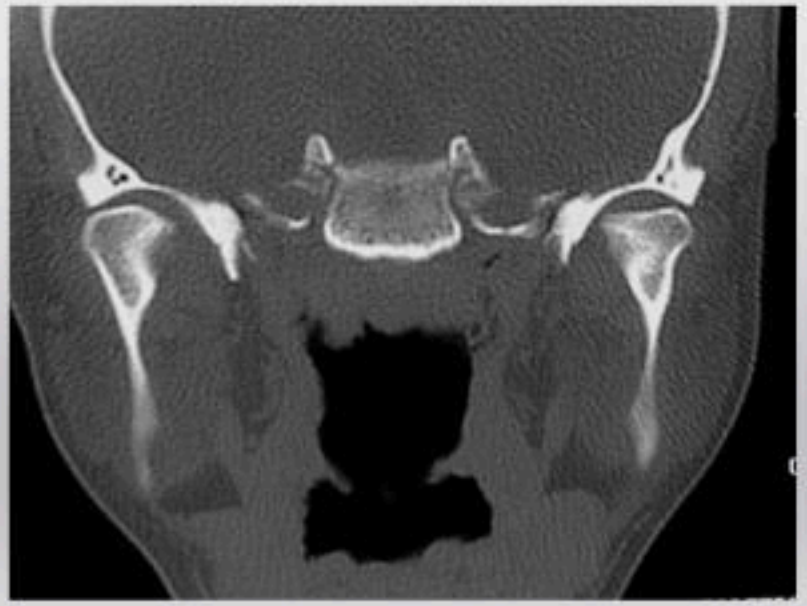


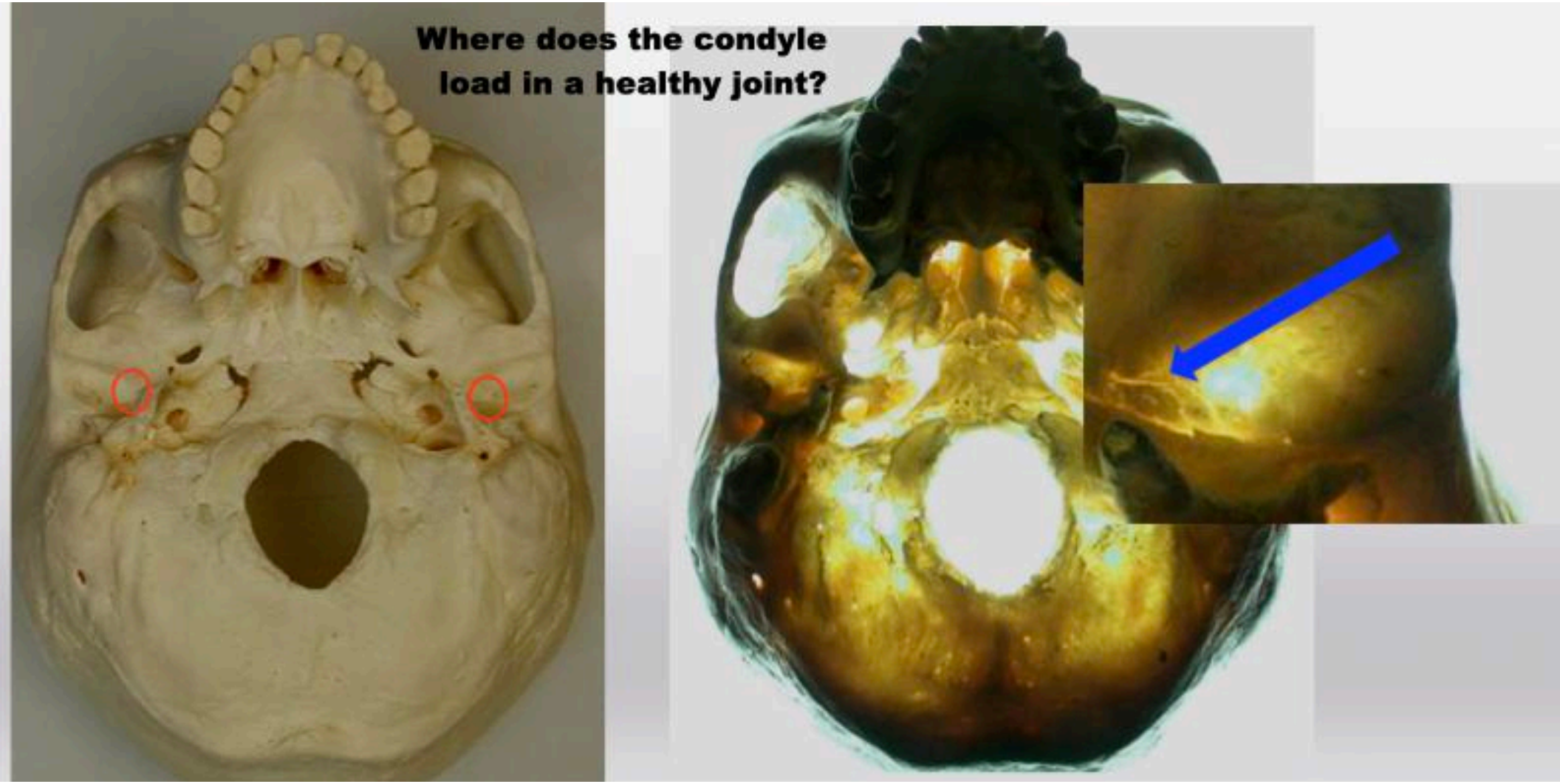


Find Closest Bone to Bone

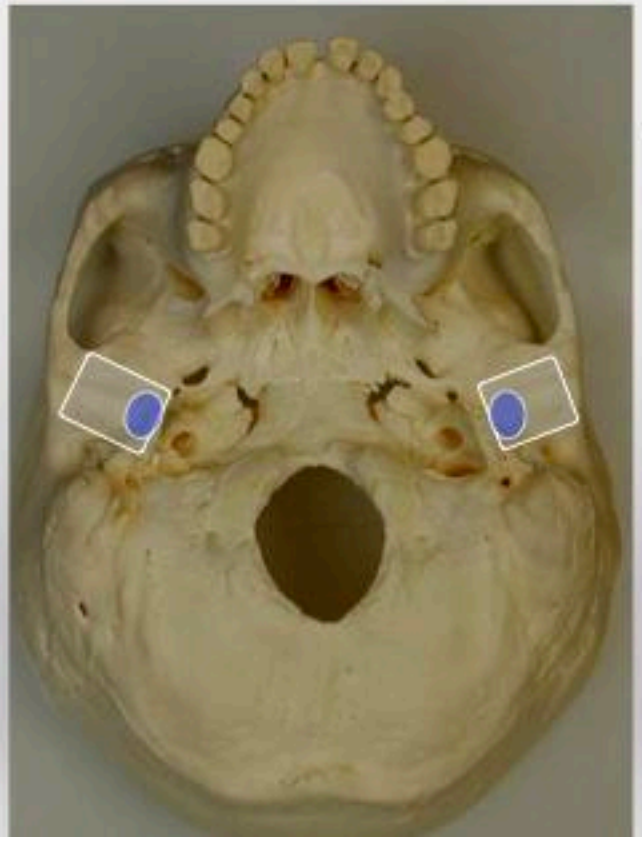
Unstable Mechanically

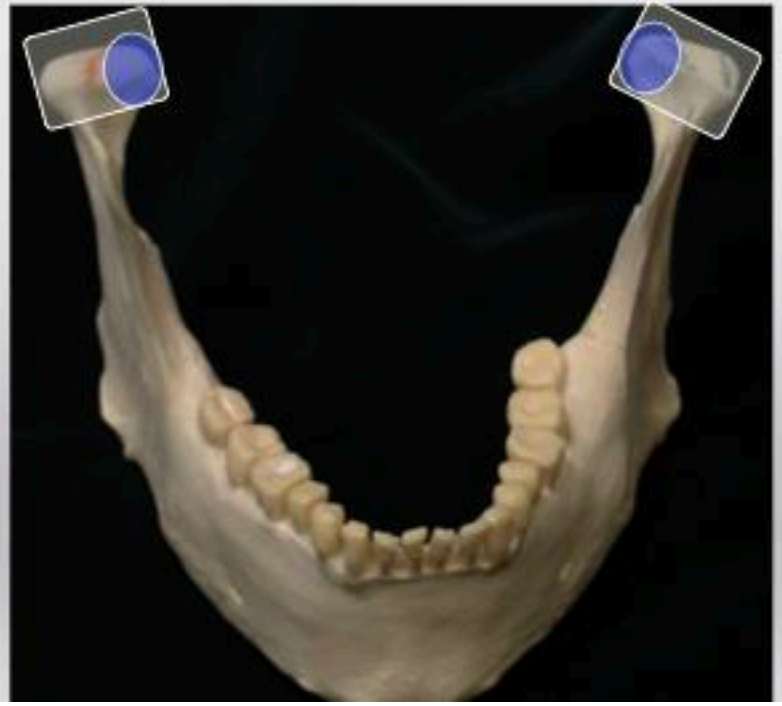
Hypersensitive Occlusion




Where does the condyle
load in a healthy joint?

Centric Relation (CR) Load Zone

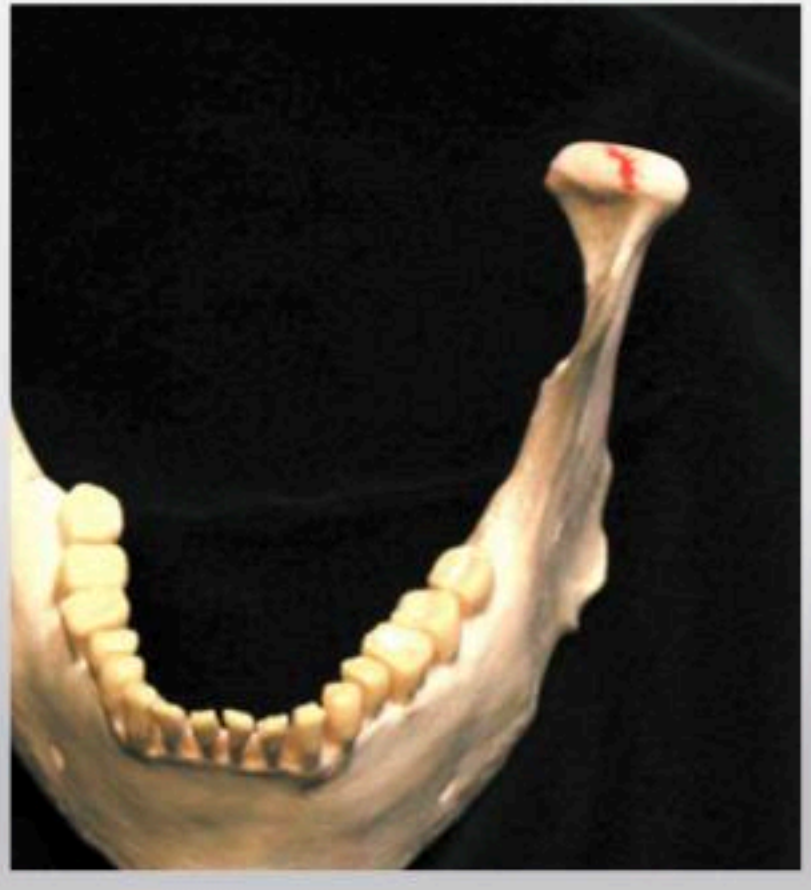




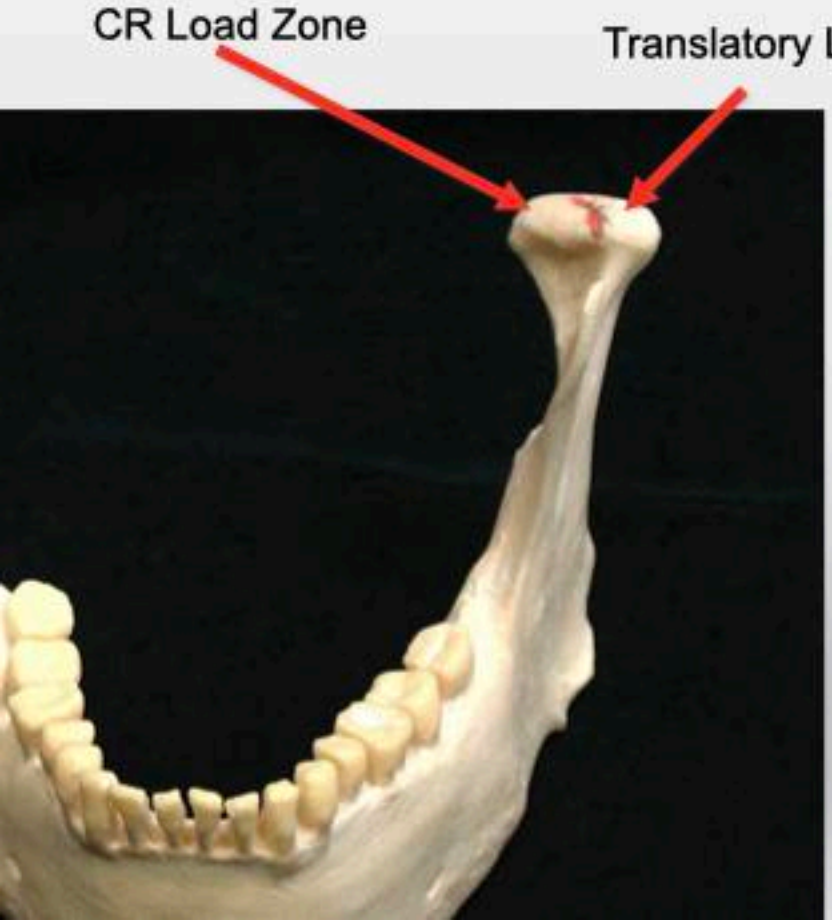
Protrusive Movement

Condyle moves out of fossa

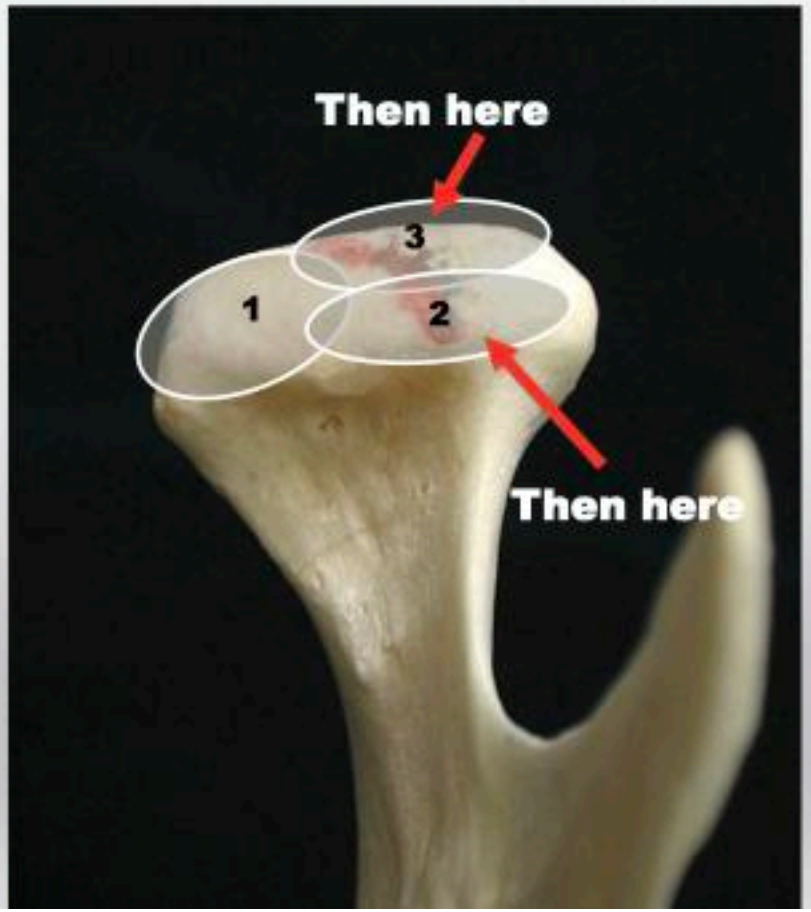
Translatory Load Zone



CR and Translatory Load Zones

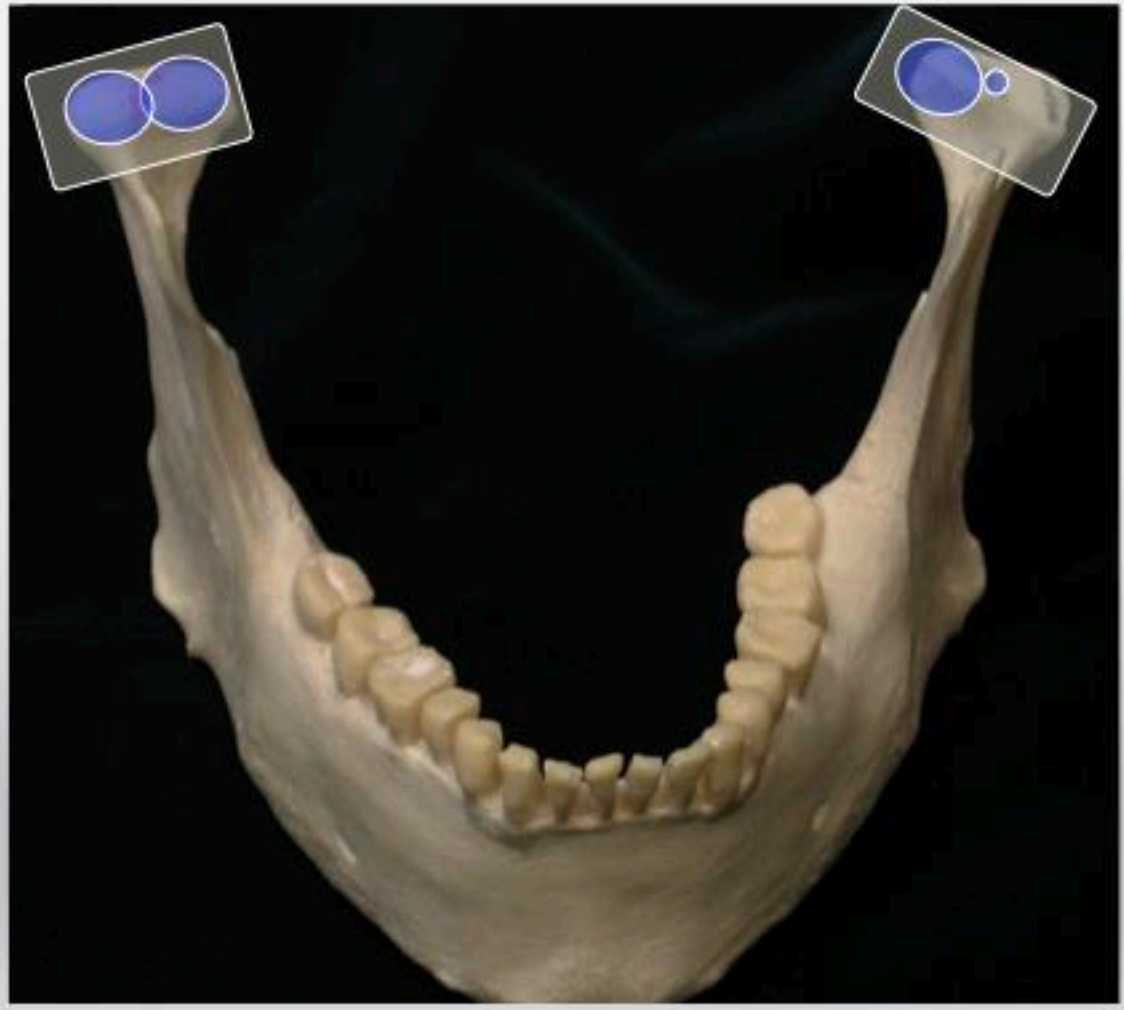


Load zones on opening



CR zone in damaged joints may not be on the medial pole

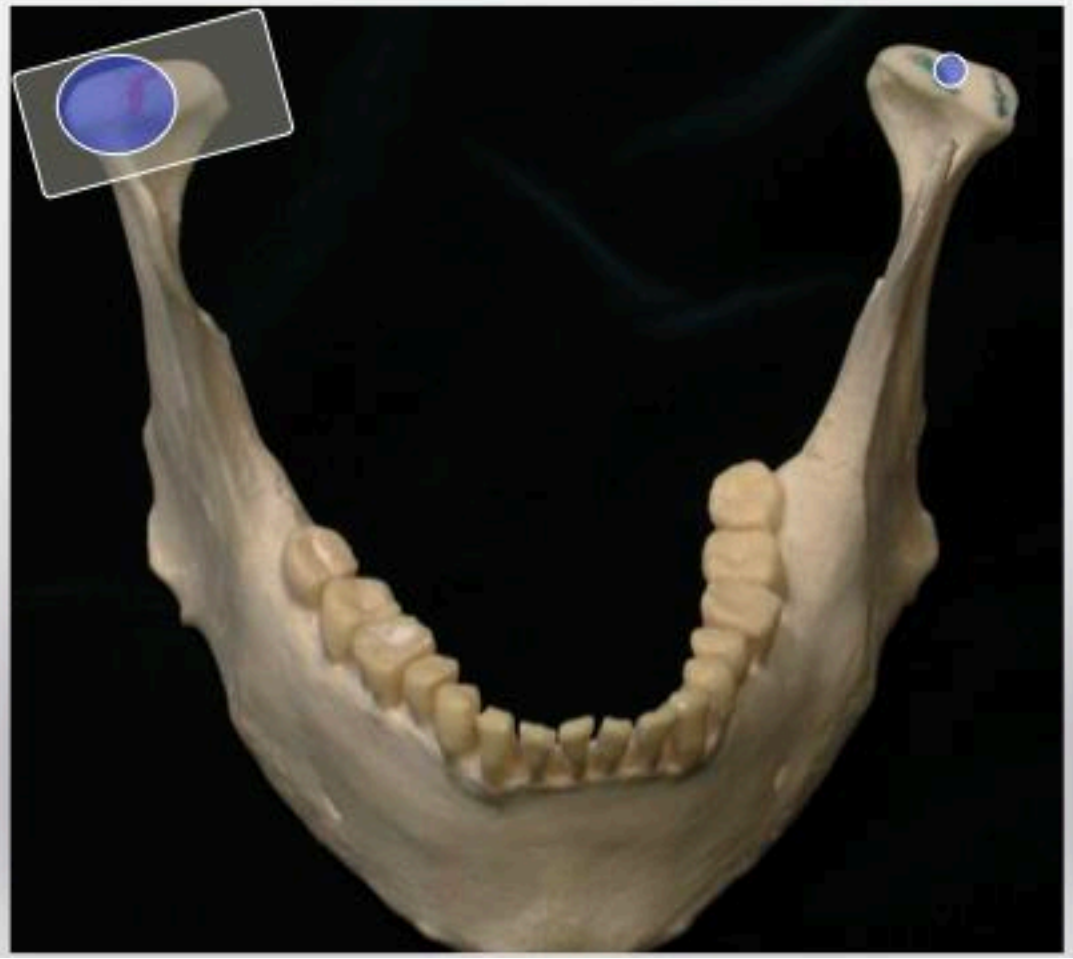
Condylar Loading in Disc Displacement



Run x3

Mechanically Unstable TMJs
"Wobbly Joint"

Joint Subluxates under Load



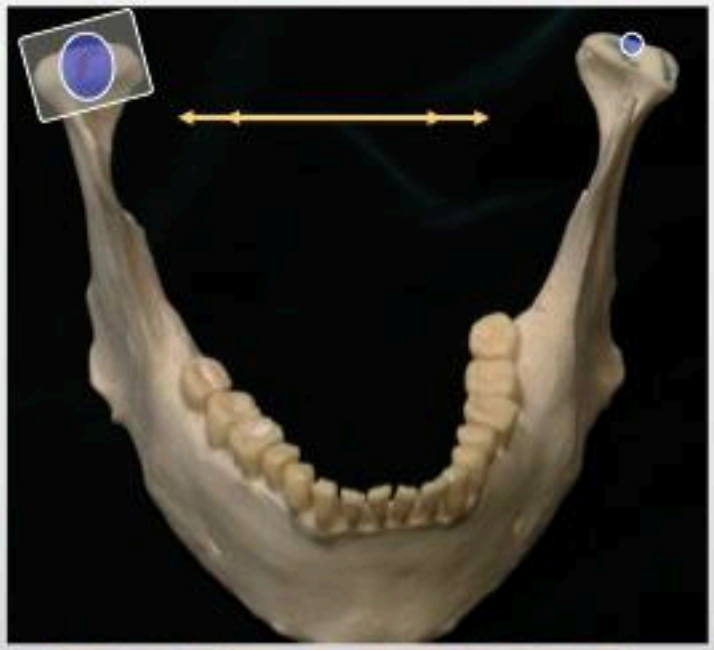
Run Demo

Non-Linear Joint Deformity- Mechanically Unstable TMJs- "Wobbly Joint"

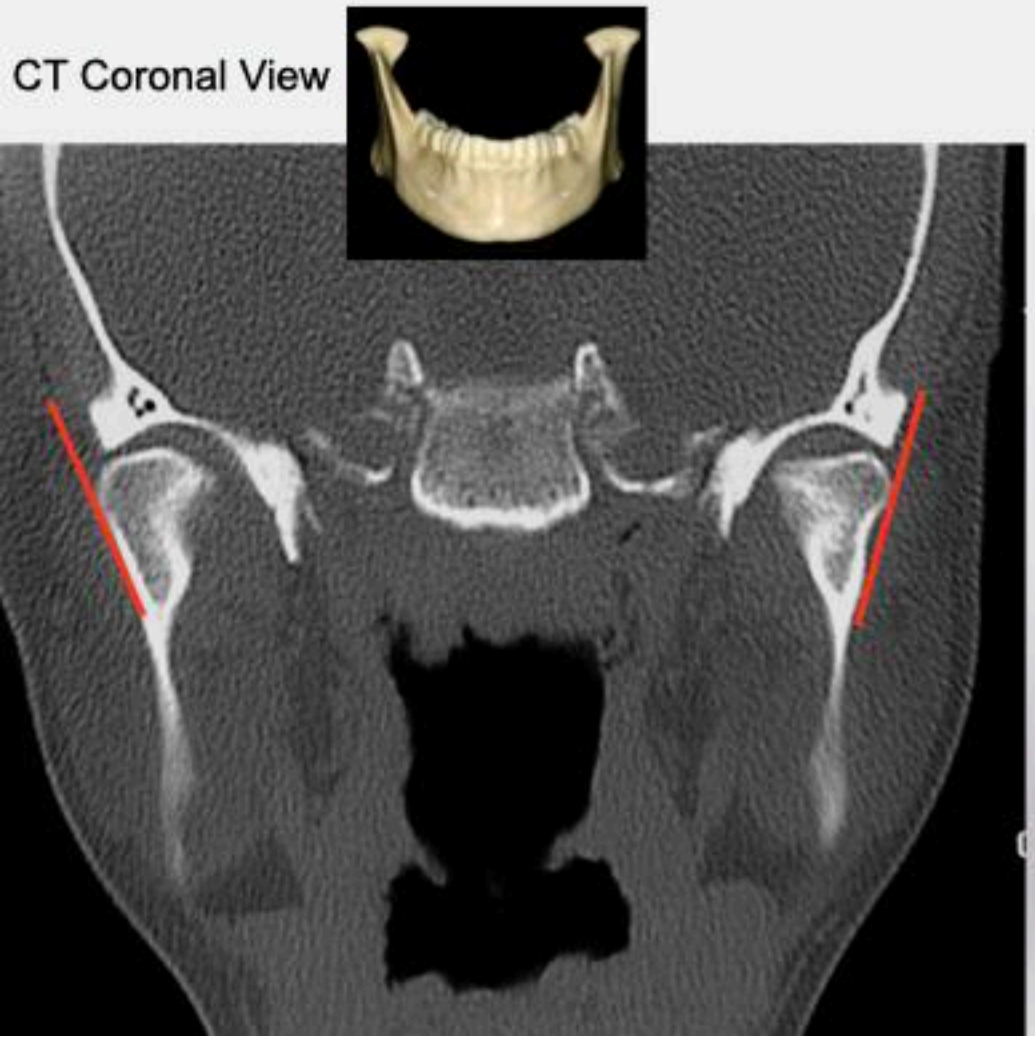
TM Joint subluxates under load
- Adapted CR "wobbles"

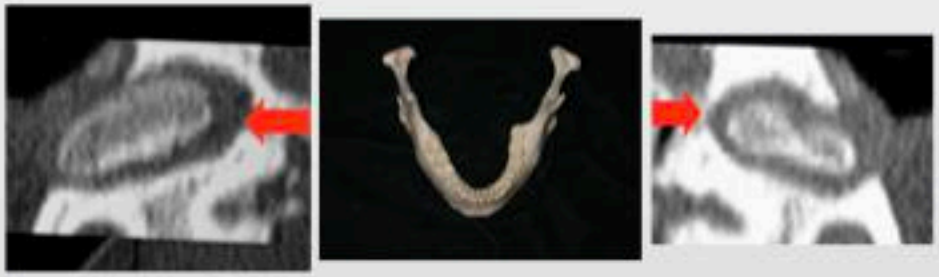
TMJ Muscle hyperactivity
- Looks similar to OMD
- Muscles must stabilize the joint
- Deep temporalis especially sore

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

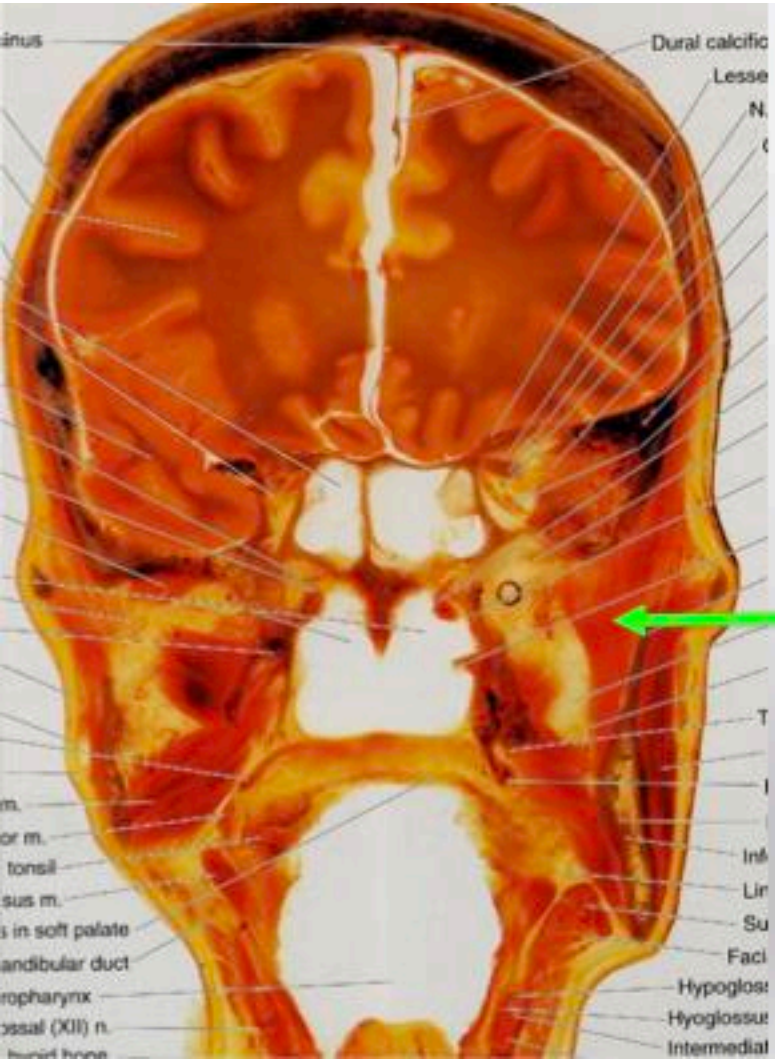


CT Coronal View

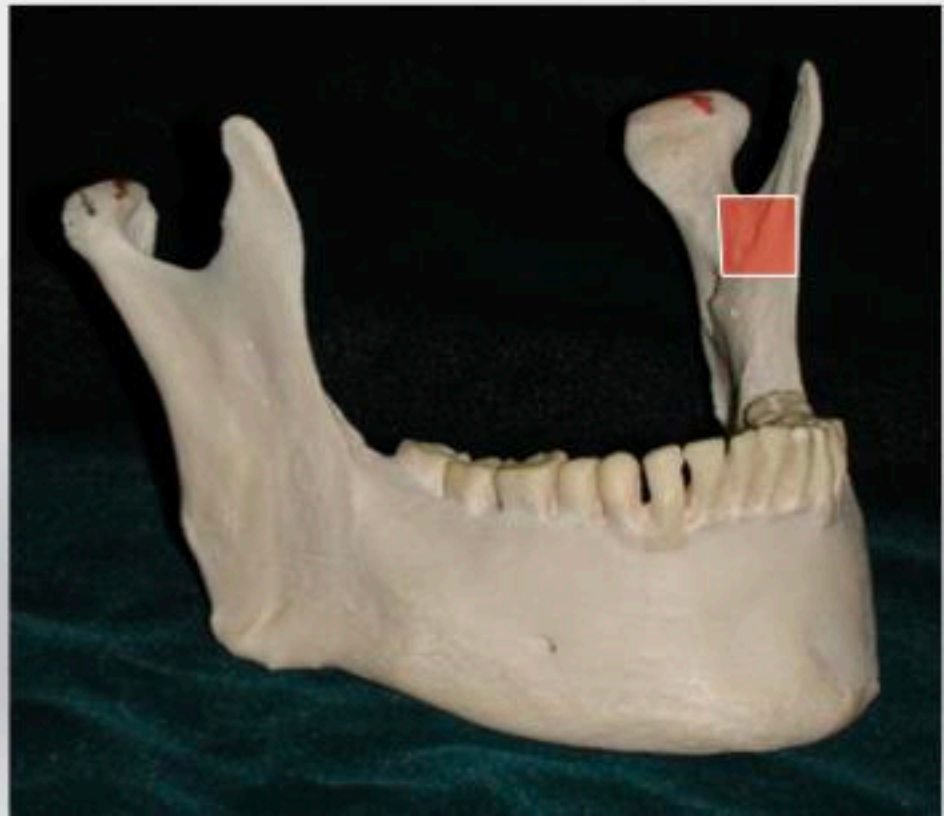


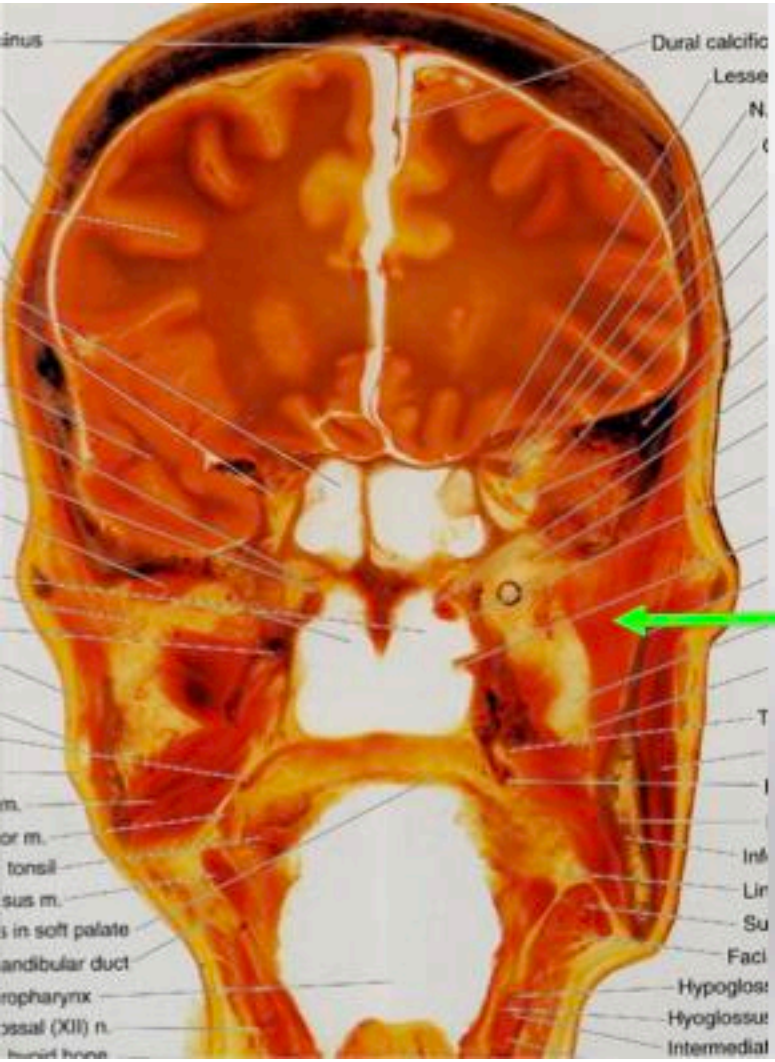


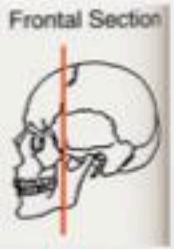
CT Axial View



What Muscles is this and what does it do?







Deep Temporalis
- Stabilizes TM joint side to side
- Always sore in "Wobbly Joints"

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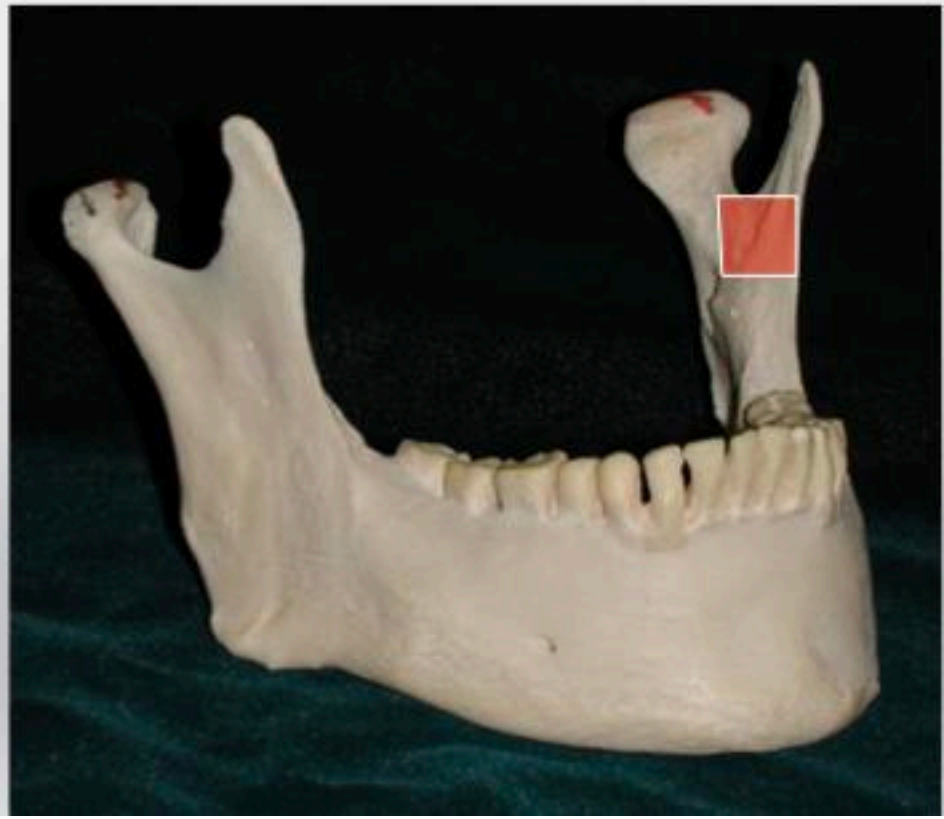

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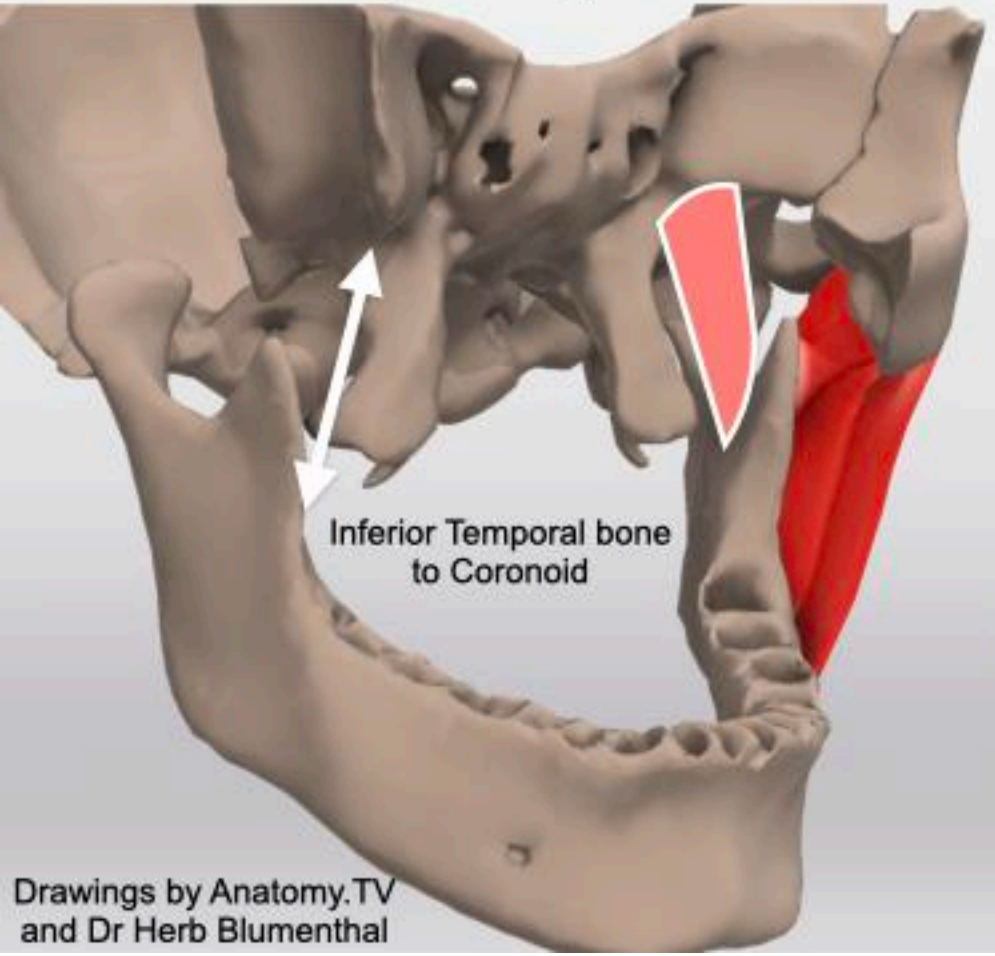
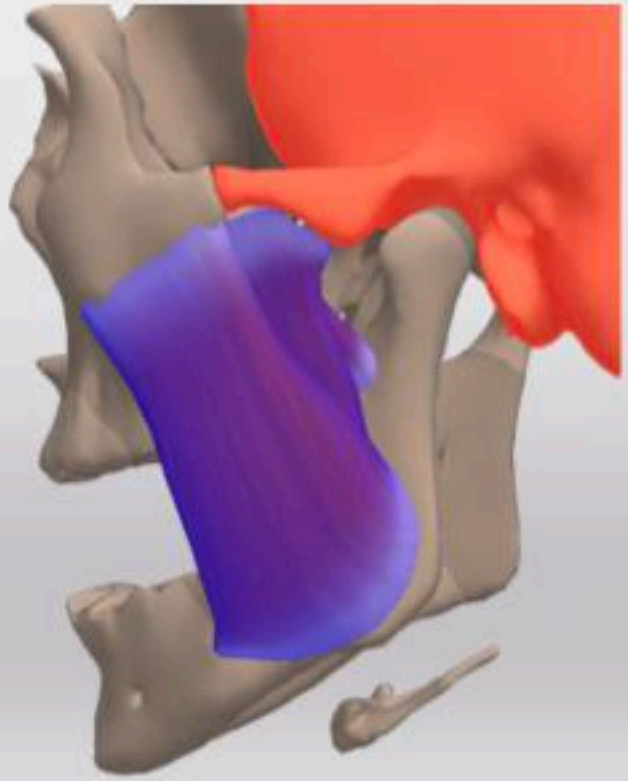


Drawings by Anatomy.TV
and Dr Herb Blumenthal

Masseter Muscle is Complex

Complex Muscle
3 Different Portions
3 Different Functions



Non-Linear Joint Deformity-
Mechanically Unstable TMJs- "Wobbly Joint"

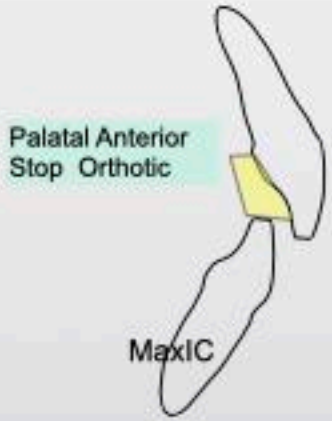
TM Joint subluxates under load
  Adapted CR "wobbles"

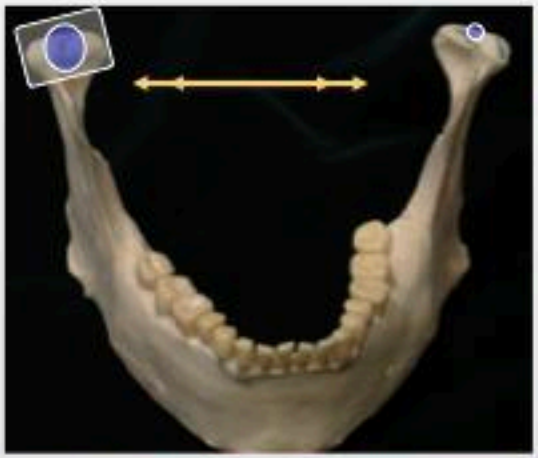
TMJ Muscle hyperactivity
  Looks similar to OMD
  Muscles must stabilize the joint
  Deep temporalis especially sore

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.





TMD Therapies

Surgical

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

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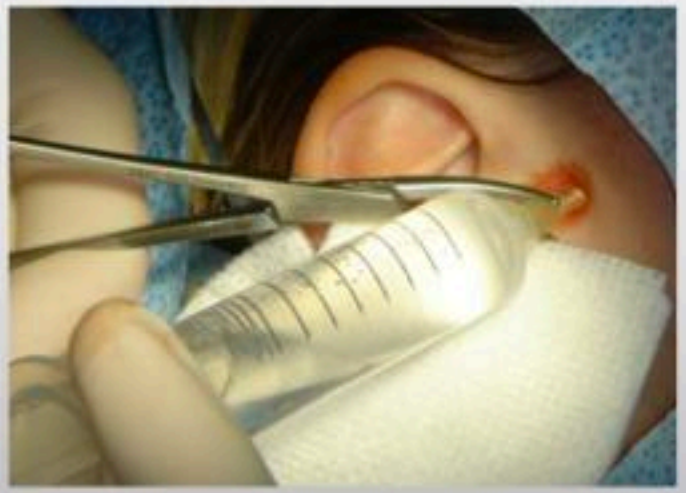
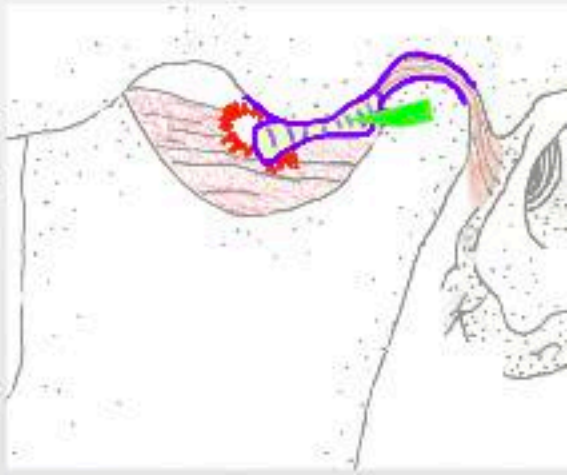


Needle into superior joint space
Flush out debris
Inject Platelet Rich Plasma

Indications:
Acute Closed Lock
Less than 6 weeks



Joint inflammation not responding to NSAIDs

TMD Therapies

Surgical

Refer: Arthrocentesis w/ PRP

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Refer: Total Joint Replacement

Refer: Orthognathic Surgery

Condylar Distraction

TMD Therapies

Surgical

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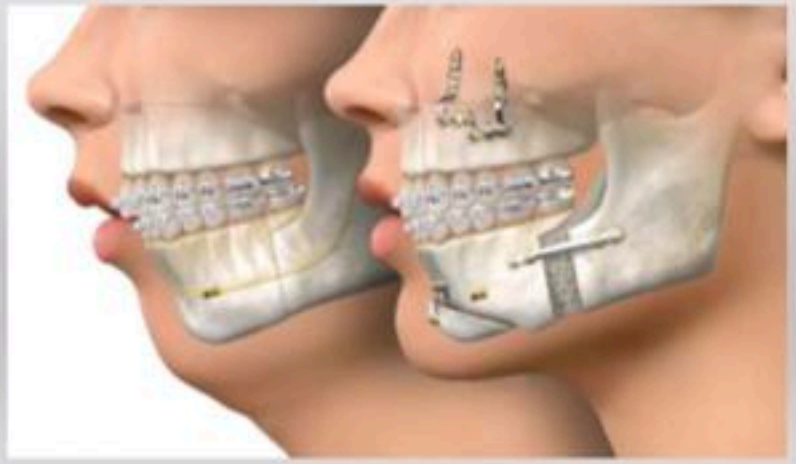
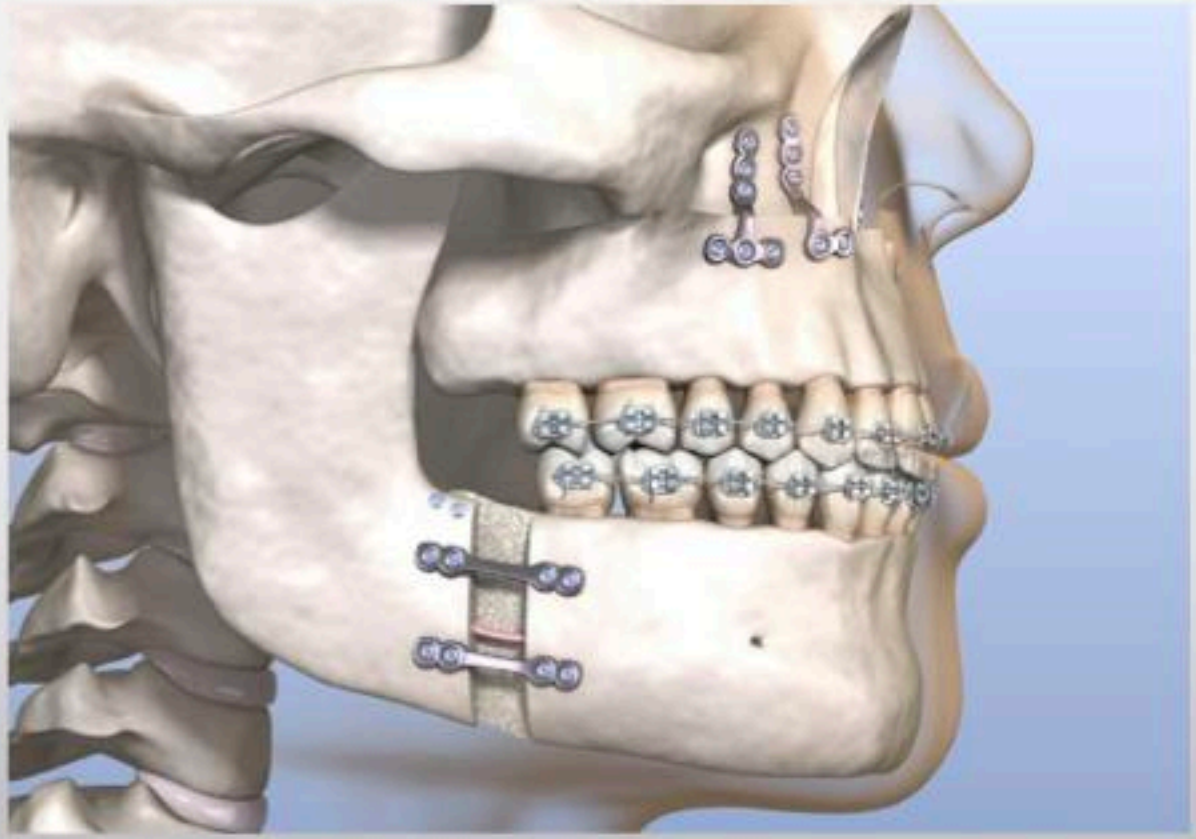
Refer: Discectomy w/ Fat Graft
Refer: Total Joint Replacement

Refer: Orthognathic Surgery





TMD Therapies

Surgical

Refer: Arthrocentesis w/ PRP
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Refer: Total Joint Replacement

Refer: Orthognathic Surgery

Pre-surgical Orthodontics

Maxillary Expansion with Lingual Light Wire and orthodontics

Orthopedics and Orthodontics by Dr John Droter

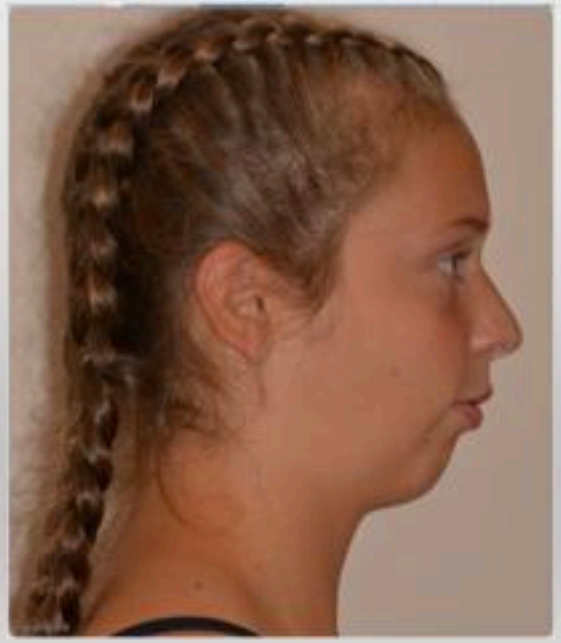
TMD Therapies

Surgical

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

Refer: Orthognathic Surgery

Upper and Lower Jaw Surgical Advancements
by Dr Edward Zebovitz



TMD Therapies

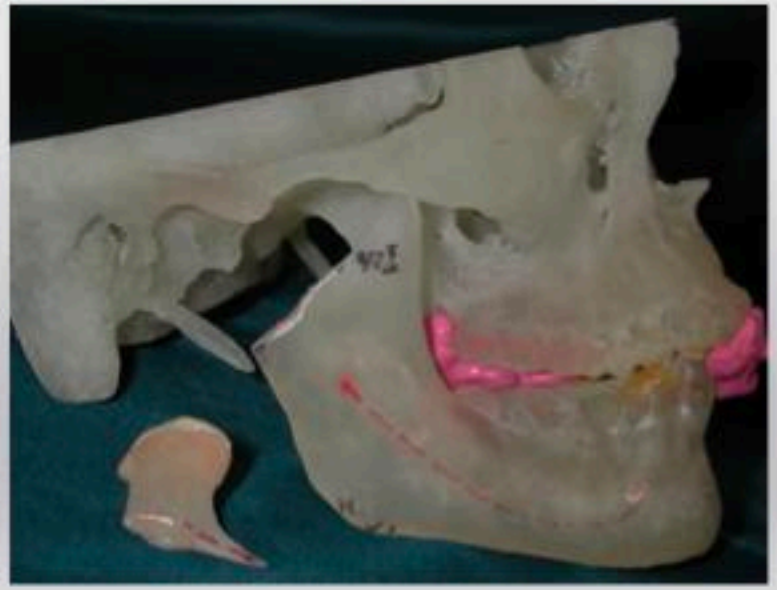
Bite by Dr John Droter
Total Joint Replacement by Dr Edward Zebovitz

Surgical

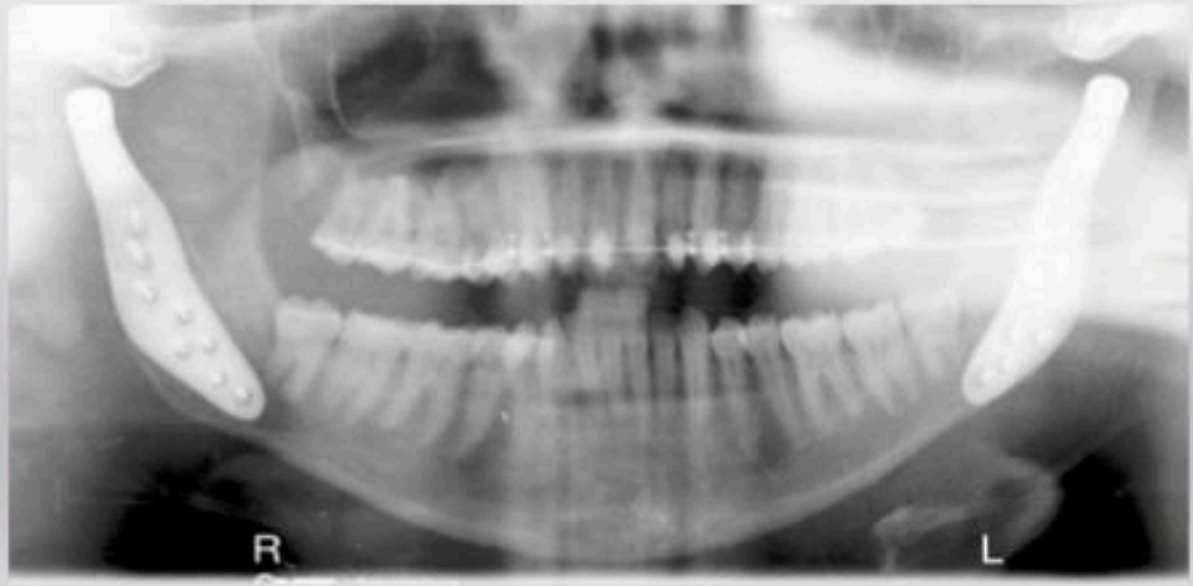
Refer: Arthrocentesis w/ PRP
Refer: Discectomy w/ Fat Graft

Refer: Total Joint Replacement

Refer: Orthognathic Surgery



Lateral Pterygoid Attached



Oral Surgical Support for a TMD Practice

Dx Blocks
Muscle Trigger Point Injections
Sympathetic Nerve Blocks
Botox for Severe Parafunction
Arthrocentesis
Discectomy, Fat Graft, Condylar Distraction
Orthognathic Surgery Malocclusion
Orthognathic Surgery Airway
Total Joint Replacement

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

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
Myobrace
Aqualizer
Diagnostic Palatal Anterior Stop
Lower full coverage CR
Lower posterior deprogrammer
Lower TMJ Rehab flat plane
Lower Indexed
Brux Checker
Upper full coverage hard CR guard
BiArch Posterior Deprogrammer
Mandibular Advancement Device
Lateral Bruxing Device

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