Ontario 2025 The Click

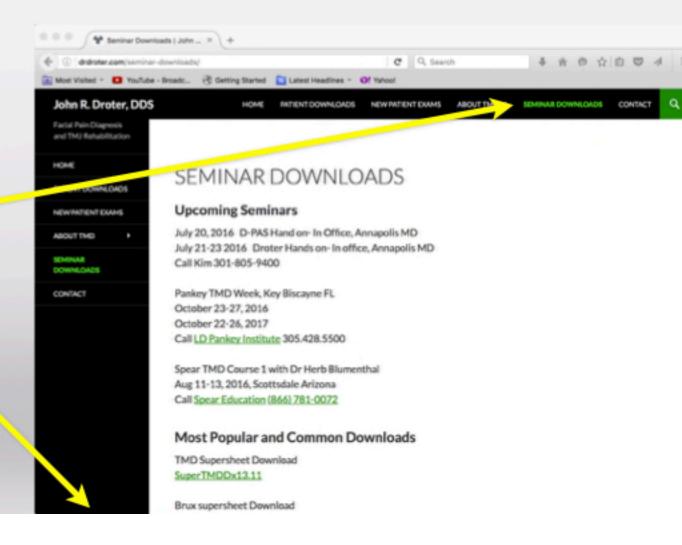
John R Droter DDS Annapolis, Maryland

John R Droter, DDS

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

Seminar Download

Ontario





Hello. I am:

John R Droter DDS Annapolis, Maryland

Milestones



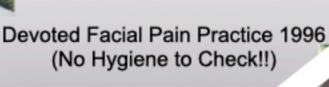
Visiting Faculty LD Pankey Institute 2008-



Visiting Faculty Spear Education 2013-2020

Visiting Faculty Orthodontic Program Washington Hospital Center 2000-2012

Past staff AAMC: Orthopedic Rounds In OR for TMJ Surgeries



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





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

Disclosures:

Atomic Skis- Sponsored. I got stuff.

LD Pankey Institute TMD Course Honorarium

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



Living Tree Dental Lab High Quality Dental Orthotics License fee on my designs



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







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

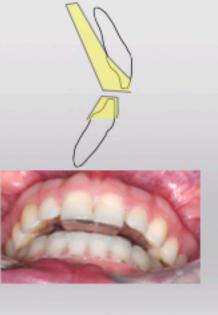
3D Printed Orthotics

D-PAS
DiagnosticPalatal Anterior Stop





Brux-PAS with lower Essix



Hard Lower Posterior Stop with upper essix





Hard Lower Full Coverage Centric Relation Orthotic





6 Common TMDs

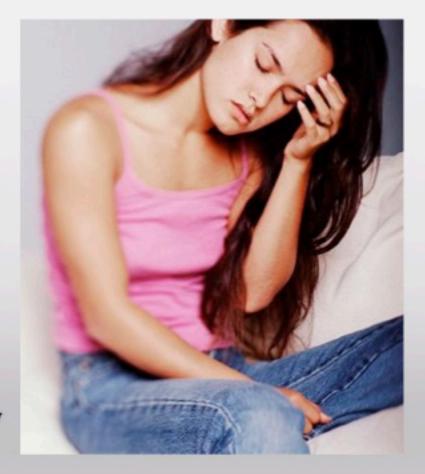
Parafunctional Clenching
Parafunctional Grinding
Occlusal Muscle Dysfunction
Osteoarthritis
Acute Sprain
Acute Closed lock of TMJ disc

5 Common Obstacles

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

1 TMD that usually does not need therapy

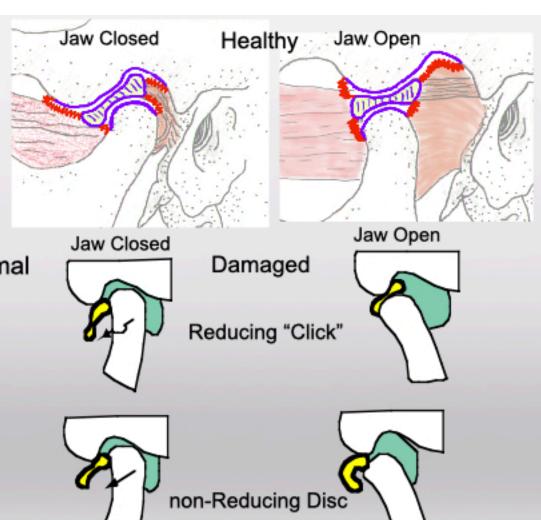
TMJ Clicking

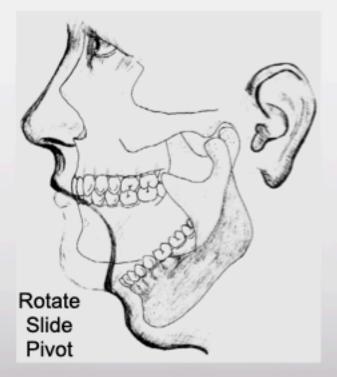


The Click

Key Points:

Clicking jaw joints are common, but not normal
All clicking joints are damaged
The "Click" usually does not need to treated
A non reducing disc is
not the #1 cause of limited opening





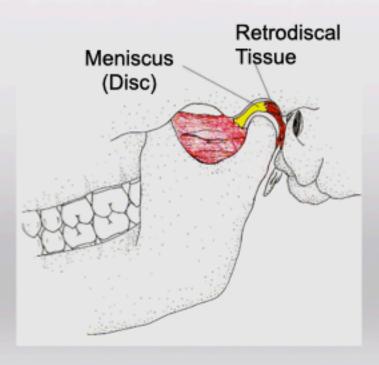
Rotation only 25mm

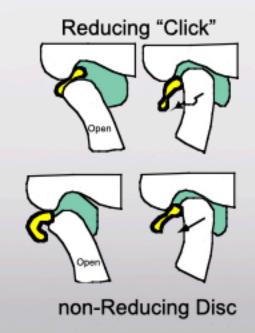
Max Open 40-55mm Right Lateral 10-12mm Left Lateral 10-12mm Protrusive 10-12mm



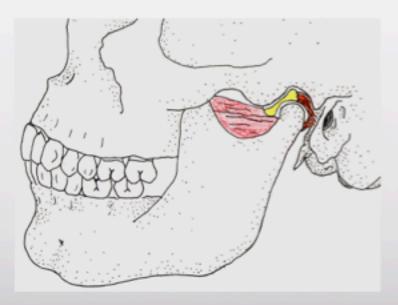
TMJ has 2 Joint Compartments:

Upper- Translation Lower- Rotation

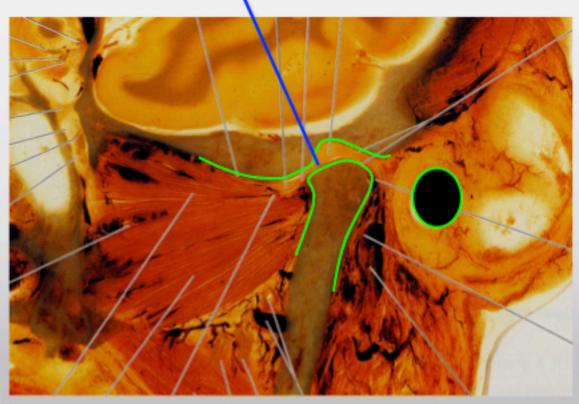




The Temporomandibular Joint

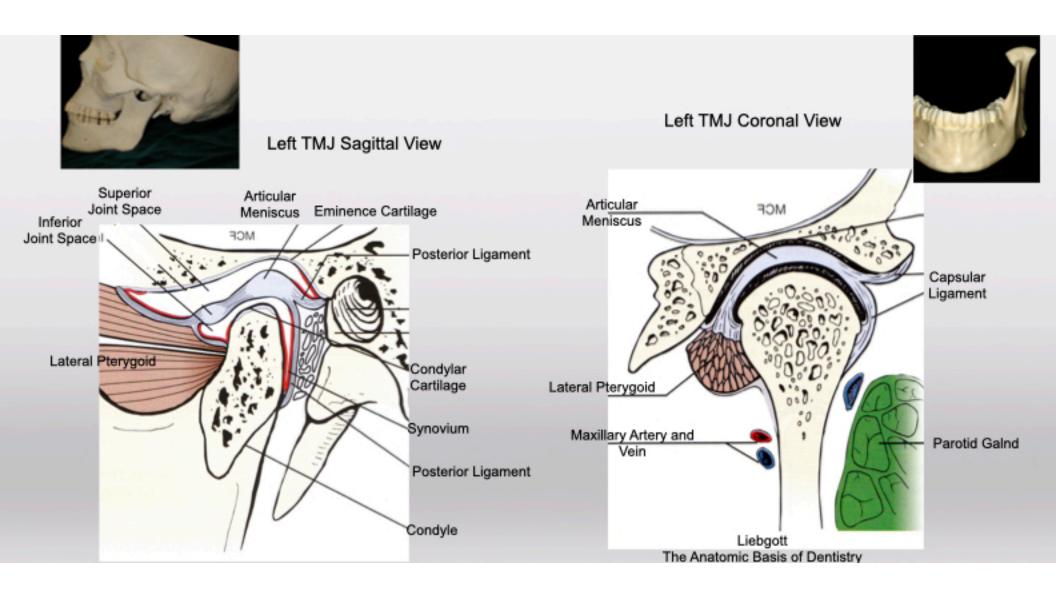


Ear
Sideways "S" Fossa
Condyle
Disc- Thick Thin Thick

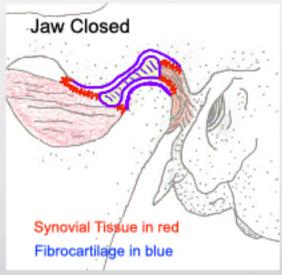


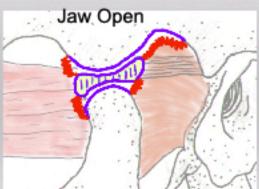
Disc: Thick-Thin-Thick

Oblique Sagittal View Romrell, Mahan



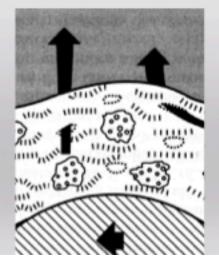
Normal TMJ- Synovium, Cartilage

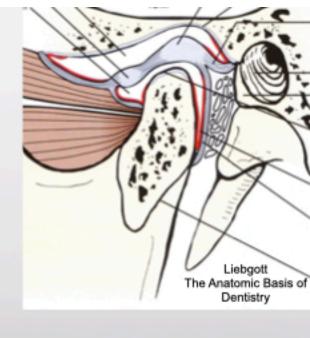




Fibrocartilage-Slope of Eminence Disc Top of Condyle

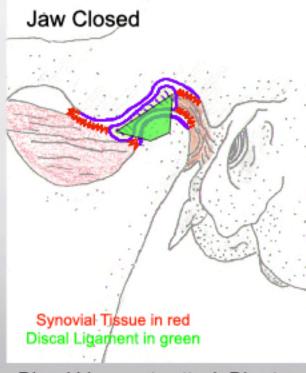
> Synovial Tissue makes Synovial Fluid No blood vessels in a health joint Nutrition to the cartilage cells Lubrication- Hyaluronic Acid and Lubricin





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

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

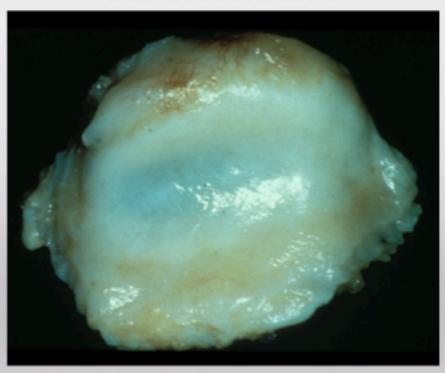
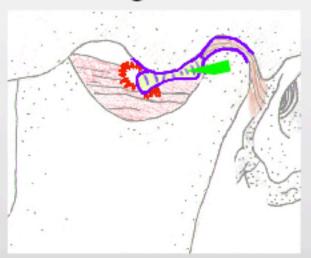


Photo Courtesy of Dr Henry Gremillion

Damaged TMJ- Anteriorly Dislocated Disc



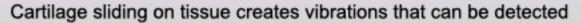
Torn or stretched Meniscal ligaments

Anterior Dislocated Disc

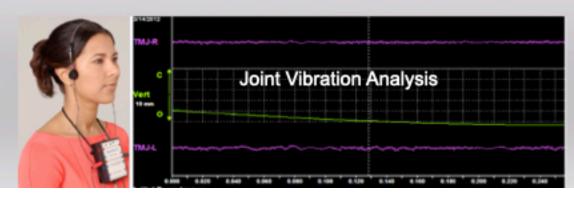
Damaged Synovium

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

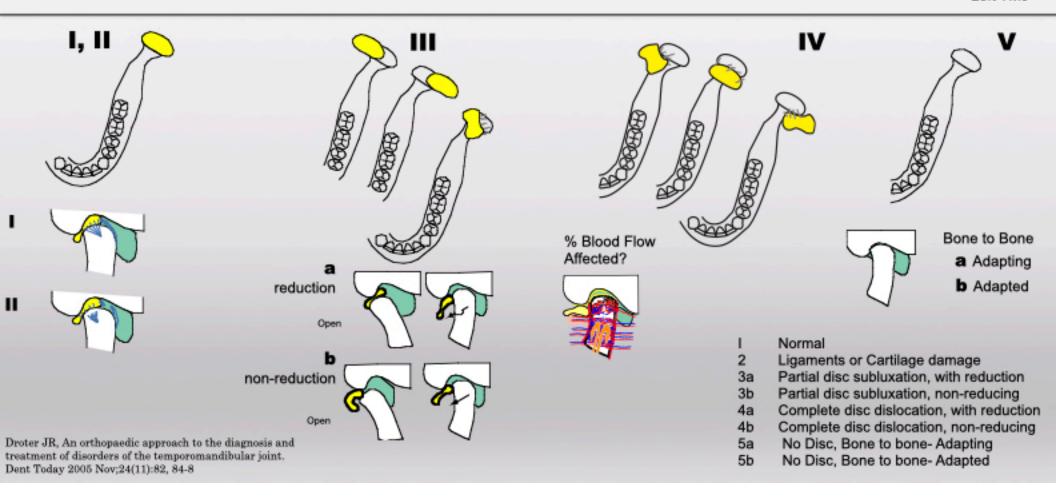








Dr. Mark Piper's Classification



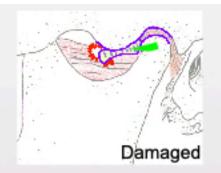
Basic Orthopedics

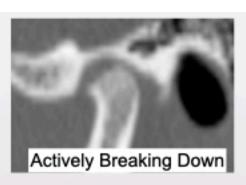
Joints are either Healthy or Damaged

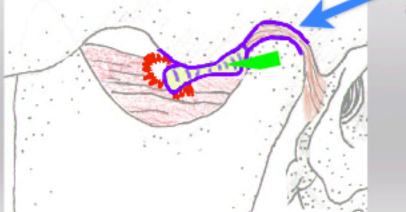
If damaged, joints will be either:
Actively Breaking Down
Adapting
Adapted
Structurally, Mechanically
Favorably, Unfavorably

Majority of damaged TMJs adapt favorably









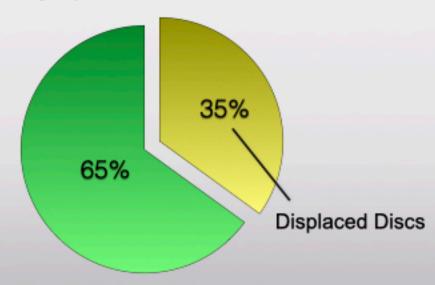
Posterior ligament, synovium, and retrodiscal tissue adapt to form a

Pseudo-disc

Tissue Fibrosis

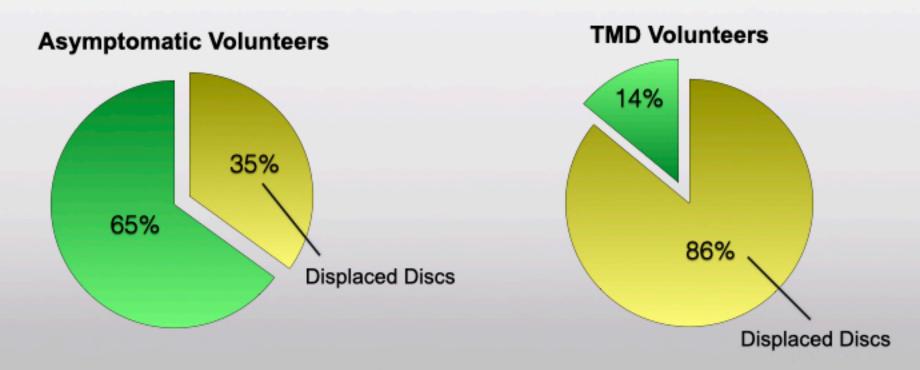
Prevalence Displaced Discs on MRI

Asymptomatic Volunteers



The Prevalence of Disc Displacement in Symptomatic and Asymptomatic Volunteers Ribeiro R, Tallents R, Katzberg R, J Oral Facial Pain 1997;11:37-47

Prevalence Displaced Discs on MRI



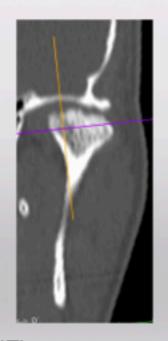
The Prevalence of Disc Displacement in Symptomatic and Asymptomatic Volunteers Aged 6 to 25 years Ribeiro R, Tallents R, Katzberg R, J Oral Facial Pain 1997 ;11:37-47 MRI of 237 volunteers

What is the Clinical Relevance of TMJ Damage Post-Puberty?

John R Droter DDS Annapolis, Maryland



Damaged TMJs



Adapt Favorably Adapt Fairly Adapt Poorly

85% 14% • <1%

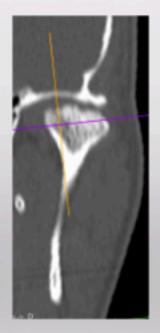
Occlusal Muscle Dysfunction
Osteoarthritis
Mechanically Dysfunctional

Avascular Necrosis
Progressive Condylar Resorption

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



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85%

14% <1%

Occlusal Muscle Dysfunction
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Progressive Condylar Resorption

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

Leeuw, Boering, Stegenga, Bont, Journal of Craniomandibular Practice, April 1995, vol. 13, No. 2

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

www.jrdroter.com

6 Common TMDs

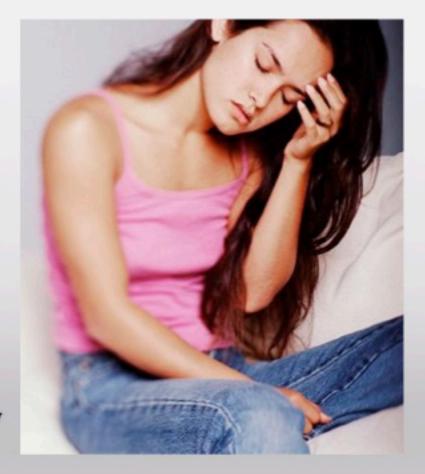
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Acute Closed lock of TMJ disc

5 Common Obstacles

Neck and Postural Instability
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Compromised Breathing/Airway
Avascular Necrosis
Referred Pain Muscle Triggerpoints

1 TMD that usually does not need therapy

TMJ Clicking



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

There is no love sincerer than the love of food.



G. B. Shaw







Damaged TMJs



Adapt Fairly
Adapt Poorly

85% 14% --->

Occlusal Muscle Dysfunction Osteoarthritis Mechanically Dysfunctional

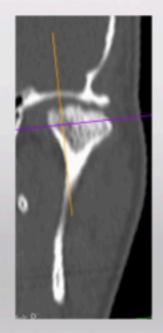
Avascular Necrosis

Progressive Condylar Resorption

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



Damaged TMJs



Adapt Fairly
Adapt Poorly

Occlusal Muscle Dysfunction
Osteoarthritis
Mechanically Dysfunctional

Avascular Necrosis
Progressive Condylar Resorption

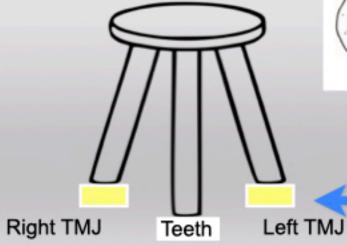
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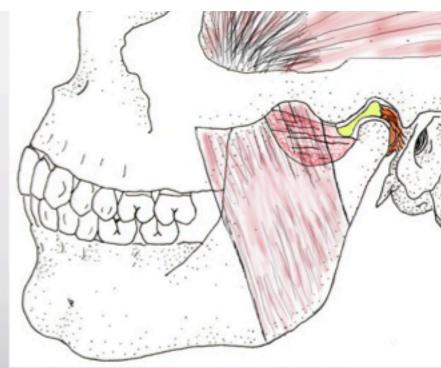
Neck and Postural Instability A change in any one area will affect the others CNS/PNS This is a dynamic orthopedic System Skull **TMJ** Teeth Mandible Neck Teeth Muscle Muscle TMJ Neck venn diagram

Normal Joint with Normal Occlusion

All teeth touch evenly with condyles seated in fossa

What happens to the occlusion if the disc is dislocated?

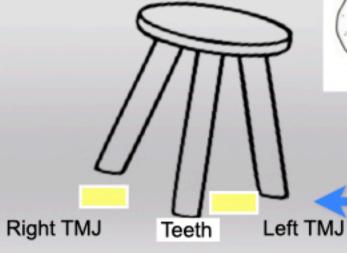


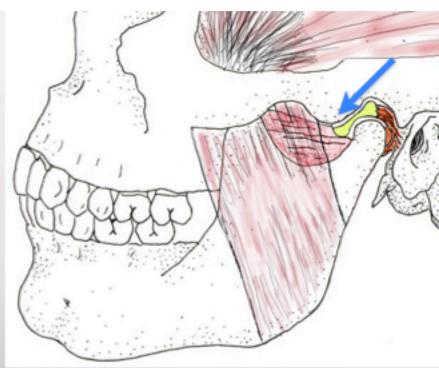


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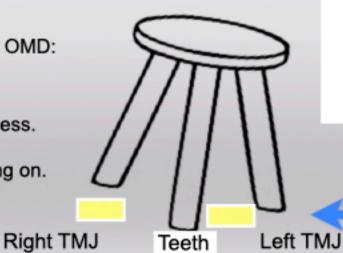
Damaged Joint with Malocclusion

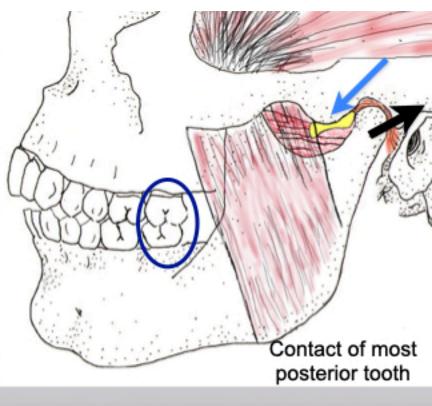
85% damaged joints adapt favorably with respect to the TMJ.

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

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

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





Occlusal Shift Short

Occlusal Muscle Disharmony

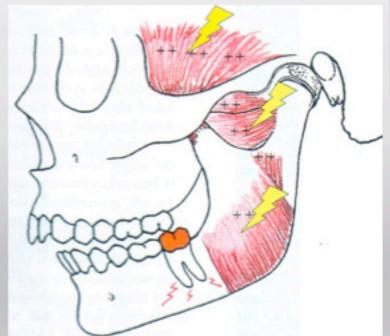
Uneven tooth contact with condyles fully seated triggers muscle activity

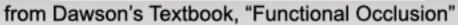
Lateral pterygoid fires out of sequence to create even tooth contact on closure

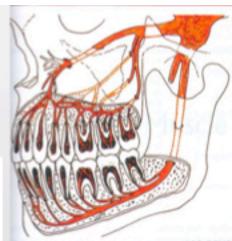
Disharmony in all muscles: Splinting/Bracing

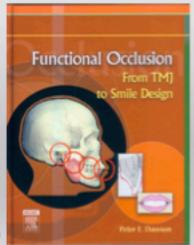
Muscles sore from overuse

Muscles do not think- CNS input



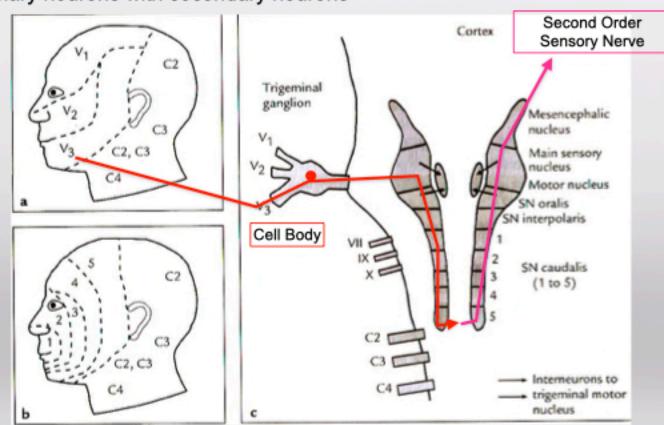


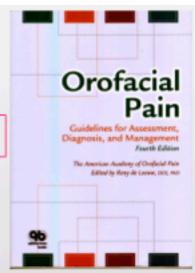




Trigeminal Ganglion-Cell bodies of trigeminal primary sensory neurons Trigeminal Nucleus Connection of primary neurons with secondary neurons

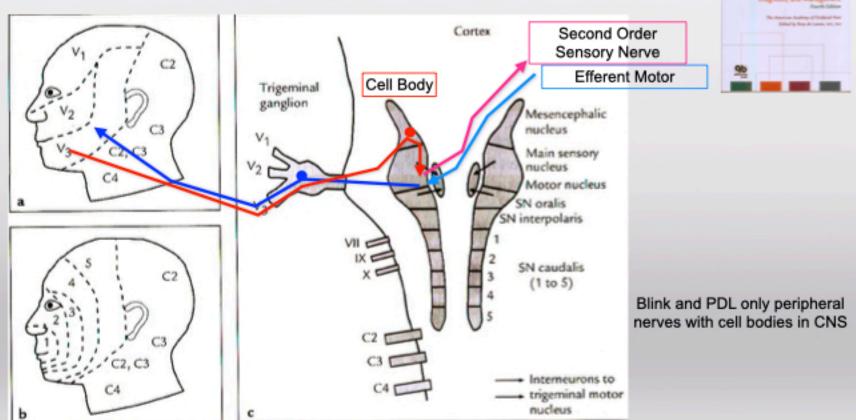
Afferent First Order Sensory Nerve





First Order PDL sensory neurons and proprioception neurons of TMJ closing muscles have their cell bodies in the upper section of the Trigeminal Nucleus and synapse with their second order neurons in the Motor nucleus

Efferent motor neurons to the TMJ muscles also synapse in the motor Nucleus

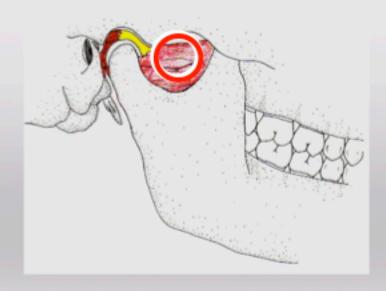


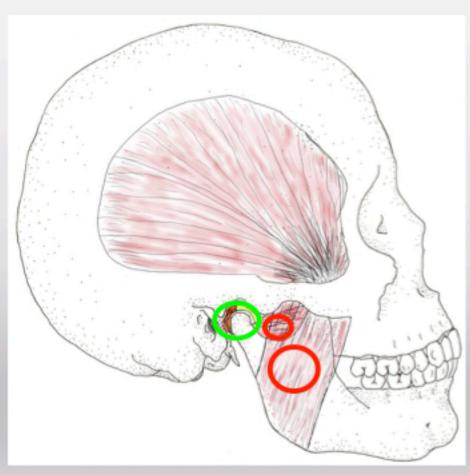
Orofacial

PDL Afferent First Order Sensory Nerve

Occlusal Muscle Dysfunction Pattern

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

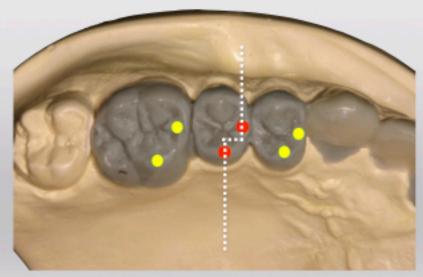




Drawings by Gretta Tomb DDS and John Droter DDS

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

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



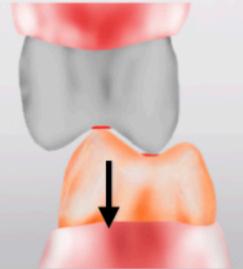


Drawing by Dr Jim Kessler

Ideal Occlusion for Comfortable Muscles

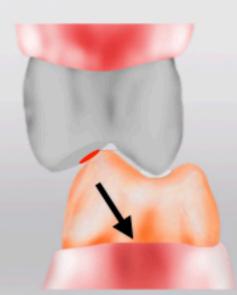
Ideal

No sideways forces on back teeth.



Not Ideal

Tense Muscles Teeth can fracture

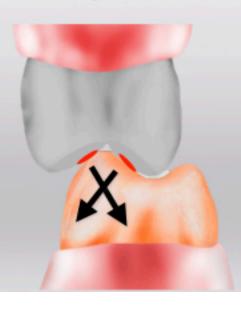


Sideways forces can fracture teeth

Not Ideal

Tense Muscles

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

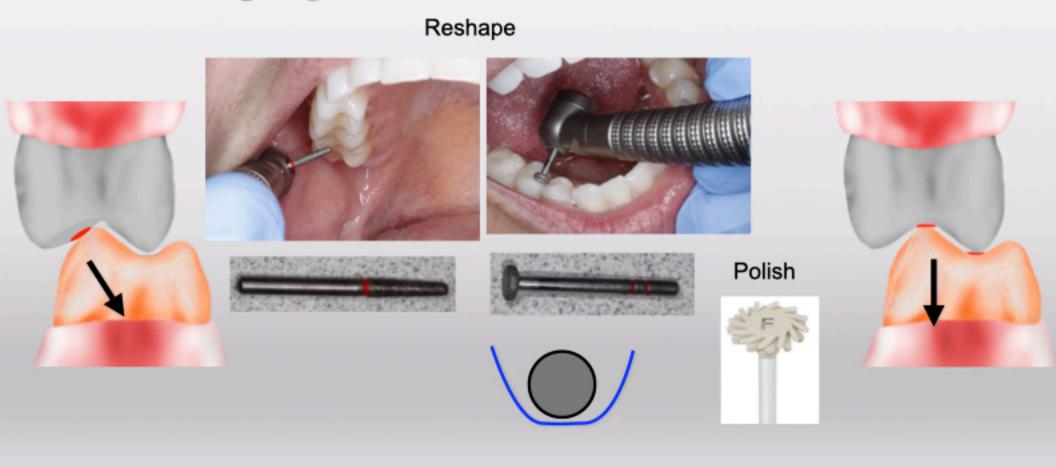


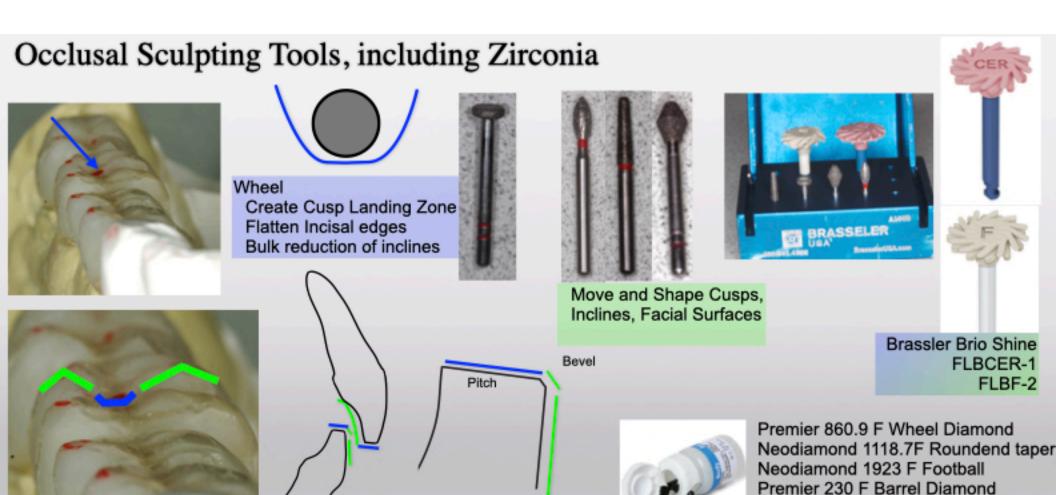


Not Ideal

This is now a functionless tooth. Other teeth now have more force.

Occlusal Sculpting





Filtek Supreme- B1B, Allbond Bisco

Bonding Zirconia, E.max, Porcelain, Gold

Roughen with Diamond

Microtech

Katana Cleaner, Kuraray Removes phosphates, saliva

Clearfil Ceramic Primer Plus, Kuraray

All Bond, Bisco

Light Cure Critical step for stronger bond

Filtek Composite shade B1B









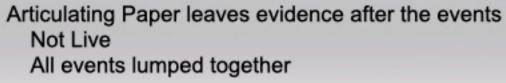




T-Scan Computerized Occlusion

Occlusion Live and in Slow Motion











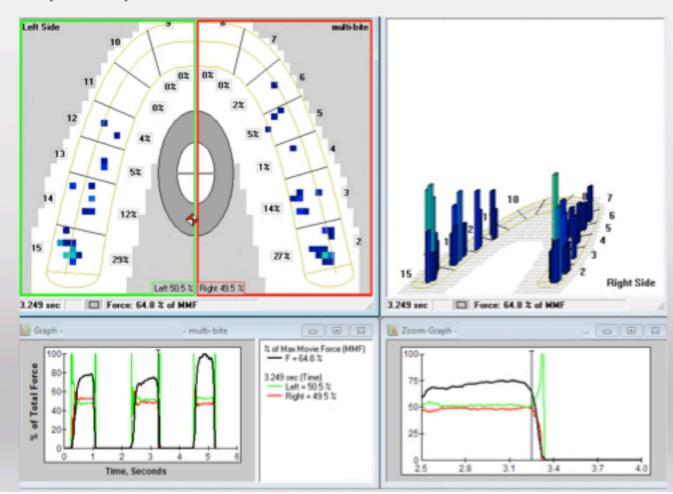
Using Since1999



Time Force Graphic Representation of the Occlusion

T-Scan Gives you:
Timing
Intensity
Location
Distribution

"Occlusion in Slow Motion" Regular 10 msec intervals Turbo 2.5 msec



Treat Occlusal Muscle Dysfunction- Sculpt the Bite



LD Pankey Institute, Key Biscayne FL





Facial Pain-What are the choices?

*This is not a complete listing of all the possibilities

TMD and Oral Facial Pain

June 24-28, 2026

John R Droter, DDS Ed Zebovitz, DDS Laura Brescia, DDS Glen Kidder, DDS Steve Malone, DDS Paul Kelly









Class size limited to 24 Call Jackie at (305) 428-5500 www.pankey.org

Learn Occlusal Equilibration

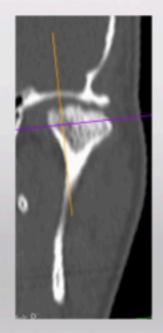
Pankey Essentials Course 1 or

Mastering Equilibration: July 26-28, 2026.

Dr Kevin Muench, DDS



Damaged TMJs



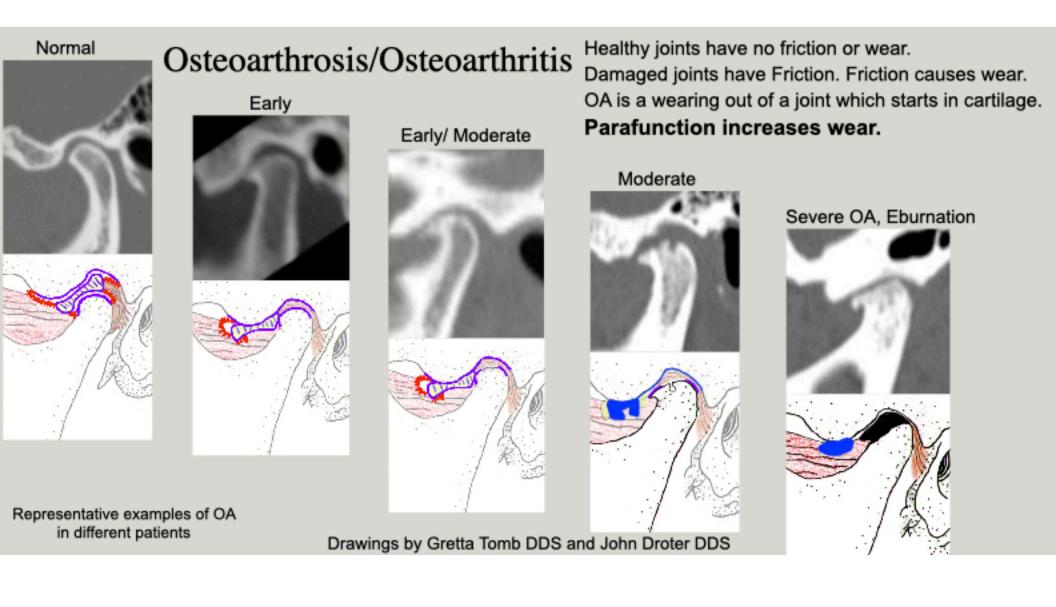
Adapt Favorably
Adapt Fairly
Adapt Poorly

85% 14% ->> <1%

Occlusal Muscle Dysfunction
Osteoarthritis
Mechanically Dysfunctional

Avascular Necrosis
Progressive Condylar Resorption

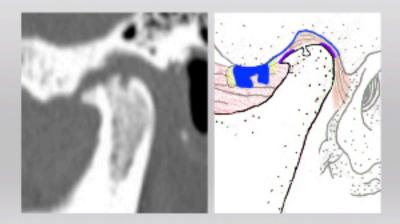
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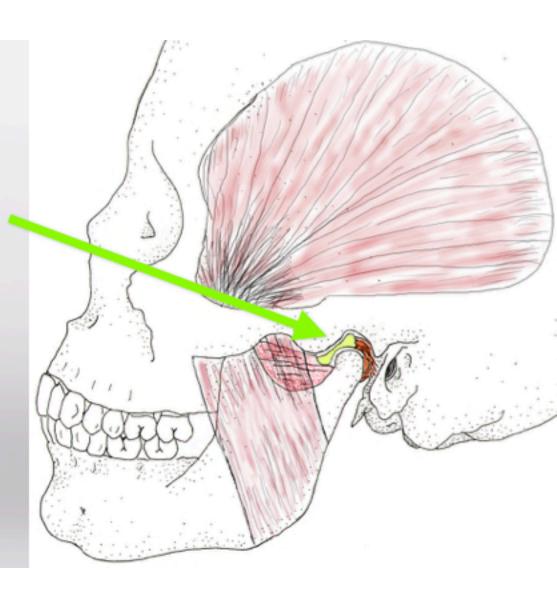


Osteoarthritis is the most common of the 40 different diseases that affect all joints.

Heathy Temporomandibular Joint "TMJ"

Osteoarthritis of the TMJ





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







Treatment OA

Osteoarthrosis

Minimize parafunctional Forces:

Hard Lower Posterior Stop Night Guard with Upper Essix Glucosamine 1500mg /Chondroitin 600 mg per day





Osteoarthritis

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

NSAIDs

CBD Balm

Cold Laser

If still inflamed arthrocentesis with Platelet Rich Plasma (PRP)

Shea Brand CBD

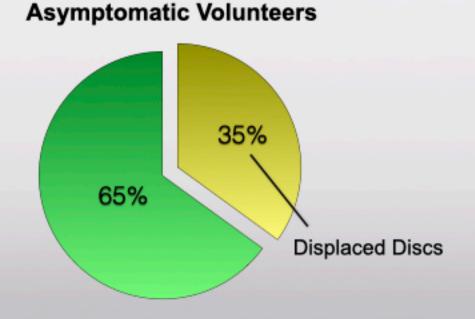


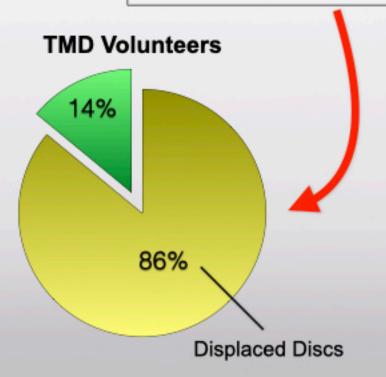


MLS Laser 3x week for 3 weeks

Prevalence Displaced Discs on MRI

Occlusal Muscle Disharmony Osteoarthritis





The Prevalence of Disc Displacement in Symptomatic and Asymptomatic Volunteers Aged 6 to 25 years Ribeiro R, Tallents R, Katzberg R, J Oral Facial Pain 1997;11:37-47 MRI of 237 volunteers



Damaged TMJs



Adapt Favorably
Adapt Fairly
Adapt Poorly

14% Occlusal N
Osteoarthi
Mechanica

Occlusal Muscle Dysfunction Osteoarthritis

Mechanically Dysfunctional

Avascular Necrosis

Progressive Condylar Resorption

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Basic Orthopedics

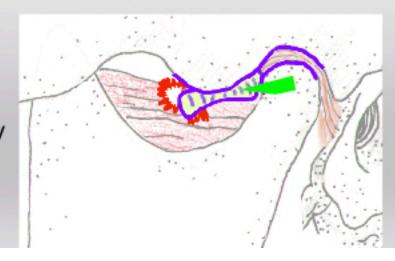
Joints are either Healthy or Damaged

> Adapted Unfavorably Mechanically

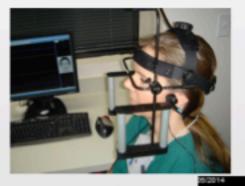
Intermittent Locking

"Wobbly" Joint

Majority of damaged TMJs adapt favorably



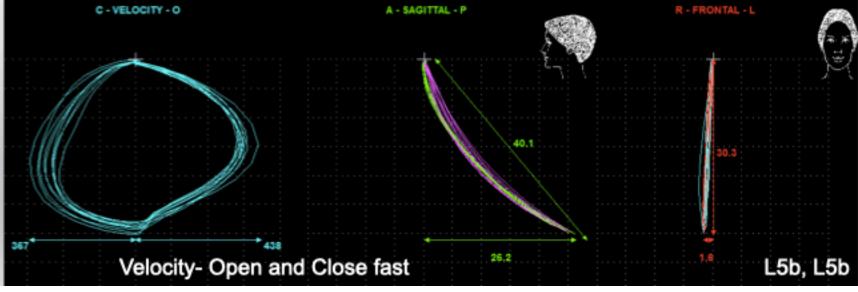
BioResearch Jaw Tracker



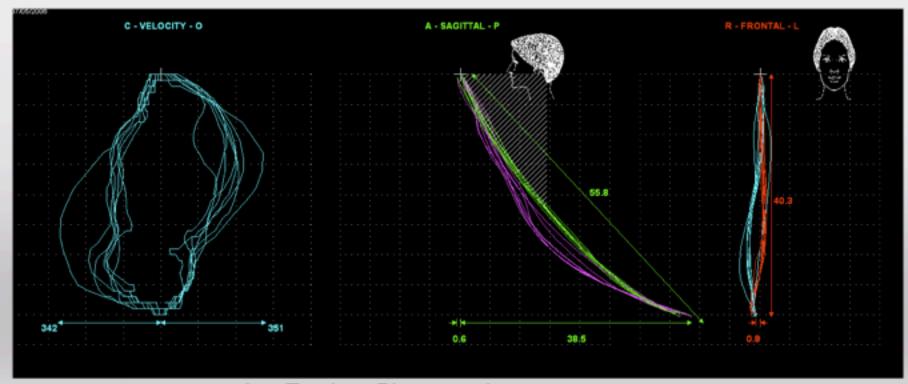
Normal TMJ- Motion

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





Mechanically Dysfunctional: Intermittent Locking Jaw "Gymnastics" to open and close



Jaw Tracker- Bioresearch

Mechanically Dysfunctional: Intermittent Locking TMJ Home Therapy

20 2 2 10 Exercises

5-6x a day to rehabilitate damaged jaw joint

20 reps Side to side

Forward and back 2 reps

Open wide, but not too far 2 reps

Side to side 10 reps

You can go to 2-3x a day to maintain once joint has adapted

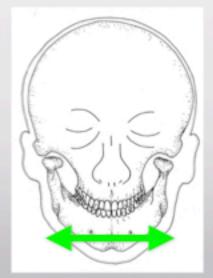
Doctor's Best Vegetarian Glucosamine Chondroitin & MSM Take 2/day

Shaklee +C Boost- 500 Vitamin C Sustained Release.

Take 1000mg before sleep







Intermittent Locking Treatment: TMJ Rehabilitation Orthotic

2nd Bi only contact Manipulate temporal bones



Convert to all teeth in contact



Create a Harmonious Anterior Guidance



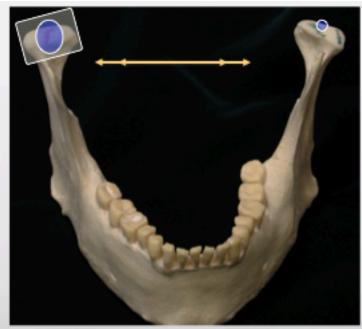
Non-Linear Joint Deformity-Mechanically Unstable TMJs- "Wobbly Joint"

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

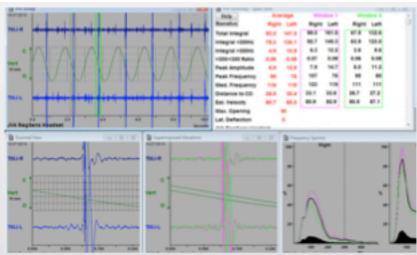




Joint Vibration Analysis

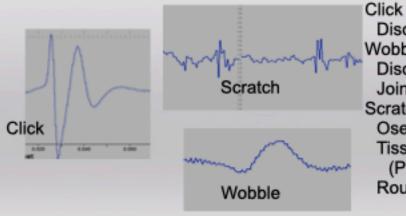
Objectively measures and quantifies joint vibrations during motion which is an indication of cartilage health





Based on Sonar. It is not a microphone

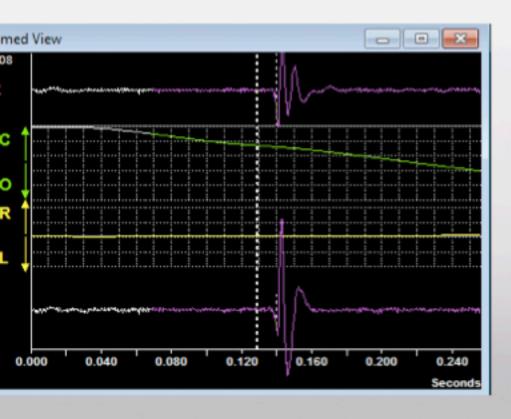
Three main types of sounds

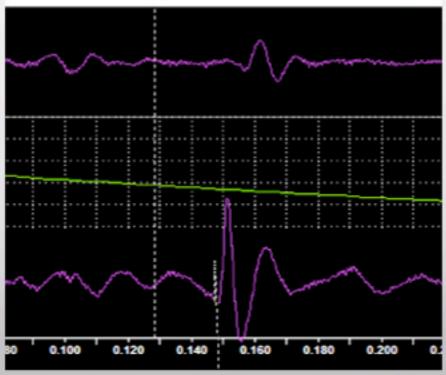


Disc Reduction
Wobble
Disc subluxation
Joint subluxation
Scratch
Oseoarthritis
Tissue against cartilage
(Piper 4b)
Rough cartilage- clenching

JVA measures the health of the cartilage

Simple or Complex





Simple left click with transference vibration to right L4a

Complex Click L3a, R4b

Diagnostic Palatal Anterior Stop

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

Better- Decrease in Symptoms

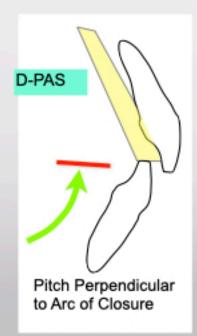
Sleep Clenching Inhibited: Wear D-PAS as night guard Orthotic Improved Airway: D-PAS as night guard Occlusal Muscle Disharmony: Occlusal Adjust

Worse-Increase in Symptoms

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

Stays the Same- No Change in Symptoms

Damaged TMJ are mechanically stable Pain not related to occlusion







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



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

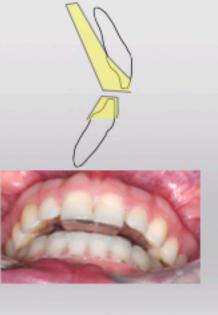
3D Printed Orthotics

D-PAS
DiagnosticPalatal Anterior Stop





Brux-PAS with lower Essix



Hard Lower Posterior Stop with upper essix





Hard Lower Full Coverage Centric Relation Orthotic







Damaged TMJs



Adapt Fairly
Adapt Poorly

85% 14% --->

Occlusal Muscle Dysfunction Osteoarthritis Mechanically Dysfunctional

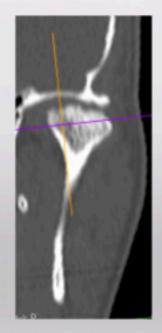
Avascular Necrosis

Progressive Condylar Resorption

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



Damaged TMJs



Adapt Favorably
Adapt Fairly
Adapt Poorly

14% Occlus
Osteos
Mecha

Occlusal Muscle Dysfunction
Osteoarthritis
Mechanically Dysfunctional

Avascular Necrosis
Progressive Condylar Resorption

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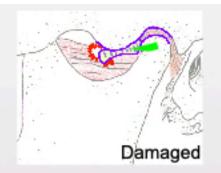
Basic Orthopedics

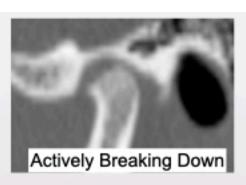
Joints are either Healthy or Damaged

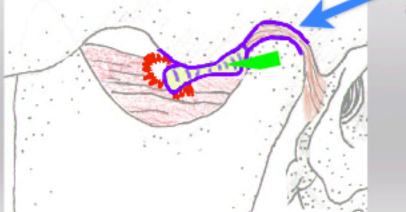
If damaged, joints will be either:
Actively Breaking Down
Adapting
Adapted
Structurally, Mechanically
Favorably, Unfavorably

Majority of damaged TMJs adapt favorably









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

Pseudo-disc

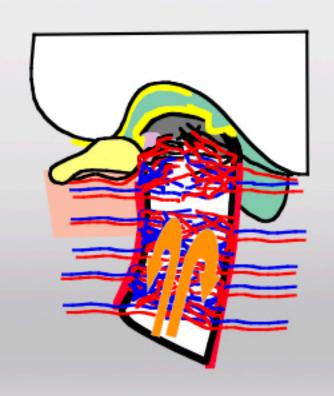
Tissue Fibrosis

Basic Orthopedics

Joints are either Healthy or Damaged

> Active Structural Breakdown

Osteolysis: Condylar Bone Loss



Age 30 Female Start

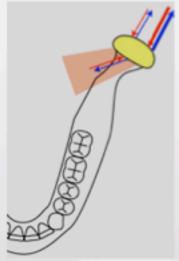




Front teeth use to touch 1 year ago



Axial View

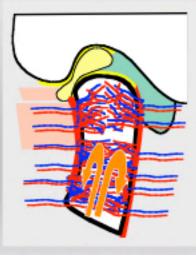


Normal TMJ Blood Flow, Marrow

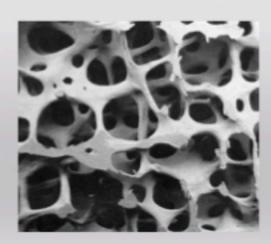
Condylar head limited collateral circulation Epiphyseal growth center

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

No Blood vessel inside joint



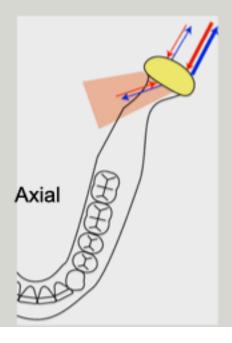


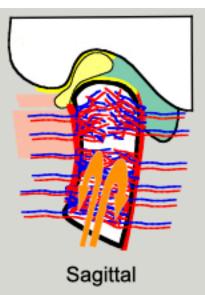


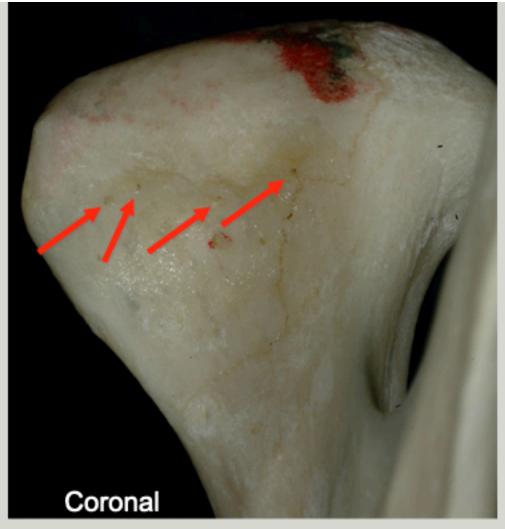
Closed Sagittal

Condylar Perfusion

Blood flows in and out of the condylar head through vessels that pierce the cortex

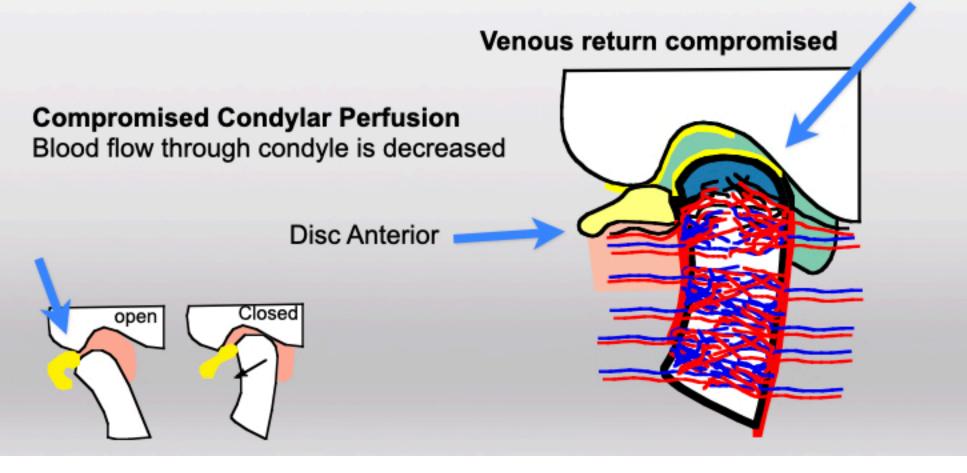


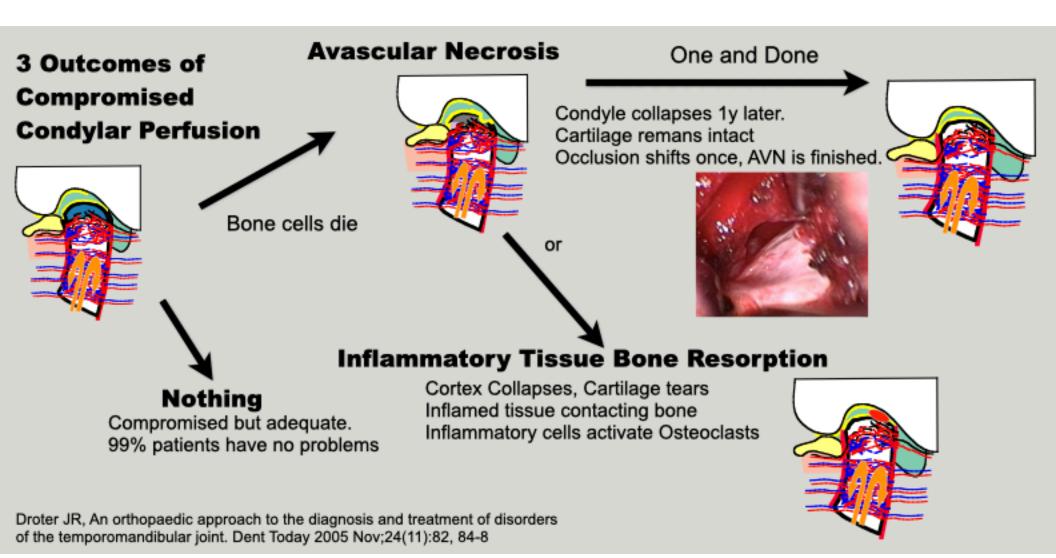




When the clicking stops (4a to 4b):

Condyle Distalized





Anterior Openbite with Active Osteolysis due to Inflammatory Tissue Bone Resorption

Non Surgical Therapies



Condylar Distraction



Anti Inflammatory Therapies









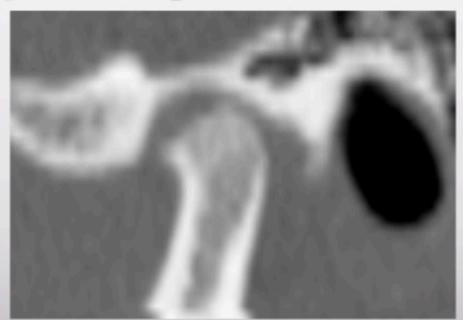


Hypoxia Induced Progressive Condylar Resorption

HI-PCR

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

Occlusion will constantly be changing



1 year after the clicking stops is the "Danger Zone"

Look for TMJ bone loss, anterior open bite developing Avascular Necrosis Hypoxia Induced Progressive Condylar Resorption

After clicking stops:

Get CT or CBCT scan of the TMJ
Maintain jaw motion: PT, exercises
Get photos
Mounted models

Monitor occlusion over the next year Follow up CBCT scan 1 year later After 1 year "Adapted Favorably"





\$558,000 Malpractice Verdict

Failure to diagnose condylar resorption during orthodontic treatment

Dental Liability Alert, Vol 5, Issue 6, May 2002

Additional Dental Malpractice Verdicts

S558,000 VERDICT - Failure to diagnose Condylar Resorption - Excessive use of cervical head-gear as part of orthodontic treatment - TMJ Syndrome - Occlusal deficiencies - Ostrotomy recommended for minor phaintiff.

This dental majoractice action was brought on behalf of the minor female plaintiff, age 11 at the time in question, against her treating orthodontist. The plaintiff alleged that the defendant failed to diagnose idiopathic condylar resorption (a condition similar to osteoarthritis) and excessively utilized cervical heed gear in her orthodontic treatment, causing permanent mouth and jaw injuries.

molars rearward and leave more room for the incisors. The plaintiff were the only. headquar for approximately nine. The plaintiff's dental expert testified

The minor plaintiff treated with the time condylar recorption to run its defendant for approximately two years course. The plaintiff contended that for a Class Emulacolusion (secondary - the defendant failed to recognize that to crowding in the upper arch), a mid- the plaintiff's jaw was rotating open line shift and a doup bits by white. The due to the loss of calcification of the defendant prescribed cervical head- teeth and jaw associated with condygear, comprised of a wire which connects behind the head to pull the - negligently attempted to reverse the open bite by inappropriate methodol

that the methodology employed by the The plaintiff's dental experts testi-defundant worsened the plaintiff's fied that the plaintiff suffered from con-open bile, causing her to develop TMJ dylar recoglion of the jow during the syndrome and requiring a future Lafort time period the plaintiff was under the I (lower jaw) celectomy. The cost of tion would have been evidence on as between \$25,000 and \$30,000, aca ray. The plaintiff contended that the conding to the plaintiff's eral surgeon standard of care required the defen- The plaintiff alleged that had the dedant to stop all orthodonic treatment ... fendant performed a proper examinaunder these dicumstances and allow tion, treated the dental dysfunction

TIENTAL LIABILITY ALERT USPS 010967 is published Bi-monthly for \$150/year by Jury Verdict Review Publications, Inc., 45 Springfield Ave., Springfield, N.J. 67081. Periodical Postage Paid at Springfield, N.J. and additional mailing offices. Postmaster: Send Address Changes to Dental Liability Alort, 45 Springfield Ave., Springfield. N.J. 07081"

Notione 5, hour 6 - May 2002

adequately and referred her to the proper specialists, the plaintiff would have suffered no injury.

The defendant denied negligence and contended that the plaintiff's resorption process was not detectable with any routine diagnostic study normally used in orthodontic treatment. The defense export opined that the treatment provided by the defendant comported with the standard. The delense expert additionally maintained that all injuries suffered by the plaintiff were the result of her idiopathic condition. The defendant asserted that he made a timely referral to an oral surgeon who diagnosed the bilisteral condylar resorption, a rare condition which is not well understood by the medical community.

The jury found for the plaintiff and awarded \$558,000.

Plaintiff's orthodonia expert. Ira Yorkes from Woburn, Ma. Plaintil's expert and surgeon: Charlotte White from Tallahassee. Fla. Delendant's destal experts: Charles S. Green from Shokie, III. and Daniel M. Laskin from Richmend, Va. Defendant's orthodontia expert: Cyril Sadowsky from Skoke, II.

REFERENCE

Change County, Fis. Haughey vs. Frankl, Case no. 96-1024; Judge Jeftoxts D. Miller. Attorney for plaintiff. Christopher M. Larmoyeux of Munigomery & Larmoyeux in West Pain Seach, Fla.: Altomay for defendark Kenneth L. Baker and John S. Derr of Bush & Derr in Orlanda.

The TMJ: What You need to Know before you change an occlusion

TMJ

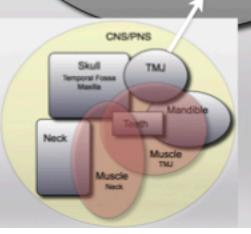
Does it Hurt?
Does it Move?
Does it Wobble?
Is it Structurally Stable?

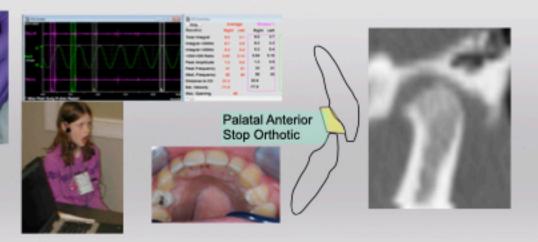
Palpate and Load the TMJ.

Measure Smoothness and Range of Motion (Quality and Quantity), Record Joint Vibrations- JVA Bioresearch

D-PAS test: 2 weeks sleep, 2 days 24/7.

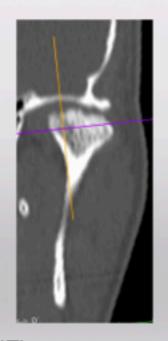
Take CT scan- see intact cortex of condylar bone and fossa. CR ≠ Max IC less than 2mm (horizontal), not more than 3mm.







Damaged TMJs



Adapt Favorably Adapt Fairly Adapt Poorly

85% 14% • <1%

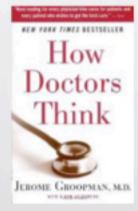
Occlusal Muscle Dysfunction
Osteoarthritis
Mechanically Dysfunctional

Avascular Necrosis
Progressive Condylar Resorption

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

Blinded by the Click

There is no rule that says you only get one disease



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

Jaw is clicking, ear pain

Jaw is clicking, sudden onset headache, 53 year old

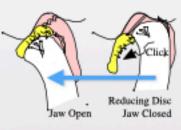
Jaw is clicking, temple pain, pain increases with chewing, 62 year old

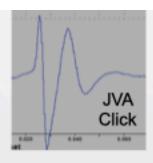
Jaw use to click, Jaw stopped clicking and can not open wide

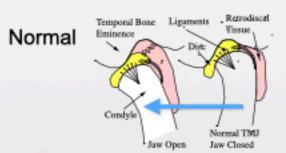
History is key, physical exam is next most important, palpate the muscles and joint. Notice the age group does not fit OMD for the second and third patient.

Differential Diagnosis of TMJ Clicking

Disc Reduction







Adhesive Click



"Sticky Disc" - Disc sticks after prolonged clenching, then releases

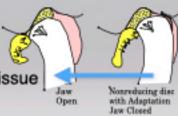
Eminence Thud



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

Adhesion Crackle

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



The Click

Reducing "Click"

Key Points:

Clicking jaw joints are common, but not normal

All clicking joints are damaged

The "Click" usually does not need to treated

A non reducing disc is not the #1 cause of limited opening

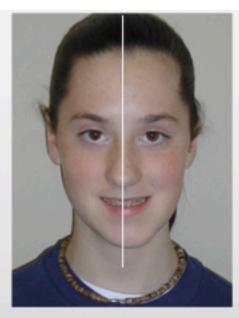


What is the Clinical Relevance of TMJ Damage Pre-Puberty?

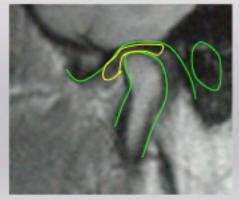
John R Droter DDS Annapolis, Maryland

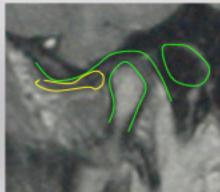
Normal TMJ Damage Prepuberty Normal Post Puberty Pre Puberty Normal growth 4b Pre-puberty is not a degenerative process Can affect growth Post Puberty 4b Small condyle Pre Puberty **Growth Disturbance** Small fossa

Age 17

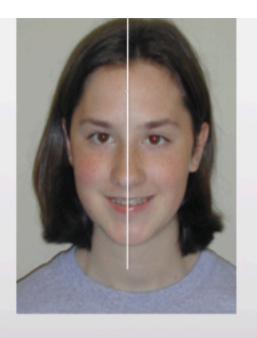


R TMJ





L TMJ



Identical Twin Sister Age 17

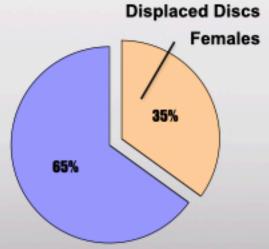
Pt of Ed Zebovitz, DDS

Şakar, O., Çalişir, F. (2013). Evaluation of the Effects of Temporomandibular Joint Disc Displacement and Its Progression on Dentocraniofacial Morphology in Symptomatic Patients Using Posteroanterior Cephalometric Analysis. Cranio, 31(1), 23–31.

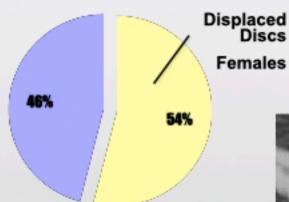
TMJ Damage Prepuberty

Prevalence Displaced Discs

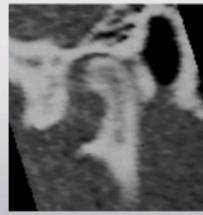
Asymptomatic Volunteers



Presenting to Ortho Office



In patients with Displaced Discs Condyles of Females Distalized Significantly more than Males



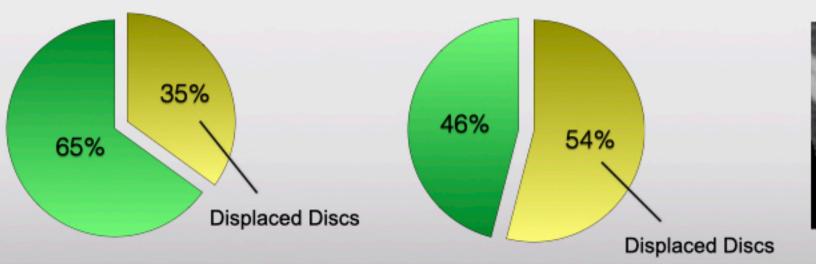
The Prevalence of Disc Displacement in Symptomatic and Asymptomatic Volunteers Ribeiro R, Tallents R, Katzberg R, J Oral Facial Pain 1997;11:37-47

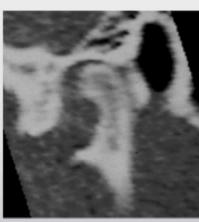
Osseous Morphology and Spatial Relationships of the TMJ Comparisons of Normal and Anterior Disc Positions, Kinniburgh R, Major P, Nebbe B, Angle Orthod 2000;70:70-80

Prevalence Displaced Discs on MRI

Asymptomatic Volunteers

Females Presenting to Ortho Office





The Prevalence of Disc Displacement in Symptomatic and Asymptomatic Volunteers Ribeiro R, Tallents R, Katzberg R, J Oral Facial Pain 1997;11:37-47

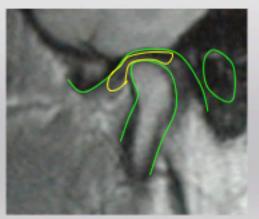
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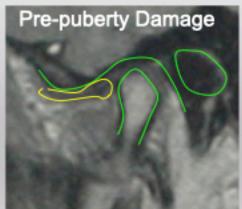
In patients with Displaced Discs Condyles of Females Distalized Significantly more than Males

Basic Orthopedics

Joints are either Healthy or Damaged

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





Small condyles due to TMJ damage:

Pre-puberty TMJ damage, the joints adapted, but did not grow.

Post-puberty TMJ damage will be a degenerative process.

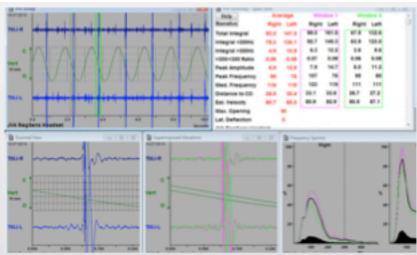
Note ratio condyle size to fossa size



Joint Vibration Analysis

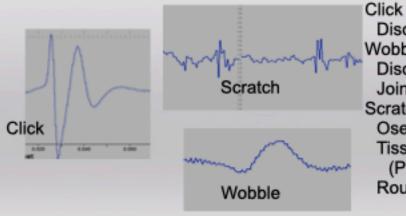
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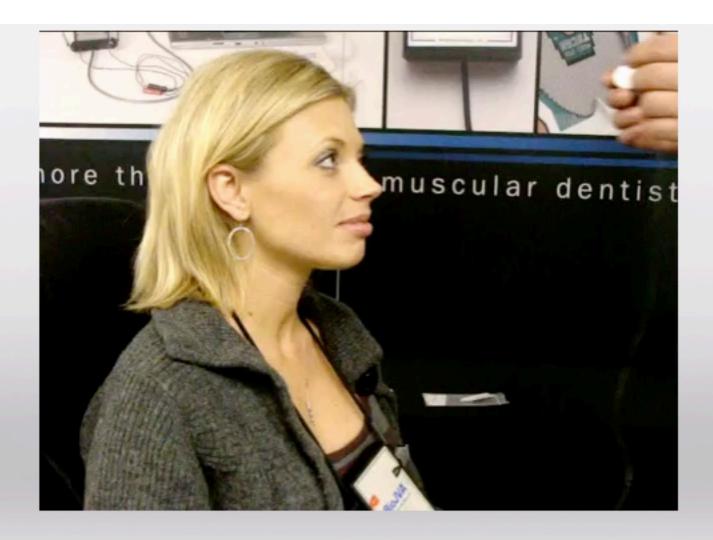
Three main types of sounds



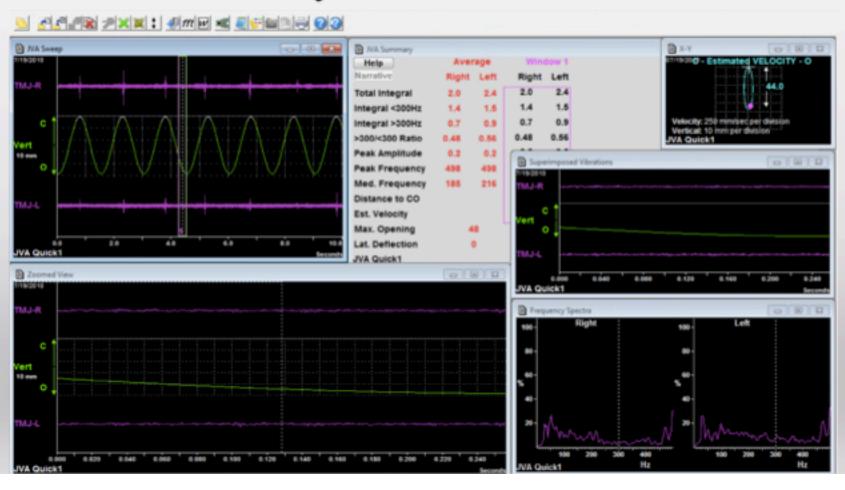
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Oseoarthritis
Tissue against cartilage
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Rough cartilage- clenching

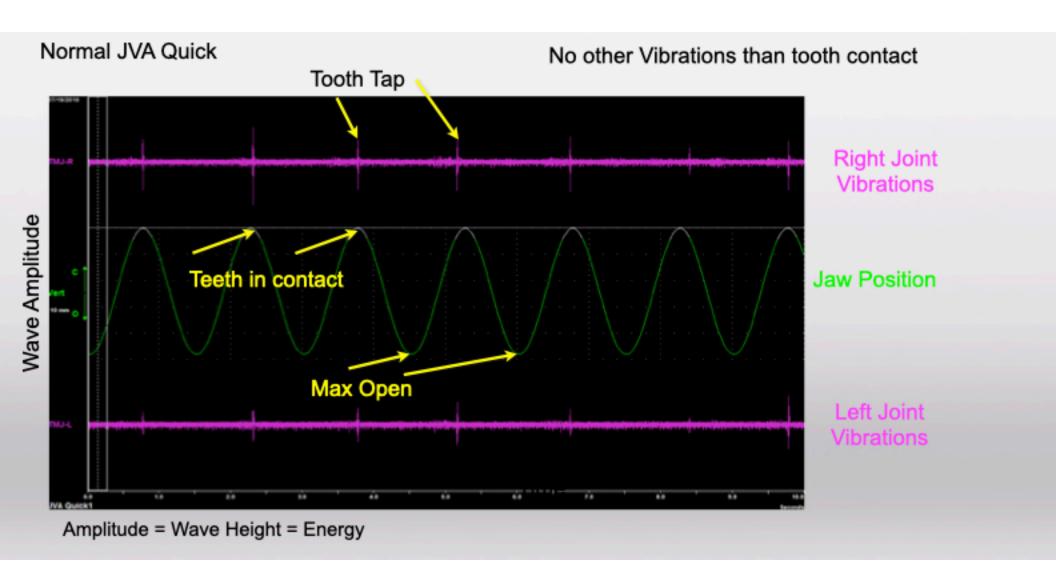
JVA measures the health of the cartilage

Recording JVA



Joint Vibration Analysis Software





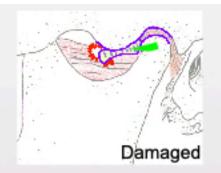
Basic Orthopedics

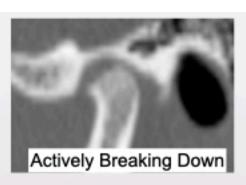
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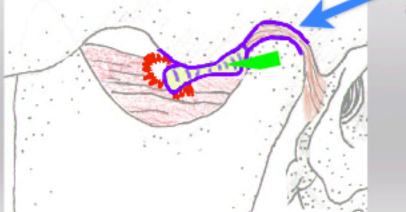
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Adapted
Structurally, Mechanically
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Majority of damaged TMJs adapt favorably







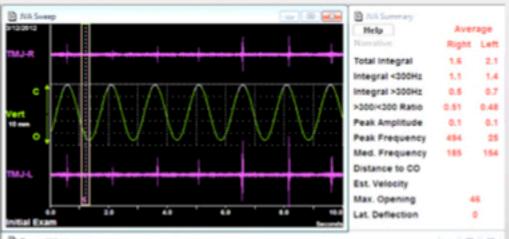


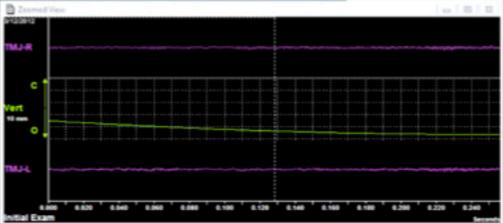
Posterior ligament, synovium, and retrodiscal tissue adapt to form a

Pseudo-disc

Tissue Fibrosis

Healthy or Damaged?





Healthy or Damaged?



TMJ-L

Smooth Wobble Click

Vibration Types

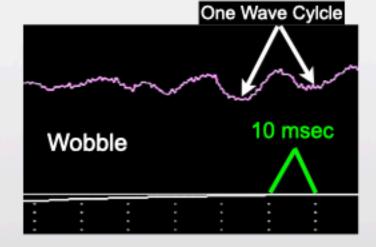
Good Vibrations

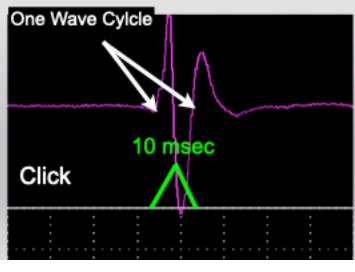
Wobble/Bump

Rolling wave

Hertz = cycles/sec

riorez – cy





Click/Tap/Crackle 100 Hz (range of 60-150) 1 cycles in 10 msec

50 Hz (range of 20-100)

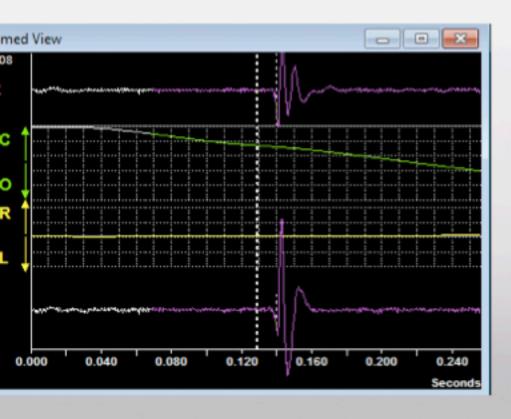
0.5 cycle in 10 msec

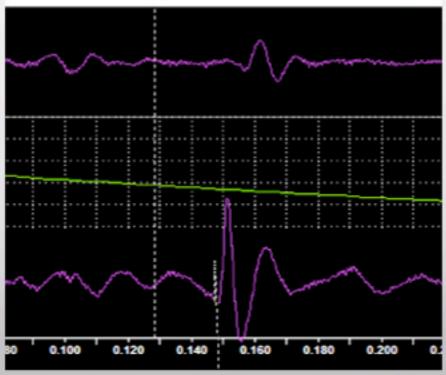
Double Cycleless hz in 2nd cycle

Scratch

All Hz 500 to 50 Disorganized Choppy Random full spectrum Hz

Simple or Complex



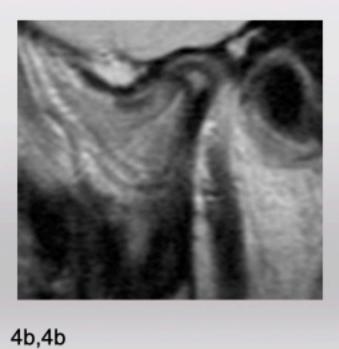


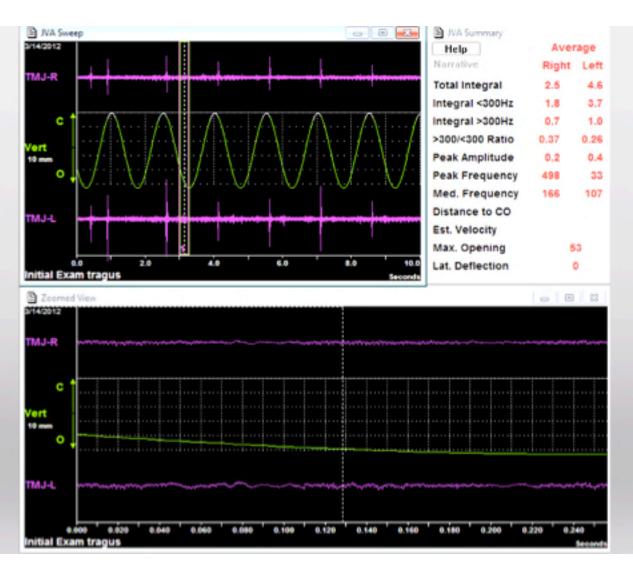
Simple left click with transference vibration to right L4a

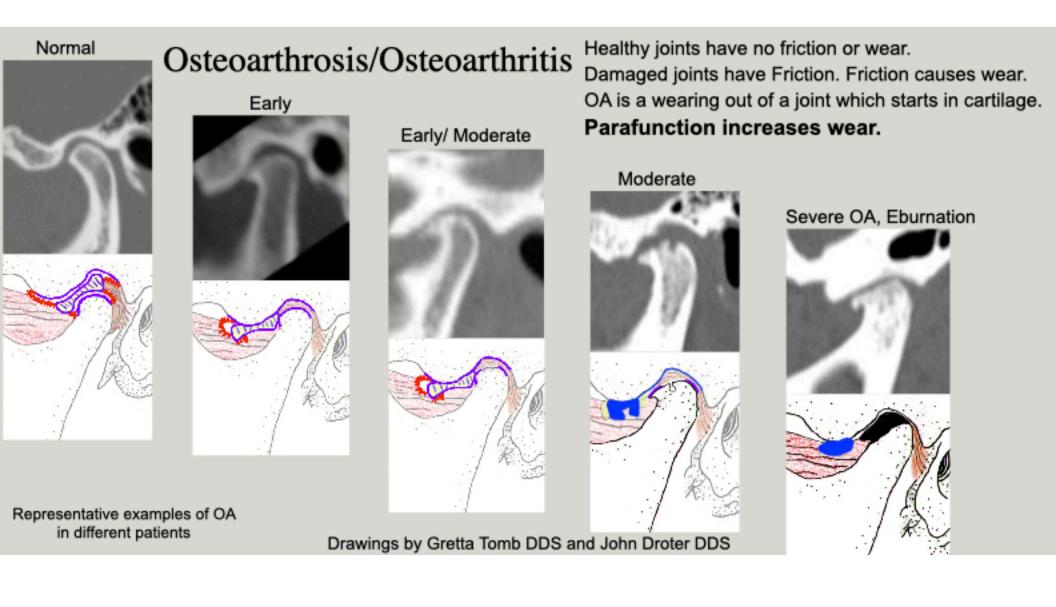
Complex Click L3a, R4b

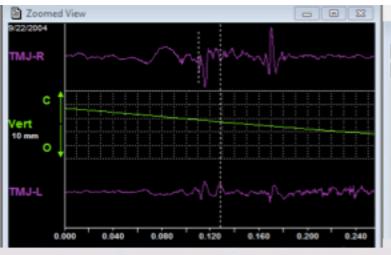
Well adapted bilateral anteriorly dislocated discs nonreducing

Max Open is 53mm Total integral 4.6 Pascals





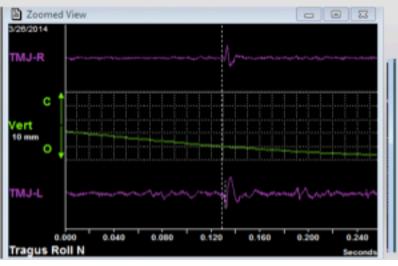






Joint Vibration Analysis

Osteoarthritis pre Treatment with NSAIDs



	2014	
Help	Average	
Narrative	Left	Right
Total Integral	19.2	10.4
Integral <300Hz	17.4	8.8
Integral >300Hz	1.8	1.6
>300/<300 Ratio	0.11	0.18
Peak Amplitude	1.6	0.7
Peak Frequency	91	91
Med. Frequency	115	150

2014

Osteoarthrosis eburnation over time

Smooth Wobble

Click

Good Vibrations Healthy Cartilage No Movement

Wobble 1 4 1

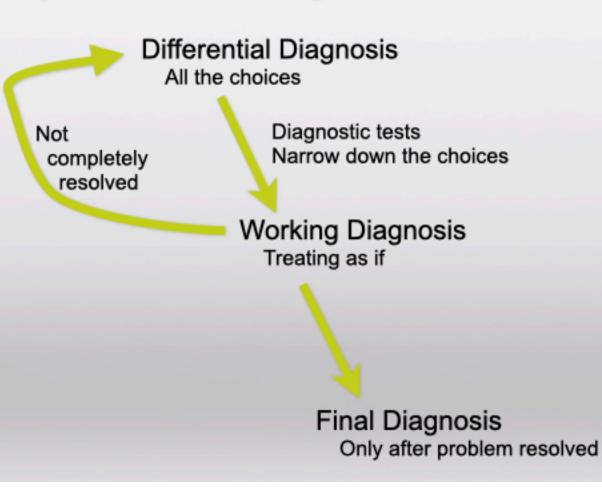
Disc Dislocation
Disc Reduction
Disc subluxation
Joint subluxation
Condyle bumps Disc
Sensor roll on face

Click

Disc Reduction
Disc Dislocation
Adhesion Crackle
Tooth Tap
Contralateral Transference

Scratch
Cartilage Fibrillation
Cartilage against tissue
Bone against bone
Velcro Noise

Why is Joint making this vibration?



6 Common TMDs

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

Differential Diagnosis: Limited Joint Motion

Muscle Spasm

Painful to Move Joint Pain Muscle Pain

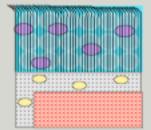
Mechanically Blocked 4b Acute Adhesion

Masseteric Space Infection Hematoma

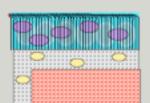


You have 6-8 weeks to get jaw moving before cartilage is irreversibly damaged, independent of the cause of the immobilization

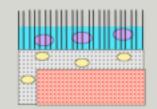
Healthy Cartilage



4 Weeks



8 Weeks



Lose 50% height of cartilage

Collagen still intact

Process is reversible

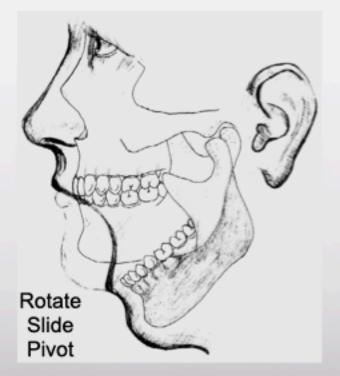
Loss of 50% proteoglycans and water

Proteoglycans not being produced by Chondrocytes

Move joint with light force/repetitive motion next 30 days



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



Rotation only 25mm

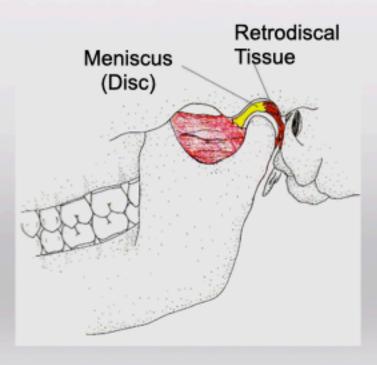
Max Open 40-55mm Right Lateral 10-12mm Left Lateral 10-12mm 10-12mm

Protrusive



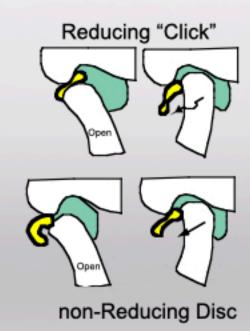
TMJ has 2 Joint Compartments:

Upper-Translation Lower- Rotation



Acute non-Reducing Disc Limits Translation.

"Old Adapted" may have full range of motion.



Limited Opening Algorithm

Differential Diagnosis Limited Opening:

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

Diagnostic Tests:

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

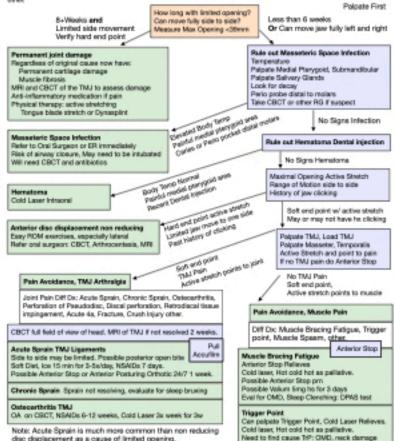






Dr Droter's Limited Opening Algorithm

Differential Diagnosis Limited Opening (Less than 36mm): Pain Avoidance Sore Joint, Pain Avoidance Sore Muscle, Hentona, Muscle Spasm, Masseteid Space Infection, Norwiducing Disc (8b, 3b Acute), Joint Fibrosis, Muscle Fibrosis, ether.

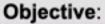


...

Another Case Limited Opening:

Subjective:

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



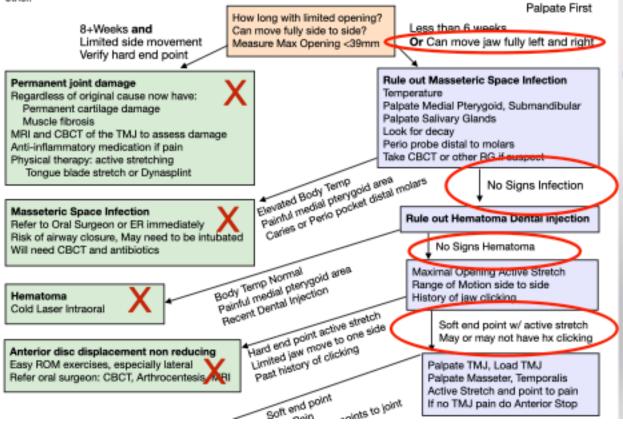
Limited opening 25, Mandible shifts right
Normal side to side motion
98 temp, normal perio probe 2nd molars, no caries
No pain palpation RL Medial Pterygoid
Soft end point on active stretch, 35mm, R TMJ pain
Right TMJ pain to palpation, Left TMJ normal
Posterior cross bite on left





Dr Droter's Limited Opening Algorithm

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



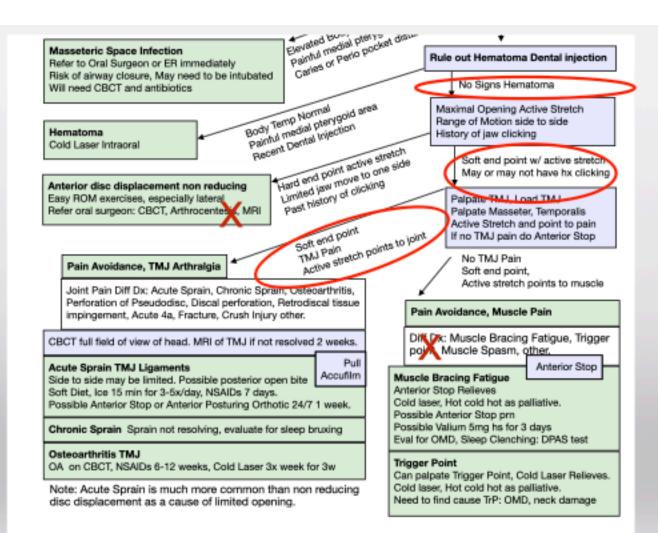
Objective:

Limited opening 25mm, Mandible shifts Left Normal side to side motion

Normal temp, normal perio probe 2nd molars No caries

No pain palpation RL Medial Pterygoid Soft end point on active stretch, 35mm, with R TMJ pain

Right TMJ pain to palpation, Left TMJ normal



Working Diagnosis:

Acute Sprain Right TMJ Ligaments

Limited opening due to muscle bracing Right TMJ pain

Current Sprain Protocol

We used Advil gel caps 600mg tid with food

Soft chew diet

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

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

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

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

Temporary upper Anterior Stop for sleep

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

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





MLS Cold Laser BioResearch







Temporary Anterior Stop ArrowPath Sleep

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MLS Cold Laser BioResearch







Temporary Anterior Stop ArrowPath Sleep

