

# TMD for the GP

John R Droter DDS  
Annapolis, Maryland

Annapolis, Maryland  
John R Droter DDS

[www.jrdroter.com](http://www.jrdroter.com)



**Hello. I am:**

**John R Droter DDS  
Annapolis, Maryland**

*Annapolis, Maryland  
John R Droter DDS*

# Milestones



Visiting Faculty Spear Education 2013

Visiting Faculty LD Pankey Institute 2008

Visiting Faculty Orthodontic Program  
Washington Hospital Center 2000

On staff AAMC: Orthopedic Rounds  
In OR for TMJ Surgery

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

CT and MRI Imaging Joints 1992  
Guy Haddix, DDS: Mentor  
(3,100 images and rising)

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



JACOBI

# 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

## 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

## 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

## 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

## 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

## Surgical

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





# Facial Pain Diagnosis

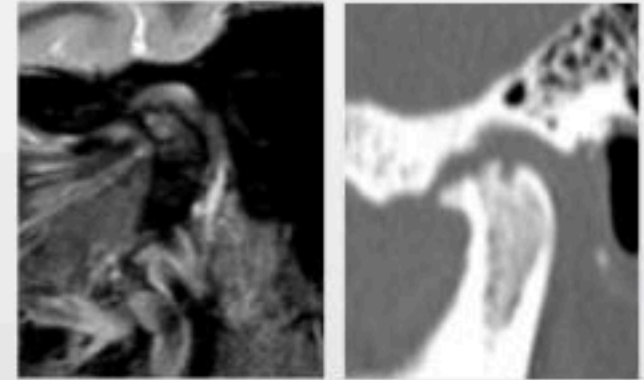
## Diagnostic Tools

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

### Biometrics

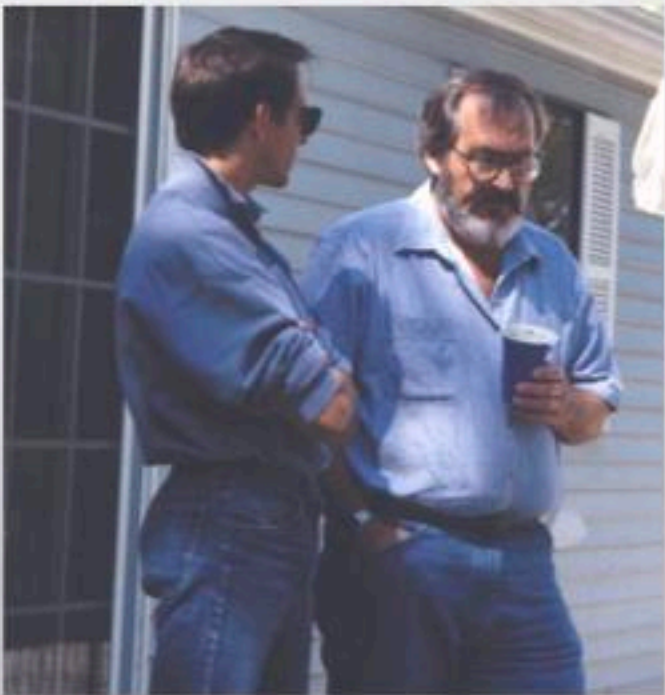
- Joint Vibration
- Jaw Tracker
- Electromyography
- T-Scan

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

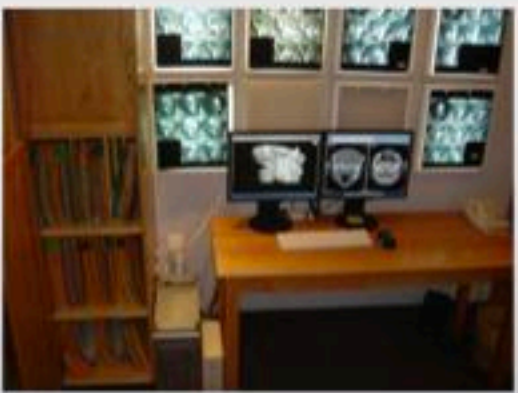




Dr Guy Haddix had been taking CT scans since 1990

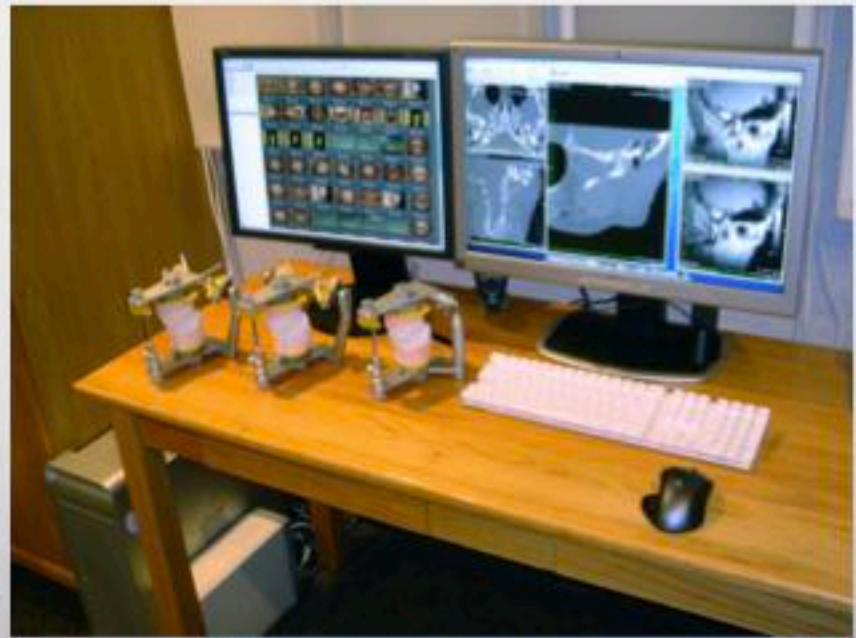


CT and MRI Scans in my practice since 1992.

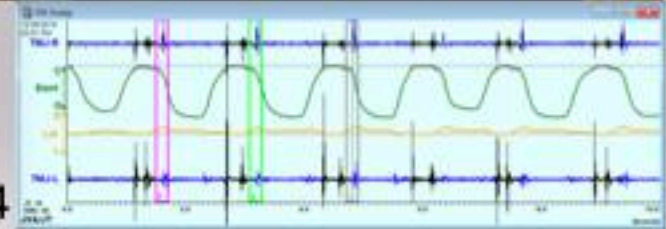


Closet full of printed scans just as digital appeared!!

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](http://www.APSleep.com)  
[info@apsleep.com](mailto: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:

Atomic Skis- Sponsored.  
I do benefit financially.

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

Spear Education- Paid  
honorarium for lectures

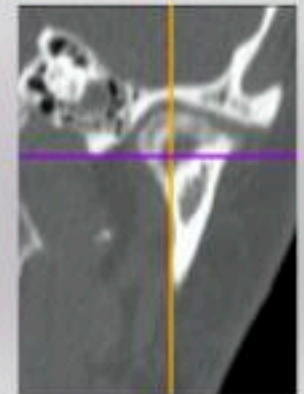
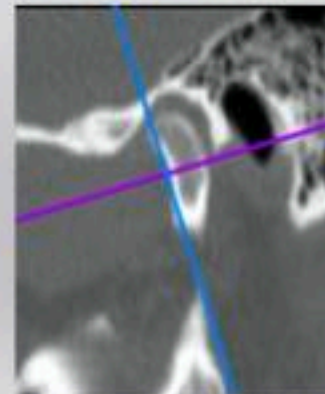
Patent on sleep device: LatBrux  
Co-Owner of ArrowPath Sleep



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

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





# Treat what is in my area of expertise

Appliance Therapy/  
Occlusal Adjust



Appl

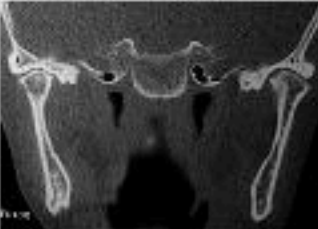


CR Before Adjust

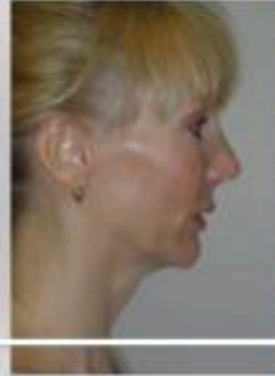


CR After

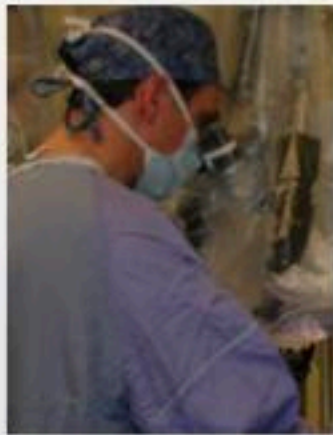
Complex  
Restorative



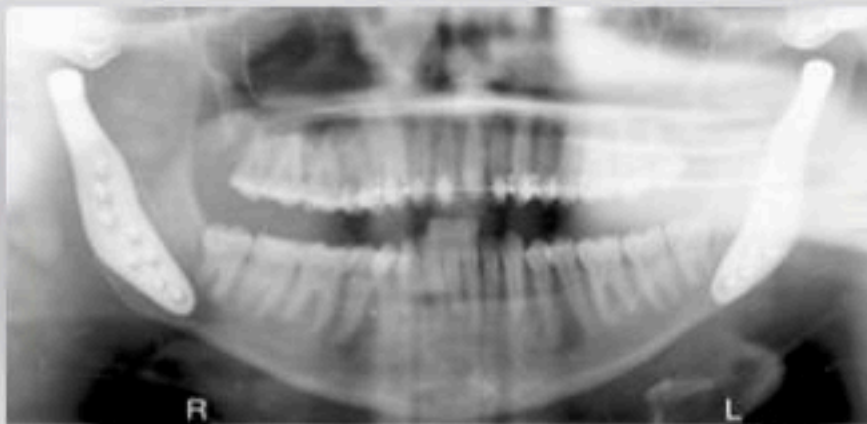
Occlusal Management-  
Orthodontics/  
Orthognathic Surgery



## Occlusal Planning- Discectomy/ Fat graft



## Occlusal Planning- Total Joint Replacement





John R Droter, DDS

To get today's lecture slides:  
go to [www.jrdroter.com](http://www.jrdroter.com)

Seminar Download

Atlanta 2021

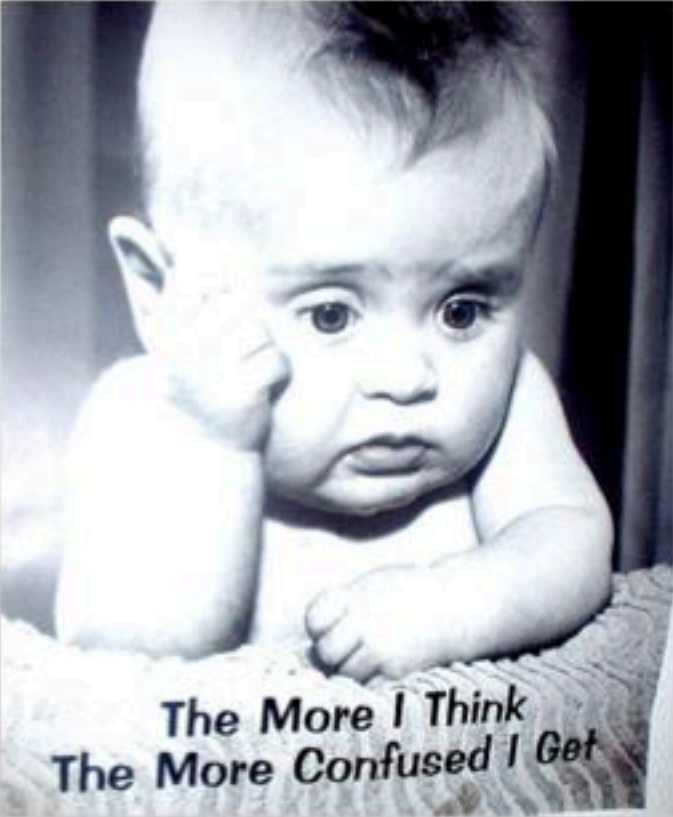
The screenshot shows a web browser window displaying the website for John R. Droter, DDS. The page title is "Seminar Downloads | John R. Droter, DDS". The navigation bar includes links for HOME, PATIENT DOWNLOADS, NEW PATIENT EXAMS, ABOUT TMD, SEMINAR DOWNLOADS, and CONTACT. The left sidebar contains links for HOME, PATIENT DOWNLOADS, NEW PATIENT EXAMS, ABOUT TMD, SEMINAR DOWNLOADS, and CONTACT. The main content area is titled "SEMINAR DOWNLOADS" and lists "Upcoming Seminars":  
July 20, 2016 D-PAS Hand on- In Office, Annapolis MD  
July 21-23 2016 Droter Hands on- In office, Annapolis MD  
Call Kim 301-805-9400  
Pankey TMD Week, Key Biscayne FL  
October 23-27, 2016  
October 22-26, 2017  
Call LD Pankey Institute 305.428.5500  
Spear TMD Course 1 with Dr Herb Blumenthal  
Aug 11-13, 2016, Scottsdale Arizona  
Call Spear Education (866) 781-0072  
Below this, there is a section for "Most Popular and Common Downloads" listing "TMD Supersheet Download" with a link to "SuperTMDQx12.11" and "Brux supersheet Download".

# Why is TMD So Confusing?

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# TMJ/TMD Confusion



Dogmatic  
Arguments



# Why Confusion?

TMD/TMJ  
Symptoms based

Not One Disease



Temporomandibular Disorders (TMD) is an umbrella term covering any condition causing pain or dysfunction in the temporomandibular joint, muscles of mastication, trigeminal nerve, facial nerve, and associated head and neck musculoskeletal and neural structures. Craniomandibular Disorders would be a better term (CMD).



# 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 Mouse), TMJ  
Malignant neoplasms of bones of skull and face  
Open Lock TMJ, Recurring  
Osteoarthritis TMJ, active degeneration  
Osteoarthritis- inactive  
Osteochondritis Dissecans TMJ  
Osteolysis Mandibular Condyle, Active  
Perforation Meniscus, TMJ  
Perforation Pseudodisc, TMJ  
Psoriatic Arthritis TMJ  
Rheumatoid Arthritis Seronegative 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 MesioC 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 (see Neck Instability)  
Trigger Point Neck Muscle with Referred Pain  
Trigger Point Neck Muscle, Localized Pain

## 5. Parafunction

Excessive Tooth Wear, Damage  
Hypereruptive 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  
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## 6. Whole Body / Systemic

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

## 7. Other

Nerve Entrapment Masseteric Nerve due to Masseteric hypertonicity  
Neurosensory 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

## 1. TMD: TMJ Damage and Diseases

Adhesions and ankylosis of temporomandibular joint  
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Dislocation jaw cartilage without reduction, favorable adaptation, TMJ  
Effusion, TMJ  
Fracture of subcondylar process of mandible  
Gout, TMJ  
Growth Disturbance Prepuberty due to TMJ damage  
Hemarthrosis TMJ, Traumatic  
Hyperplasia Mandibular Condyle,  
Hypoplasia Mandibular Condyle  
Hypoxia Reperfusion Injury, TMJ Cartilage Damage  
Hypoxic Progressive Condylar Resorption

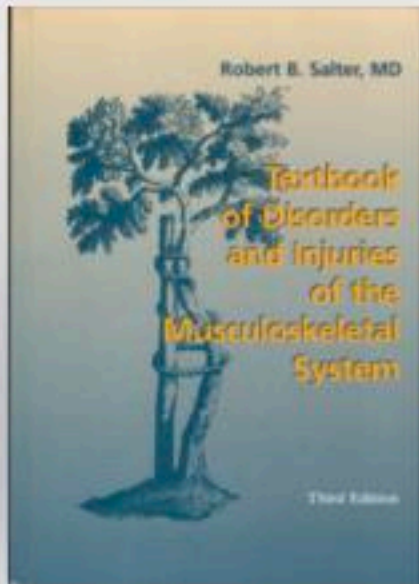
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Psoriatic Arthritis TMJ  
Rheumatoid Arthritis Sero Negative TMJ  
Rheumatoid Arthritis TMJ  
Sprain Discal Ligament TMJ, acute with joint edema  
Subluxation on Loading, TMJ  
Subluxation on Movement, TMJ  
Synovial Cyst (Ganglion Cyst)  
Synovial Hyperplasia  
Synovitis



# My Core Belief

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

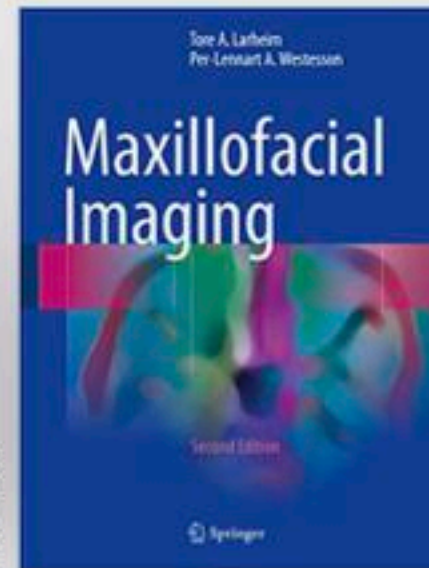
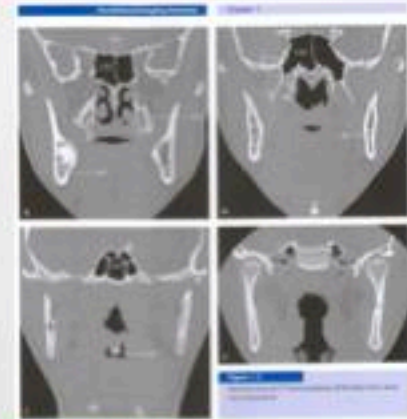
Understanding orthopedic medicine is the key to understanding joints, including the TMJ



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

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

Maxillofacial Imaging  
Larheim  
Westesson





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Other  
Otitis Ear Infection  
Pain disorder exclusively related to psychological factors, Somatoform pain disorder  
Pain disorder with related psychological factors  
Peripheral Sensitization

# 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

## 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

## 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

## 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

## Occlusal Orthopedic

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

## Tongue Parafunction

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

## Surgical

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







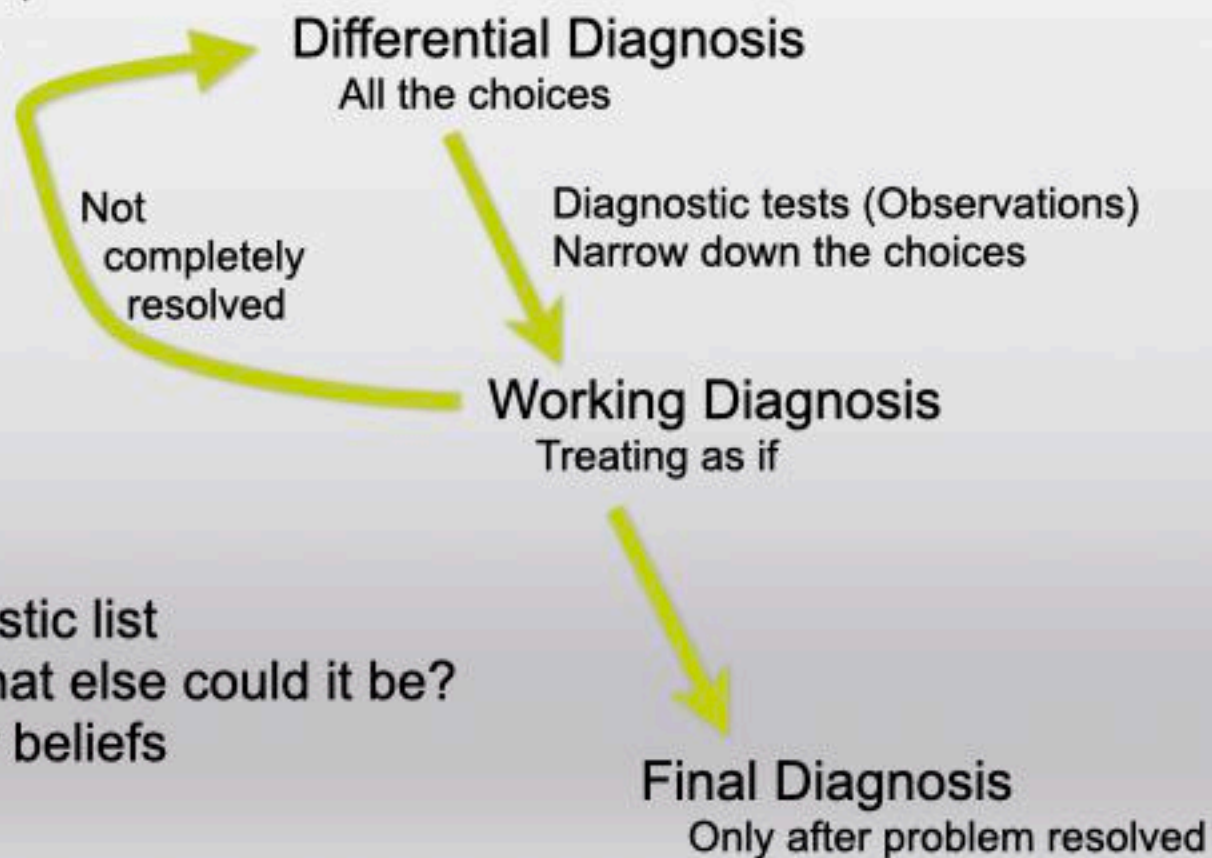
## The Diagnostic Process

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



**Think!!**

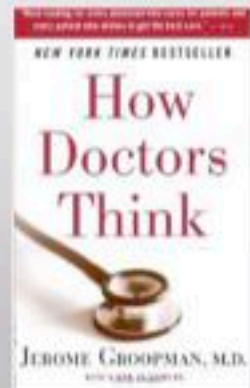
Always make a differential diagnostic list  
Ask, "It appears to be this, but what else could it be?"  
Be aware you are blinded by your beliefs



# Differential Diagnosis

## Diagnostic Boxes: Pattern Recognition

“My Tooth Hurts”



# Differential Diagnosis

## Diagnostic Boxes: Pattern Recognition

## “My Tooth Hurts”

Reversible Pulpitis secondary to caries

Irreversible Pulpitis secondary to caries

Pulpitis secondary to split tooth

Pulpal necrosis

Referred Pain from Muscle  
Trigger Point

Sinus Infection

Sympathetic Mediated Pain

Neuroma

Periodontal Infection

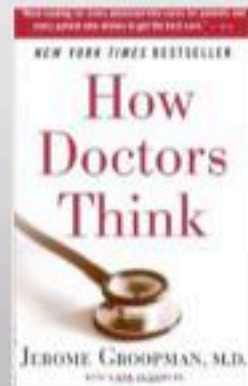
Inflamed Tissue secondary to  
popcorn husk

Aphthous Ulcer

Periodontal ligament inflammation  
secondary to Occlusal Trauma

Pulpitis secondary to Occlusal Trauma

Other

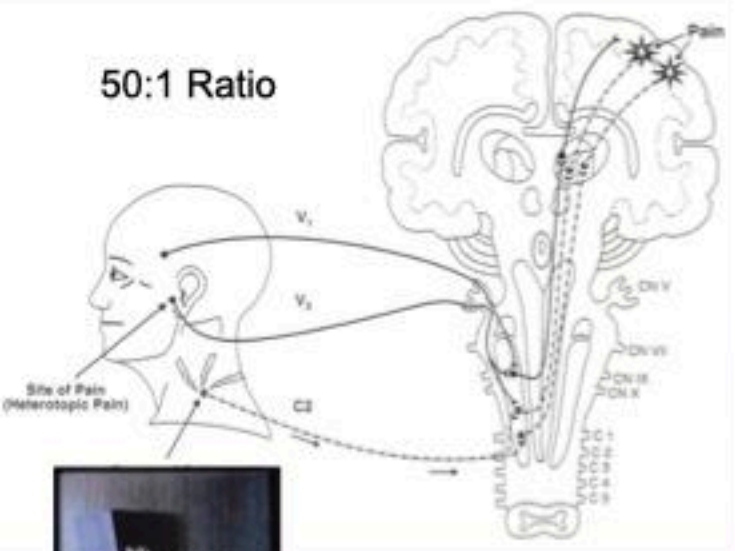




# Referred Pain Convergence

More primary sensory neurons than secondary neurons that travel to brain

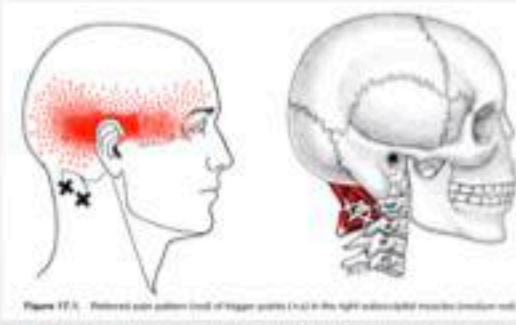
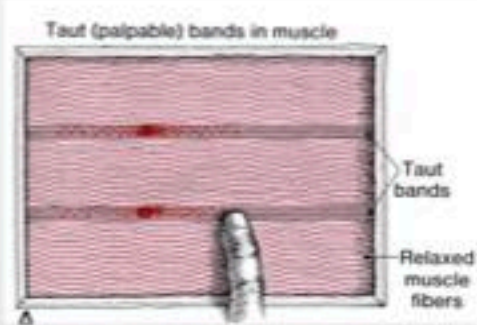
50:1 Ratio



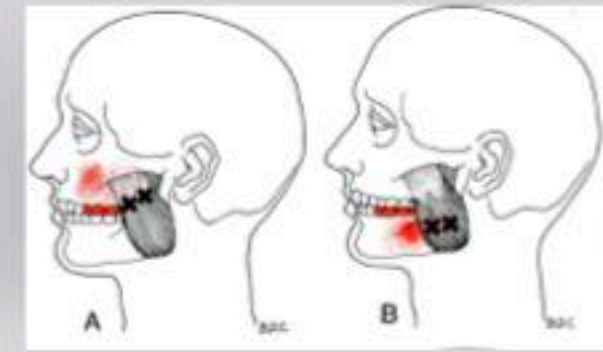
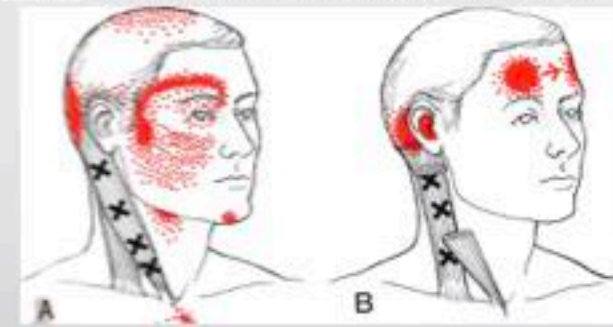
"Bell's Orofacial Pain"  
Jeffery Okeson

# Trigger Points

Contracted mass of actin, myosin and histamine



"The Trigger Point Manual"  
Janet Travell, MD



# Differential Diagnosis

## Diagnostic Boxes: Pattern Recognition

## “My Tooth Hurts”

Reversible Pulpitis secondary to caries

Irreversible Pulpitis secondary to caries

Pulpitis secondary to split tooth

Referred Pain from Muscle  
Trigger Point

Periodontal Infection

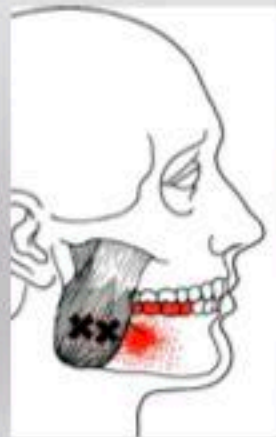
Inflamed Tissue secondary to  
popcorn husk

Aphthous Ulcer

Periodontal ligament inflammation  
secondary to Occlusal Trauma

Pulpitis secondary to Occlusal Trauma

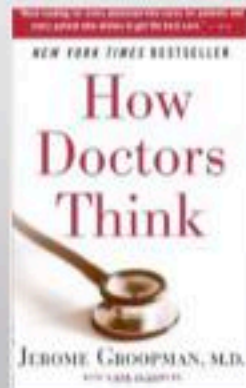
Other



“How Doctors Think”, by Jerome E. Groopman

Diagnose by Pattern Recognition  
Tendency to make patients fit what we know  
Ignore signs and symptoms that do not fit

Always make a differential diagnostic list  
Ask, “It appears to be this, but what else could it be?”  
Be aware you are blinded by your beliefs



# Differential Diagnosis

## Diagnostic Boxes: Pattern Recognition

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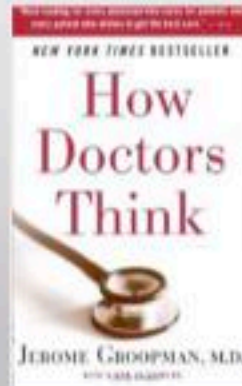
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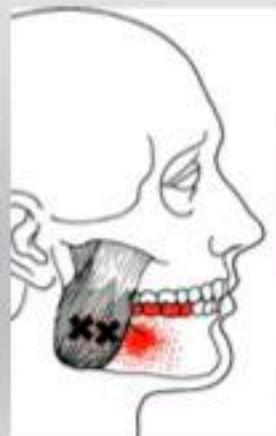
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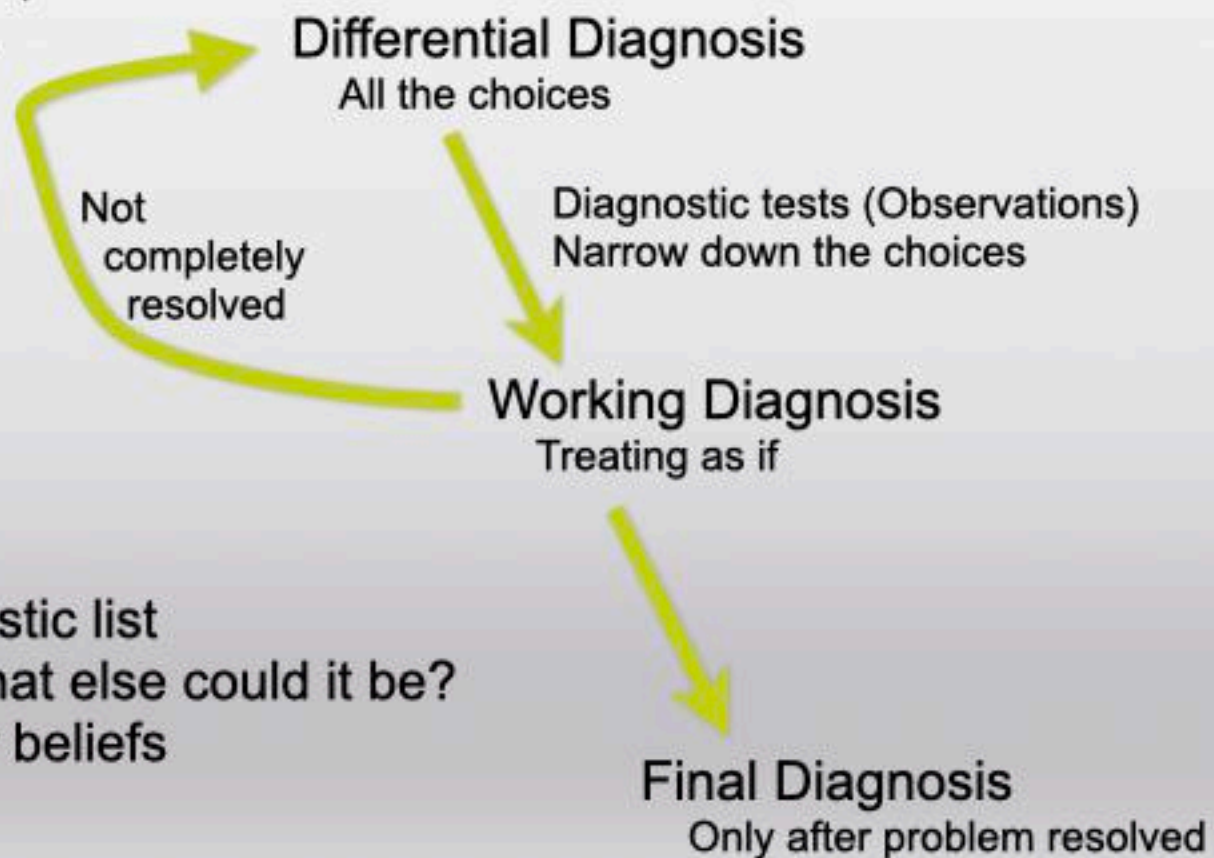
## The Diagnostic Process

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



**Think!!**

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Ask, "It appears to be this, but what else could it be?"  
Be aware you are blinded by your beliefs



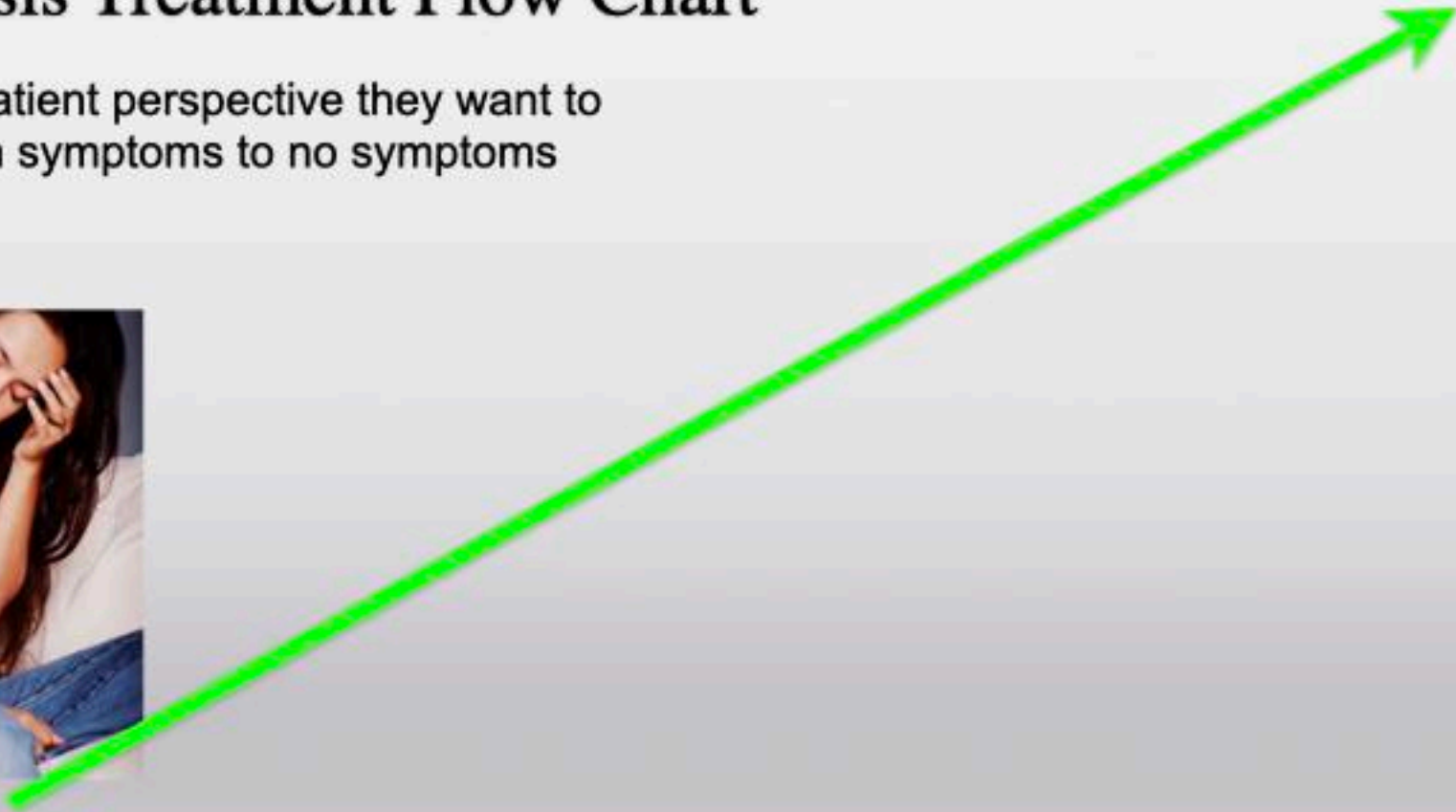
# Diagnosis Treatment Flow Chart

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



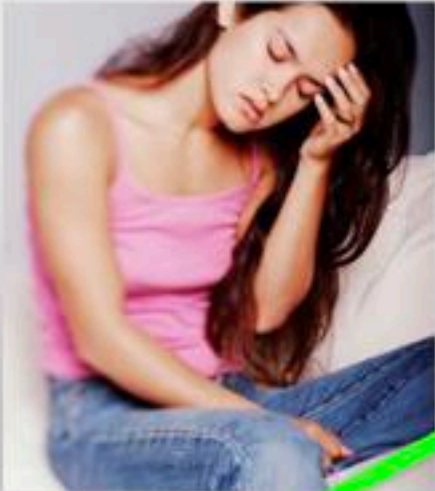
Symptoms

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

No Signs

No Symptoms  
Final Dx

Doctor Re-Exam

If not resolved

Symptom Dx

Tooth Pain  
Arthralgia

Specific Dx

Irreversible Pulpitis  
Osteoarthritis

vs  
vs



# Diagnosis Treatment Flow Chart

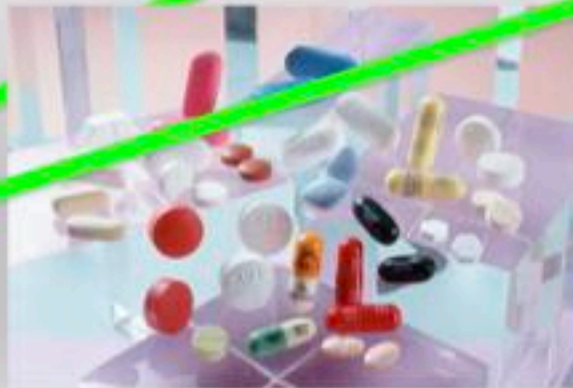
From a patient perspective they want to go from symptoms to no symptoms

No Symptoms

Less Symptoms



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**

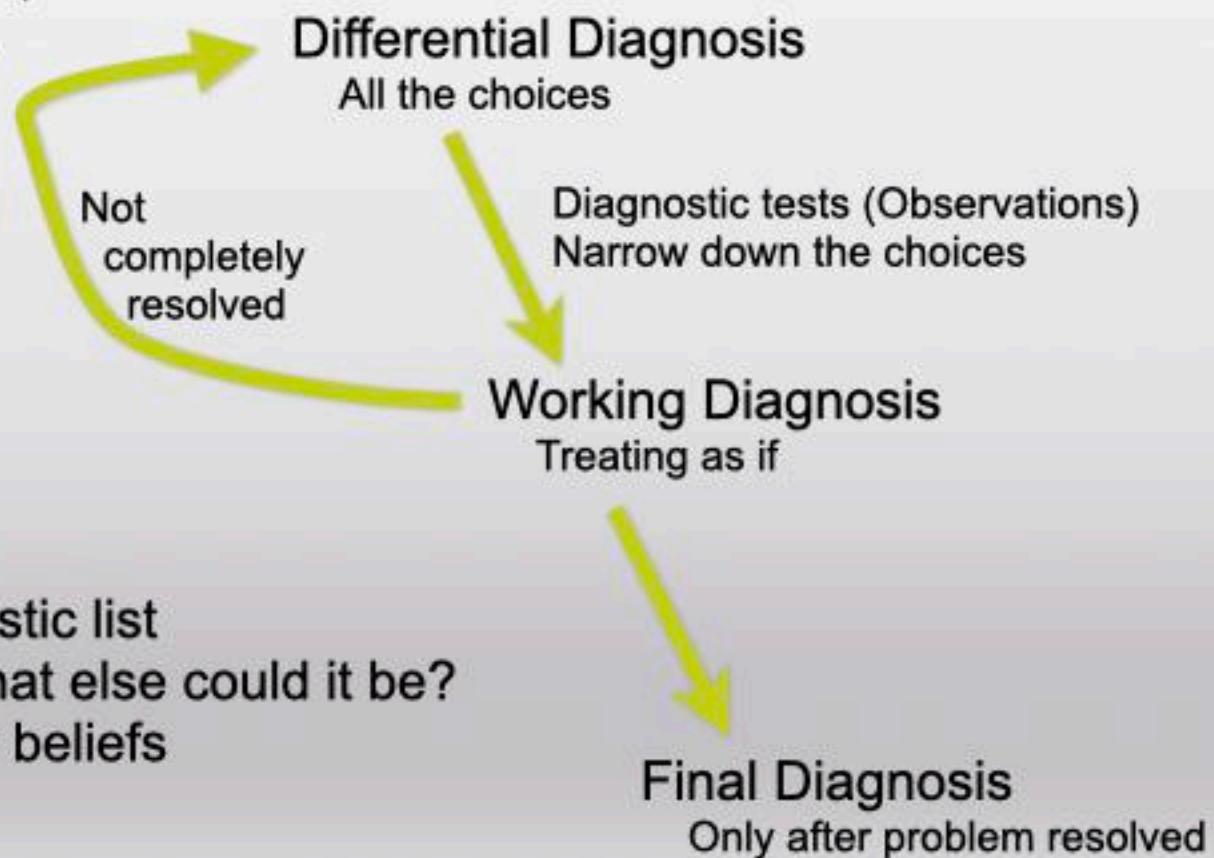
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Ask, "It appears to be this, but what else could it be?"  
Be aware you are blinded by your beliefs





# TMD Therapies

John R Droter DDS  
Annapolis, Maryland

Annapolis, Maryland  
John R Droter DDS

# 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 neoplasms of bones of skull and face  
Open Lock TMJ, Recurring  
Osteoarthritis TMJ, active degeneration  
Osteoarthritis- inactive  
Osteochondritis Dissecans TMJ  
Osteolysis Mandibular Condyle, Active  
Perforation Meniscus, TMJ  
Perforation Pseudodic, TMJ  
Psoriatic Arthritis TMJ  
Rheumatoid Arthritis Seronegative 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 MesioC 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 (see Neck Instability)  
Trigger Point Neck Muscle with Referred Pain  
Trigger Point Neck Muscle, Localized Pain

## 5. Parafunction

Excessive Tooth Wear, Damage  
Hypereruptive 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 Deformity Standing  
Postural Deformity Walking  
Postural Forward Head Position  
Upper Airway Resistance, UARS

## 7. Other

Nerve Entrapment Masseteric Nerve due to Masseteric hypertonicity  
Neurosensory 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

# 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

## 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

## Medicinal

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

## 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

## Occlusal Orthopedic

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

## Tongue Parafunction

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

## Surgical

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





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Breathe, Walk , Exercise



# TMD Therapies

## Physical

### Ice Hot Cold Hot

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Wet Towel in Microwave  
**3 Min Hot**  
**3 Min Hot**



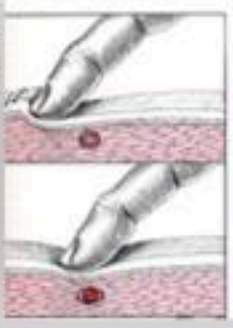
**3 Min Cold**

Ice Pack  
15 min 3-5x a day



ThermoSafe  
U-Tek Cold Pack  
-23° C

Triggerpoint  
in muscle



# TMD Therapies

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Hot Cold Hot

**Cold Laser**  
**TENS in office**  
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Breathe, Walk, Exercise

Cold laser for sore joints, inflammation,  
muscle triggerpoints

3x week for 3 weeks



BioResearch MLS Laser 808, 905 pulsed Diode



Past Dry Needling and ischemic Pressure

Handheld TENS  
Acupuncture Pen

BioResearch  
QuadraTENS



# MLS Laser

Multiwave Locked System Laser

808 nm Continuous, 905 nm Pulsed

Stimulates metabolic processes in cells  
Decrease inflammation  
Pain Reduction  
Faster Healing



Diode Laser



# Treatment OA

## Osteoarthritis

Minimize parafunction:

If sleep grinding due to airway:

CPAP or Dental Airway Device

Glucosamine 1500mg /Chondroitin 600 mg



Shea Brand CBD

## Osteoarthritis

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

NSAIDs

Cold Laser

If still inflamed arthrocentesis with  
Platelet Rich Plasma (PRP)



No Shellfish allergy



MLS Laser  
3x week for 3 weeks

# TMD Therapies

## Physical

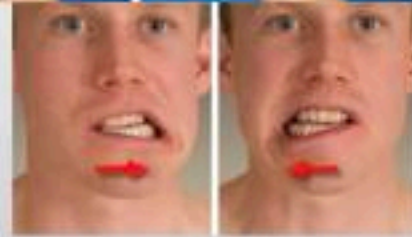
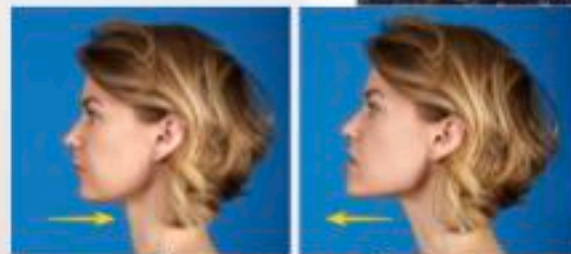
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- Hot Cold Hot
- Cold Laser
- TENS in office
- TENS home use

### Range of motion exercises

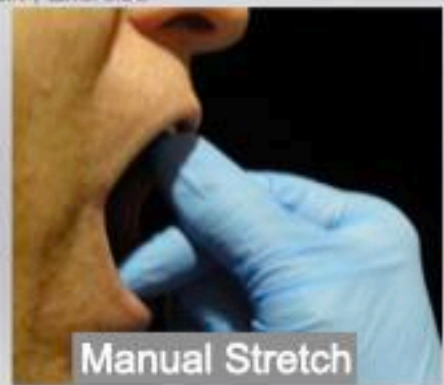
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- Breathe, Walk, Exercise

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



Danger,  
Danger,  
Danger.



Manual Stretch



Tongue Blade



DynaSplint

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

# TMD Therapies

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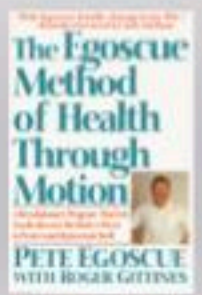
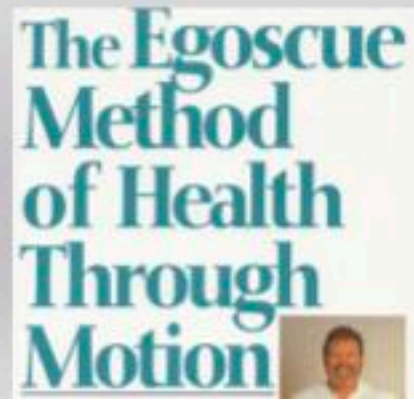
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 Breathe, Walk, Exercise

Postural  
Restoration  
Therapy



Dr Mariano Rocabado

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





# TMD Therapies

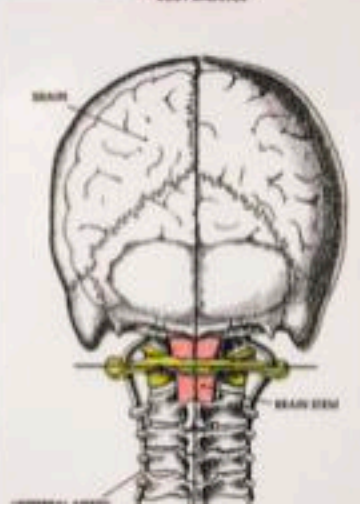
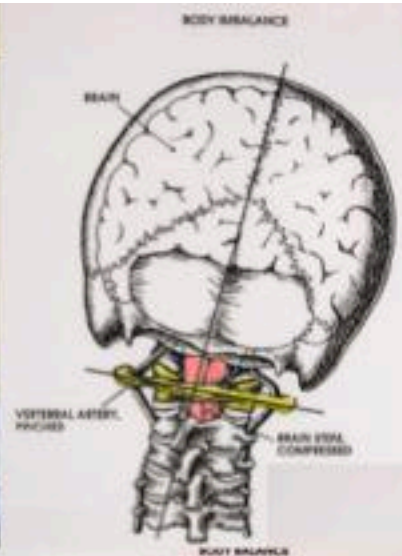
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Breathe, Walk, Exercise

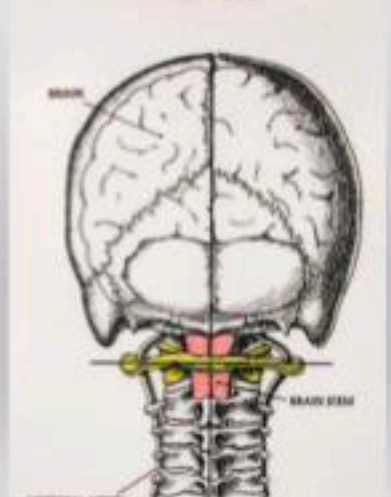
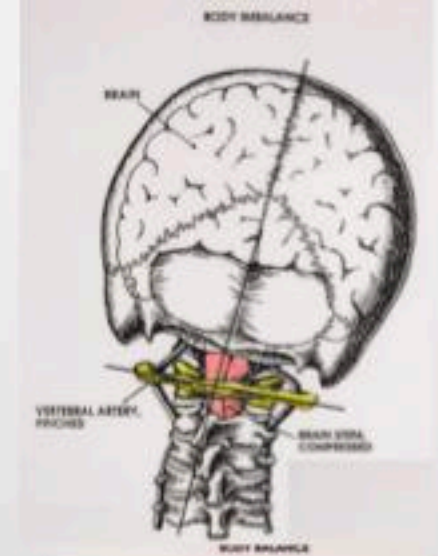
Atlas Alignment



Atlas Orthogonist  
Branch of Chiropractic Medicine



Uses sound wave to move atlas,  
disrupts muscle bracing



# TMD Therapies

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## Breathe, Walk , Exercise

Postural Restoration PT addresses these





## 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



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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)

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

## Medicinal

Anti Inflammatory:  
NSAIDs,  
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Glucosamine/Chondroitin MSM  
Vitamins: Vit C, Vit D, Vit B12  
Minerals: Magnesium, Electrolytes  
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## Sleep/ Fatigue

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Diet Modification  
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## Occlusal Orthopedic

Lingual Light Wire  
Lower soft sectional orthotic  
Sectional orthodontics  
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## Tongue Parafunction

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Myobrace  
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Frenectomy  
Myofunctional therapy

## 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

Refer to MD for Lyme therapies

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Food

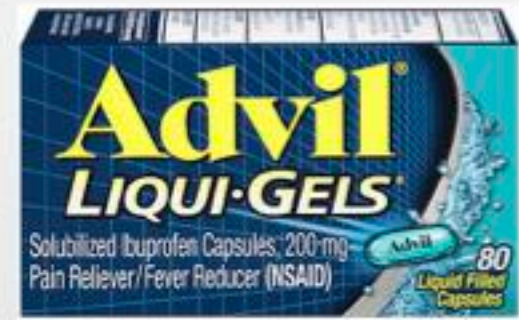
# TMD Therapies

## 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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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  
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

Shea Brand CBD



No Shellfish allergy



Vegan



# TMD Therapies

## Medicinal

- Anti Inflammatory:
  - NSAIDs,
  - Doxycycline low dose
- CBD Topical
- Glucosamine/Chondroitin MSM

### Vitamins: Vit C, Vit D, Vit B12

### Minerals: Magnesium, Electrolytes

### Minerals: Iron

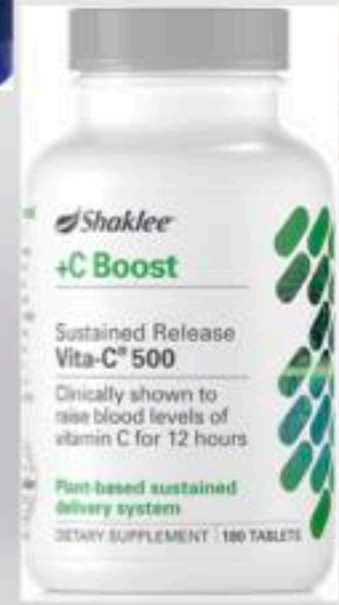
- Refer to MD for Lyme therapies
- Refer to MD Rheumatoid Arthritis therapies
- Refer Botox Masseter injections
- Refer Botox Lateral Pterygoid Injections
- Food

Mother Earth Ionic Angstrom  
Magnesium 2 oz bottle  
0.5 teaspoon sublingual



Women  
add iron

Vit C 1,500 mg  
before exercise



# TMD Therapies

## Medicinal

- Anti Inflammatory:
  - NSAIDs,
  - Doxycycline low dose
- CBD Topical
- Glucosamine/Chondroitin MSM
- Vitamins: Vit C, Vit D, Vit B12
- Minerals: Magnesium, Electrolytes
- Minerals: Iron

**Refer to MD for Lyme therapies**  
**Refer to MD Rheumatoid Arthritis therapies**

- Refer Botox Masseter injections
- Refer Botox Lateral Pterygoid Injections
- Food



MRI STIR  
Disc Lysis  
Joint infection

Spikey = Rheumatoid Arthritis

# TMD Therapies

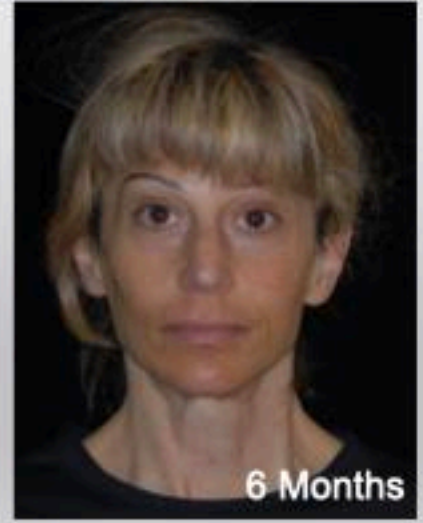
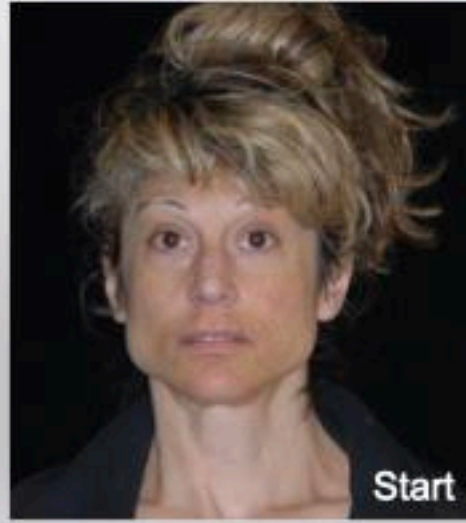
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- CBD Topical
- Glucosamine/Chondroitin MSM
- Vitamins: Vit C, Vit D, Vit B12
- Minerals: Magnesium, Electrolytes
- Minerals: Iron
- Refer to MD for Lyme therapies
- Refer to MD Rheumatoid Arthritis therapies

### Refer Botox Masseter injections

- Refer Botox Lateral Pterygoid Injections
- Food

Botox for Hypertrophic Masseters from chronic clenching





# 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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- Minerals: Iron
- Refer to MD for Lyme therapies
- Refer to MD Rheumatoid Arthritis therapies
- Refer Botox Masseter injections
- Refer Botox Lateral Pterygoid Injections

## Food

### Anti- Inflammatory Diet



# 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

## 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

## 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

## 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

## Occlusal Orthopedic

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

## Tongue Parafunction

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

## Surgical

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

# TMD Therapies

## Dental Orthotics

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- Mandibular Advancement Device
- Lateral Bruxing Device



# Dental Orthotics

## Diagnostic



ArrowPath Sleep  
Anterior Stop

## Management



Bi Arch Posterior Stop

## Therapeutic



Indexed Orthotic

## Protective



Myobrace



D-PAS



D-PAS

Therapeutic you  
resolve a condition

# TMD Therapies

## Dental Orthotics

### In Office Trial Anterior Stop

- Temporary home use anterior stop
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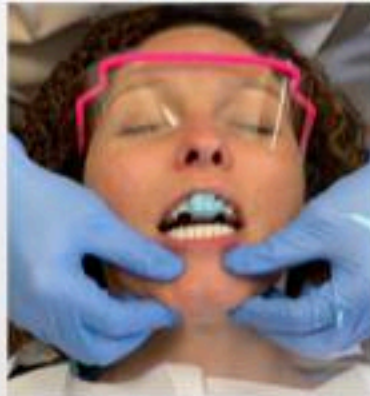


ArrowPath Sleep  
Anterior Stop

## 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**

With anterior stop in place:

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

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

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

3rd round same as first except less taps each position

**Office USE ONLY** Do not send home with patient



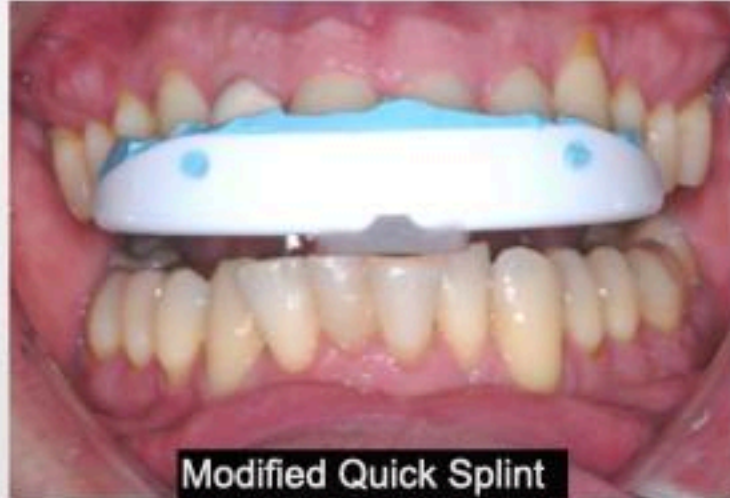
# TMD Therapies

## 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
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Reline with  
Blue Mousse

# TMD Therapies

## Dental Orthotics

In Office Trial Anterior Stop

### Temporary home use anterior stop

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APS Temp Anterior Stop



Form on teeth



Reline with Blue Mousse



# 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
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- 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

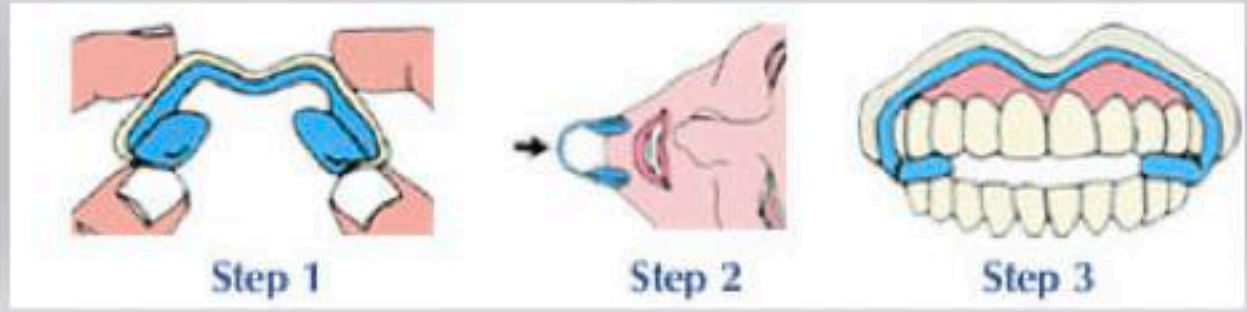
### Aqualizer

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

Water cushion for the teeth

I use the low and medium thickness.

Keep in Freezer



# AQUALIZER®

---

# ULTRA

The Aqualizer® Ultra is a new improved version of the Aqualizer® designed to be more comfortable to the gums than previous models.

This is our best seller and will fit most adult patients' mouths. The Ultra comes in three vertical openings (thicknesses): 2mm (low), 3-4mm (med), and 5-6mm (high).

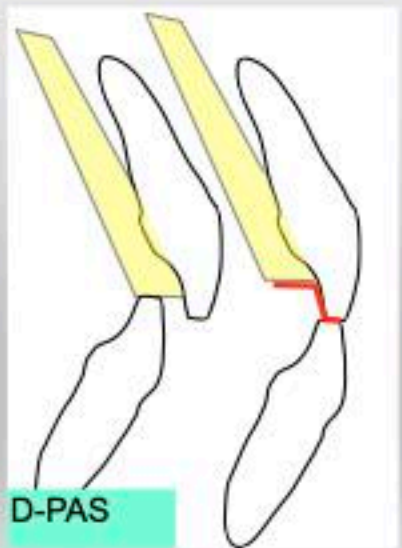
# TMD Therapies

## Dental Orthotics

- In Office Trial Anterior Stop
- Temporary home use anterior stop
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### Diagnostic Palatal Anterior Stop

- Lower full coverage CR
- Lower posterior deprogrammer
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- Lateral Bruxing Device



# Diagnostic Palatal Anterior Stop

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

## Better- Decrease Symptoms

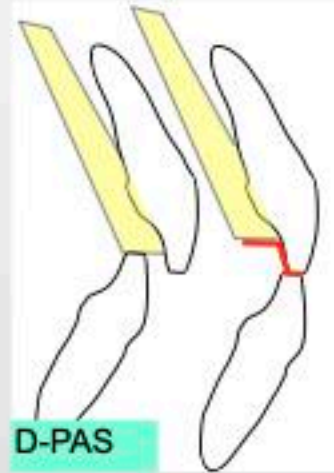
Sleep Clenching: Wear D-PAS as night guard  
Occlusal Muscle Disharmony: Occlusal Adjust

## 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



Dots in the back,  
line in the front

3-6 weeks trial of an ideal occlusion



3D Print Keysplint Soft with  
durasplint added to anterior

# 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

## Advanced TMD Orthotics

Lower Posterior  
Deprogrammer



Indexed Orthotic

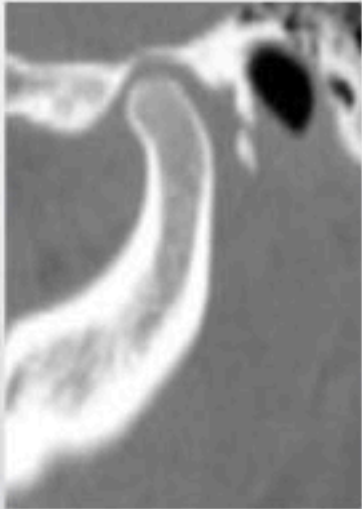


Centric Relation  
Orthotic



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

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

## Brux Checker Great Lakes Orthodontics

0.1mm Mylar: Same as mylar strip for composite

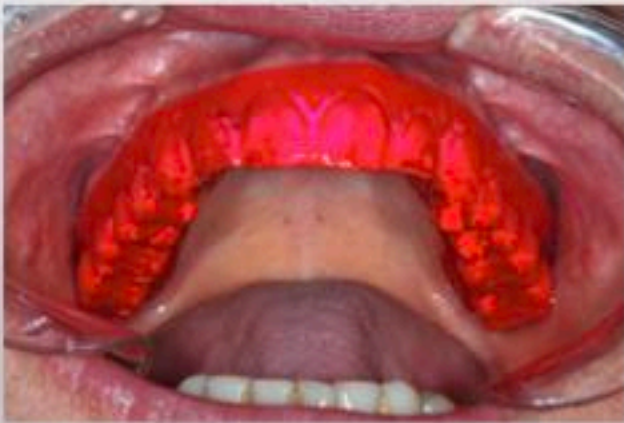


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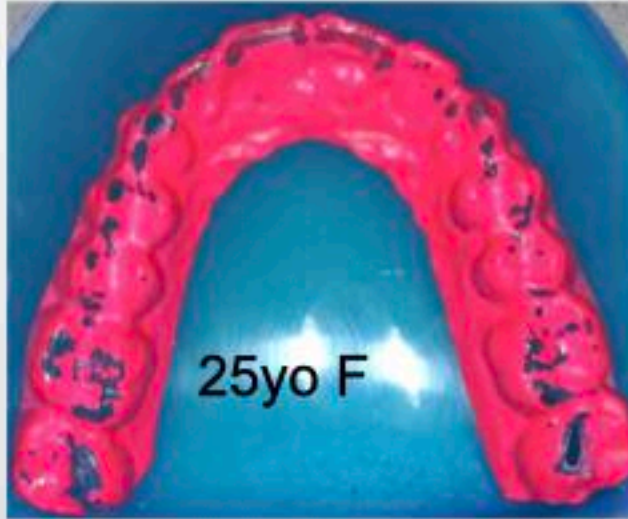
Does grinding occur awake or asleep?

Brux Checker  
Great Lakes Orthodontics

0.1mm Mylar



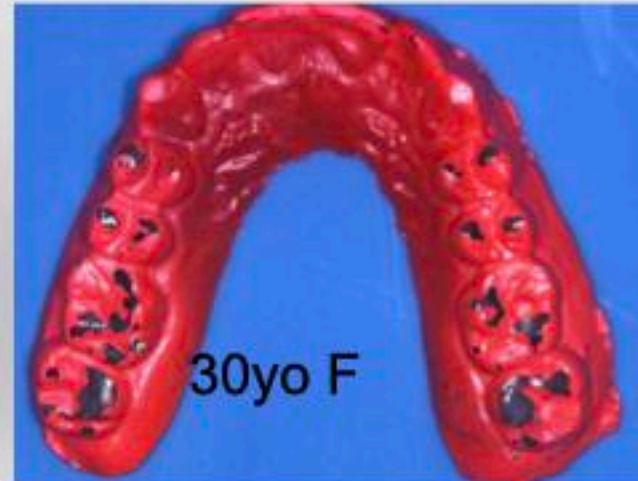
Made on Biostar Machine



25yo F



29yo F



30yo F

# TMD Therapies

## Dental Orthotics

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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

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
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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

Patient can place severe force on front teeth.

Upper teeth +2 mobility

### Upper hard full coverage CR guard



# TMD Therapies

## Dental Orthotics

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- Brux Checker
- Upper full coverage hard CR guard

## Posterior Stop Night Guard

- Mandibular Advancement Device
- Lateral Bruxing Device

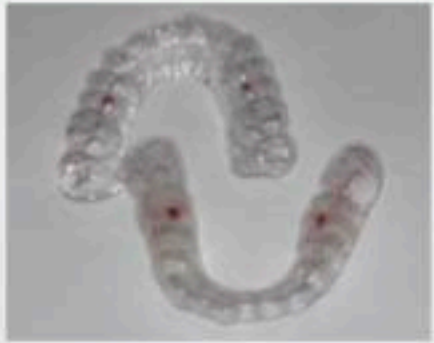




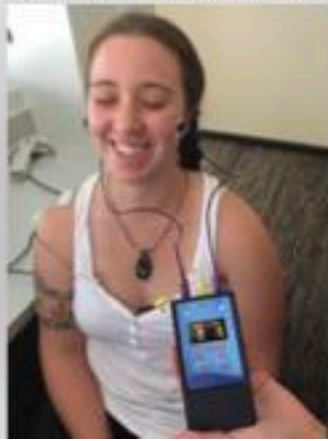
# TMD Therapies

## Dental Orthotics

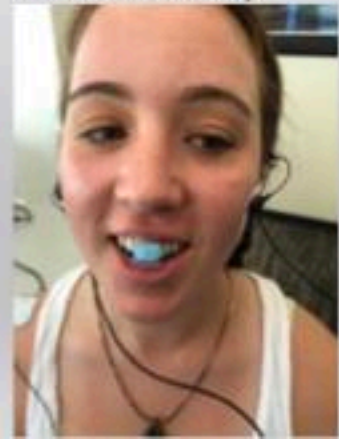
### Posterior Stop Night Guard



Clench back teeth



Clench anterior stop



Can place moderate force on front teeth

Clench  
Back teeth +250  $\mu$ v  
Front teeth +121  $\mu$ v

M-Scan



# TMD Therapies

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- 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

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- 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

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Mandibular Advancement Device  
Lateral Bruxing Device

## 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

## 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

## Occlusal Orthopedic

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

## Tongue Parafunction

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

## Surgical

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

# TMD Therapies

## Surgical

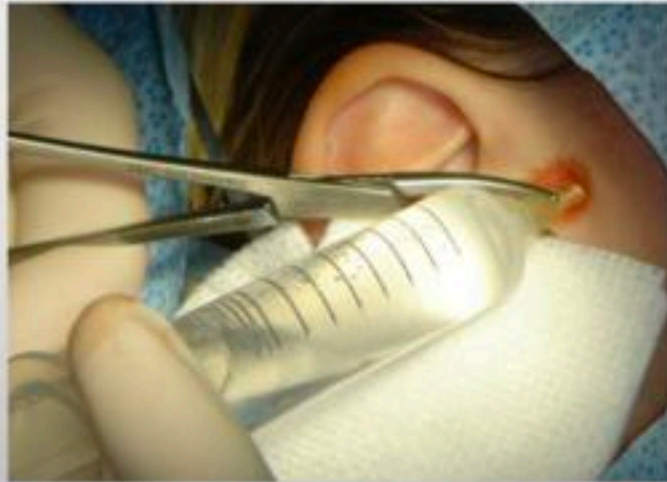
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# TMD Therapies

## Surgical

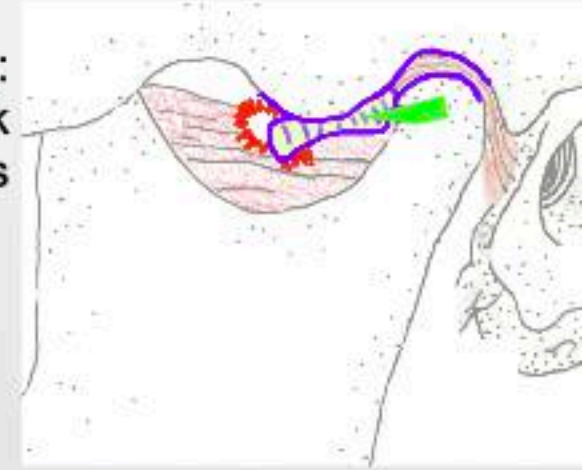
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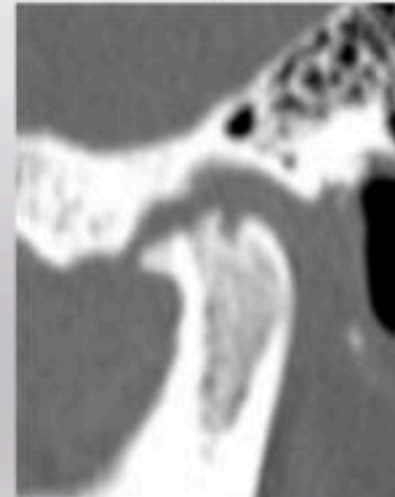


Needle into superior joint space  
Flush out debris  
Inject Platelet Rich Plasma

Indications:  
Acute Closed Lock  
Less than 6 weeks



Joint inflammation not  
responding to NSAIDs





# TMD Therapies

## Surgical

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

**Refer: Orthognathic Surgery**

Orthopedics and  
Orthodontics by  
Dr John Droter

Pre-surgical Orthodontics



Maxillary Expansion with  
Lingual Light Wire and  
orthodontics



# TMD Therapies

## Surgical

Refer: Arthrocentesis w/ PRP

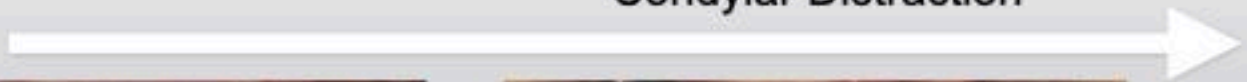
**Refer: Discectomy w/ Fat Graft**

Refer: Total Joint Replacement

Refer: Orthognathic Surgery



## Condylar Distraction



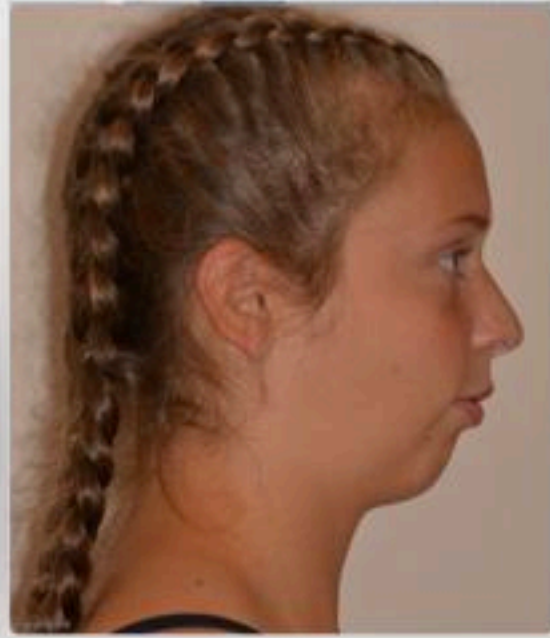
# TMD Therapies

## 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

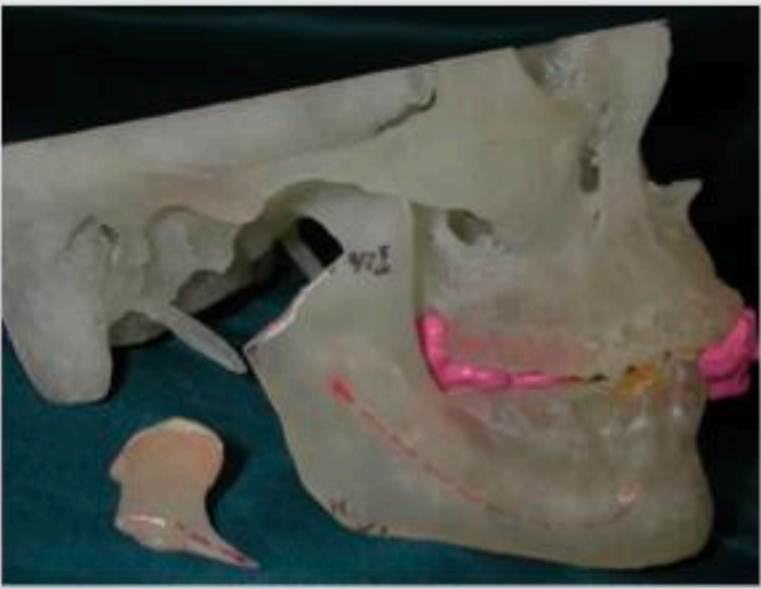
## Surgical

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

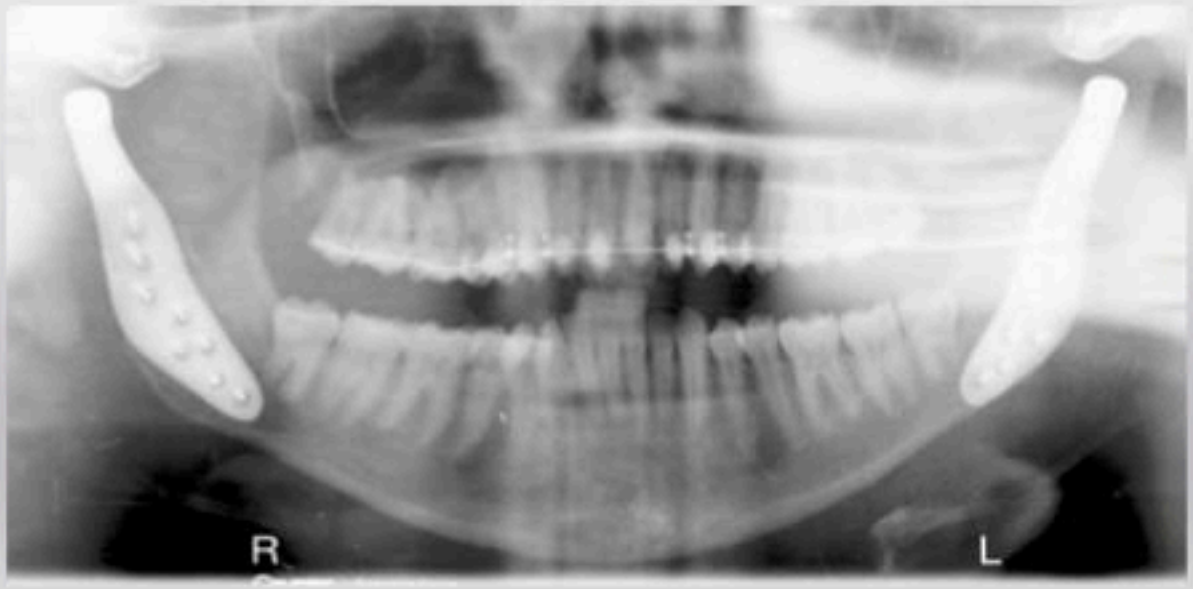
Refer: Arthrocentesis w/ PRP  
Refer: Discectomy w/ Fat Graft

### Refer: Total Joint Replacement

Refer: Orthognathic Surgery



Lateral Pterygoid Attached



# 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  
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Refer to Physical Therapy: Postural Restoration Therapy  
Refer to Physical Therapy: Various Muscle Therapies  
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Breathe, Walk , Exercise

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

## 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  
Refer to MD Rheumatoid Arthritis therapies  
Refer Botox Masseter injections  
Refer Botox Lateral Pterygoid Injections  
Food

## 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

## Occlusal Orthopedic

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

## Tongue Parafunction

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

## Surgical

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

# TMD Therapies

## Occlusal Orthopedic

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



# TMD Therapies

## Occlusal Orthopedic

### Lingual Light Wire

Lower soft sectional orthotic  
Sectional orthodontics  
Expansion orthopedics/ orthodontics  
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Occlusal Adjustment with DTR, TekScan  
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# TMD Therapies

## Occlusal Orthopedic

Lingual Light Wire

### Lower soft sectional orthotic

- Sectional orthodontics
- Expansion orthopedics/ orthodontics
- Restorative Dentistry
- Occlusal Adjustment with DTR, TekScan
- Condylar distraction

Intrudes lower posterior teeth

Lower Soft Sectional



Start



LSS and  
Lingual  
Light Wire



6 Months

# TMD Therapies

## Occlusal Orthopedic

Lingual Light Wire  
Lower soft sectional orthotic

### **Sectional orthodontics**

Expansion orthopedics/ orthodontics  
Restorative Dentistry  
Occlusal Adjustment with DTR, TekScan  
Condylar distraction





Start Age 50



Lingual Light Wire w/ Sectional Ortho



Post Occlusal Reshaping



# TMD Therapies

## Occlusal Orthopedic

Lingual Light Wire  
Lower soft sectional orthotic  
Sectional orthodontics  
Expansion orthopedics/ orthodontics

## Restorative Dentistry

Occlusal Adjustment with DTR, TekScan  
Condylar distraction



# Restorative Dentistry

Pathological Occlusion

??Airway Related Bruxing?



Restore Function

Composite Trial Occlusion

AHI + 26 CPAP



Anterior guidance  
or group function?





# TMD Therapies

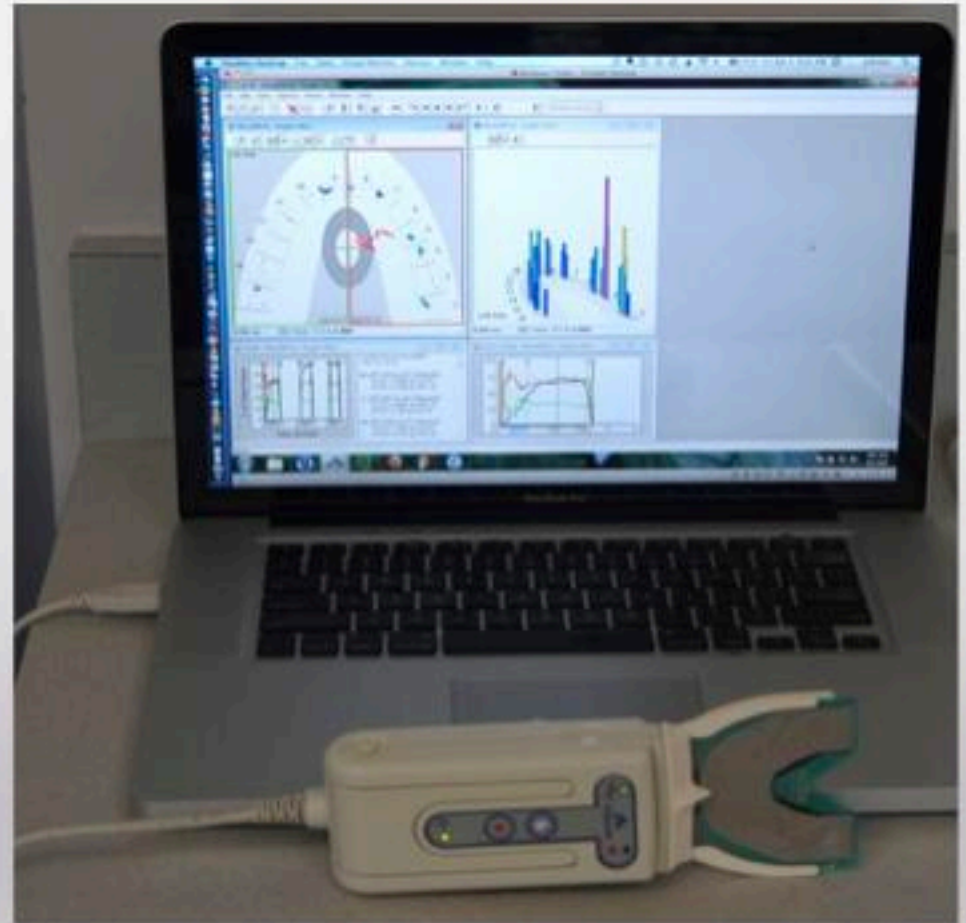
## Occlusal Orthopedic

Lingual Light Wire  
Lower soft sectional orthotic  
Sectional orthodontics  
Expansion orthopedics/ orthodontics  
Restorative Dentistry

### **Occlusal Adjustment with DTR, TekScan**

Condylar distraction

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



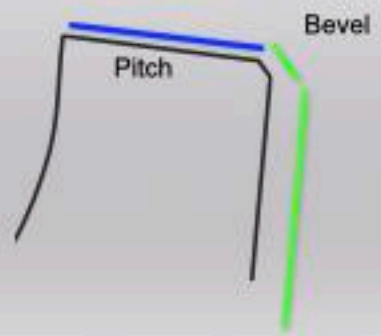
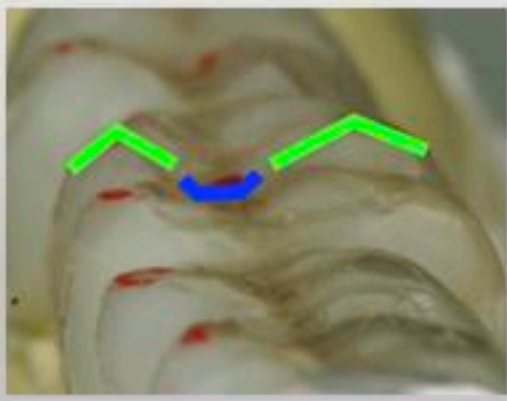
**Wheel**  
 Create Cusp Landing Zone  
 Flatten Incisal edges  
 Bulk reduction of inclines



Move and Shape Cusps,  
 Inclines, Facial Surfaces



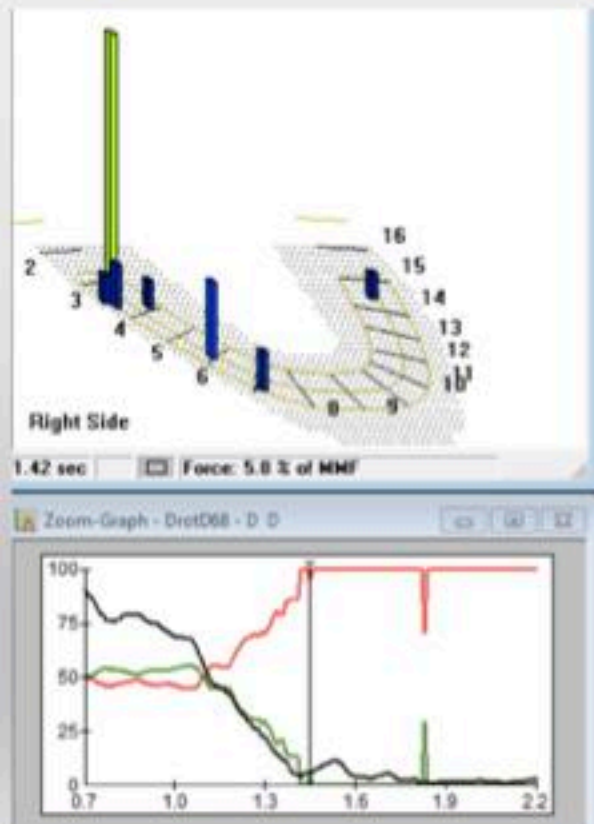
Brassler Brio Shine  
 FLBCER-1  
 FLBF-2



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

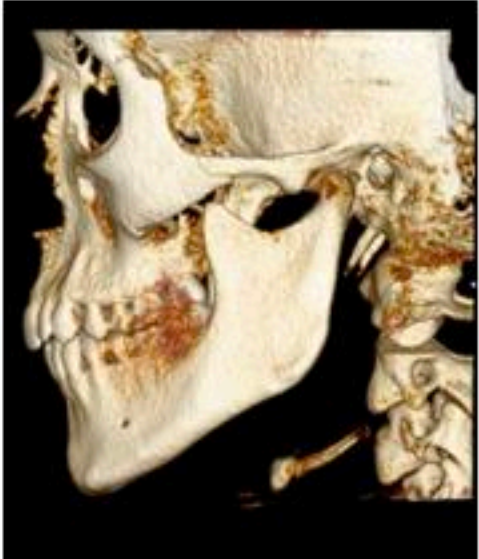
Lingual Light Wire  
Lower soft sectional orthotic  
Sectional orthodontics  
Expansion orthopedics/ orthodontics  
Restorative Dentistry  
Occlusal Adjustment with DTR, TekScan

## Condylar distraction

Orthopedically move the Maxilla



Anterior Openbite Non Surgical Treatment: Moving the Maxilla

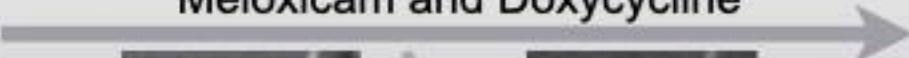


# Anterior Openbite with Active TMJ Bone Loss

Non Surgical Therapies



Condylar Distraction  
Meloxicam and Doxycycline





# TMD Therapies: (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

## 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

## 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

## 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

## Occlusal Orthopedic

Lingual Light Wire  
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## Surgical

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



# Choosing the Correct Night Guard

[www.APSleep.com](http://www.APSleep.com)

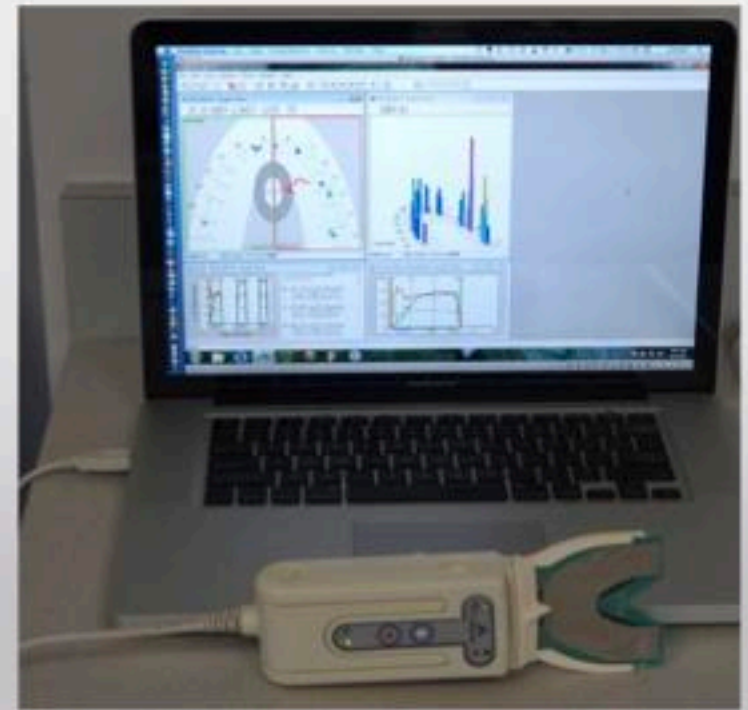
**My #1 Choice: Best Night Guard**

**My #1 Choice: Best Night Guard is patient's teeth:**

**Physiological Harmonious Occlusion**  
**Mechanically Stable TMJs**  
**Cranial Alignment**  
**Neck C1 alignment**

## **Occlusal Adjustment with DTR, TekScan**

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







# Choosing the Correct Night Guard

[www.APSleep.com](http://www.APSleep.com)

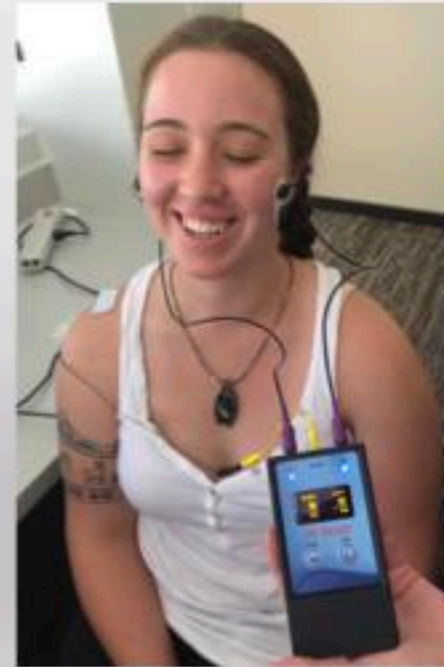
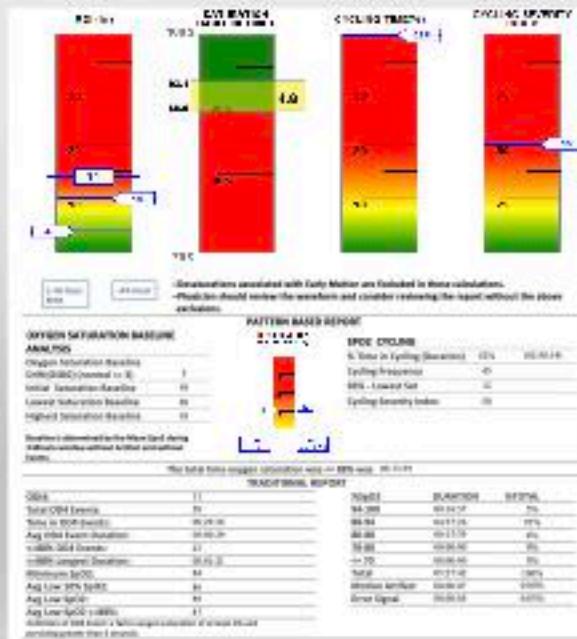
**EMG Muscle Test: Forces on Front Teeth**

**Sleep Heart Rate and Oxygen**

## EMG Muscle Test: Forces on Front Teeth

### Sleep Heart Rate and Oxygen

SleepSAT  
Patient Safety Inc.



M-Scan  
BioResearch



# 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

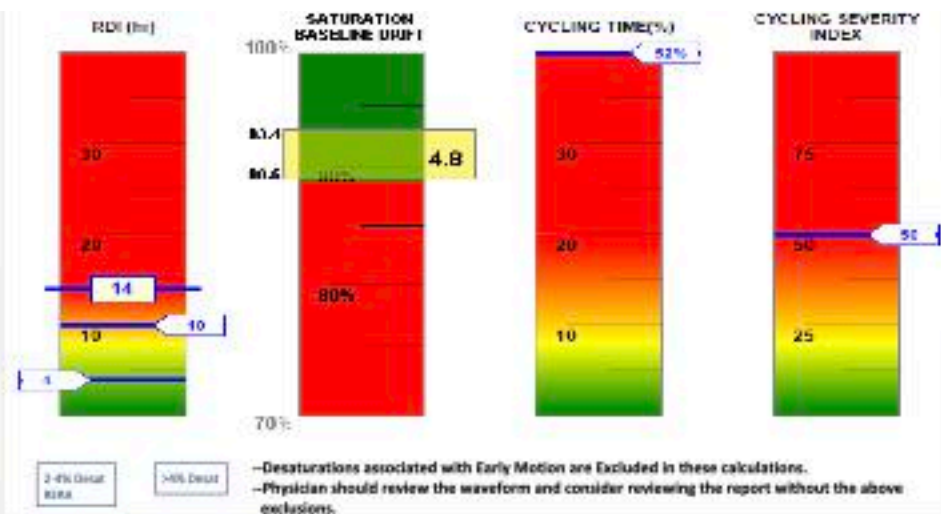


Patient Safety Inc.



Order Pulse Ox and Software: Go to my website or  
[www.patientsafetyinc.com](http://www.patientsafetyinc.com)

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



**OXYGEN SATURATION BASELINE ANALYSIS**

Oxygen Saturation Baseline	
Drift(OSBG) (normal <= 5)	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.

**PATTERN BASED REPORT**

SPO2 CYCLING  
 % Time in Cycling (Duration) 52% (02:50:14)  
 Cycling Frequency 45  
 96% - Lowest Sat 13  
 Cycling Severity Index 58

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

TRADITIONAL REPORT		SPO2 CYCLING		
OD4:		%SpO2	DURATION	%TOTAL
Total OD4 Events:	11	94-100	00:16:37	5%
Time in OD4 Events:	06:29:26	88-94	04:57:26	91%
Avg OD4 Event Duration:	00:00:28	80-88	00:13:39	4%
<=88% OD4 Events:	23	70-80	00:00:00	0%
<=88% Longest Duration:	00:01:21	<= 70	00:00:00	0%
Minimum SpO2:	84	Total	05:27:42	99%
Avg Low 10% SpO2:	86	Motion Artifact	00:00:07	0.04%
Avg Low SpO2:	89	Error Signal	00:00:05	0.03%
Avg Low SpO2 <=88%:	87			

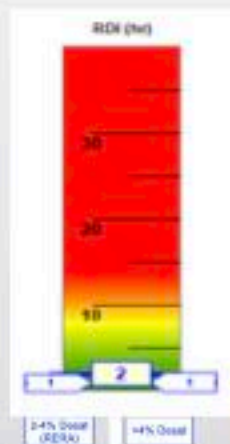
Definition of OD4 Event: a fall in oxygen saturation of at least 4% and persisting greater than 3 seconds.



Age 16F  
 cc: Facial Pain, Excessive Daytime Fatigue



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



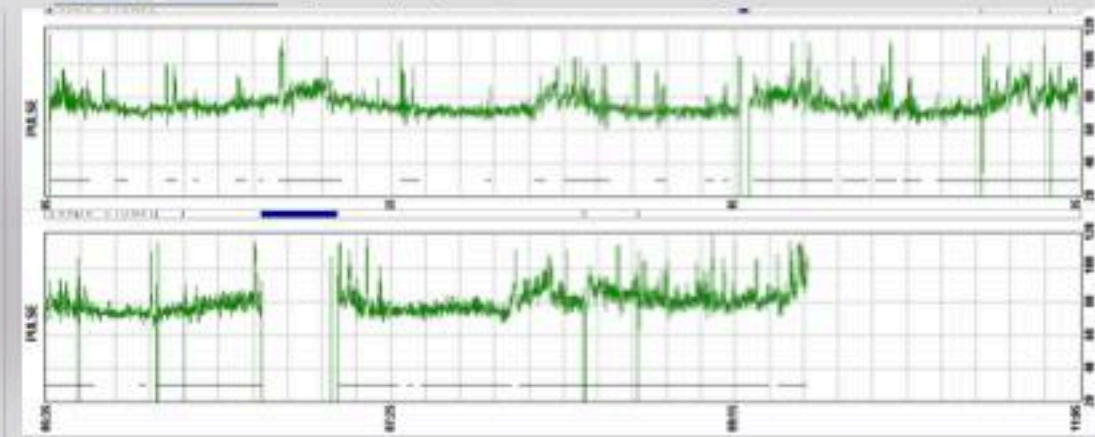
PULSE RATE DATA	
<b>Autonomic Arousal</b>	
Index (#/hr):	31
<b>Pulse Rate Range</b>	
Mean:	78
Min:	34
Max:	122
<b>Tachycardia - Sleep (&gt;90 bpm)</b>	
Duration:	00:34:56
% (VRT):	6%
<b>Bradycardia - Sleep (&lt;50 bpm)</b>	
Duration:	00:00:35
% (VRT):	0%



Heart Rate  
 >90 bpm  
 for 35 min

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

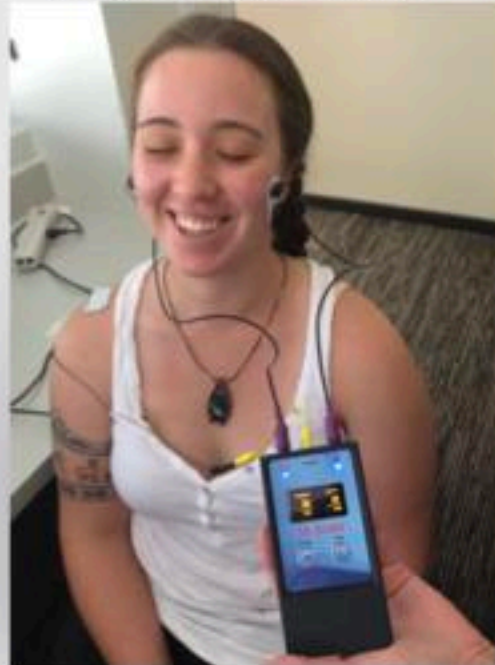


# Choosing the Correct Night Guard

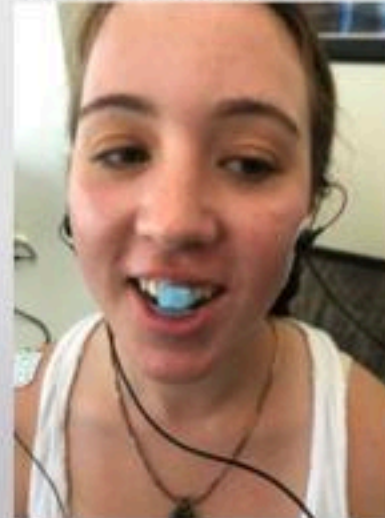
## M-Scan EMG Electromyography



Clench back teeth



Clench  
anterior stop



Can place moderate force  
on front teeth

Clench  
Back teeth +250  $\mu\text{V}$   
Front teeth +121  $\mu\text{V}$



## EMG Muscle Test: Forces on Front Teeth

### Sleep Heart Rate and Oxygen

**Low Sympathetic Arousals  
Good Blood Oxygenation**

**Low Forces**

**Moderate Forces**

**Severe Forces**

D-PAS

Posterior Stop  
Night Guard

Upper Hard  
Night Guard

**Moderate Sympathetic Arousals  
AHI less than 5**

D-PAS  
or Lat Brux  
Anterior Stop

Post Stop NG  
or Lat Brux  
Posterior Stop

Lat Brux  
Posterior Stop

**Obstructive Sleep Apnea  
AHI 5 - 20**

MAD  
Anterior Stop

MAD  
Posterior Stop

CPAP +  
Upper Hard  
Night Guard

D-PAS = Diagnostic Palatal Anterior Stop

Lat Brux = Lateral Bruxing Device

MAD = Mandibular Advancement Device



## EMG Muscle Test: Forces on Front Teeth

### Sleep Heart Rate and Oxygen

**Low Sympathetic Arousals  
Good Blood Oxygenation**

**Low Forces**

**Moderate Forces**

**Severe Forces**

D-PAS

Posterior Stop  
Night Guard

Upper Hard  
Night Guard

**Moderate Sympathetic Arousals  
AHI less than 5**

D-PAS  
or Lat Brux  
Anterior Stop

Post Stop NG  
or Lat Brux  
Posterior Stop

Lat Brux  
Posterior Stop

**Obstructive Sleep Apnea  
AHI 5 - 20**

MAD  
Anterior Stop

MAD  
Posterior Stop

CPAP +  
Upper Hard  
Night Guard

D-PAS = Diagnostic Palatal Anterior Stop

Lat Brux = Lateral Bruxing Device

MAD = Mandibular Advancement Device

# Choosing the Correct Night Guard

## Low Forces on Front Teeth

### Sleep Heart Rate/Oxygen

Low Sympathetic Arousals  
Good Blood Oxygenation

Moderate Sympathetic Arousals  
AHI less than 5

Obstructive Sleep Apnea  
AHI 5 - 20

Low Forces

D-PAS

D-PAS  
or Lat Brux  
Anterior Stop

MAD  
Anterior Stop



D-Pas



Lat-Brux

# Choosing the Correct Night Guard

## Moderate Forces on Front Teeth

### Sleep Heart Rate/Oxygen

Low Sympathetic Arousals  
Good Blood Oxygenation

Moderate Sympathetic Arousals  
AHI less than 5

Obstructive Sleep Apnea  
AHI 5 - 20

### Moderate Forces

Posterior Stop  
Night Guard

Post Deprogram  
or Lat Brux  
Posterior Stop

MAD  
Posterior Stop



Posterior Stop Night Guard



D-SAD sleep  
Panthera Dental



# Choosing the Correct Night Guard

## Severe Forces on Front Teeth

### Sleep Heart Rate/Oxygen

Low Sympathetic Arousals  
Good Blood Oxygenation

Moderate Sympathetic Arousals  
AHI less than 5

Obstructive Sleep Apnea  
AHI 5 - 20

### Severe Forces

Upper Hard  
Night Guard

Lat Brux  
Posterior Stop

CPAP +  
Upper Hard  
Night Guard





**APS**

ArrowPath Sleep

[www.APSleep.com](http://www.APSleep.com)  
[info@apsleep.com](mailto: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**



## 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

### 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





Rotate  
Slide  
Pivot

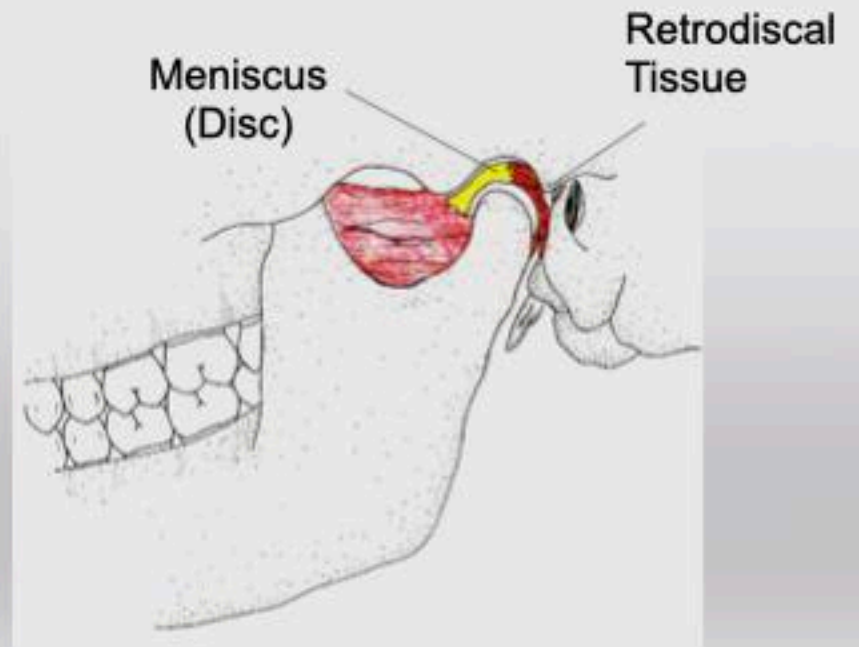
Solid end point closing  
Ligamentous end point opening

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

TMJ has 2 Joint Compartments:

Upper- Translation

Lower- Rotation



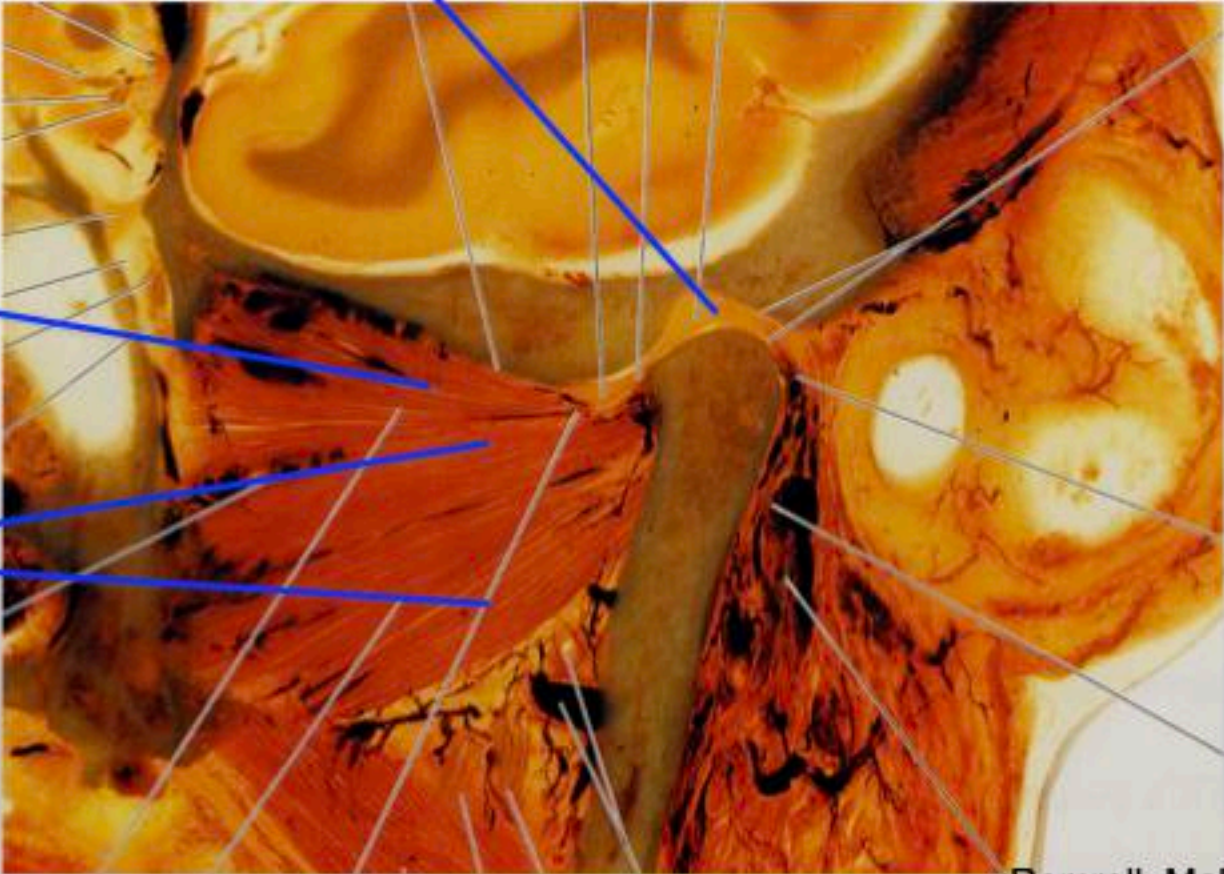


Disc: Thick-Thin-Thick

**Oblique Sagittal View**

Lateral Pterygoid  
Superior Head

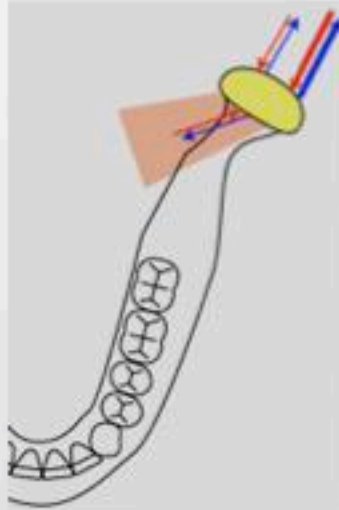
Lateral Pterygoid  
Inferior Head



Romrell, Mahan



Axial View



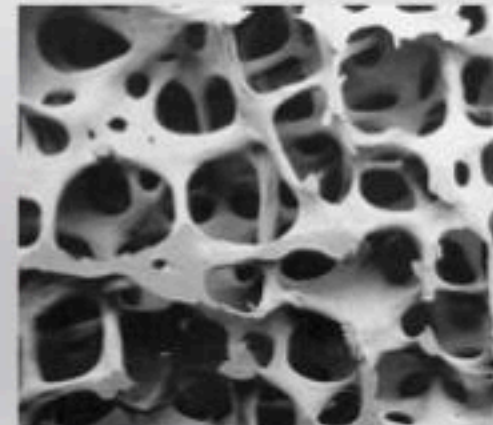
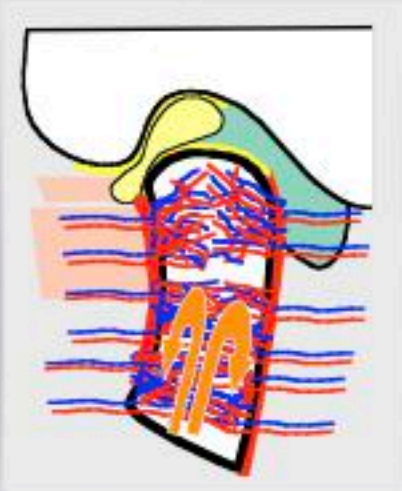
## Normal TMJ Blood Flow, Marrow

Condylar head limited collateral circulation  
Epiphyseal growth center

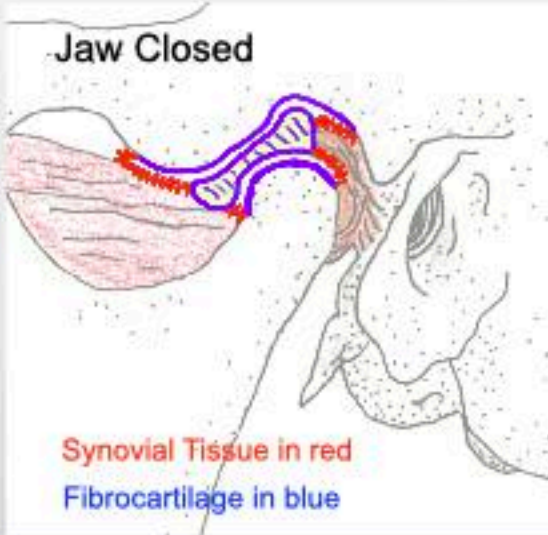
Marrow is fatty tissue with blood vessels, containing the precursor for blood cells

No Blood vessel inside joint

Closed  
Sagittal

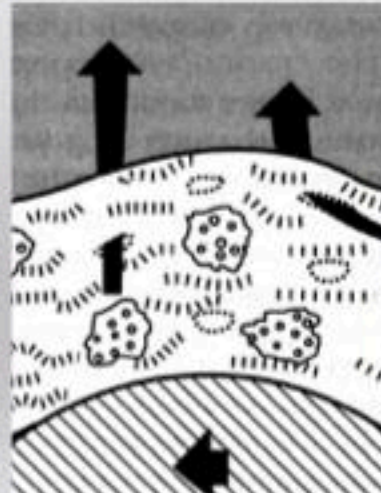
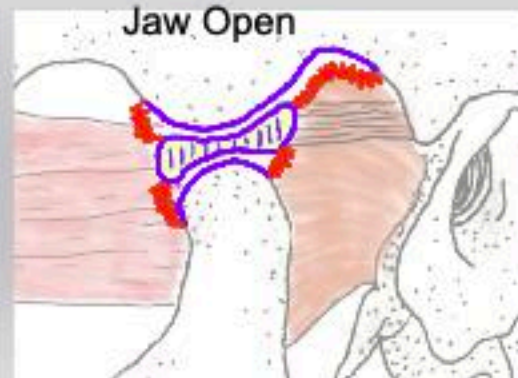
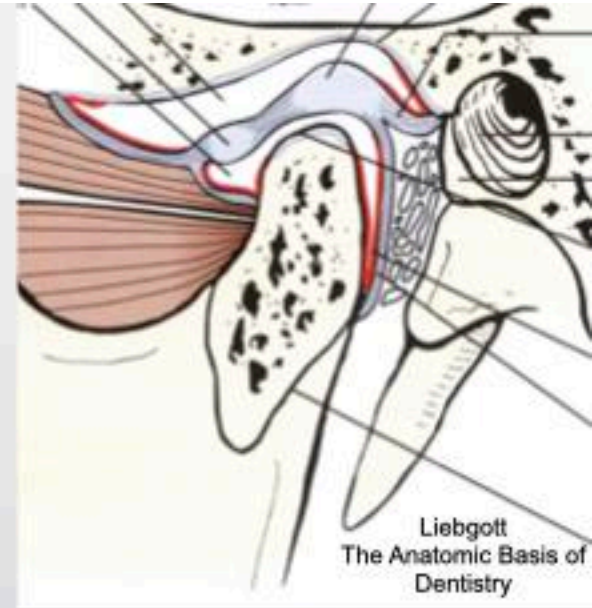


# Normal TMJ- Synovium, Cartilage



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



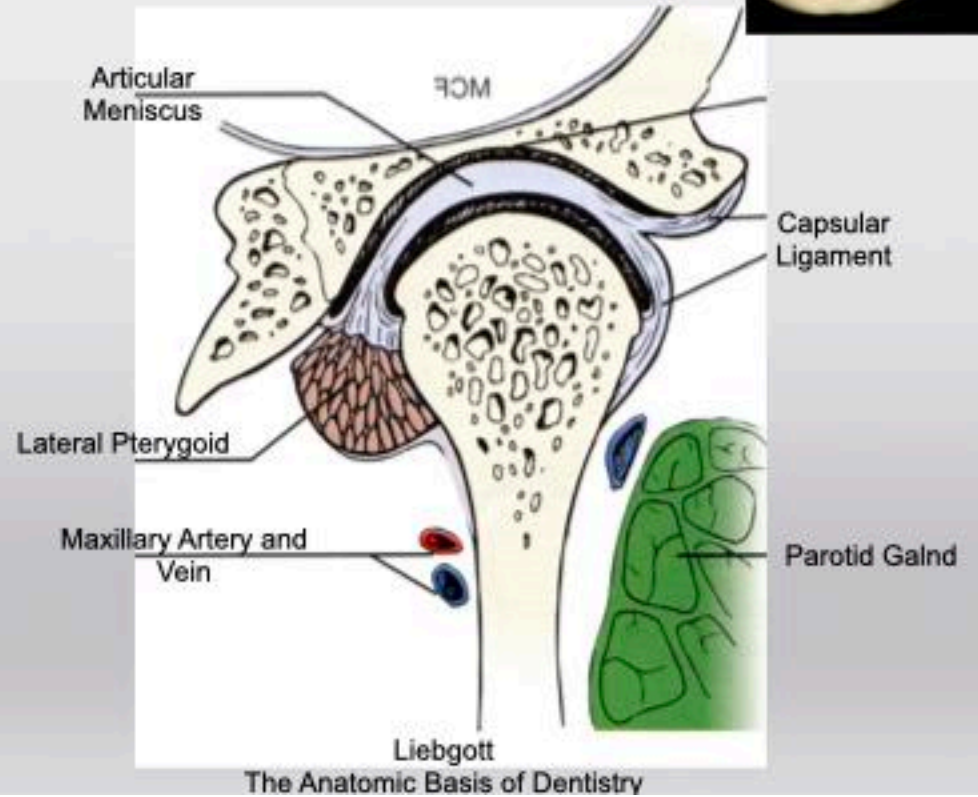
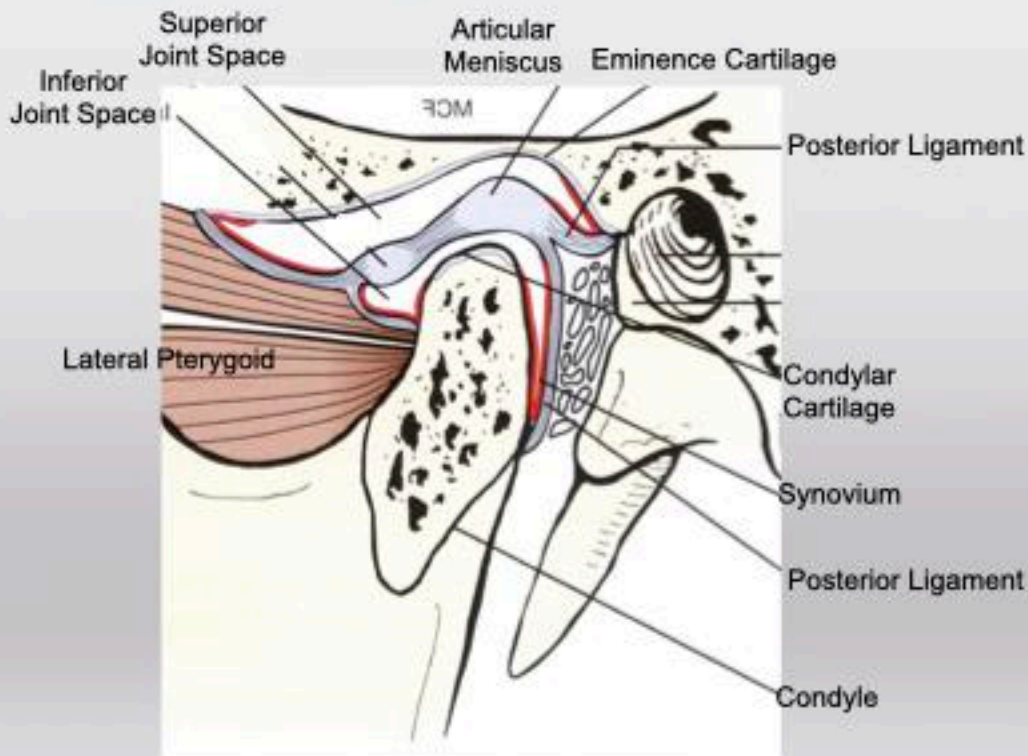
Fibrocartilage surface covered in fluid  
Cartilage is hydrophilic  
Proteoglycan negative charge  
Surface Active Phospholipids  
Fluid slides against fluid  
5x slipperier than ice



Left TMJ Sagittal View



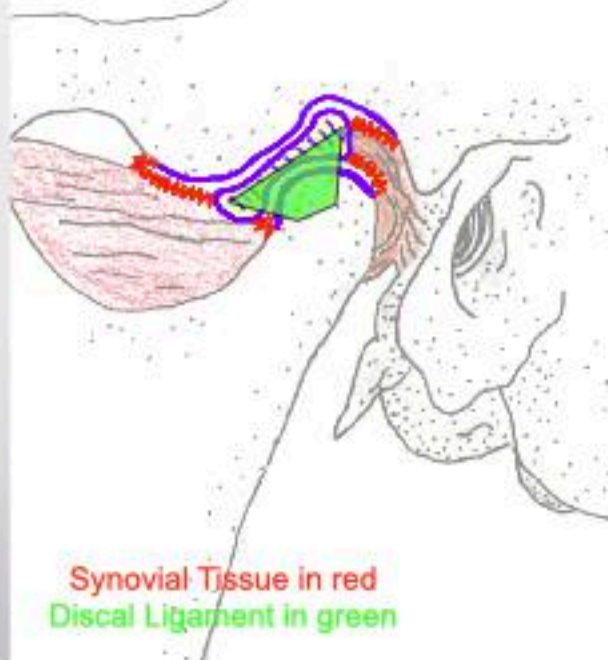
Left TMJ Coronal View





# Normal TMJ

Jaw Closed



Discal Ligaments attach Disc to Condyle

## Synovial Tissue

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

Disc viewed from above

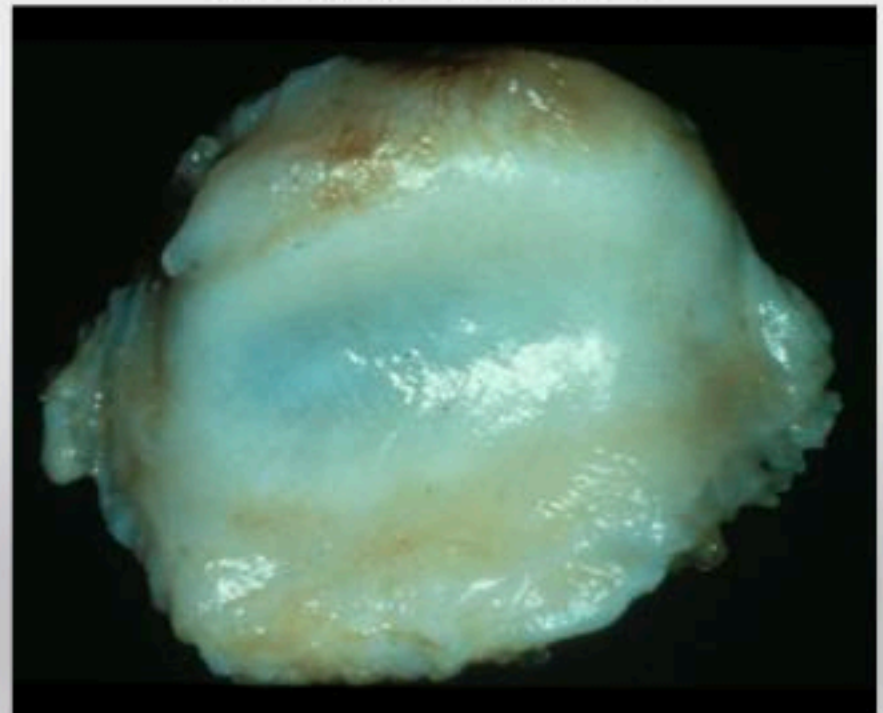
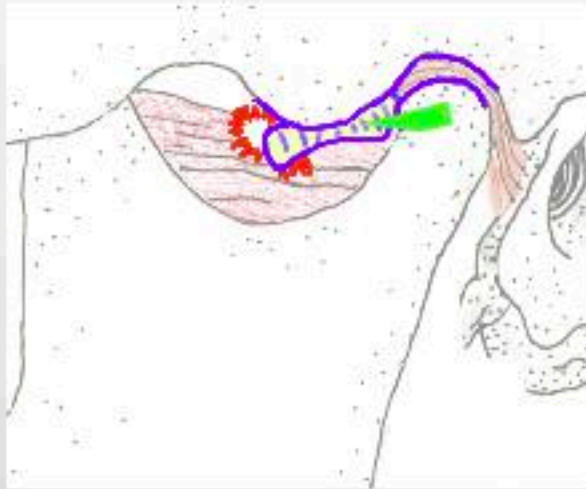


Photo Courtesy of Dr Henry Gremillion

## Damaged TMJ- Anteriorly Dislocated Disc



Torn or stretched Meniscal ligaments

Anterior Dislocated Disc

Damaged Synovium

Retrodiscal Tissue pulled up and over the condyle

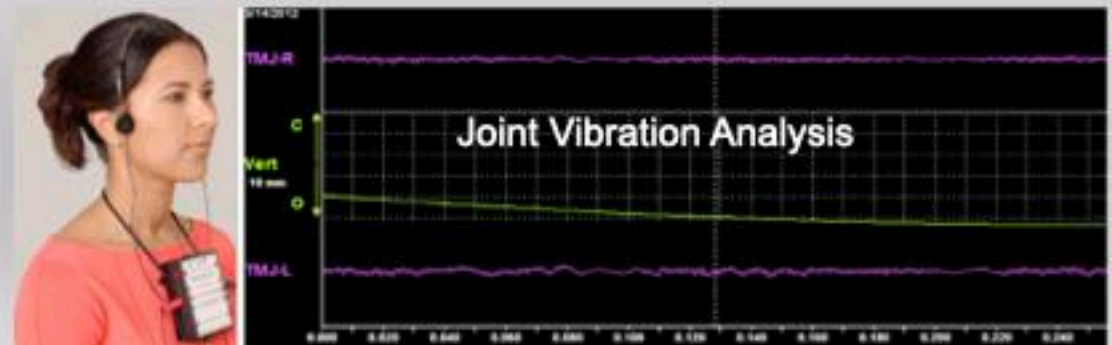
Retrodiscal tissue in direct contact with fibrocartilage

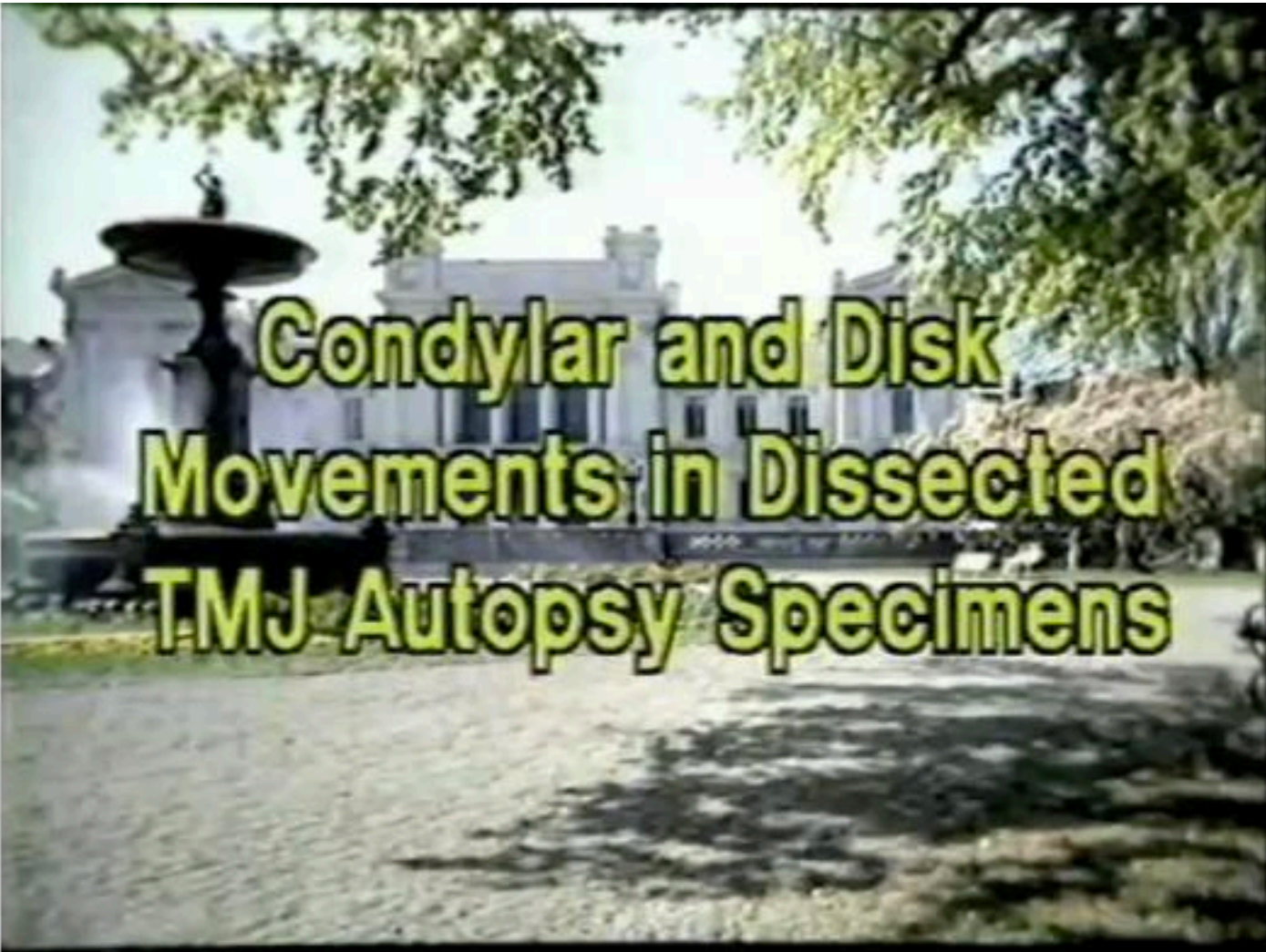
Major Increase in friction

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



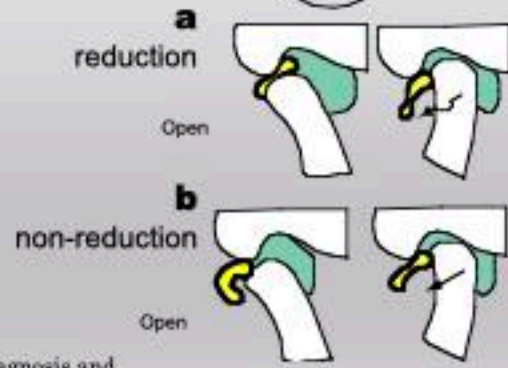
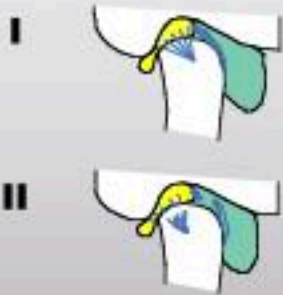
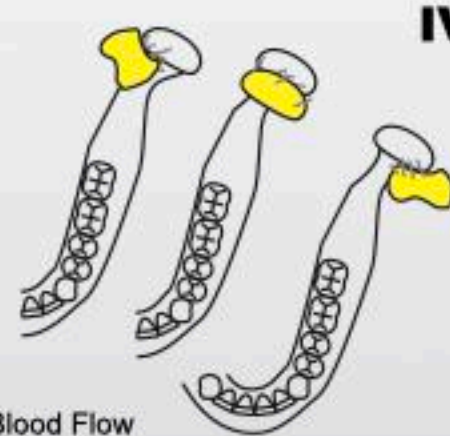
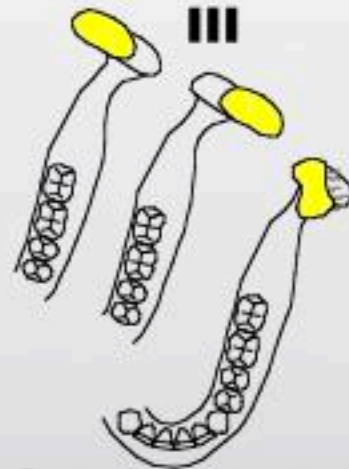
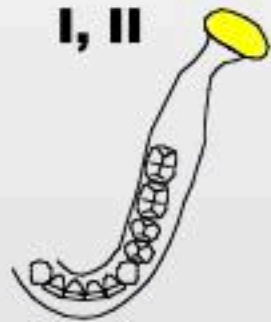


**Condylar and Disk  
Movements in Dissected  
TMJ Autopsy Specimens**



# Dr. Mark Piper's Classification

Left TMJ



% Blood Flow Affected?



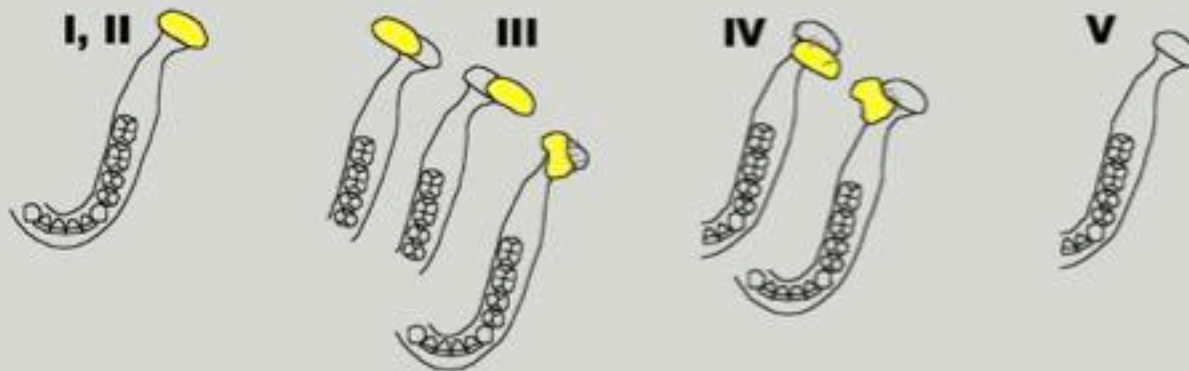
Bone to Bone  
**a** Adapting  
**b** Adapted

- 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 any indication of TMJ damage had scans



<b>I&amp;II-</b>	<b>32%</b>
<b>IIIa-</b>	<b>12%</b>
<b>IIIb-</b>	<b>3%</b>
<b>IVa-</b>	<b>18%</b>
<b>IVb-</b>	<b>30%</b>
<b>V-</b>	<b>5%</b>

**I&II- 32%**

**IIIa- 12%**

**IVa- 18%**

**V- 5%**

**IIIb- 3%**

**IVb- 30%**

**Both joints normal  
14%**

**15%**

**48%**

**\*\*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

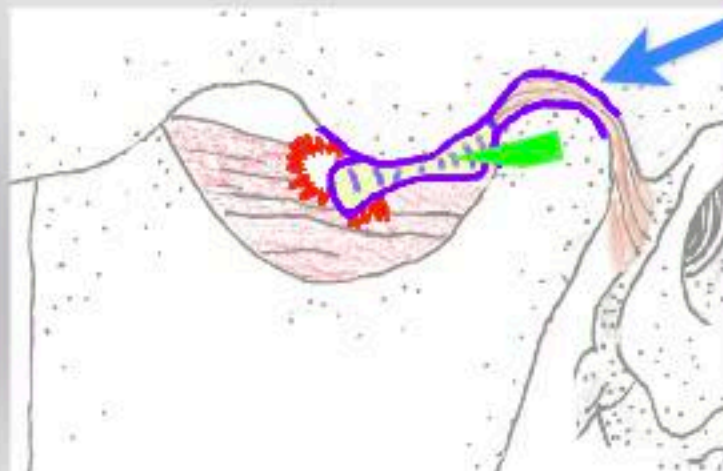


Damaged



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

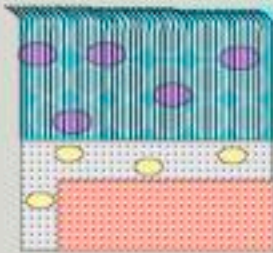
Lose 50% height of cartilage  
Proteoglycans not being produced by Chondrocytes  
Loss of 50% proteoglycans and water  
Collagen still intact  
Process is reversible

Move joint with light force/repetitive motion next 30 days

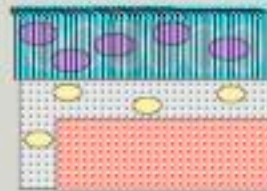
You have 6-8 weeks to get jaw moving  
before cartilage is irreversibly damaged,  
independent of the cause of the  
immobilization



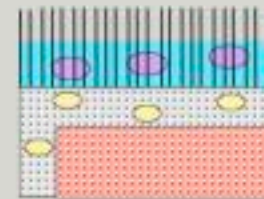
Healthy Cartilage



4 Weeks

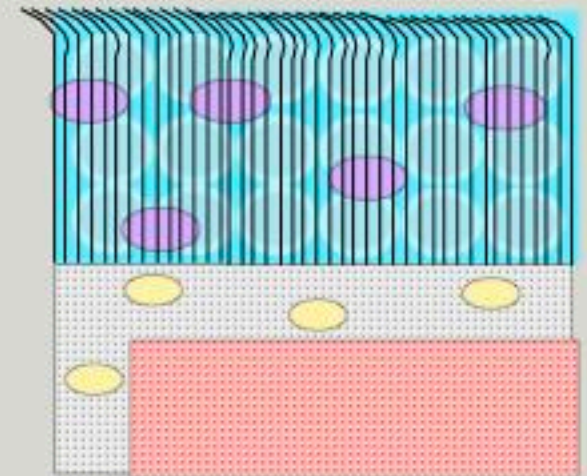
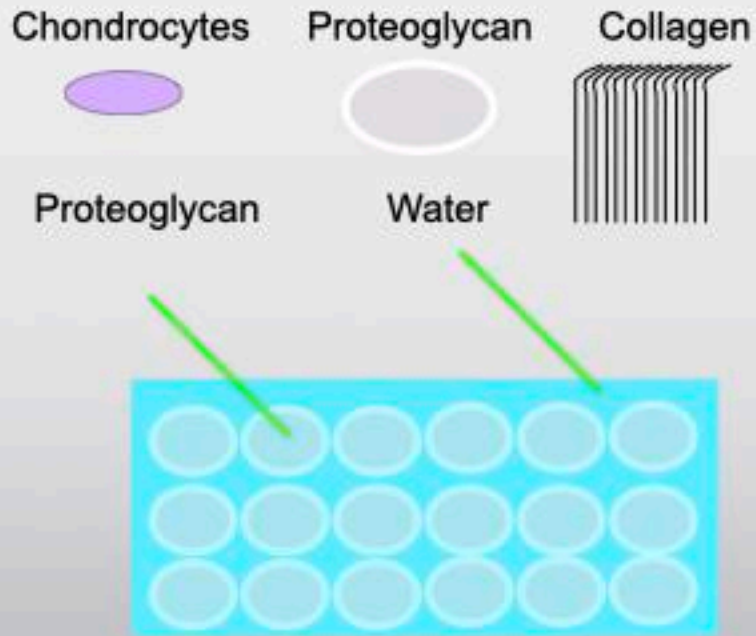


8 Weeks



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

# 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

Proteoglycans not being produced by Chondrocytes  
Collagen still intact  
Process is reversible at 4 weeks

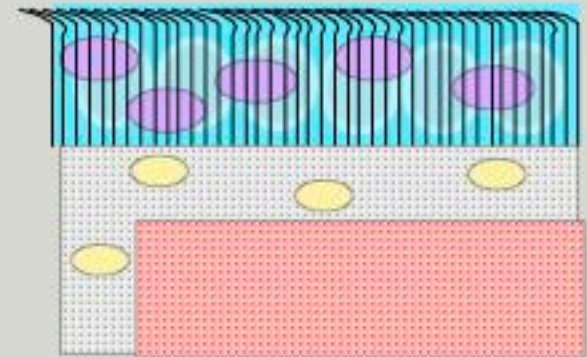
Move joint with light force/repetitive motion next 30 days

Half as many "Balloons"  
Still have "Ropes"

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

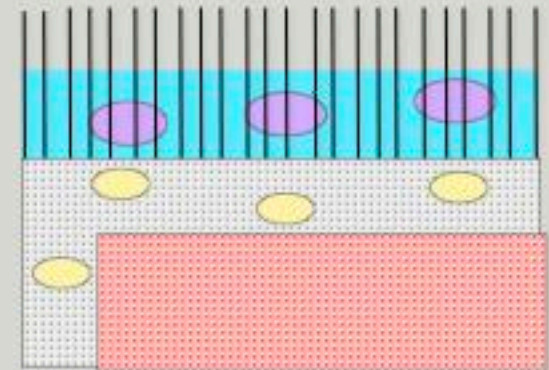
Connective tissue proliferates into the joint

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



# Differential Diagnosis: Limited Joint Motion

Muscle Spasm

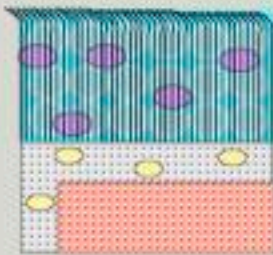
Painful to Move  
Joint Pain  
Muscle Pain

Mechanically Blocked  
4b Acute  
Adhesion

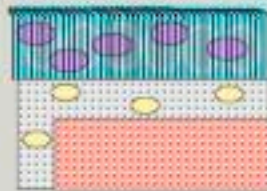
Masseteric Space  
Infection  
Hematoma



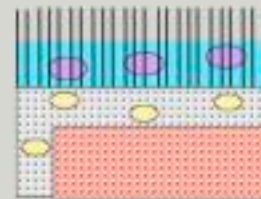
Healthy Cartilage



4 Weeks



8 Weeks



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

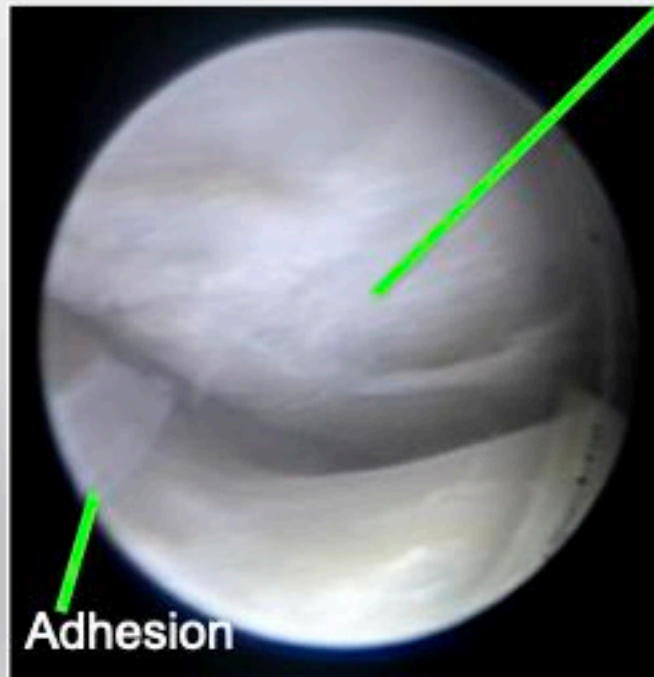
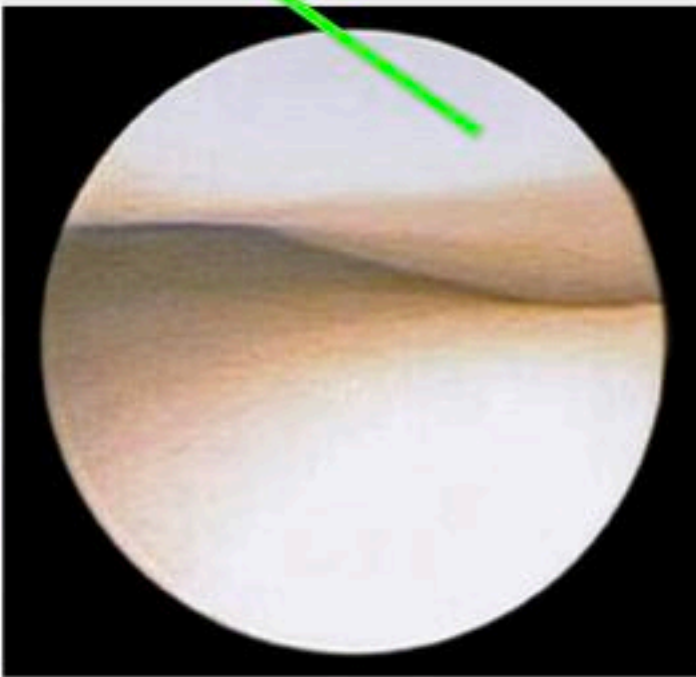


E.B. Evans, GWN Eggers, J.K. Butler, and J. Blumel, Experimental immobilization and remobilization of rat knee joints, J Bone Joint Surg Am, 1960 vol. 42 (5) pp. 737-758  
Enneking WF, Horowitz M. The intra-articular effects of immobilization on the human knee. J Bone Joint Surg Am. 1972 Jul;54(5):973-85.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

# Arthroscopic View Left TMJ

Eminence Healthy Cartilage

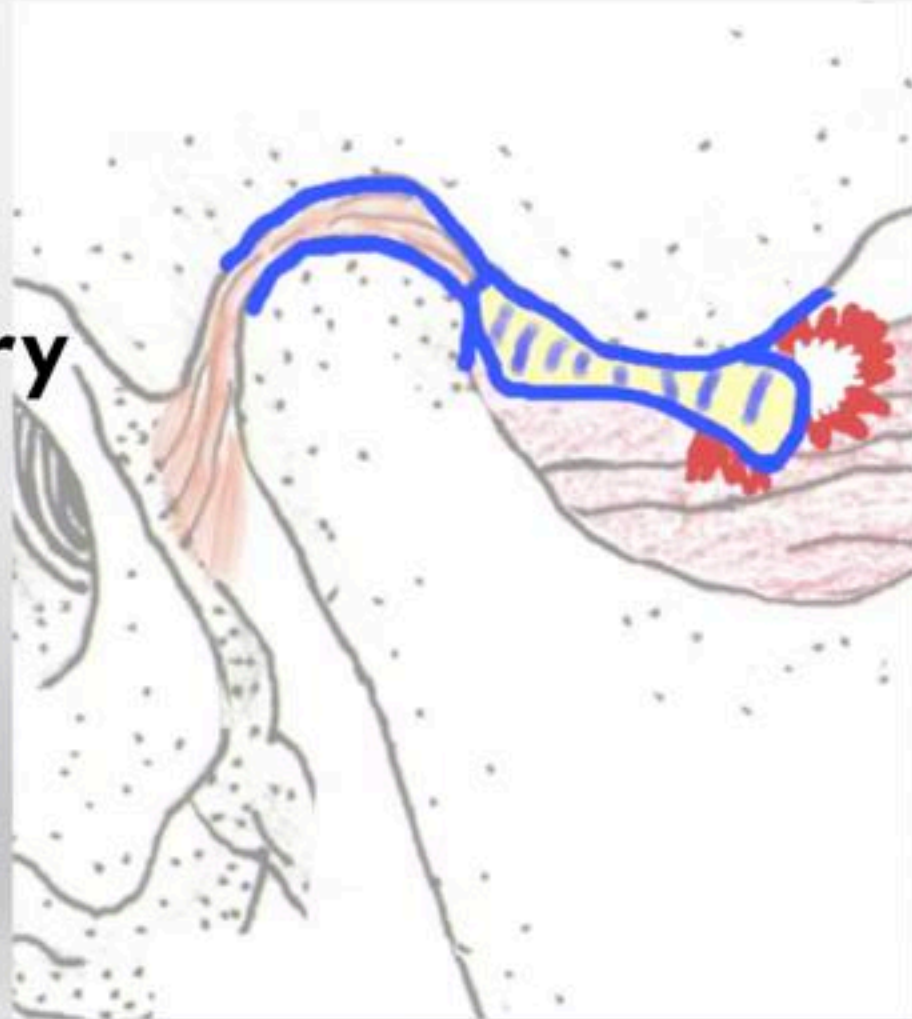
Eminence Necrotic Cartilage



Not Same Patient



# Right TMJ Open Joint Surgery



Cartilage  
Damage  
Movie

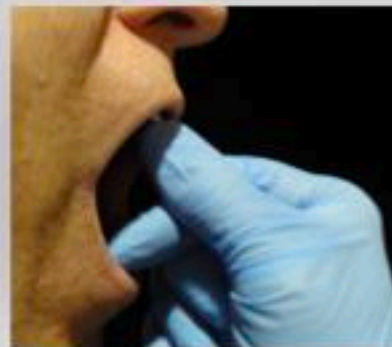
# Limited Opening Algorithm

## 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

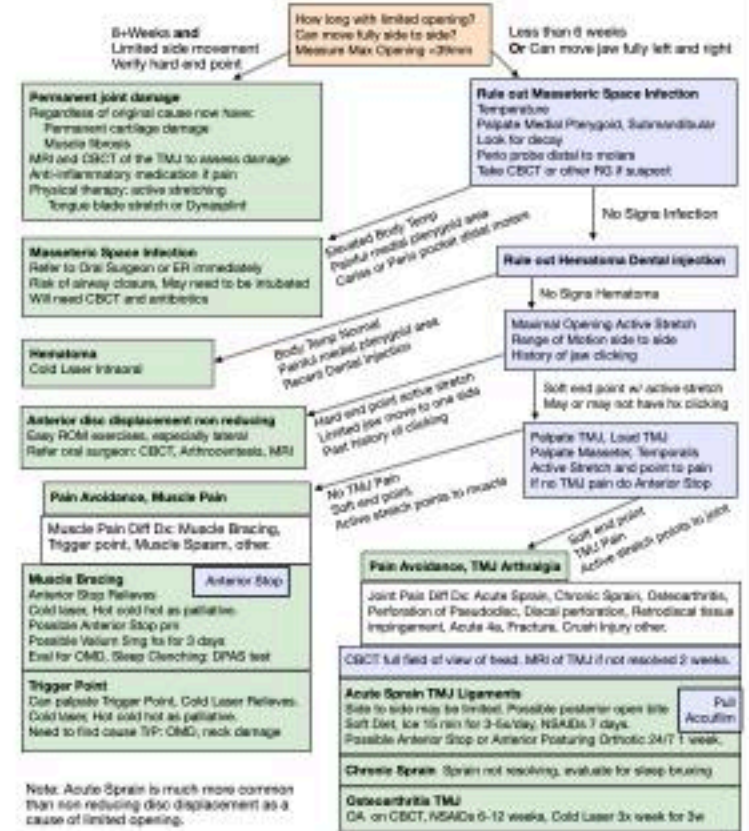
## Diagnostic Tests:

- 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



## Dr Droter's Limited Opening Algorithm

Differential Diagnosis Limited Opening (Less than 20mm): Pain Avoidance Sore Joint, Pain Avoidance Sore Muscle, Muscle Spasm, Masseteric Space Infection, Nonreducing Disc (4b,3b Acute), Joint Fibrosis, Muscle Fibrosis, other.



**Subjective:**

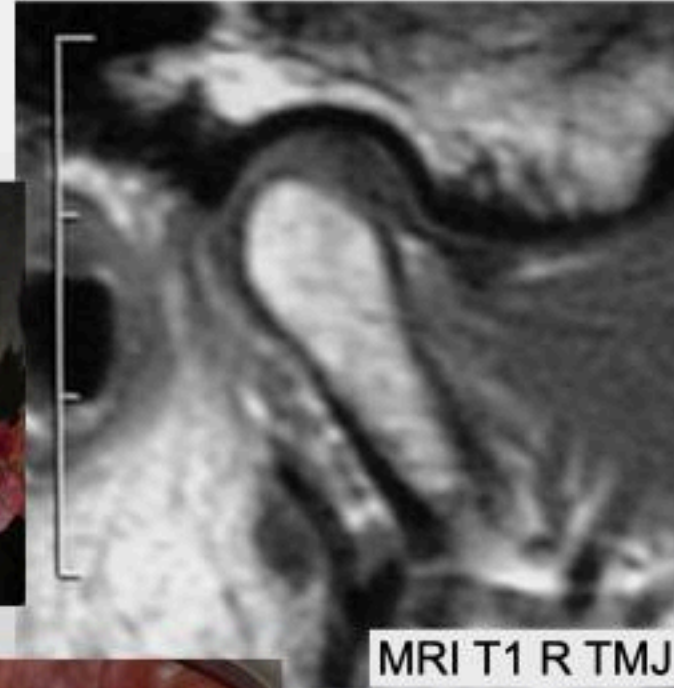
Dentist doing crown prep #30 1 week ago  
Severe pain Right TMJ after moving jaw at end of appt  
Constant deep pain Right TMJ  
Limited opening

**Objective:**

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

**Assessment:**

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

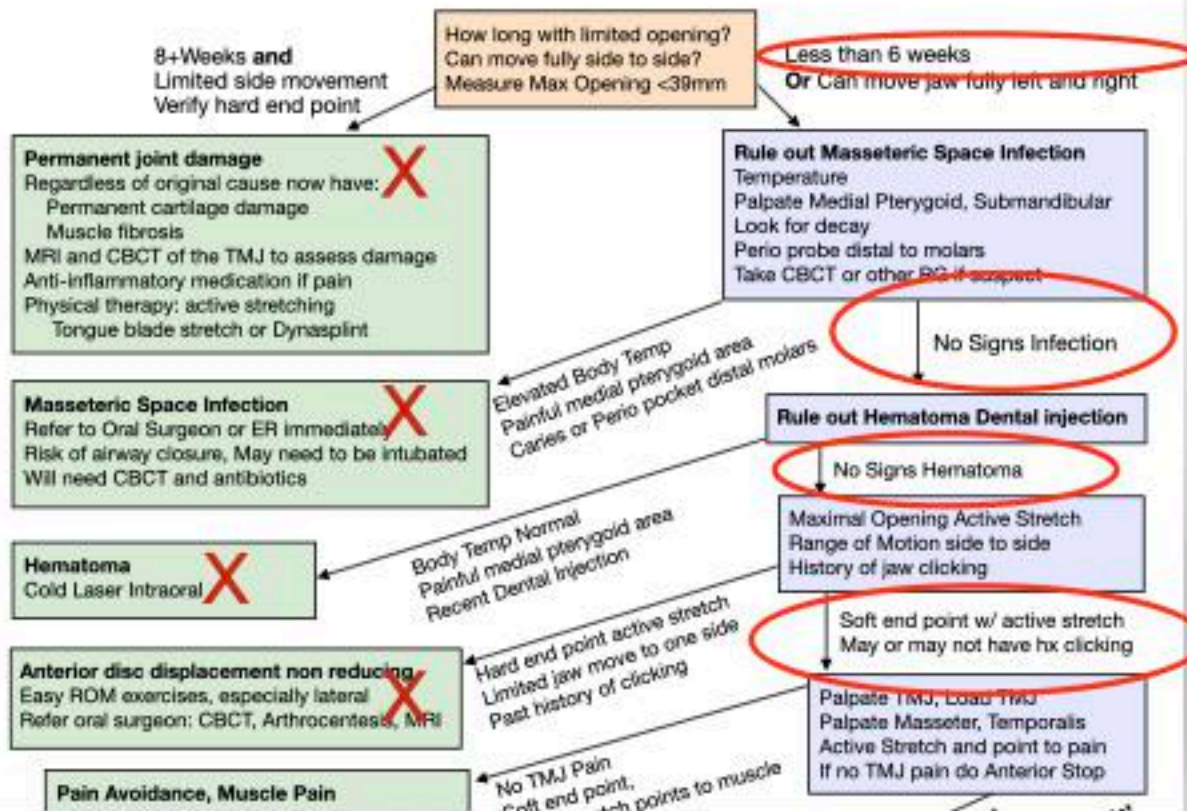




## Dr Droter's Limited Opening Algorithm

19.5

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



Objective:

Limited opening 32mm, Mandible shifts Left

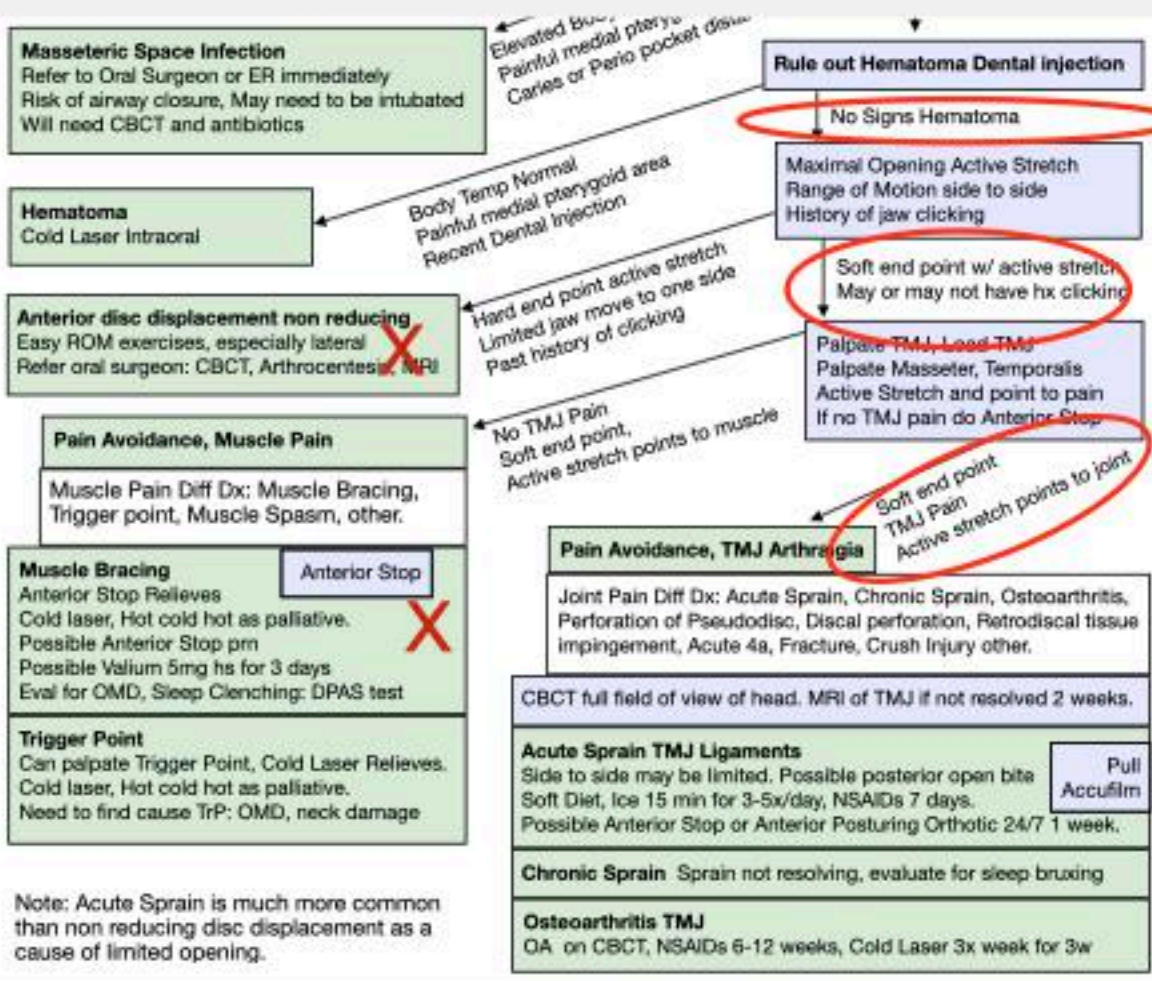
Normal side to side motion  
98 temp, normal perio probe 2nd molars, no caries

No pain palpation RL Medial Pterygoid

Soft end point on active stretch, 45mm, R TMJ pain

Right TMJ pain to palpation, Left TMJ normal

Posterior openbite Right, does not hold Accufilm



Note: Acute Sprain is much more common than non reducing disc displacement as a cause of 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



**Pain Avoidance, TMJ Arthralgia**

TMJ +  
Active stre...

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

Multiwave Locked System Laser

808 nm Continuous, 905 nm Pulsed

Stimulates metabolic processes in cells  
Decrease inflammation  
Pain Reduction  
Faster Healing



Diode Laser

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

### Difficulty chewing

Pattern:

Jaw gets tired when chewing  
chewy foods

Diseases to consider and rule out:

Occlusal Muscle Dysfunction

Arthralgia- Painful TMJ

Temporal Arteritis

Other



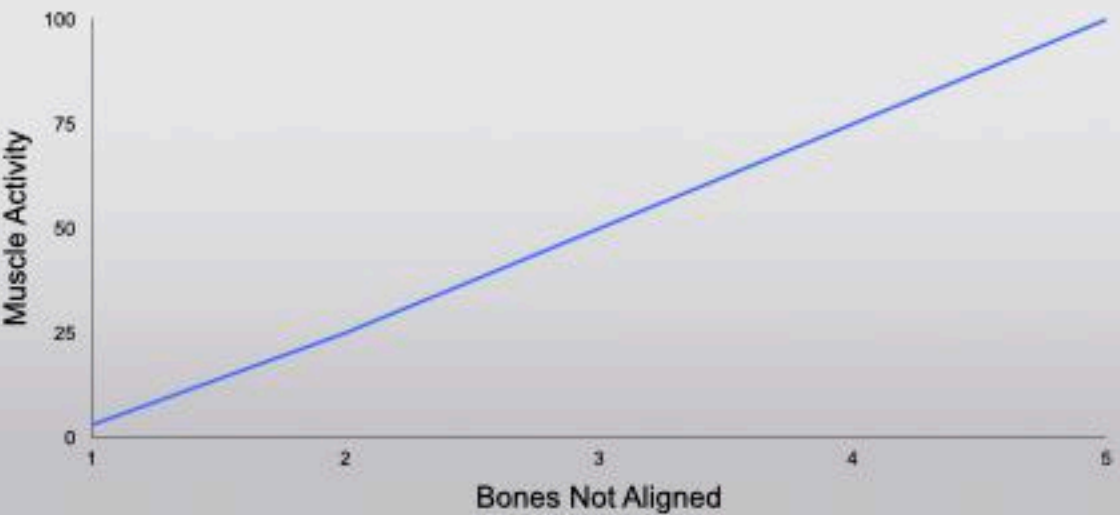
Acute vs Chronic



# Orthopedic Medicine- Optimal Load Bearing Position

Every joint has an optimal load bearing position-  
Most Bone Support/ Least Muscle Bracing when Loaded

Centric Relation- Optimal Load bearing position of the TMJ-  
Most Bone Support/ Least Muscle Bracing when Loaded



Which position can you hold the longest?



Nemeth G, On hip and lumbar biomechanics. A study of joint load and muscular activity, Scand J Rehabil Med Suppl. 1984;10:1-35.



# Occlusal Muscle Disharmony

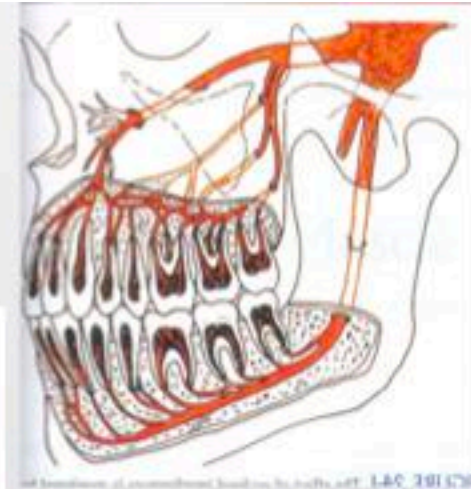
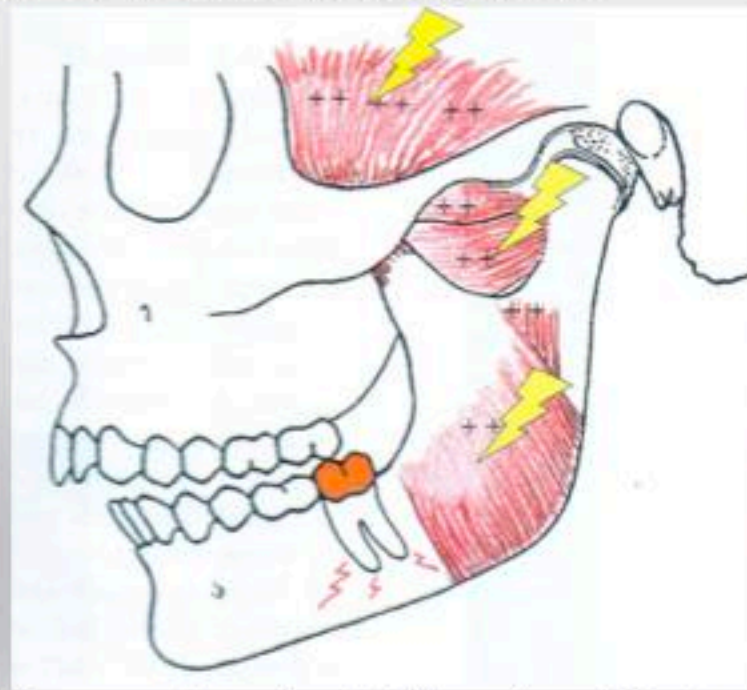
Uneven tooth contact with condyles fully seated triggers muscle activity

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

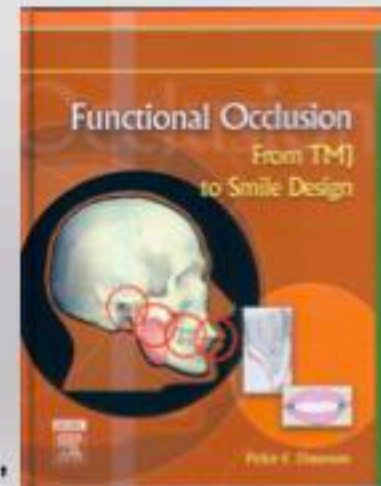
Disharmony in all muscles: Splinting/Bracing

Muscles sore from overuse

Muscles do not think- CNS input



from Dawson's Textbook, "Functional Occlusion"



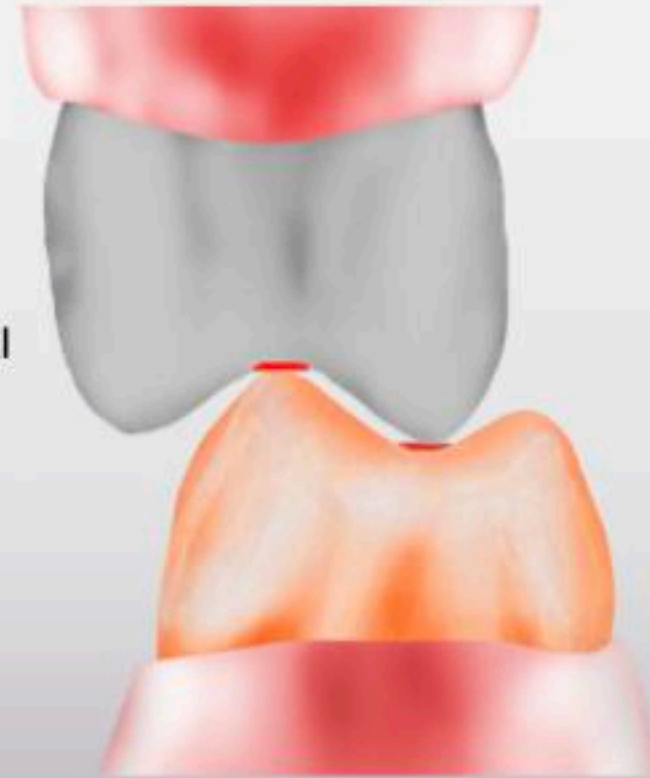
# LD Pankey's 3 Rules of Occlusion

(Clyde Schuyler)

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

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

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



Drawing by Dr Jim Kessler



# LD Pankey's 3 Rules of Occlusion Literature

(Clyde Schuyler)

Schuyler CH. J Florida Dent Soc, 1938.

Occlusal disharmony and its relation to oral discomfort.

Schuyler CH. J Am Dent Assoc. 1958 Aug;57(2):221-31.

Factors of occlusion to be observed in everyday practice.

Schuyler CH. J Pros Dent. 1963 Nov: 13(6): 1011-29.

The function and importance of incisal guidance in oral rehabilitation.

Kerstein, R. B., & Radke, J. (2012). Cranio 30(4), 243–254.

Masseter and temporalis excursive hyperactivity decreased by measured anterior guidance development.

Kerstein, R. B., & Radke, J. (2016). Cranio pp1–17.

Average chewing pattern improvements following Disclusion Time reduction.





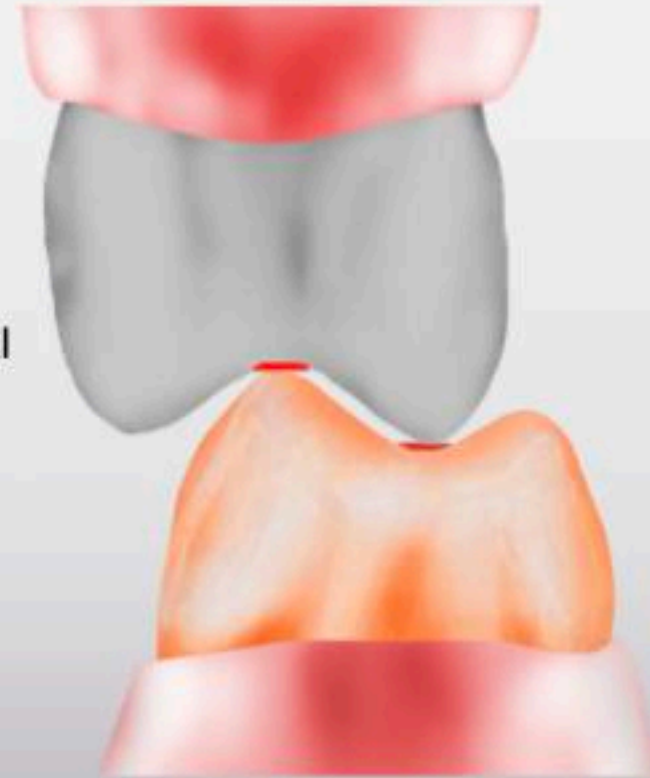
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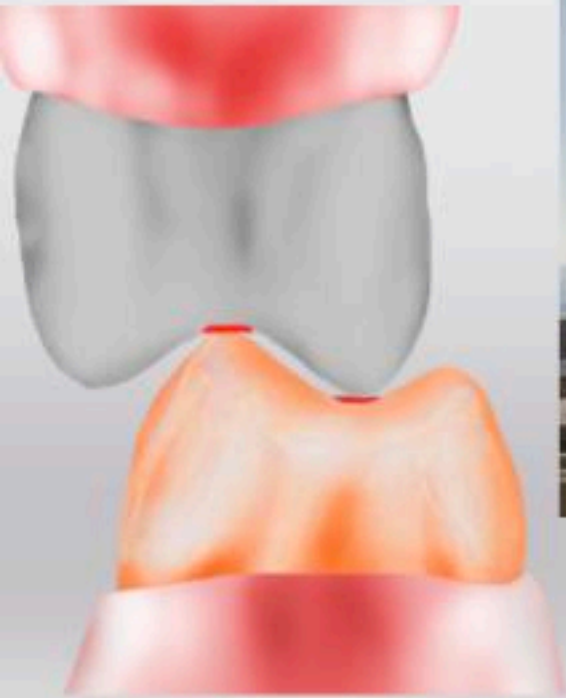
Bonus Observation- All the above work much better the closer the teeth are to being on the Curve of Spee and Curve of Wilson



Drawing by Dr Jim Kessler

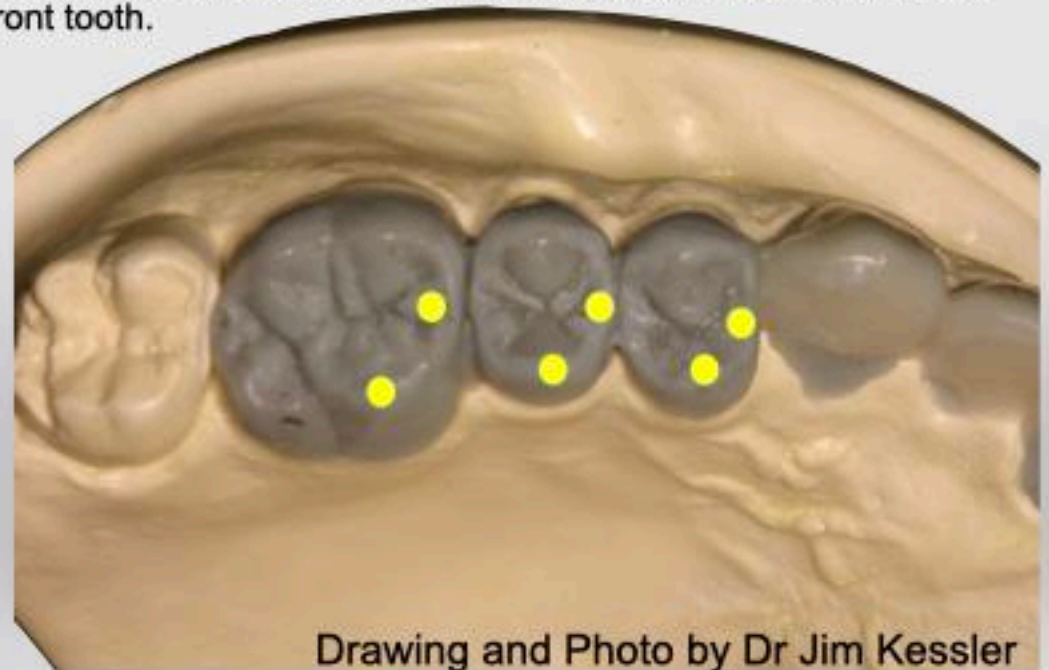
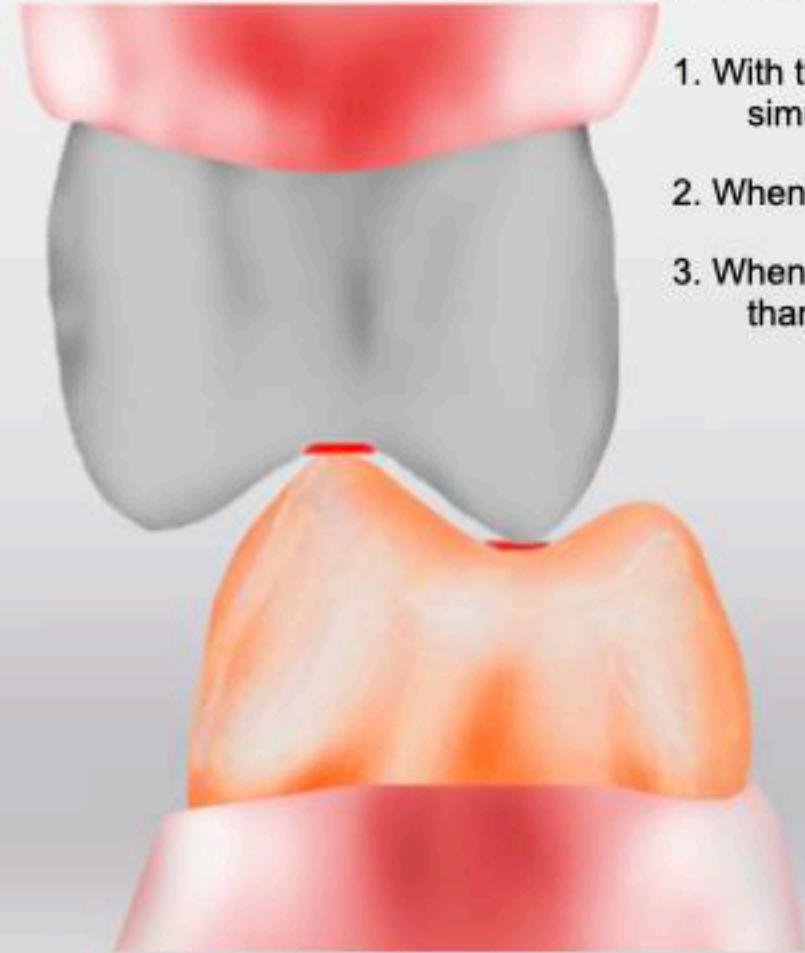
2. When you squeeze, neither a tooth nor the mandible moves (in a lateral direction).

## Rule #2 = Flat Landing Area



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

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

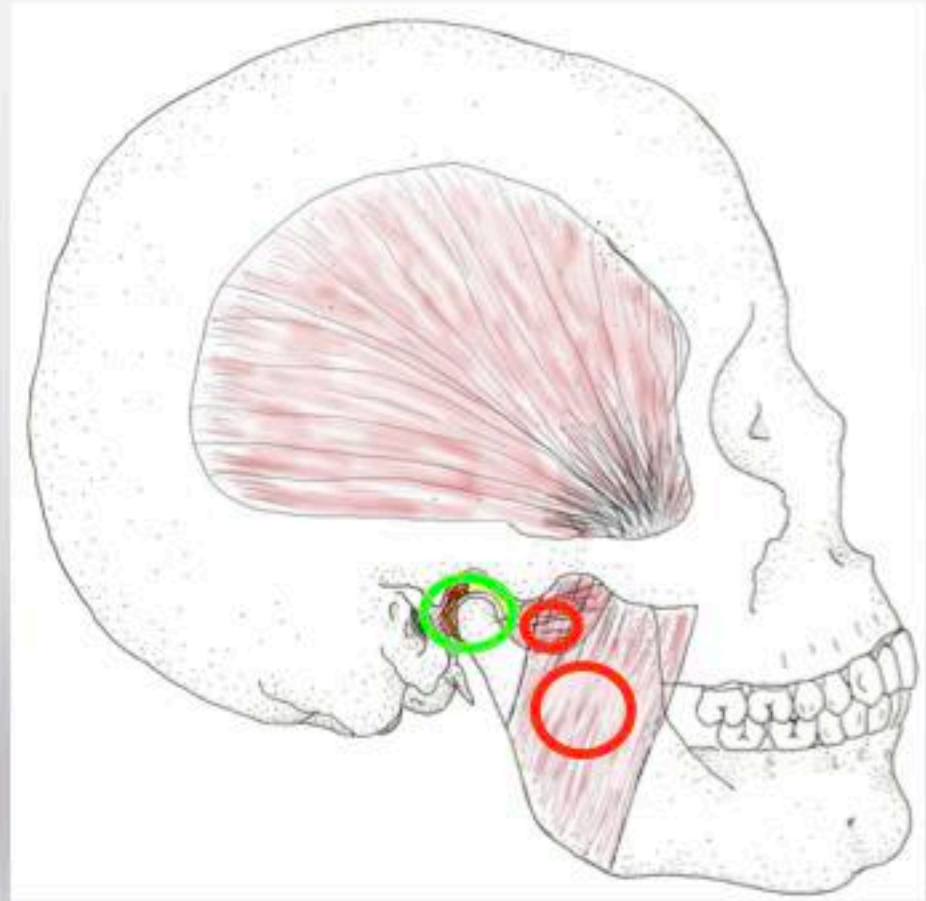
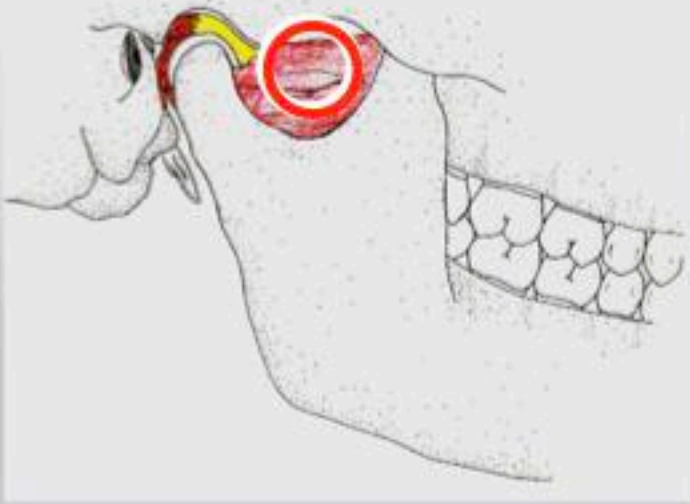


Drawing and Photo by Dr Jim Kessler



## 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

## Anterior Stop Orthotic In Office Diagnostic Test



Reline with Parkell Blu-Mousse Super Fast

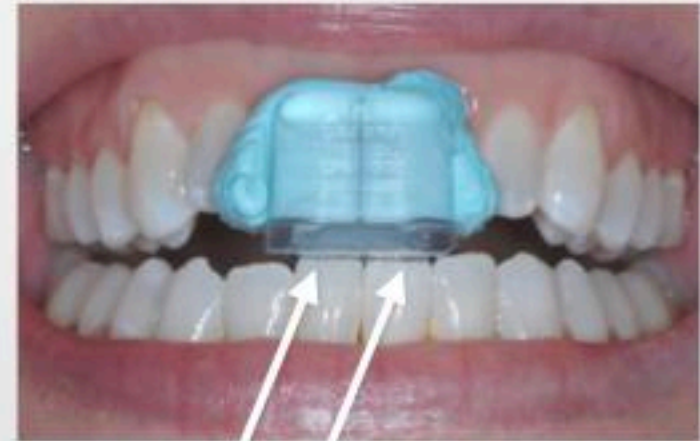


Can do 2nd reline over top of the first if needed

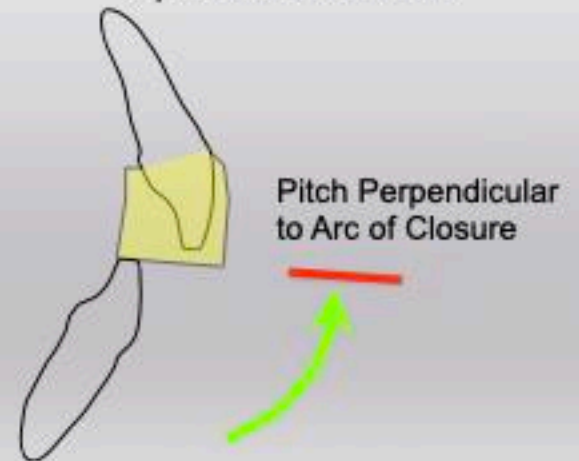


APS Anterior Stop 2.5mm

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



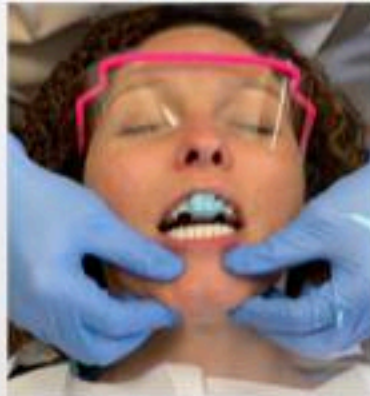
2 points of contact



## Anterior Stop Orthotic In Office Diagnostic Test



ArrowPath Sleep  
Anterior Stop



## Deprogram Muscle Engrams

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

With anterior stop in place:

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

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

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

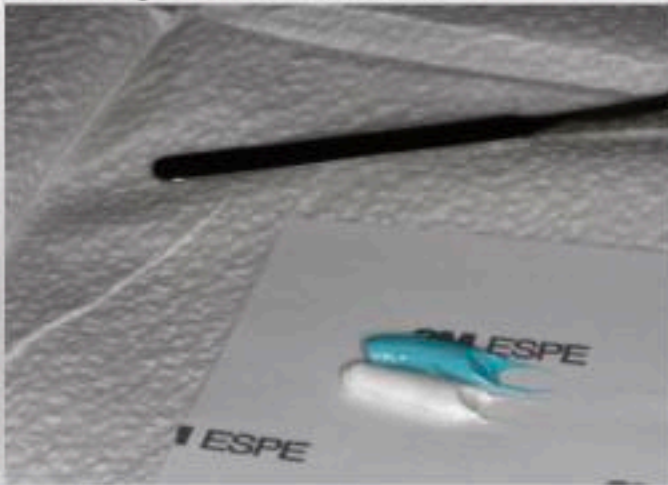
3rd round same as first except less taps each position

**Office USE ONLY** Do not send home with patient



## Anterior Stop Orthotic In Office Diagnostic Test

Can do 2nd mix to  
overlay 1st if needed



## Anterior Stop Orthotic In Office Diagnostic Test

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

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



ArrowPath Sleep  
Anterior stop 2.5 mm

>30% of headaches have an occlusal component

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

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

# Centric Relation Orthotic

Trial of Harmonious Occlusion 24/7

## LD Pankey Rules of Occlusion

Condyles fully seated

Dots in the Back

Lines in the Front

**OMD is a daytime problem. Wear 24/7.**

Patient gets to experience a full, solid, harmonious bite 24/7.

Doctor gains experience in setting up a harmonious bite in this particular patient

See patient at week # 1, 2, 4. Done in 3- 6 weeks.

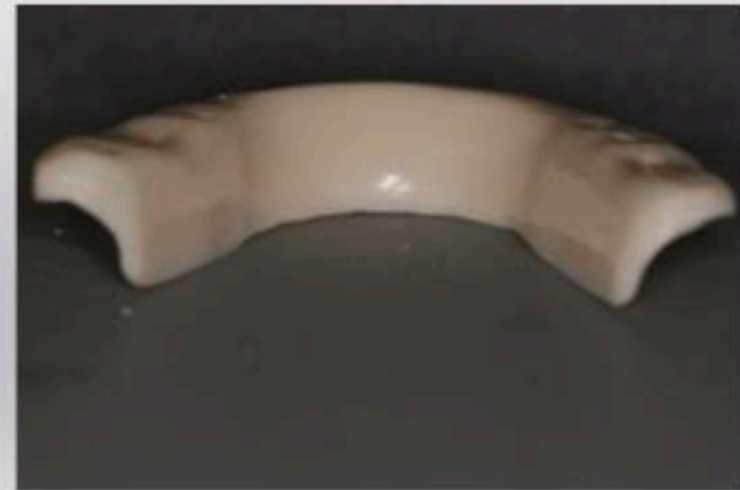


Must not rock or be squishy





Anatomic Orthotic by Dr. Buzz Raymond



Pankey Study Clubs  
Tanner Study Clubs



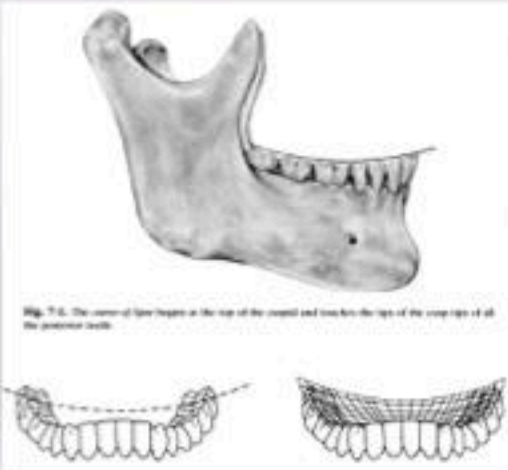
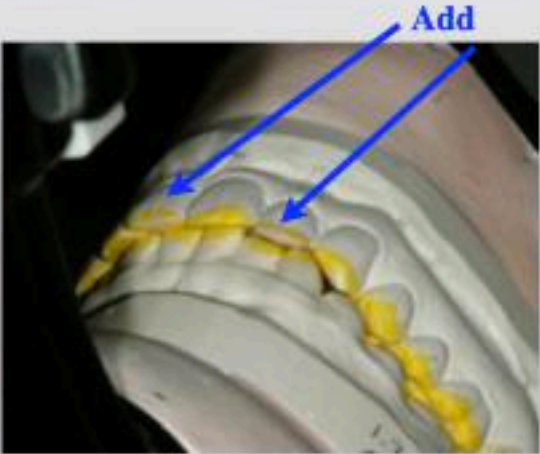
Lower Flat Plane  
Centric Relation  
Orthotic by  
Glenn Kidder



# Occlusal Adjusting is an Esthetic Procedure Form Follows Function



Before



After



# Occlusal Sculpting Tools, including Zirconia



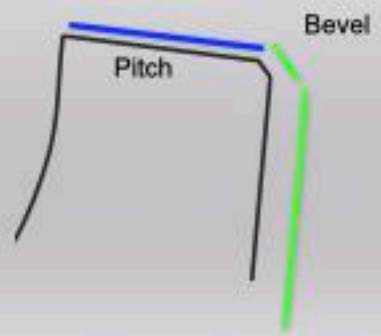
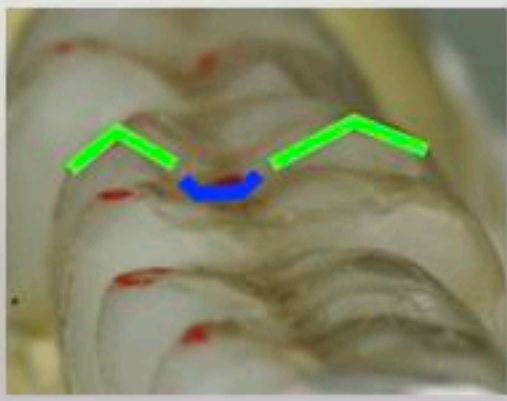
**Wheel**  
 Create Cusp Landing Zone  
 Flatten Incisal edges  
 Bulk reduction of inclines



Move and Shape Cusps,  
 Inclines, Facial Surfaces



Brassler Brio Shine  
 FLBCER-1  
 FLBF-2



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

Start Age 50



Lingual Light Wire w/ Sectional Ortho

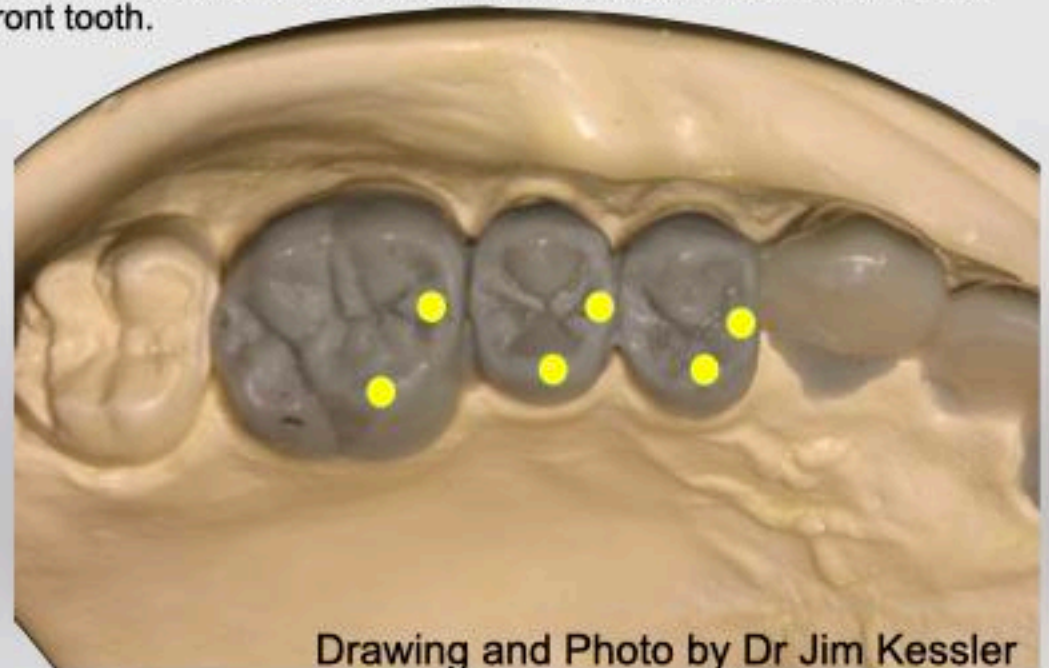
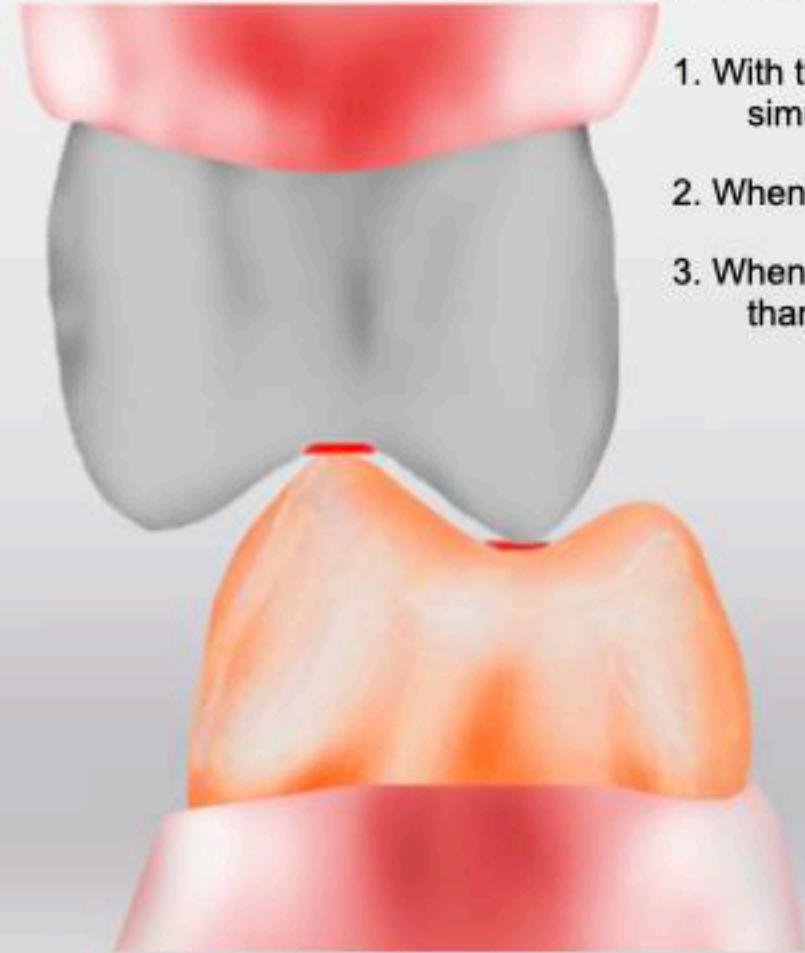


Post Occlusal Reshaping



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

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



Drawing and Photo by Dr Jim Kessler



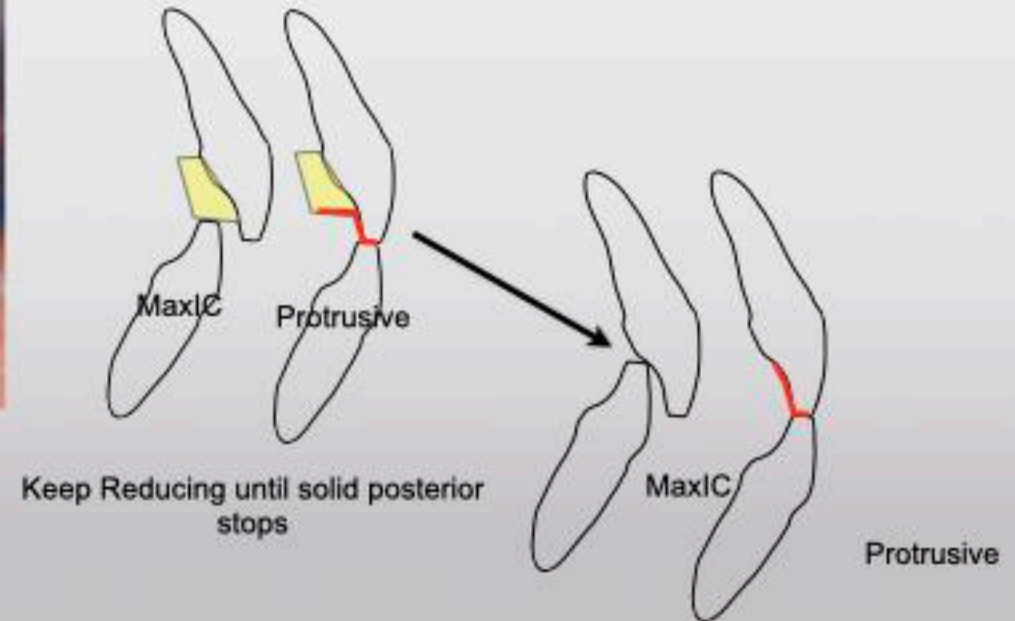
## Occlusal Adjustment Treatment Assist Orthotic Deprograms throughout the occlusal adjustment



Triad Light Shade  
Remove and refine  
Solid flat anterior stop  
Glue in with Triad clear gel  
Adjust in with teeth  
Remove once solid posterior stops



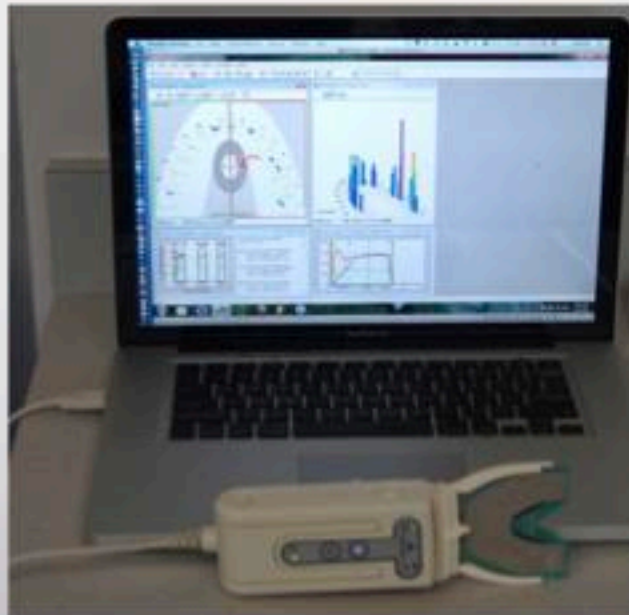
Learning the skill of occlusal adjusting to treat occlusal pathology is the doorway into a world of dentistry most do not even imagine. Creating a more harmonious occlusion is a wonderful service to provide for your patients.



More Harmonious Occlusion  $\neq$  Perfect

# T-Scan Computerized Occlusion

Measures Timing: Disclusion Time



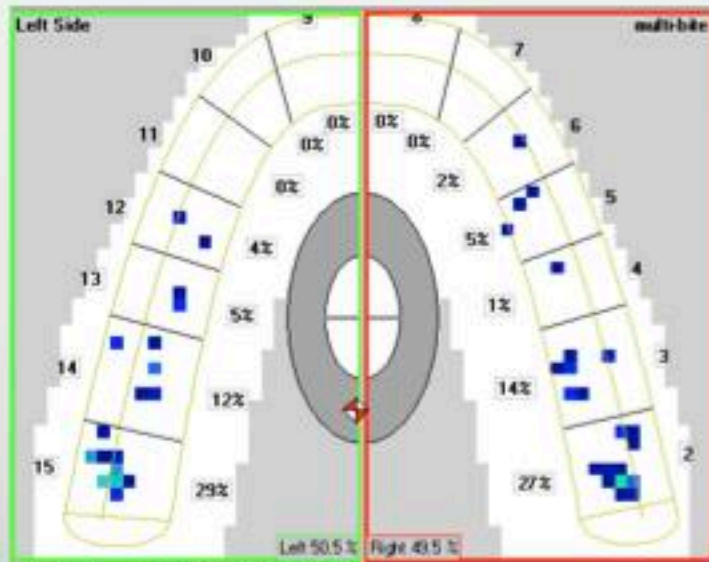
Articulating Paper leaves evidence after the events  
Not Live  
All events lumped together

Using Since 1999

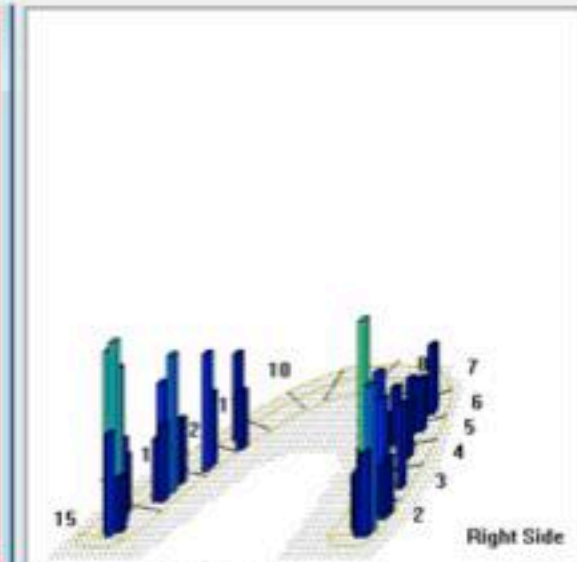


## Time Force Graphic Representation of the Occlusion

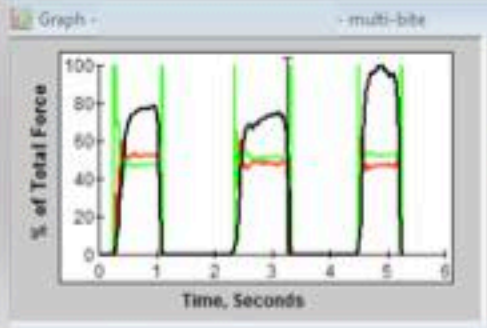
T-Scan Gives you:  
 Timing  
 Intensity  
 Location  
 Distribution



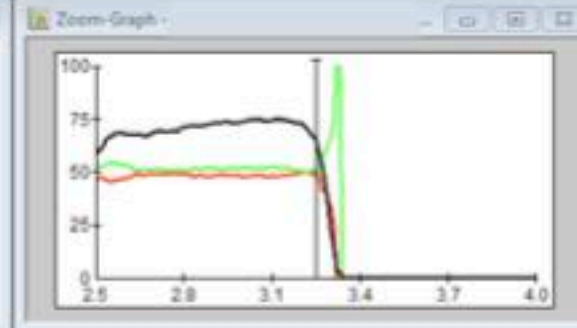
3.249 sec | Force: 64.8 % of MMF | Left 50.5 % | Right 49.5 %



3.249 sec | Force: 64.8 % of MMF



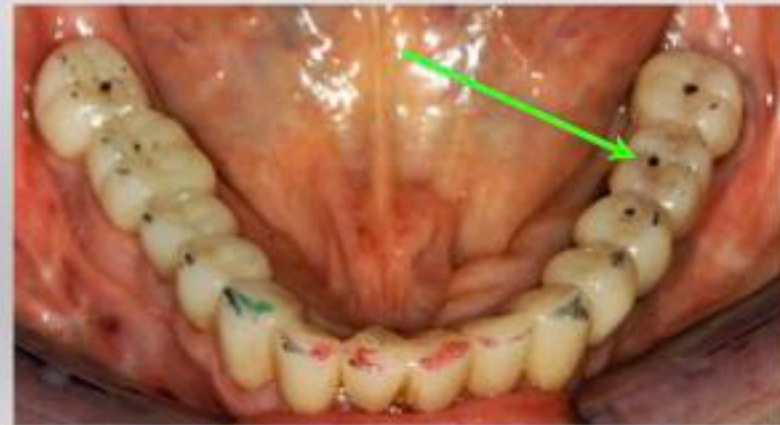
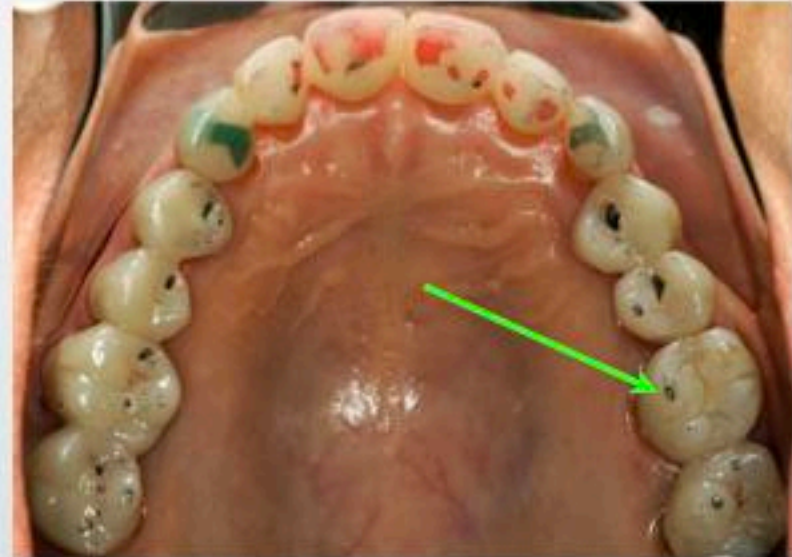
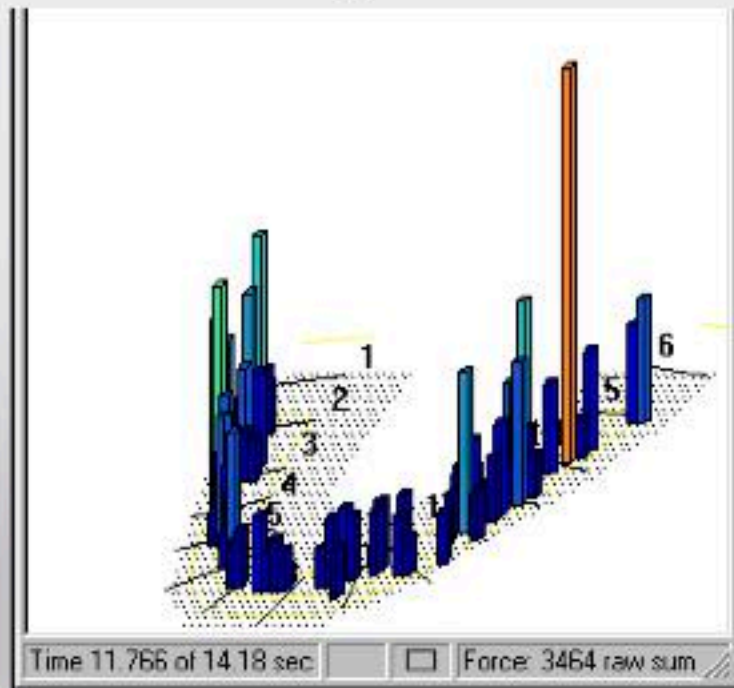
% of Max Move Force (MMF)  
 F = 64.8 %  
 3.249 sec (Time)  
 Left = 50.5 %  
 Right = 49.5 %



“Occlusion in Slow Motion”  
 Regular 10 msec intervals  
 Turbo 2.5 msec

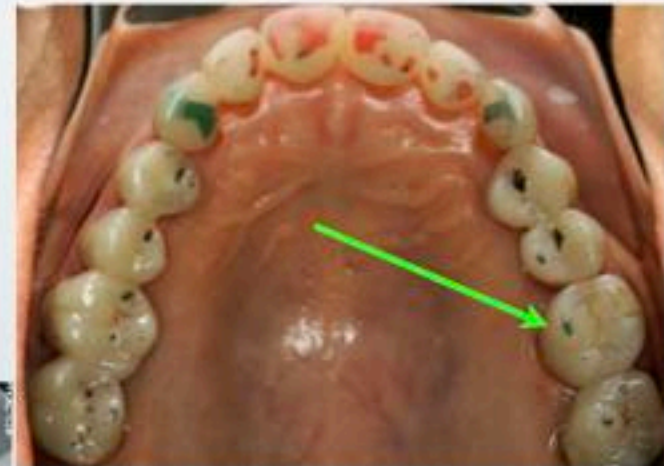
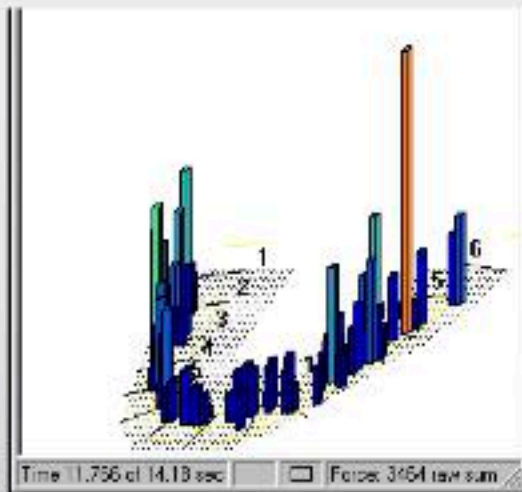


Which dot on temps is heavy?



# Implant Occlusion

Implants not moving in occlusion is incorrect

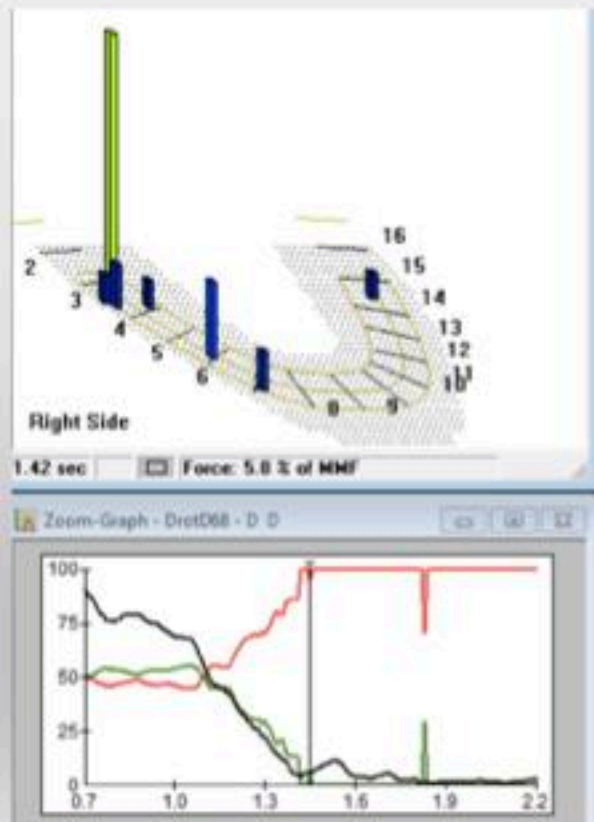


Implants and teeth will both compress bone.

Implants need to come into contact after the PDL compression phase and then they will behave the same as teeth in the bone compression phase.

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.

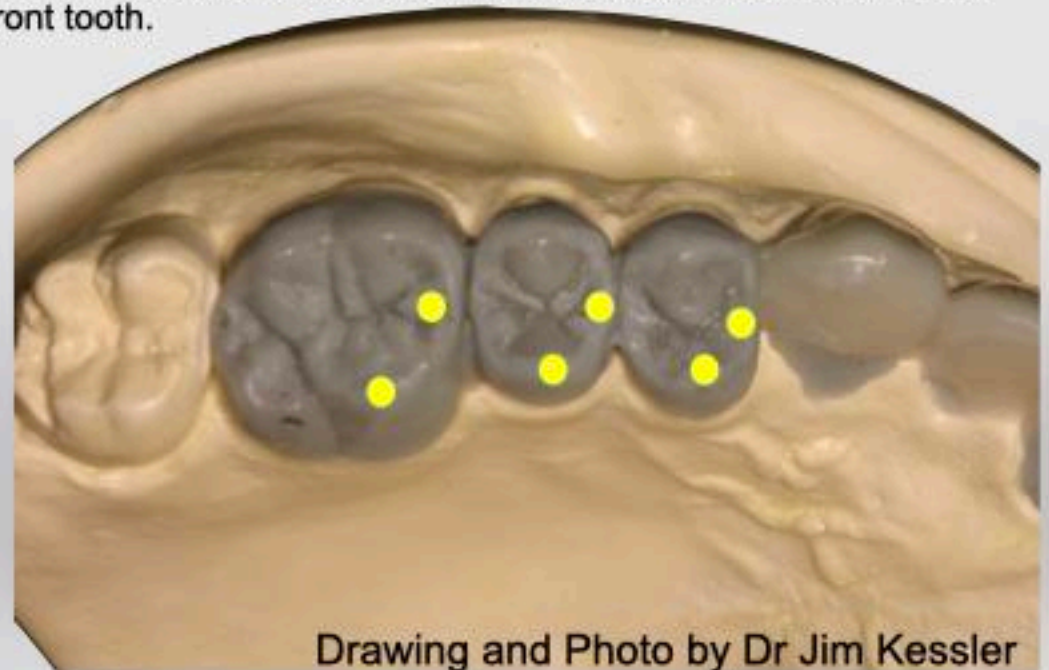


## LD Pankey's 3 Rules of Occlusion (Clyde Schuyler)



**Most Crowns are not made like this**

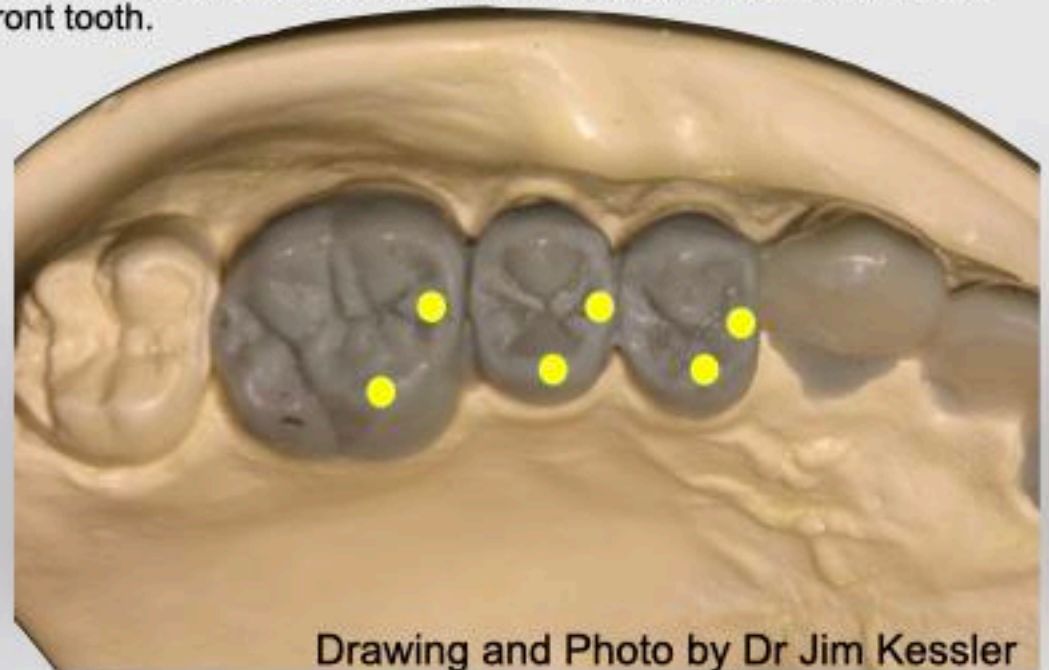
1. With the condyles fully seated in the fossa, all the posterior teeth touch simultaneously and even, with the anterior teeth lightly touching.
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**Most Crowns are either like this**

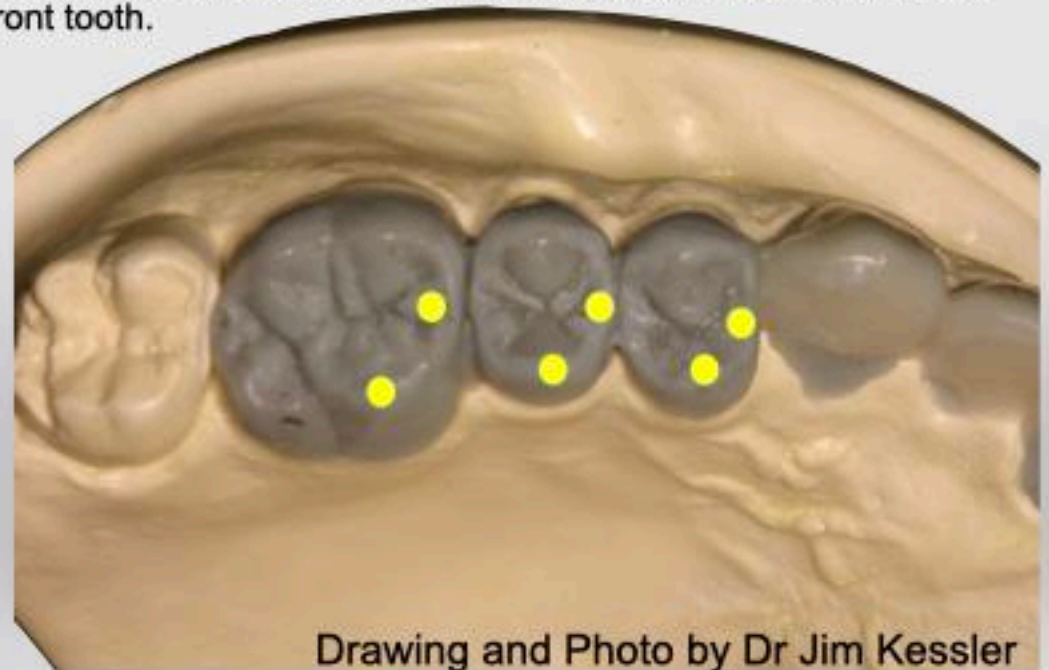


Drawing and Photo by Dr Jim Kessler

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

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or this

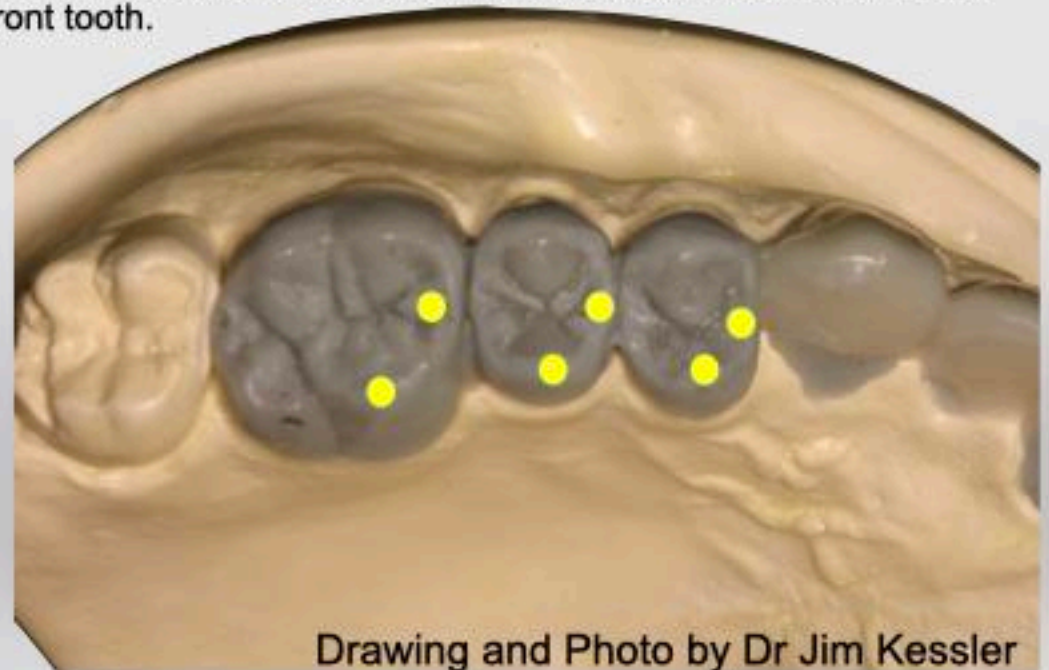
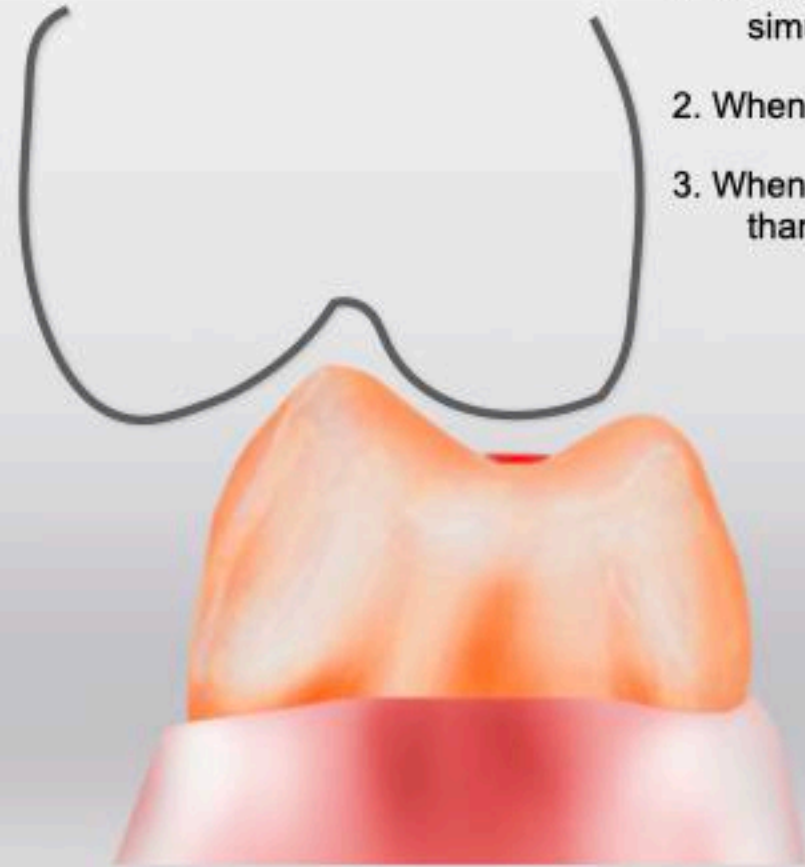


Drawing and Photo by Dr Jim Kessler



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Drawing and Photo by Dr Jim Kessler



[www.Despair.com](http://www.Despair.com)

# MEDIOCRITY

IT TAKES A LOT LESS TIME  
AND MOST PEOPLE WON'T NOTICE THE DIFFERENCE  
UNTIL IT'S TOO LATE.



Dr. Glenn Kidder 2015

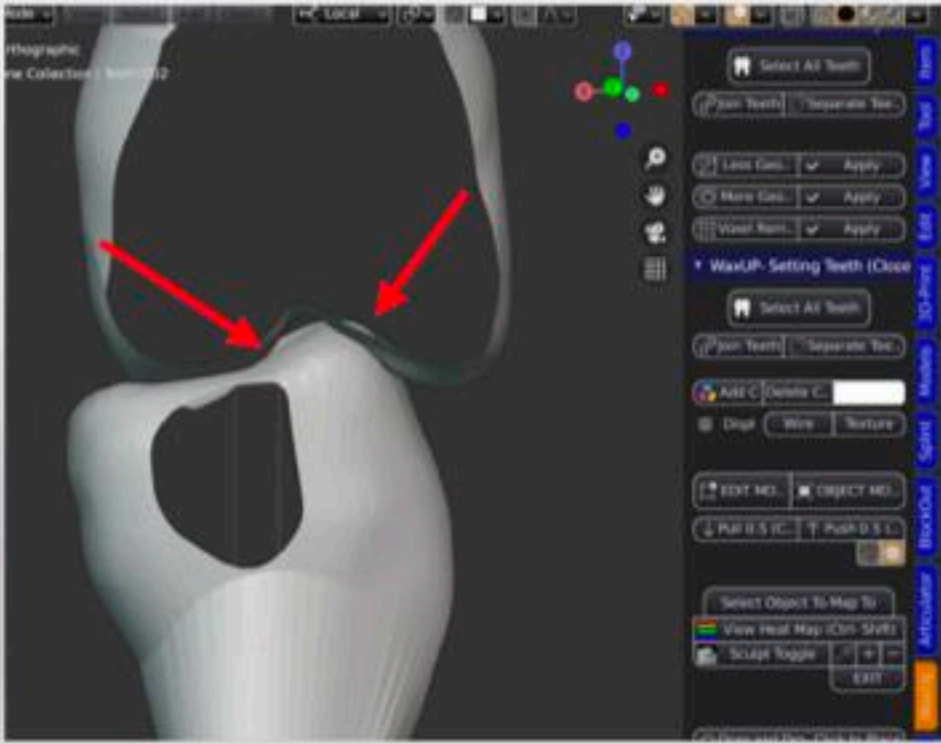
90 Consecutive New Patients

84 / 100 crowns done in past year  
were out of occlusion, did not hold  
12 $\mu$  shim stock



3D Design places contacts on inclines

Then moves it out of occlusion  
There is a setting for how far out of occlusion



Diagnostic Design with flowable composite on 3D printed models





Which tooth is a crown?



## Which tooth is a crown?

Challenge yourself to create perfect form and function on a single tooth.  
Occlusal contact holds 12 $\mu$ m Almore shimstock.



## 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



**Occlusal Muscle Dysfunction**





## Facial Pain: Not always OMD

CC: Sharp Shooting Nerve Pain Right Face

Dx: Class 2 Malocclusion

Tx: Orthognathic Surgery. Still Facial Pain.

Dx: OMD

Tx: Multiple Occlusal Adjustment over a year  
Still Pain

Dx: CT scan reveals Parotid Cancer, Stage 4.



## 7 Rules for Dx Facial Pain:

1. Listen to the patient, oral and written
2. Patients can have more than one disease
3. Develop a Differential Diagnosis
4. Run tests that increase or decrease the pain
5. Develop a Working Diagnosis
6. Diagnosis Confirmed after Tx
7. Do not chase a diagnosis too long before you rule out cancer.



Rule cancer out early, rule it out often.

# 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  
Etiology, TMJ

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

## 4. Cervical Damage

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

## 5. Parafunction

Without ruling out occlusal problems and parafunction it is hard to figure out the rest.

Muscle Bracing Pain Avoidance  
Muscle Bracing TMJ stabilization  
Muscle Bracing Airway Patency (with Tongue)  
Muscle Contracture Fibrosis Lateral Pterygoid  
Muscle Contracture Fibrosis Masseter, Medial Pterygoid, Temporalis  
Muscle Fatigue Overuse  
Muscle Hypertrophy TMJ Muscles

## 3. Cranial Alignment/Occlusion

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

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

## 6. Whole Body / Systemic

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

## 7. Other

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

Case CC



## 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**

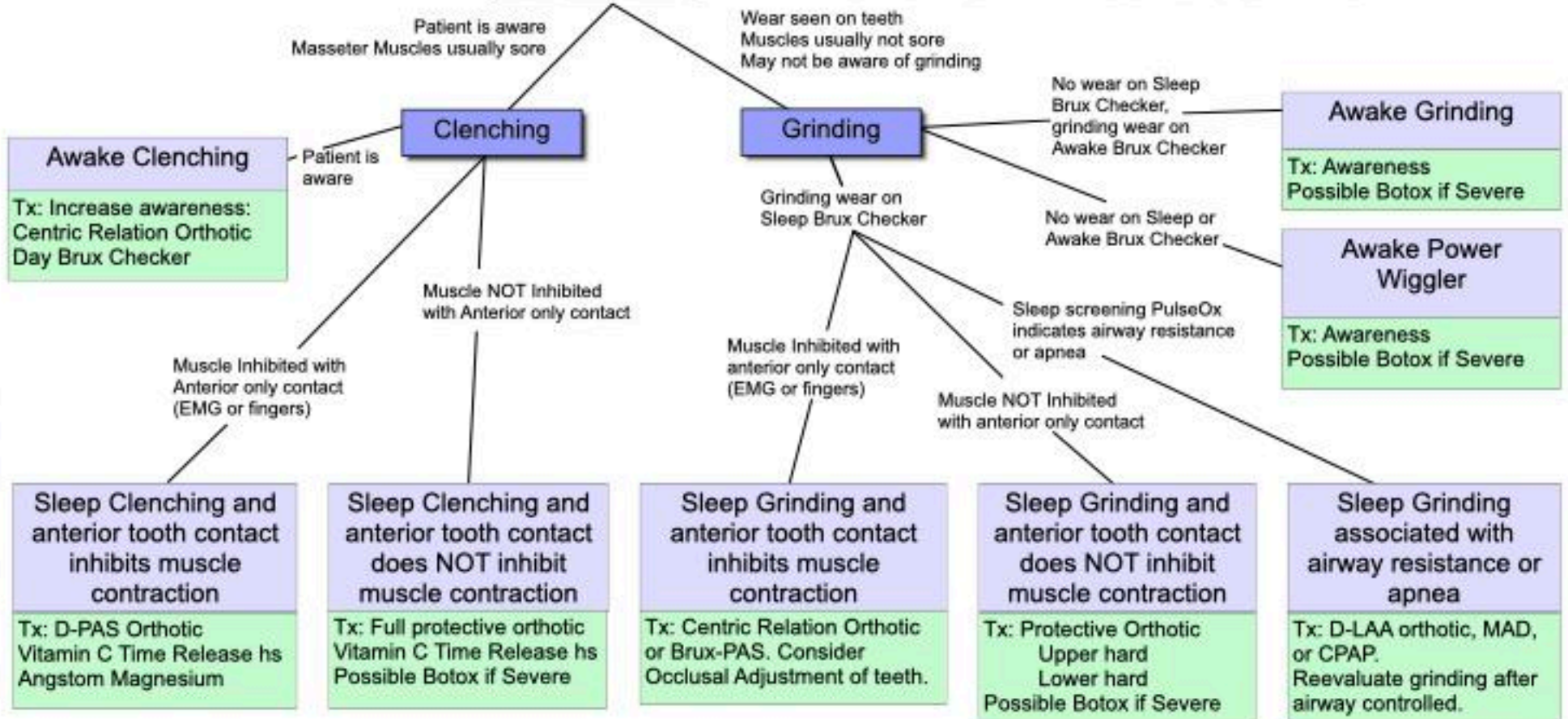
Diseases to consider and rule out:

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





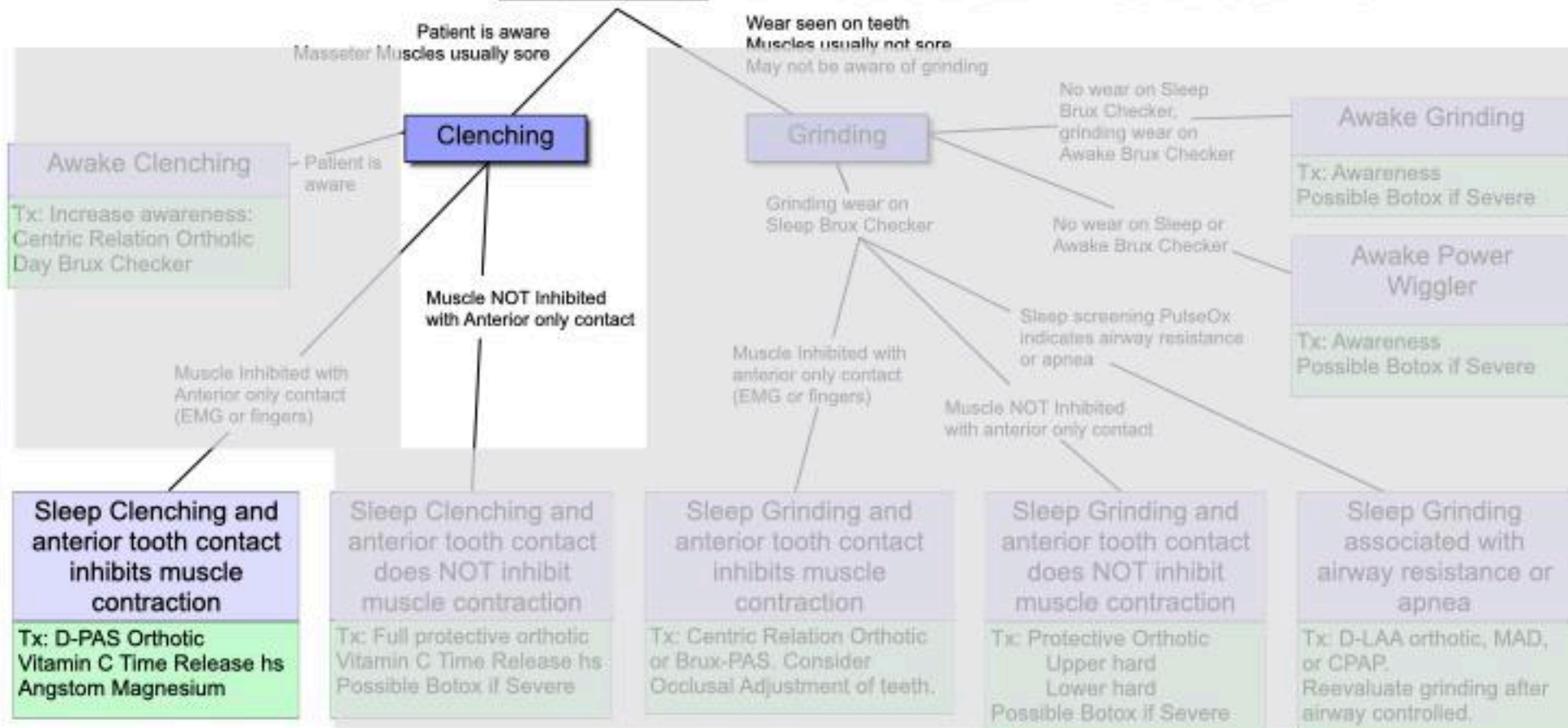
# BRUXING: PARAFUNCTIONAL TOOTH CONTACT







# 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



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

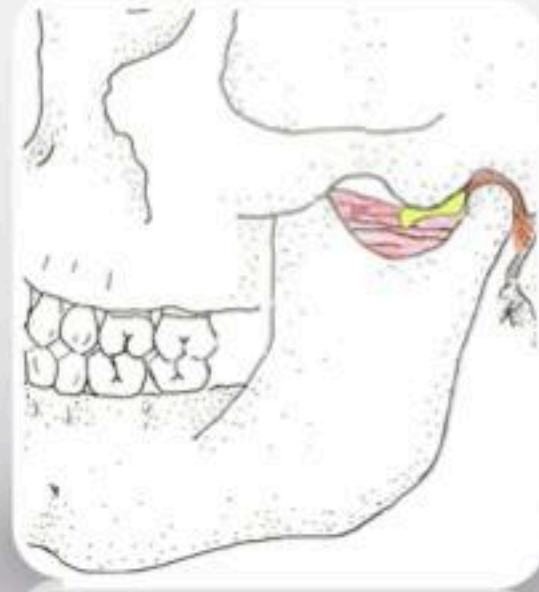
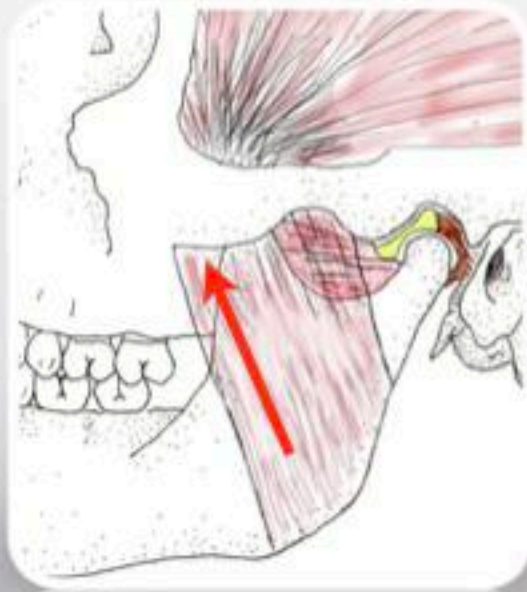
If patient is unaware of clenching-  
Plant seed at hygiene visit  
Do you clench?

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

Parker Mahan-  
"Women Hurt, Men destroy"

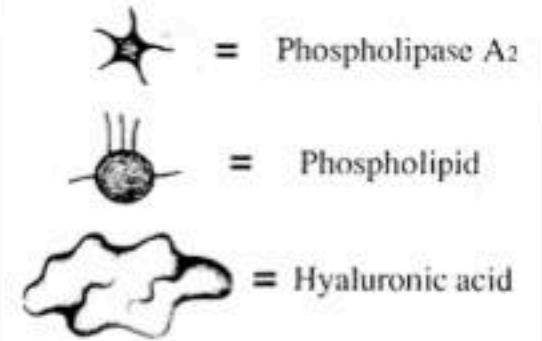
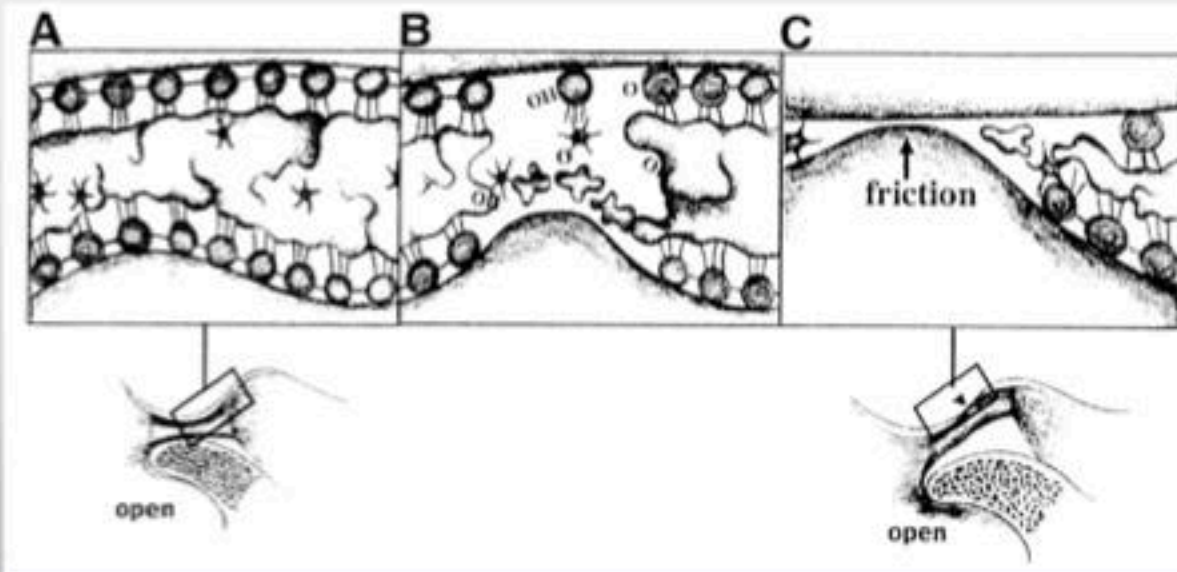
# Clenching can cause disc subluxation

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



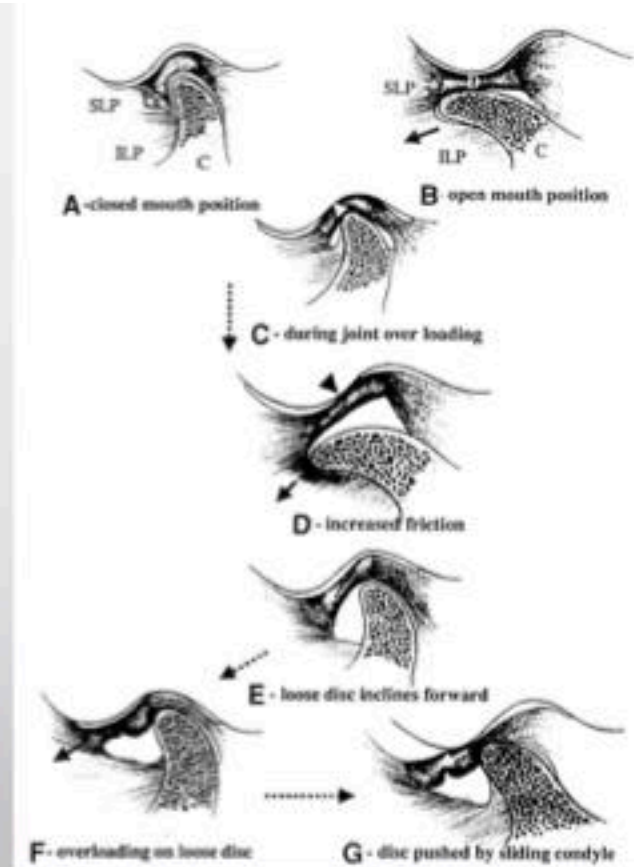
Sticky Disc sticks as mandible moves

Ligaments loosen

Disc Distorts

Eventually ADD

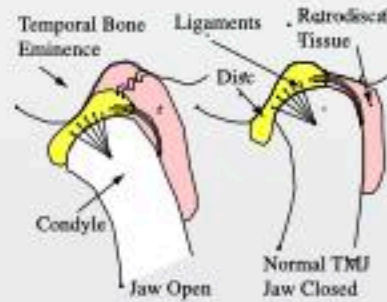
Dr. Dorit Nitzan



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

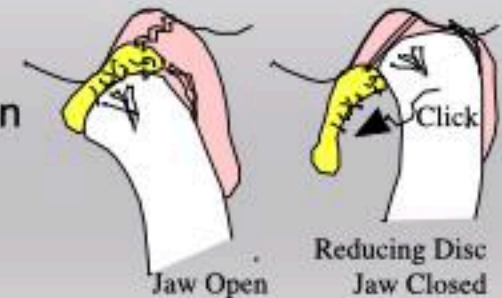
Normal



“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.



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.

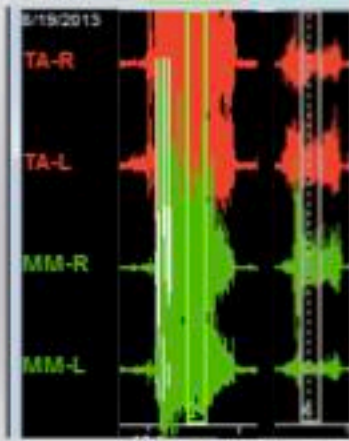


Diagnostic Palatal Anterior Stop Orthotic



**Patient with muscles inhibited by anterior only contact**

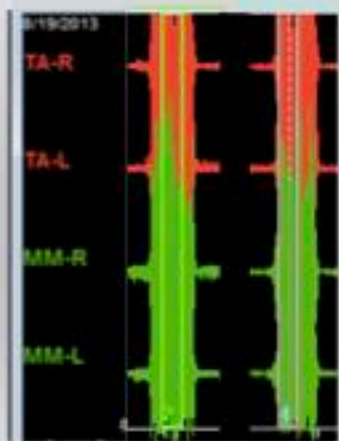
	Clench MaxIC	Anterior Stop D-PAS
	$\mu V$	$\mu V$
TA-R	100.6	15.7
TA-L	108.9	25.3
MM-R	115.4	25.5
MM-L	70.5	6.8



Major decrease in muscle power with D-PAS

**Another Patient with muscles NOT inhibited by anterior only contact**

	Clench MaxIC	Anterior Stop D-PAS
	$\mu V$	$\mu V$
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

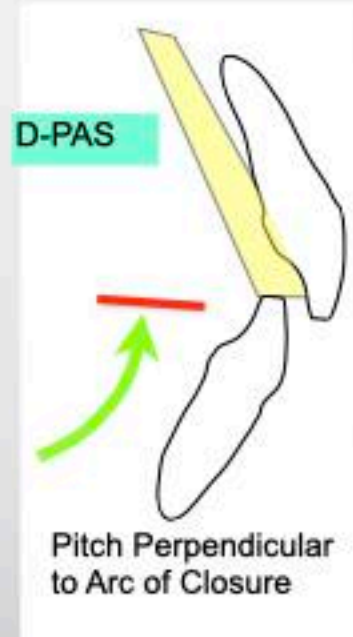
Sleep Clenching: Wear D-PAS as night guard  
Occlusal Muscle Disharmony: Occlusal Adjust

## 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

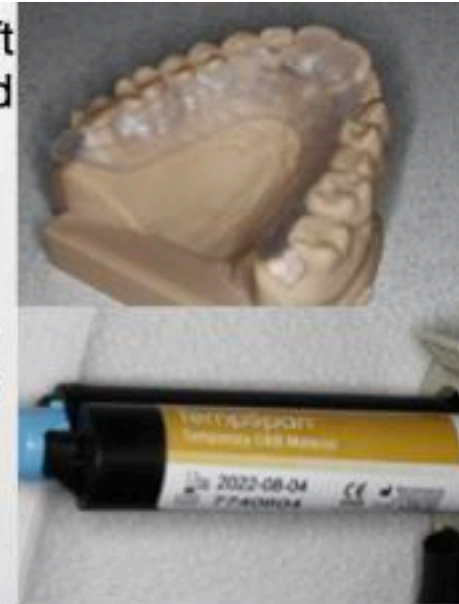


# Reline D-PAS



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.

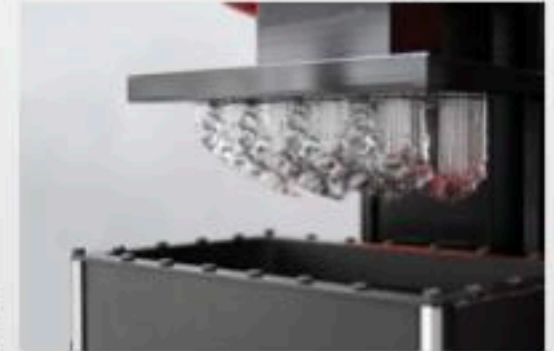
# How to create a D-PAS

Make your own

DuraSplint- Great Lakes Ortho  
Methyl Methacrylate Acrylic



Digitally Printed D-PAS  
[www.APSleep.com](http://www.APSleep.com)



**APS**  
ArrowPath Sleep

[www.APSleep.com](http://www.APSleep.com)  
Seminar Download

DPAS Construction





# 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

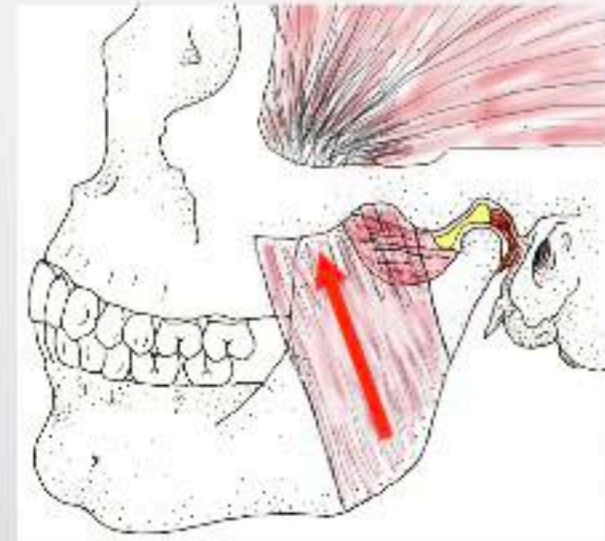
If antioxidants (Vitamin A, C, E) around:

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](http://www.naturalvitality.com)



[www.meminerals.com](http://www.meminerals.com)

Muscle Nerve. 2014 Apr 8. doi: 10.1002/mus.24260. Extracellular magnesium and calcium reduce myotonia in isolated CIC-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

Sleep Clenching  
with anterior tooth contact inhibition

## Pattern

Sore masseters on waking  
Morning TMJ clicking that resolves  
Sleep D-PAS Relieves Symptoms

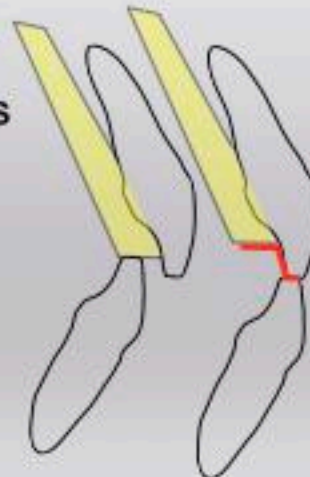
## Management Treatment

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

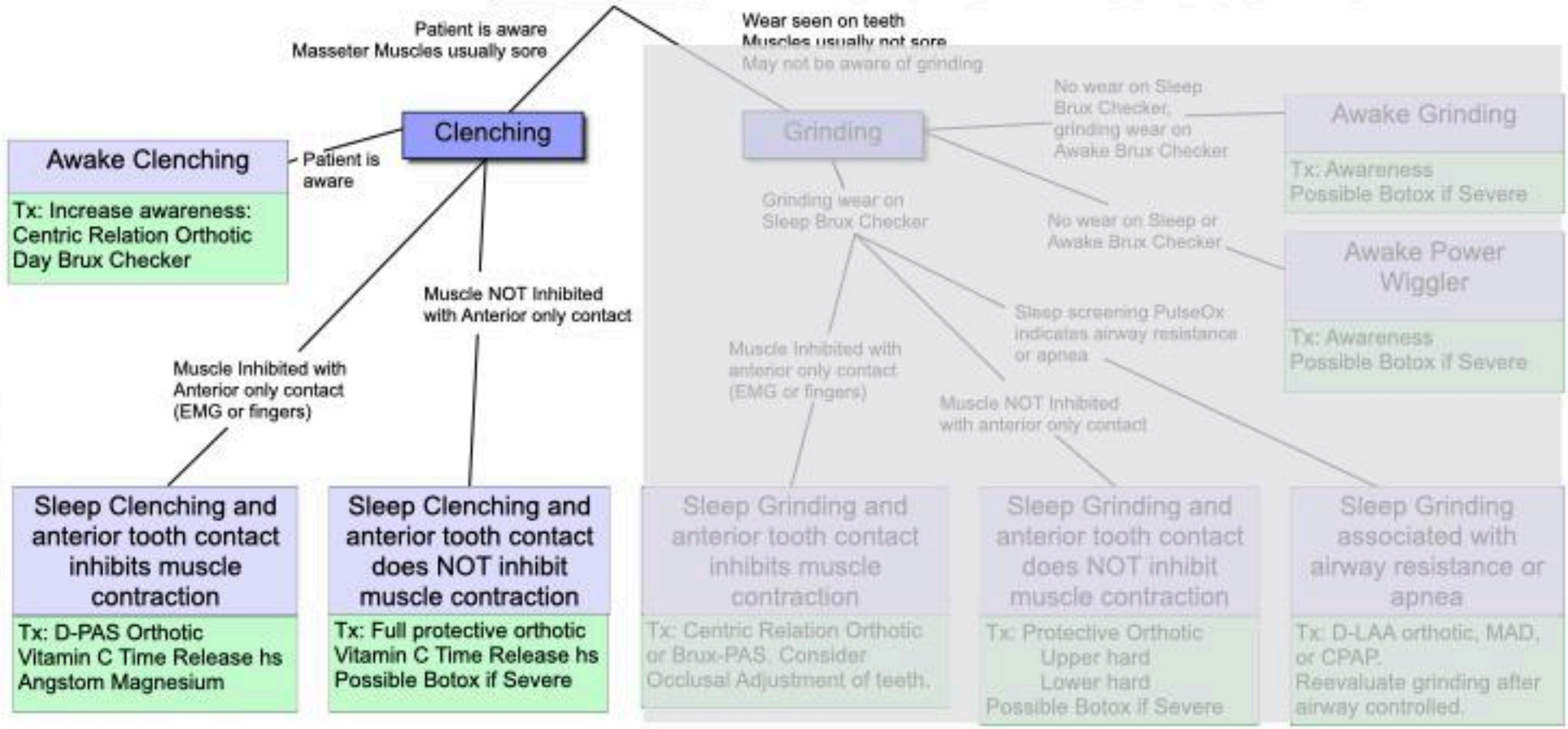
If sleep D-PAS eliminates  
sore masseters, this  
becomes their sleep orthotic.



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



**Awake Clenching**  
 Tx: Increase awareness:  
 Centric Relation Orthotic  
 Day Brux Checker

**Clenching**

**Grinding**

**Sleep Clenching and anterior tooth contact inhibits muscle contraction**  
 Tx: D-PAS Orthotic  
 Vitamin C Time Release hs  
 Angstrom 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.

**Awake Grinding**  
 Tx: Awareness  
 Possible Botox if Severe

**Awake Power Wiggler**  
 Tx: Awareness  
 Possible Botox if Severe



## Daytime Clenching- Clear Brux Checker Increase awareness to break habit

Very thin: Similar to mylar used for composites  
50  $\mu$ m thick

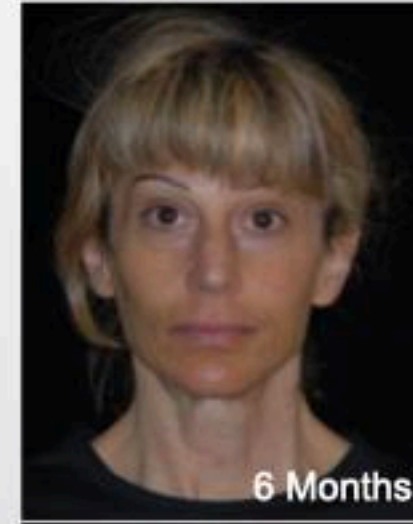
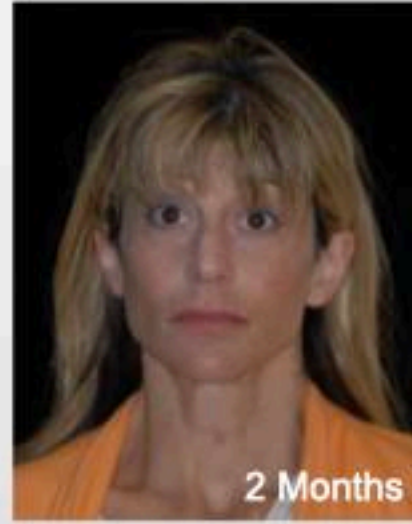
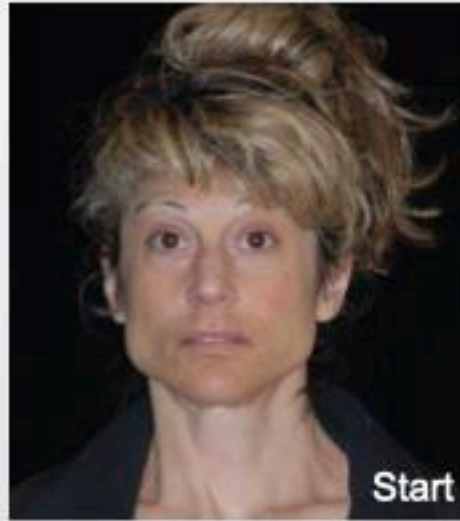


Great Lakes Orthodontics  
Biostar Platzhalterfolie  
Item Ref 3202.1

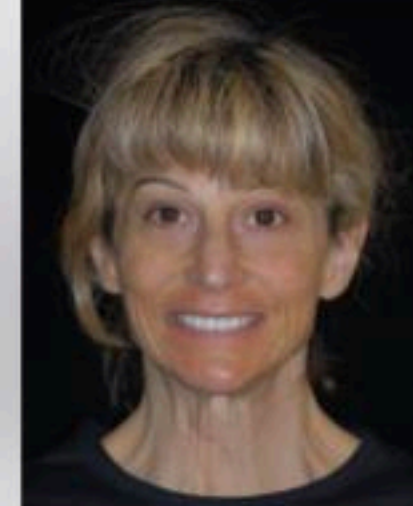


# Clenching with no Muscle Inhibition

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





# TMD Symptoms

## Anterior Open Bite

Diseases to consider and rule out:

### Developed Post-Puberty

TMJ has changed

TMJ Bone Loss (See bone loss choices)

Recent Large Disc Displacement

Condylar Fracture

Teeth have moved

Tongue- used as occlusal cushion

Tongue used to stabilize neck or TMJ

Iatrogenic- Orthotics, Retainers



# Childhood Anterior Open Bite Differential Diagnosis

## **Developed Pre-Puberty**

Genetic

Damage to TMJ growth center

Habit- Thumb, Finger, Pacifier, Tongue

Airway/ Mouth breather



Note Dysfunctional Swallow is a symptom, not cause

# Adult Onset Anterior Open Bite Differential Diagnosis

## Developed Post-Puberty



TMJ has changed

TMJ Bone Loss (See bone loss choices)

Recent Large Disc Displacement

Condylar Fracture

Teeth have moved

Tongue- used as occlusal cushion

Tongue used to stabilize neck or TMJ

Iatrogenic- Orthotics, Retainers

Both have loss of anterior coupling



Condyles Seating  
from a Postured Forward Position



Maximal Intercuspation



NOT an Anterior open bite

Can still return to  
postured forward  
position and get  
anterior tooth contact

3mm Centric Relation to  
Maximal Intercuspation slide

Centric Relation



# Adult Onset Anterior Open Bite Differential Diagnosis

Three different patients  
Three different etiologies

Iatrogenic



TMJ Bone loss



Tongue moved teeth



Diff Dx Tongue Bracing:  
Stabilize Neck  
Stabilize TMJ Subluxation  
Used as Occlusal Orthotic

Iatrogenic Orthotic

Age 23

Age 29





# Iatrogenic Orthotic



Appliance view from below

Iatrogenic Anterior open bite



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

## 1. TMJ Damage

Hypoxia Induced  
Progressive Condylar Resorption

Impingement Retrodiscal Tissue

## 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 Mes/C discrepancy  
Malocclusion Deep Bite  
Malocclusion due to mouth breathing  
Malocclusion due to TMJ bone loss  
Malocclusion due to tongue, lip or finger habits  
Malocclusion Insufficient anterior occlusal guidance  
Malocclusion lack of posterior occlusal support  
Malocclusion Posterior Openbite Bilateral  
Malocclusion Posterior Openbite Unilateral  
Malocclusion unspecified

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

## 4. Cervical Damage

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

## Parafunction

Excessive Tooth Wear, Damage  
Hypererulsive Occlusion  
Parafunction dechirnd wiggle  
Parafunction Clenching Teeth, Awake  
Parafunction Clenching Teeth, Sleep  
Parafunction Grinding Teeth, Awake  
Parafunction Grinding Teeth, Sleep  
Parafunction Tongue Bracing avoiding uncomfortable tooth contact  
Parafunction Tongue Bracing Neck stabilization  
Parafunction Tongue Bracing to maintain Airway  
Parafunction 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

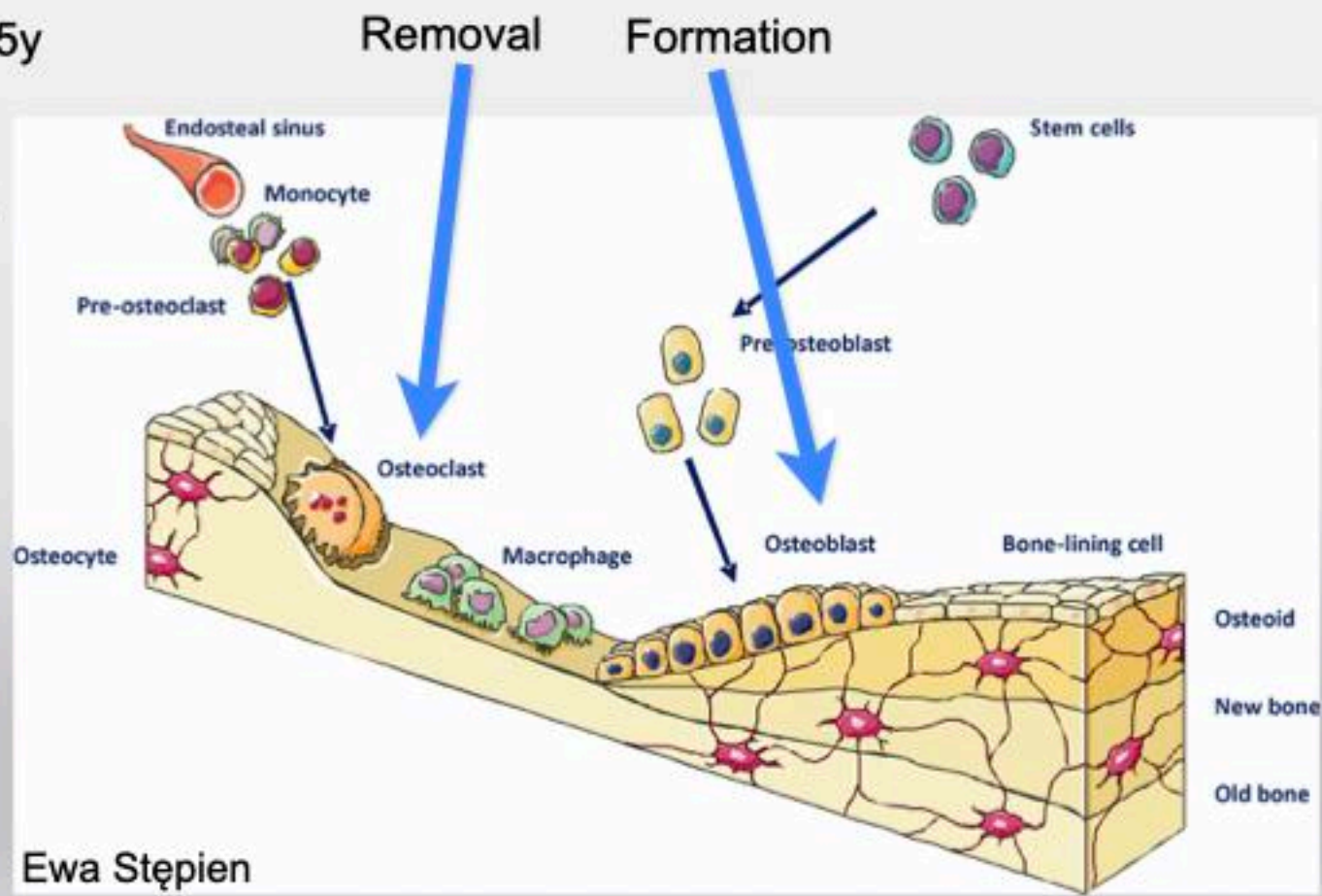
Nerve Entrapment Masseteric Nerve due to Masseteric hypertonicity  
Neuroma Trigeminal Nerve  
Obsessive-Compulsive Personality Disorder  
Other  
Otitis Ear Infection  
Pain disorder exclusively related to psychological factors, Somatoform pain disorder  
Pain disorder with related psychological factors  
Sarcoidosis

# Bone is not a static tissue

Constant turnover- 6 months to 1.5y

There is a delicate balance of cell activation/deactivation between the osteoclast and osteoblast.

- Osteoclasts  
Resorption- Bone removal
- Osteoblasts  
Bone Formation





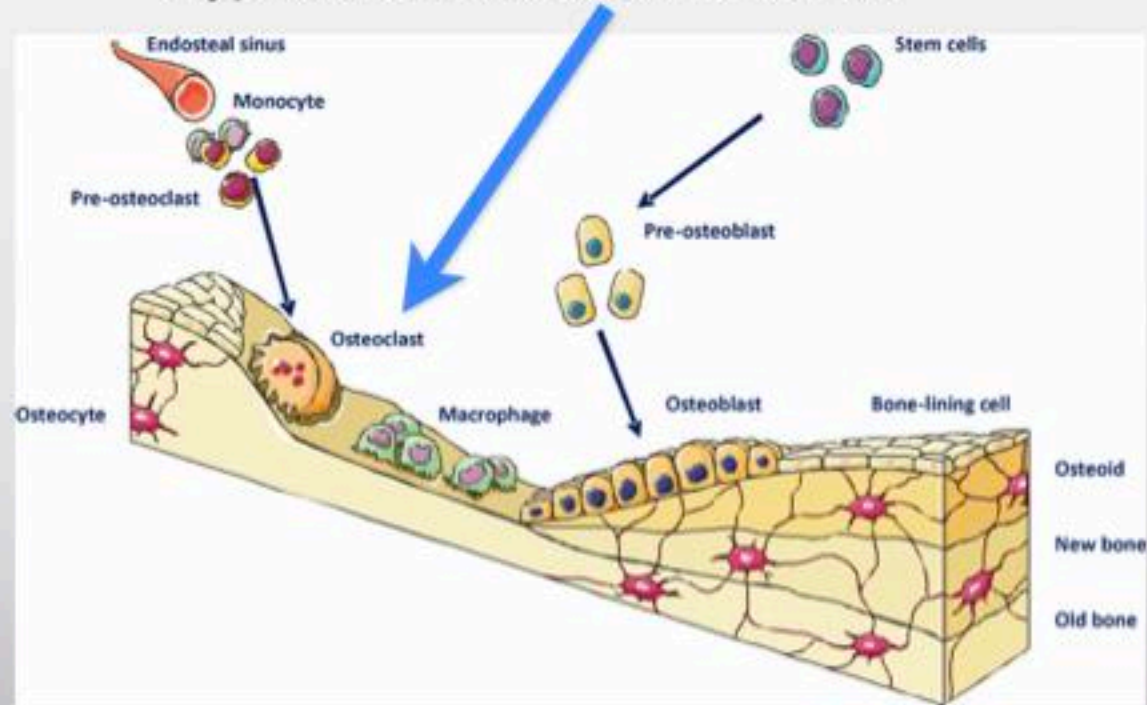
## Low Oxygen: Hypoxia

Hypoxia induces pathological bone resorption by activating osteoclast, inhibiting osteoblast

Hypoxia and reperfusion maintains osteoclast activation

## Progressive Resorption

## Hypoxia increases Osteoclasts



Knowles, H.J. & Athanasou, N.A., 2009. Acute hypoxia and osteoclast activity: a balance between enhanced resorption and increased apoptosis. *The Journal of Pathology*, 218(2), pp.256–264.

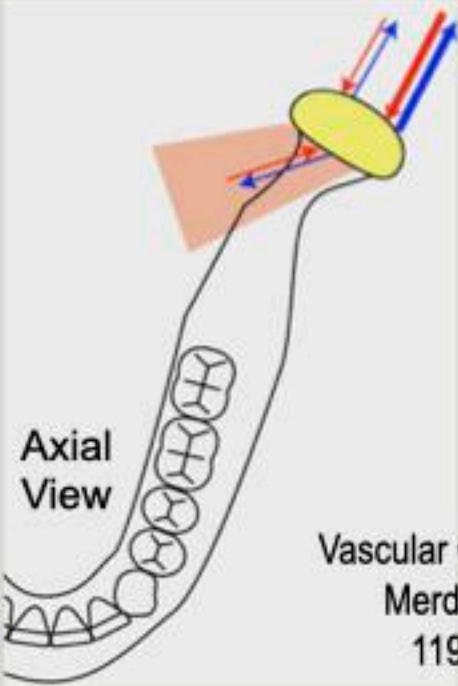
Knowles, H.J. et al., 2010. Hypoxia-inducible factor regulates osteoclast-mediated bone resorption: role of angiopoietin-like 4. *FASEB journal : official publication of the Federation of American Societies for Experimental Biology*, 24(12), pp.4648–4659.

# Condylar Perfusion

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



Sagittal View



Axial View

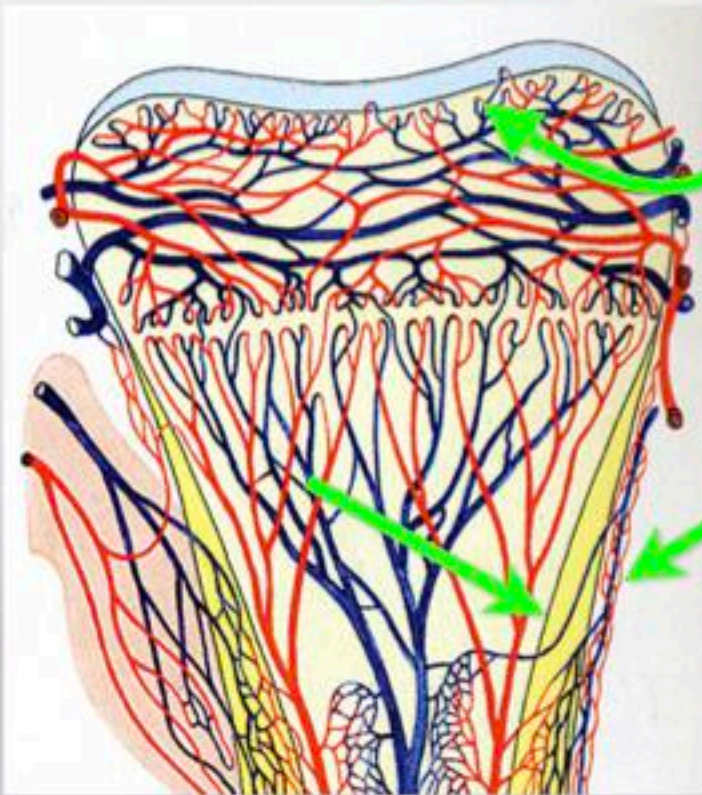
Vascular Canals. A model for vascular growth  
Merdia V, An R Acad Nac Med, 2002  
119(1) :41-50 (Article in Spanish)



Coronal



**Subchondral Bone only has blood vessels from intramedullary**



Cortical bone gets blood vessels from both intramedullary and periosteum

Abundant collateral circulation





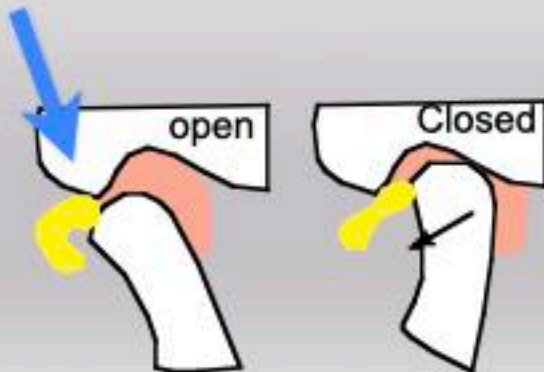
When the clicking stops (4a to 4b):

Condyle Distalized

Venous return compromised

**Compromised Condylar Perfusion**  
Blood flow through condyle is decreased

Disc Anterior



**4 Outcomes of Compromised Condylar Perfusion**



**Avascular Necrosis**

Bone cells die



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



**Inflammatory Tissue Bone Resorption**

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



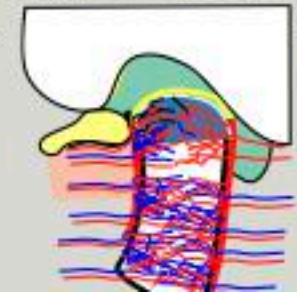
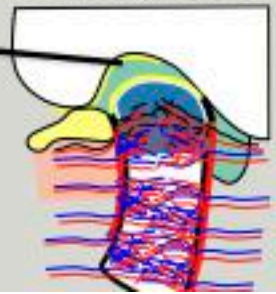
Repeated Hypoxia and Reperfusion

**Nothing**

Compromised but adequate.  
99% no problems,  
but if you are the 1.....

**Hypoxic Progressive Condylar Resorption**

Missing Cortex



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

# Anterior Open Bite Differential Diagnosis

TMJ Bone loss



Iatrogenic

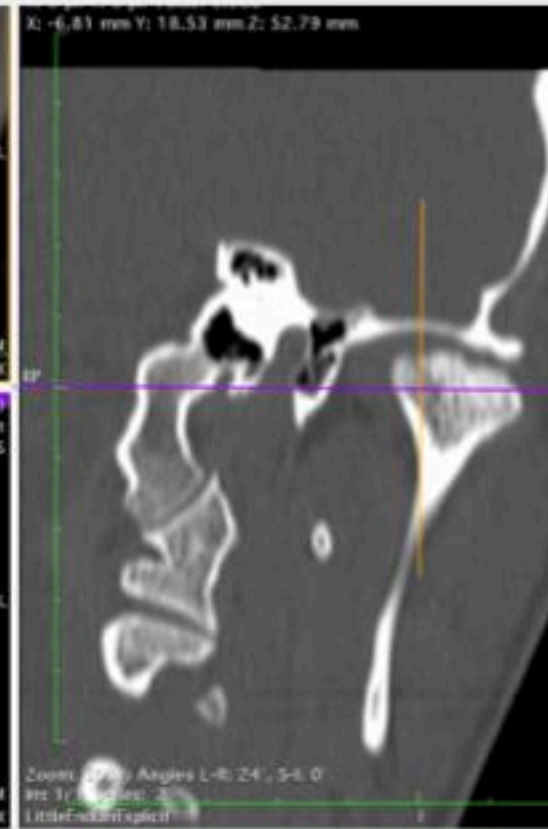
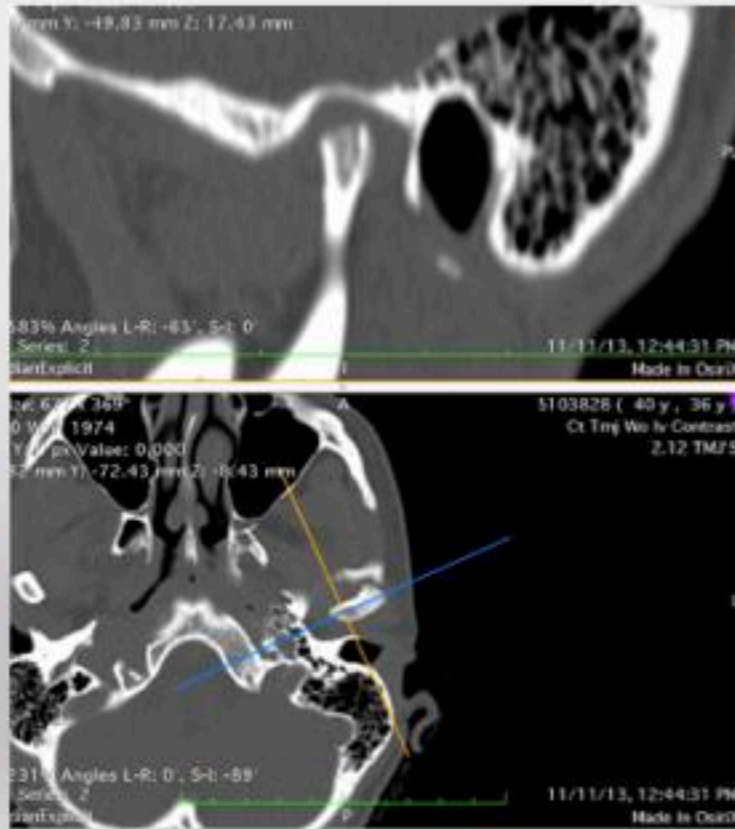
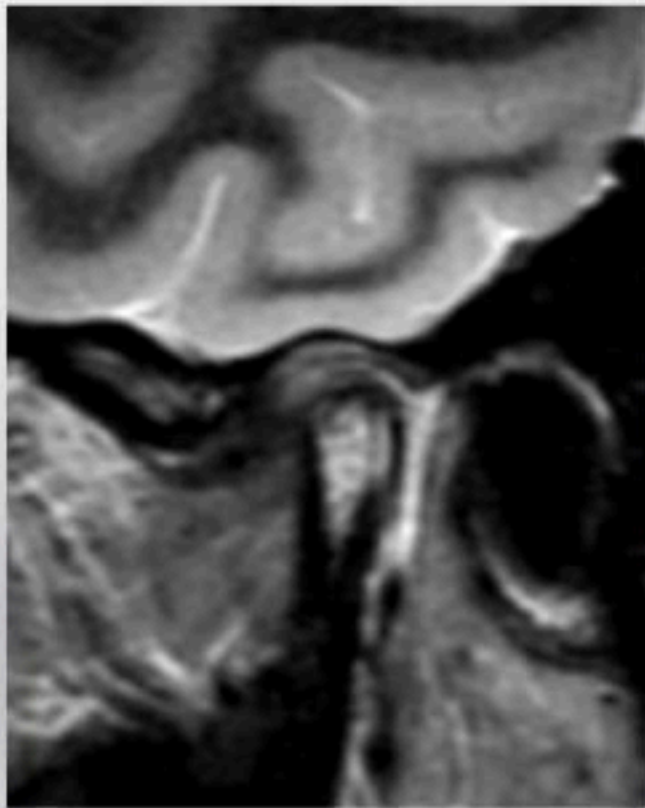


Tongue moved teeth





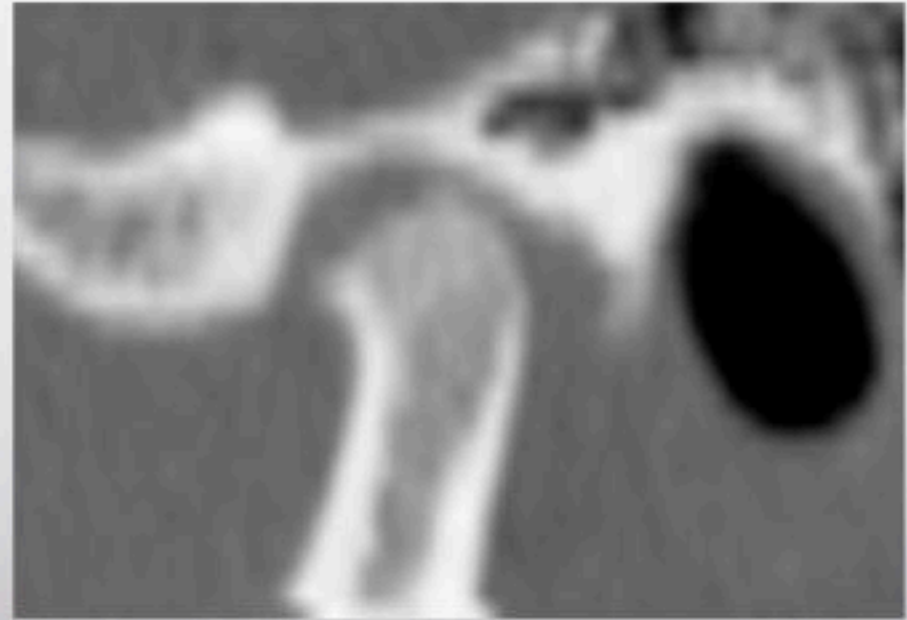
# Post Avascular Necrosis bone collapse Active Inflammatory Tissue Bone Resorption



# 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



## \$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

**\$558,000 VERDICT** - Failure to diagnose Condylar Resorption - Excessive use of cervical head-gear as part of orthodontic treatment - TMJ Syndrome - Occlusal deficiencies - Otolaryngologist recommended for minor plaintiff.

This dental malpractice 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 head gear in her orthodontic treatment, causing permanent mouth and jaw injuries.

The minor plaintiff treated with the defendant for approximately two years for a Class II malocclusion (secondary to crowding in the upper arch), a mild low angle and a deep bite/overbite. The defendant prescribed cervical head-gear, composed of a wire which connects behind the head to pull the molars rearward and leave more room for the incisors. The plaintiff wore the headgear for approximately nine months.

The plaintiff's dental experts testified that the plaintiff suffered from condylar resorption of the jaw during the time period the plaintiff was under the defendant's care and that the condition would have been evident on x-ray. The plaintiff contended that the standard of care required the defendant to stop all orthodontic treatment under these circumstances and allow

the condylar resorption to run its course. The plaintiff contended that the defendant failed to recognize that the plaintiff's jaw was relaxing open due to the loss of calcification of the teeth and jaw associated with condylar resorption and that the defendant negligently attempted to reverse the open bite by inappropriate methodology.

The plaintiff's dental expert testified that the methodology employed by the defendant worsened the plaintiff's open bite, causing her to develop TMJ Syndrome and requiring a future Labret (lower jaw) resection. The cost of the plaintiff's surgery was estimated at between \$25,000 and \$30,000, according to the plaintiff's oral surgeon. The plaintiff alleged that had the defendant performed a proper examination, treated the dental dysfunction

**DENTAL LIABILITY ALERT**, USPS #70847 is published 8-monthly for \$100/year by Jury Verdict Review Publications, Inc., 45 Springfield Ave., Springfield, N.J. 07081. Periodical Postage Paid at Springfield, N.J. and additional mailing offices. Postmaster: Send Address Changes to Dental Liability Alert, 45 Springfield Ave., Springfield, N.J. 07081.

Volume 5, Issue 6 | May 2002

adequately and referred her to the proper specialist, 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 expert opined that the treatment provided by the defendant conformed with the standard. The defense 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 bilateral condylar resorption, a rare condition which is not well understood by the medical community.

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

#### CREDITS

Plaintiff's orthodontia expert: Jia Yehou, from Wilkes, Nc. Plaintiff's expert oral surgeon: Charida White from Tallahassee, Fla. Defendant's dental experts: Charles S. Green from Skaneateles, N.Y. and Daniel M. Larkin from Richmond, Va. Defendant's orthodontia expert: Carl Szabewski from Skaneateles, N.Y.

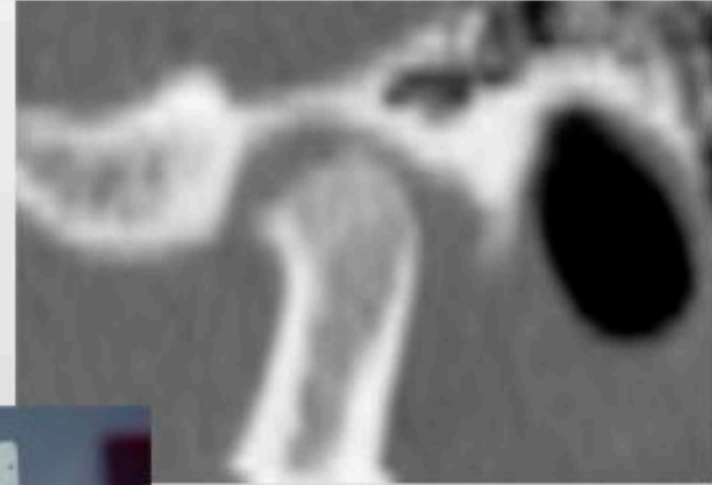
#### REFERENCE

Orange County, Fla. Houghton vs. Powell, Case no. 98-1024. Judge Jeffrey D. Miller. Attorney for plaintiff: Christopher M. Lathropkus of Markham & Lathropkus, P. West Palm Beach, Fla. Attorney for defendant: Kenneth L. Baker and John S. Orr, Jr. of Bush & Orr, in Orlando, Fla. □



# 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:

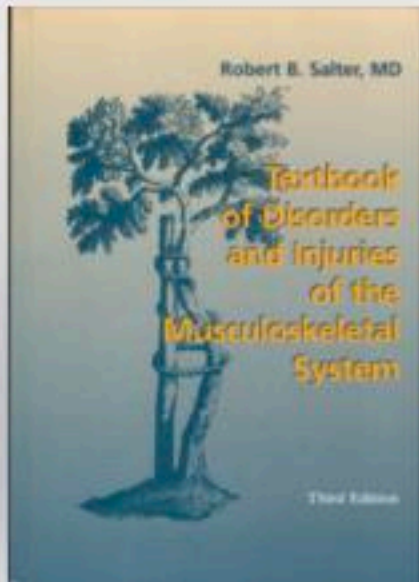
- Get CT or CBCT scan of the TMJ
- Maintain jaw motion: PT, exercises
- Get photos
- Mounted models
- Monitor occlusion over the next year
- Follow up CBCT scan 1 year later
- After 1 year “Adapted Favorably”
- Rule out Occlusal Muscle Disharmony



# My Core Belief

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

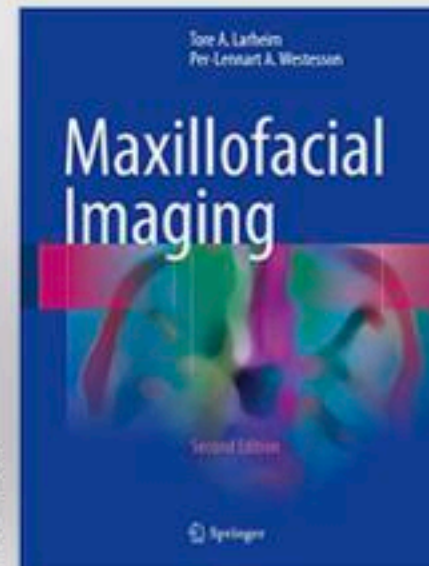
Understanding orthopedic medicine is the key to understanding joints, including the TMJ



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

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

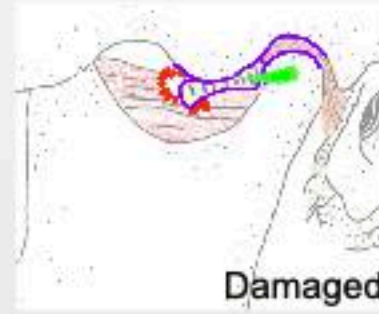
Maxillofacial Imaging  
Larheim  
Westesson



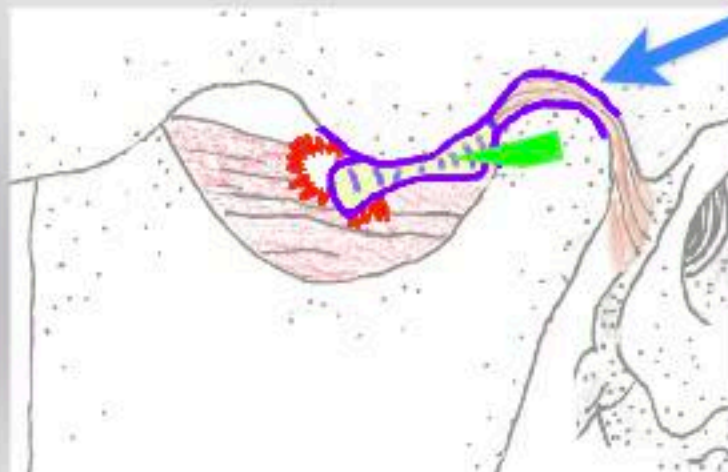
# Basic Orthopedics

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



KO

Age 30 Female  
Start



Front teeth use to touch 1 year ago



Age 30 Female  
Start



Front teeth use to touch 1 year ago



Start

Right Condyle Missing Cortex= Active Degeneration



Left Condyle Missing Cortex= Active Degeneration

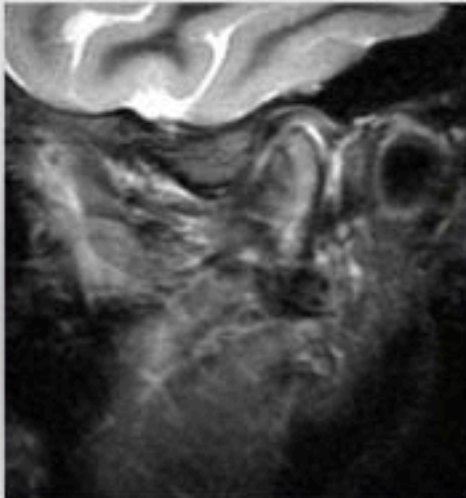
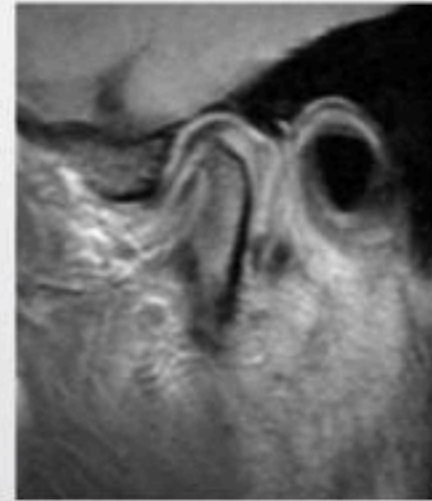


Start MRI  
R2,L2



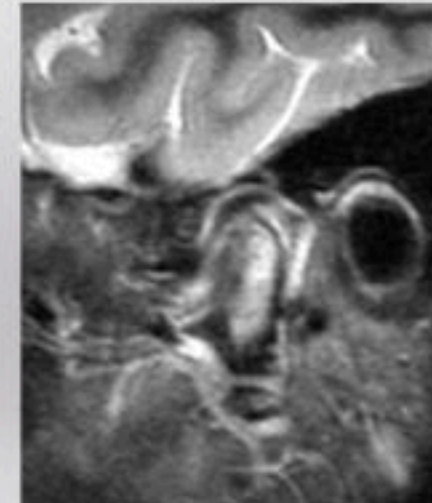
Right  
PD

Left  
PD



Right  
STIR

Left  
STIR



Tx: NSAID (Aleve 220mg bid), Doxycycline 20mg bid

Condylar Distraction

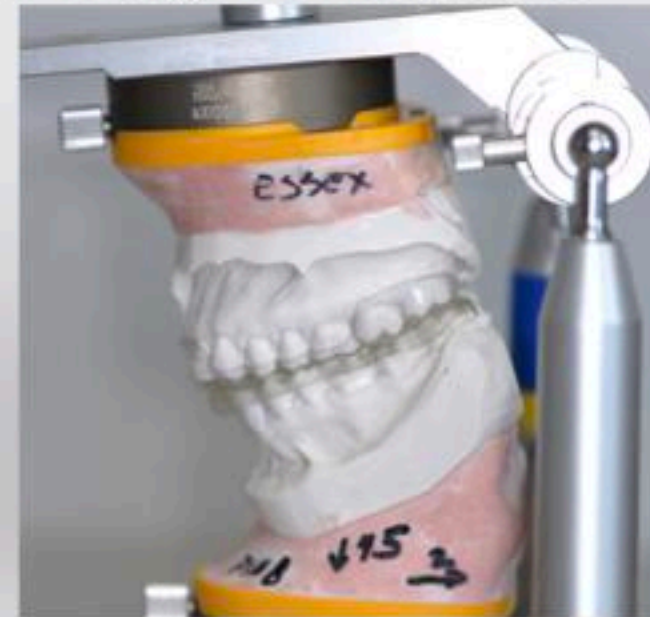
Rheumatologist and Infectious Ds MD add Plaquenil- Lyme neg, RhA neg, Equivocal bebosa bacteria

Distract Condyles on SAM MPV Articulator

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

Make upper essex, Lower full coverage indexed appliance

Switched Aleve to  
Meloxicam 7.5mg bid at 4 weeks  
due to joints still sore





Distraction orthotic try in  
prior to start



2 months

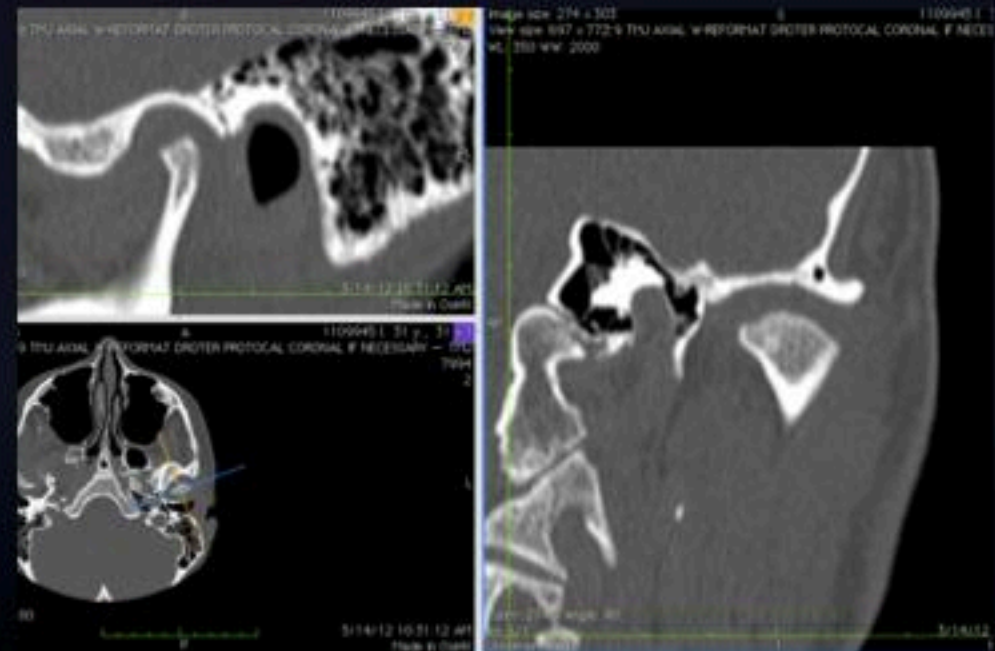


Much reduced TMJ pain



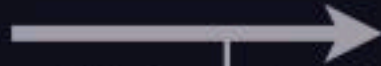
2 months- just able to tolerate full traction

Cortex has reformed





Start Age 30

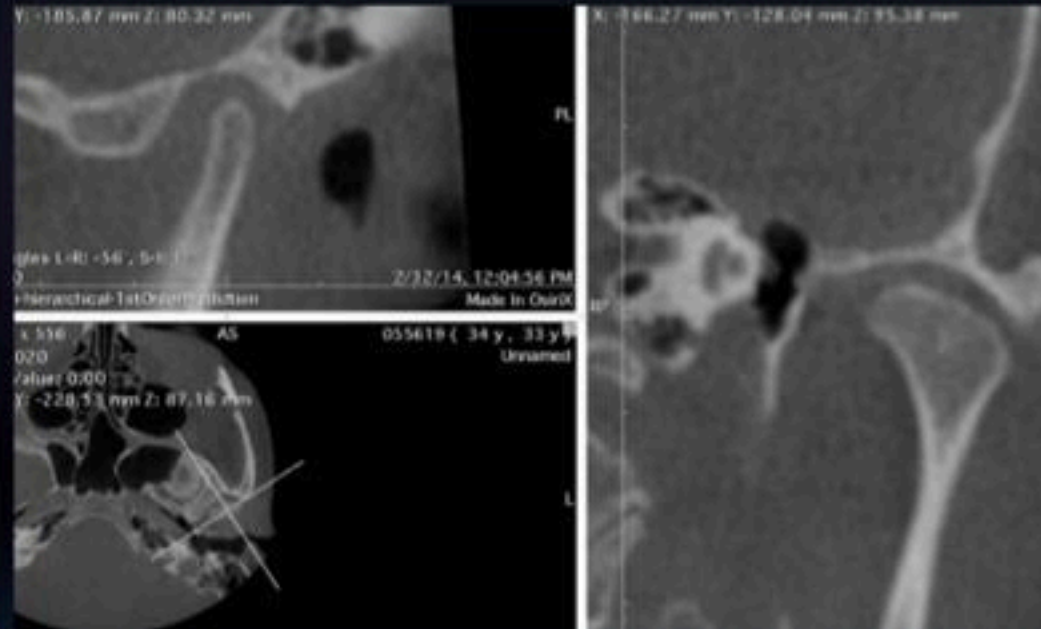
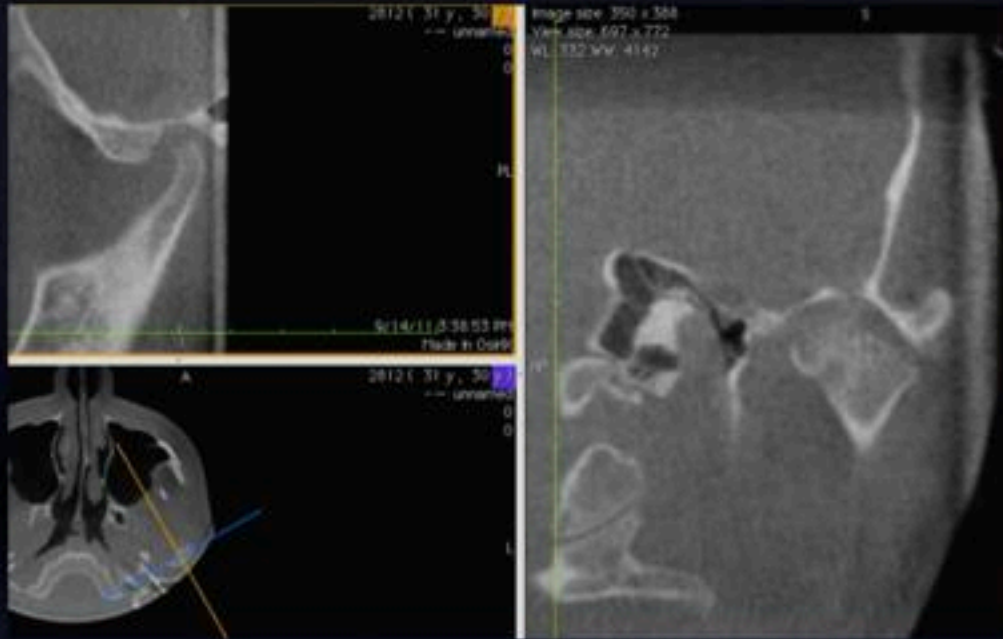


Start

Age 33

Left TMJ

Left TMJ



11 months



Age 33

Invisalign Orthodontics 2 years



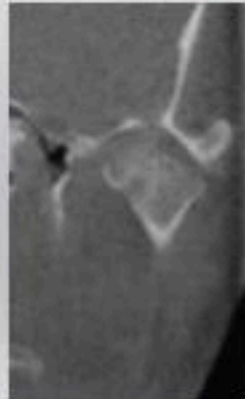


Age 34



Anterior Openbite TMJ Bone Loss

Non Surgical Therapies





Start Age 30



Post Distraction, Pre Ortho Age 31





Start Age 30

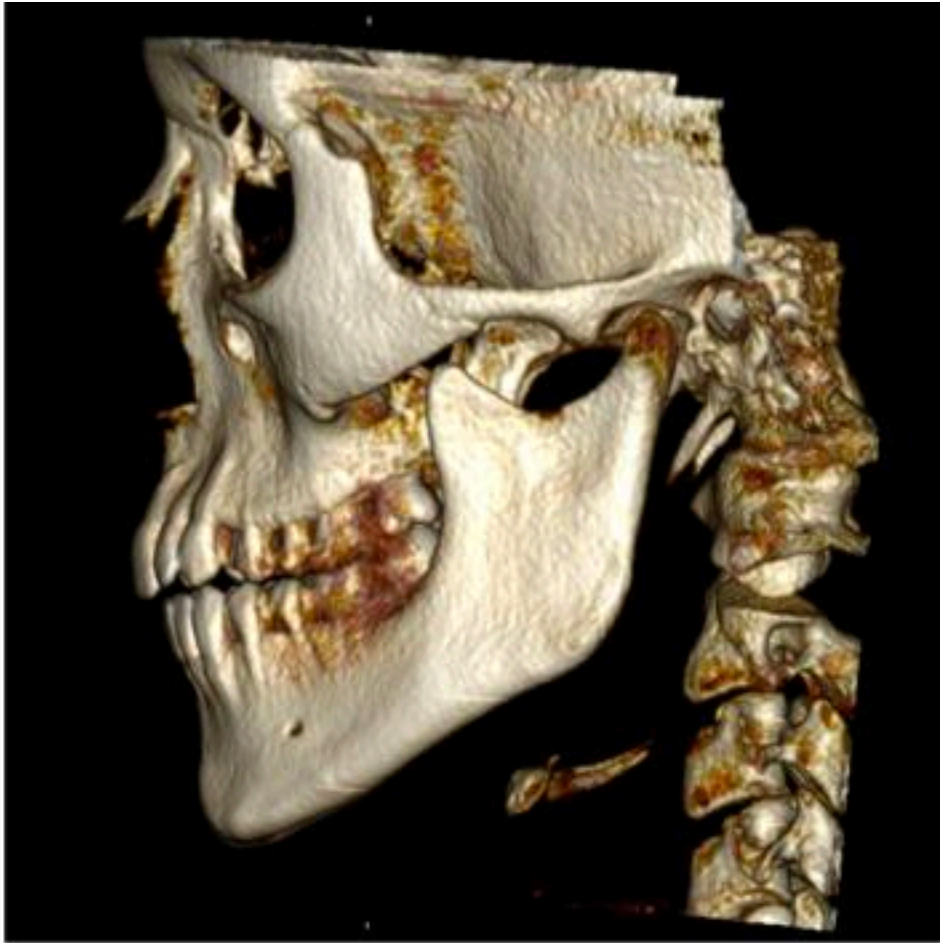
and

Post Distraction, Pre Ortho Age 31

Vary Opacity



EM



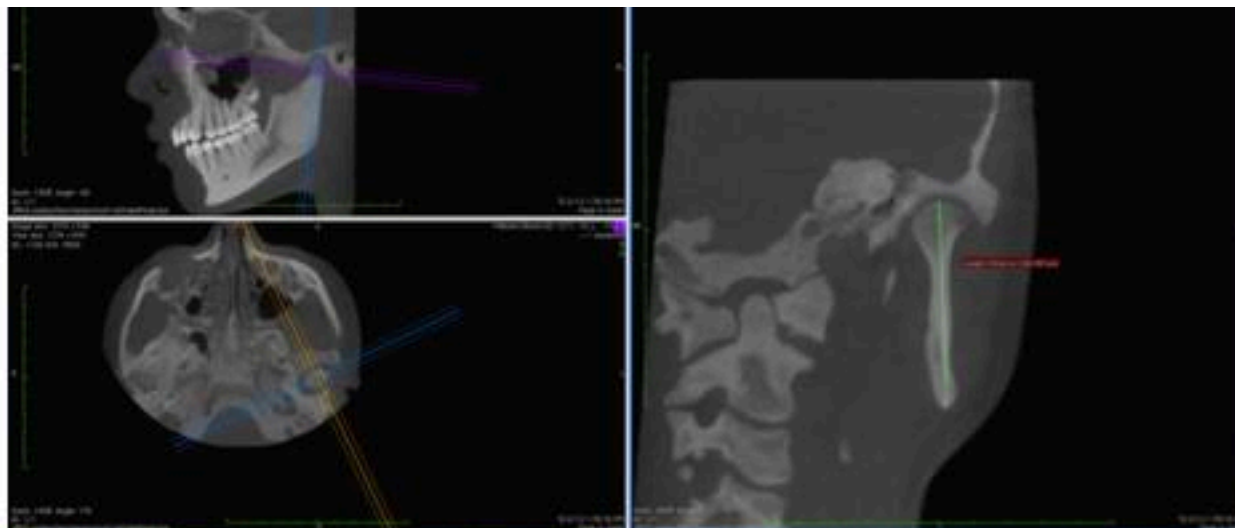
CT Left  
5/2012 Age 14



CT Left  
6/2014 Age 16



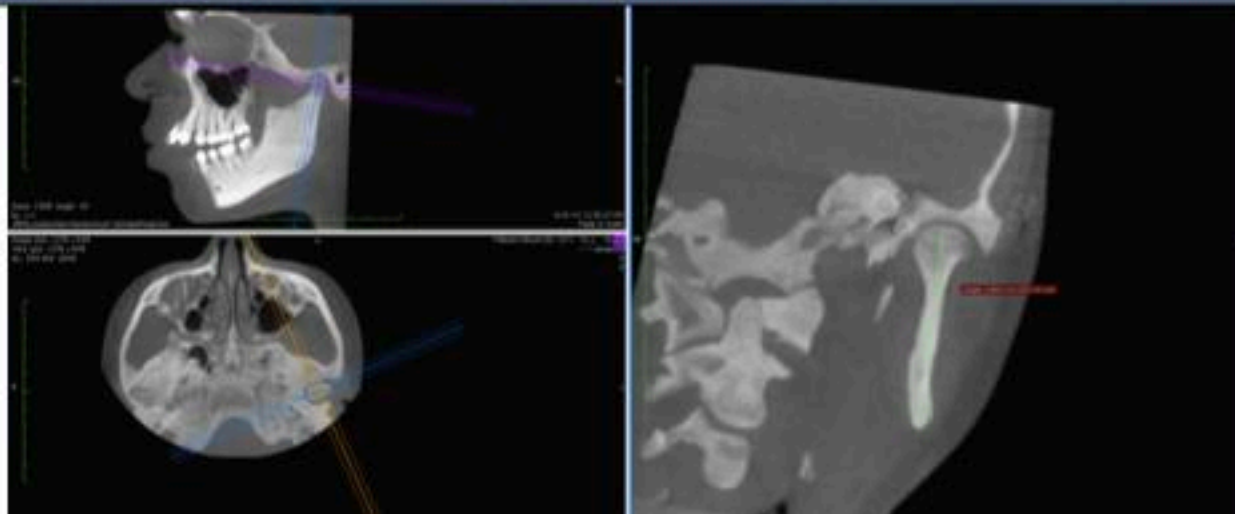
CT  
Left  
5/2012  
Age 14



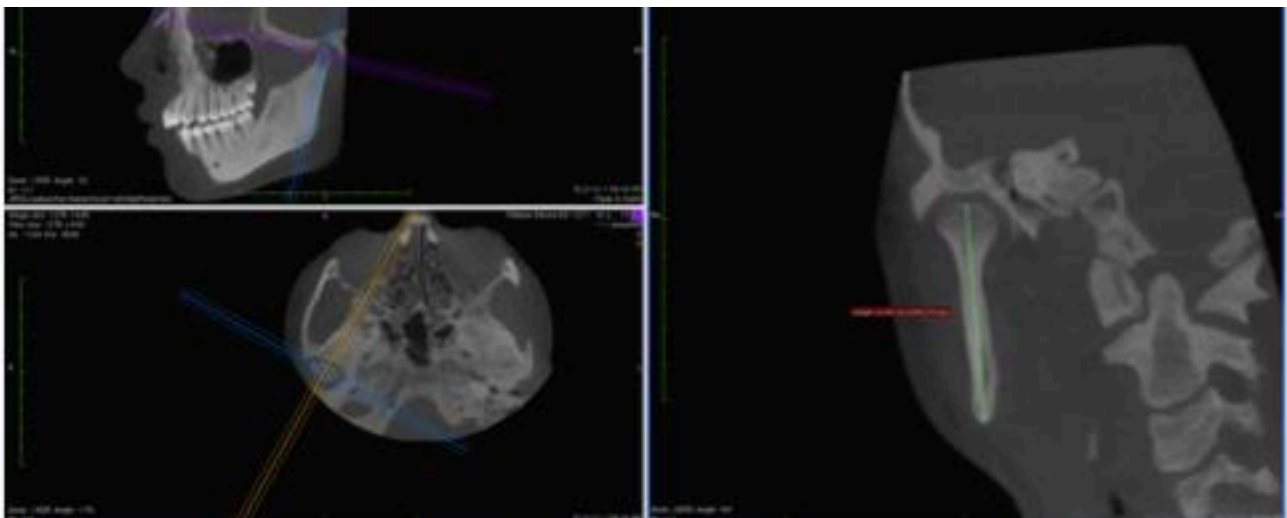
Condylar Length  
58mm

58mm

CT  
Left  
6/2014  
Age 16



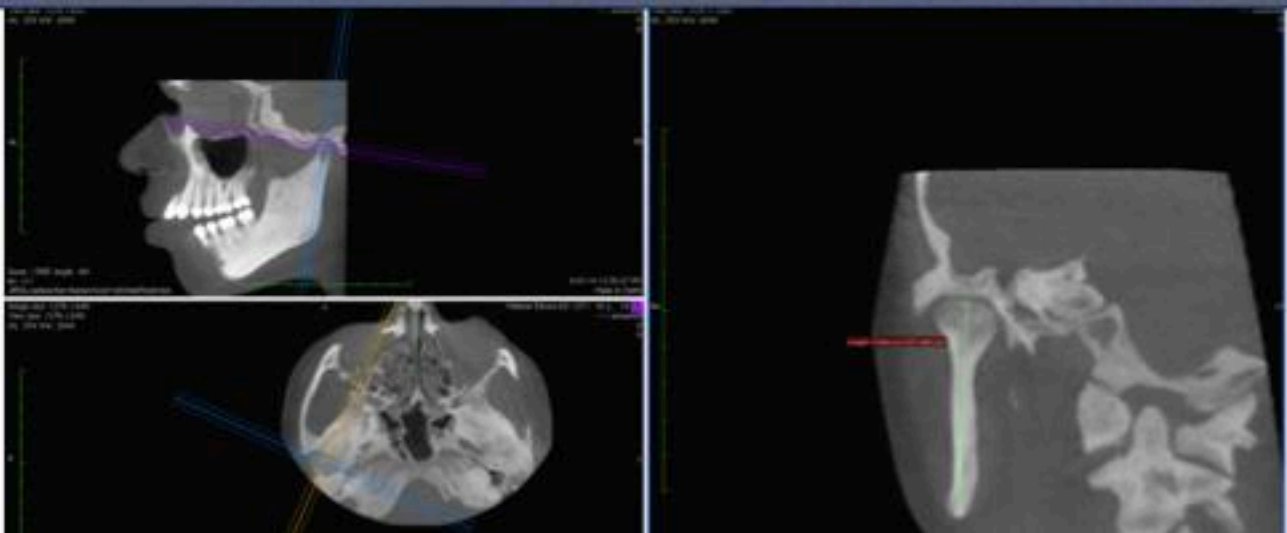
CT  
Right  
5/2012  
Age 14



Condylar Length  
60mm

60mm

CT  
Right  
6/2014  
Age 16



Tongue Bracing Moved teeth- ?Neck?

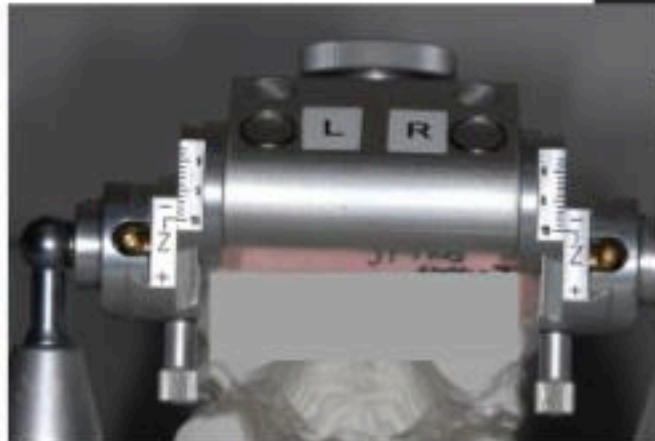
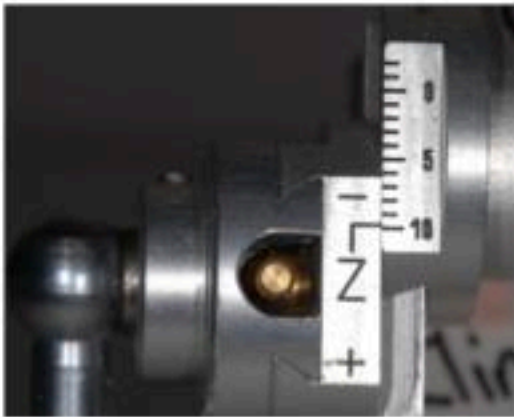
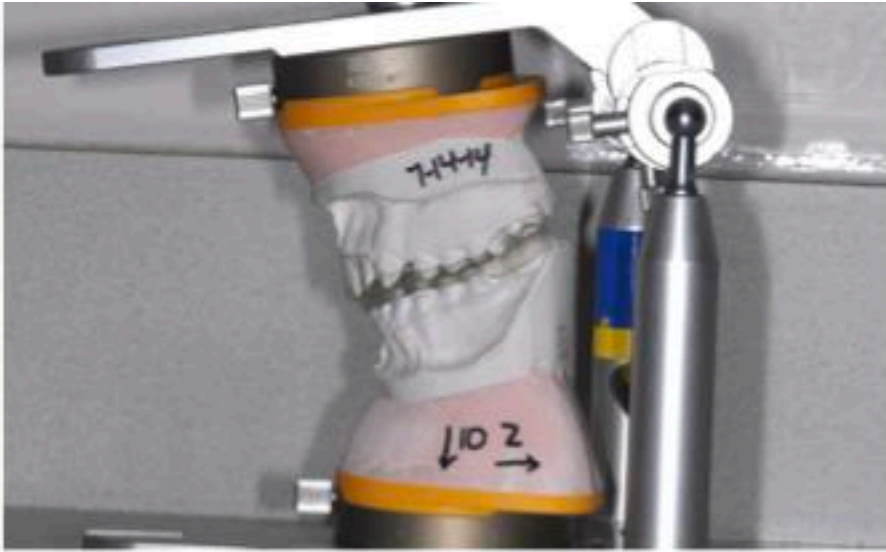


Vary Opacity to see composite view

Vary Opacity to see composite view







SAM MPV Articulator



## Condylar Distraction



Vary Opacity to see composite view

CT Left  
6/2014 Age 16





“Selfies” at 4 months





6 months



3-2015 Age 16



CT Left  
6/2014 Age 16



3-2015 Age 16



Vary Opacity to see composite view

CT Left  
6/2014 Age 16

Vary Opacity to see composite view



3-2015 Age 16



6 months



3-2015 Age 16

Anterior Openbite Treatment : Moving the Maxilla





Age 21  
4.7 years post distraction  
Orthodontics



## 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







LD Pankey Institute

Write your Dream