Hinman 2023

Grind and Clench

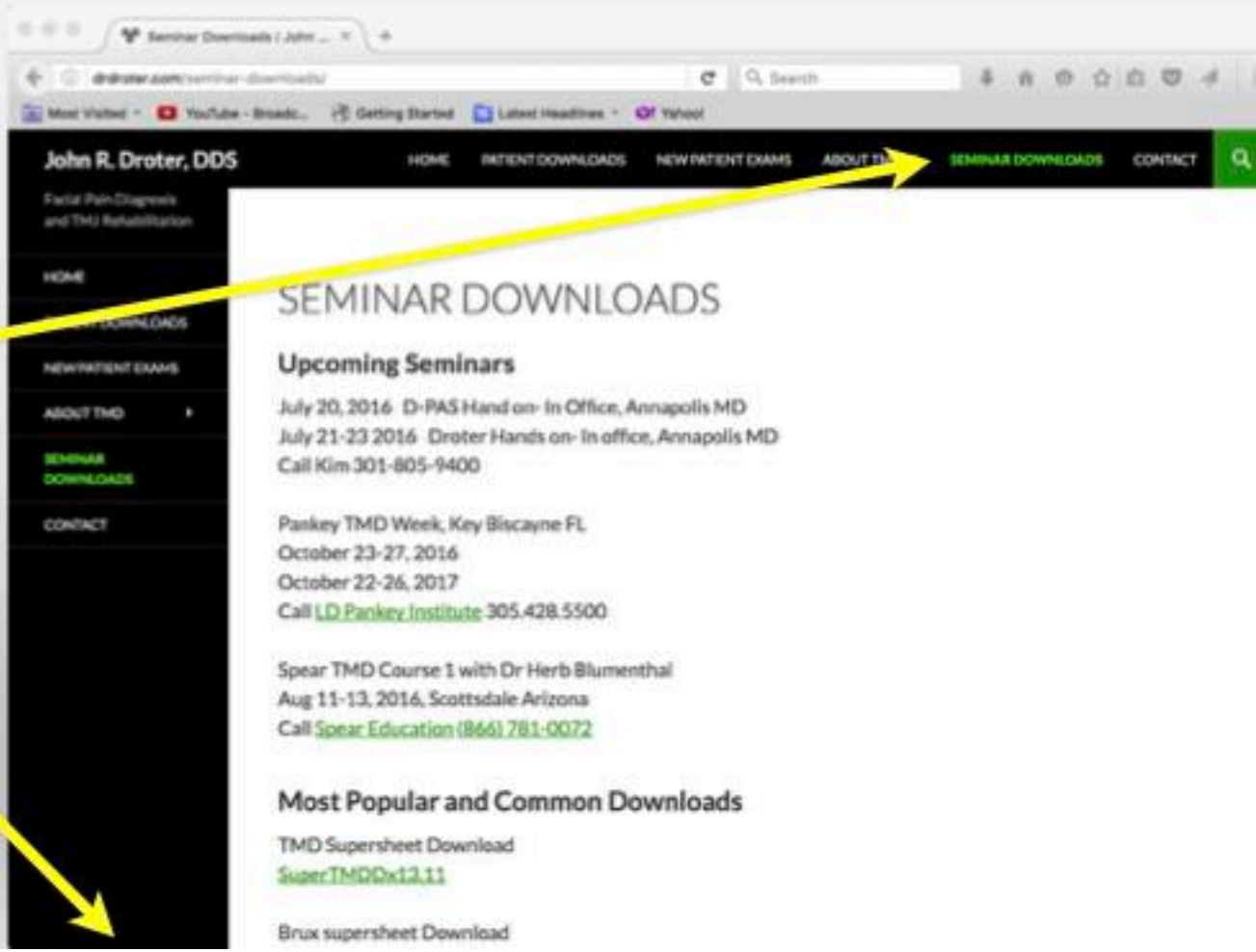
John R Droter DDS
Annapolis, Maryland

John R Droter, DDS

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

Seminar Download

Hinman 2023



Hello. I am:

John R Droter DDS
Annapolis, Maryland

Milestones

Visiting Faculty Spear Education 2013

Visiting Faculty LD Pankey Institute 2008

Visiting Faculty Orthodontic Program
Washington Hospital Center 2000

On staff AAMC: Orthopedic Rounds
In OR for TMJ Surgery

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

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

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

TMD Therapies: (70 therapies)

Physical

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

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

Medicinal

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

Occlusal Orthopedic

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

Tongue Parafunction

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

Dental Orthotics

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

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

Athletic Mouthguard
Anterior Repositioning
Occlusal Adjust Assist
Aqualizer
Myobrace

Sleep/ Fatigue

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

Surgical

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

Different Diagnoses have Different Therapies

Specific Diagnosis

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

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

Specific Therapy

TMD Therapies: (70 therapies)

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Hot Cold Hot
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Refer Botox Masseter injections
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Aqualizer
Lower Soft Sectional
Lower posterior deprogrammer
Lower TMJ Rehab flat plane
Lower postured indexed
Lower CR Indexed
Mandibular Advancement Device
Lateral Bruxing Device

Sleep/ Fatigue

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Diet Modification
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CPAP

Surgical

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

70

Lingual Light Wire- Crozat Arch Expansion

Age 29 Start

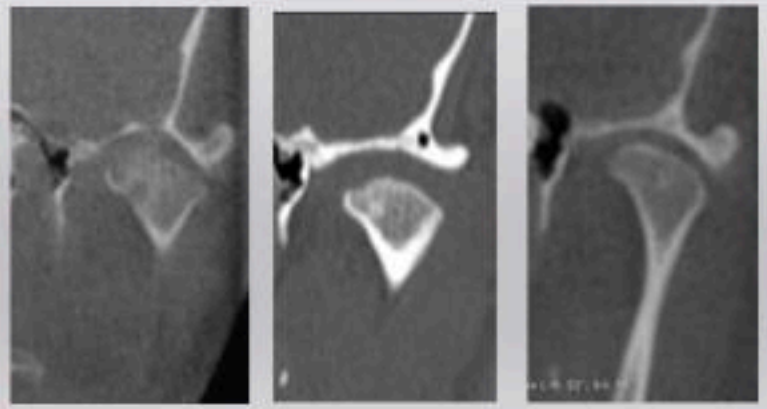
7 months LLW Age 30

Anterior Openbite with Active Osteolysis due to Inflammatory Tissue Bone Resorption

Non Surgical Therapies

Condylar Distraction

Anti Inflammatory Therapies



Restorative Dentistry

Pathological Occlusion

??Airway Related Bruxing?

Restore Function

Composite Trial Occlusion

AHI + 26 CPAP

Anterior guidance

or group function?

Disclosures:

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

Atomic Skis- Sponsored.
I got stuff.

TMD Course
LD Pankey Institute
A small honorarium for lectures

TMD Course
Spear Education
Honorarium for lectures

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

APS
ArrowPath Sleep

APS
ArrowPath Sleep

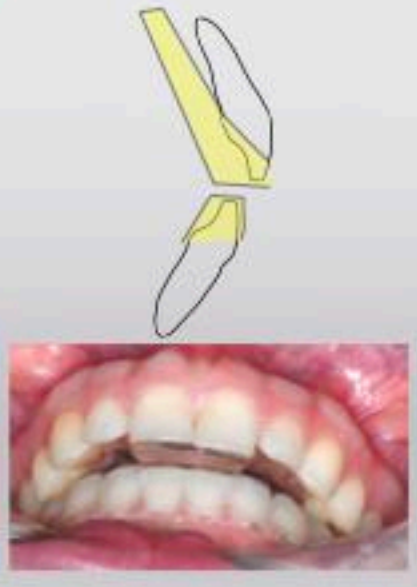
LIVING TREE DENTAL LAB

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

3D Printed Orthotics

D-PAS
Diagnostic-
Palatal Anterior Stop

Brux-PAS
with lower Essix



Hard Lower Posterior Stop
with upper essix

Hard Lower Full Coverage
Centric Relation Orthotic

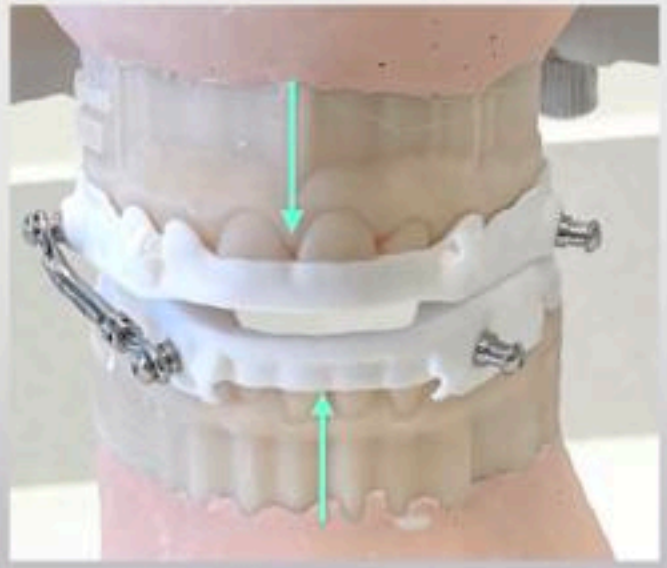
APS
ArrowPath Sleep

Great Lakes
DENTAL TECHNOLOGIES

greatlakesdentaltech.com
716.871.1161

Available May 1, 2023

ArrowPath Sleep
Lat Brux
Lateral Bruxing Guard



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

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

6 Common TMDs

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

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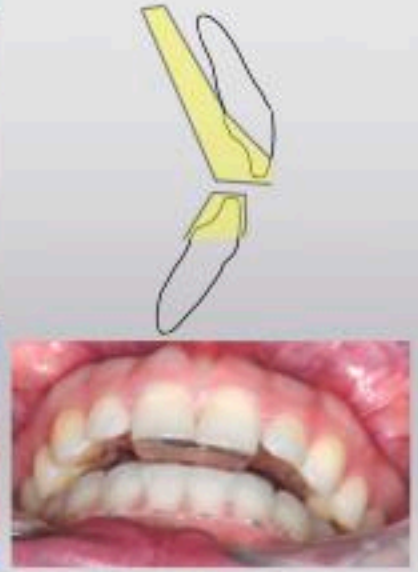
Which Orthotic to use for Bruxing?

Not one disease, not one treatment

Bruxing: A diurnal or nocturnal parafunctional activity that includes clenching, bracing, gnashing and grinding of teeth.
American Academy of Orofacial Pain (2008)

D-PAS
Diagnostic-
Palatal Anterior Stop

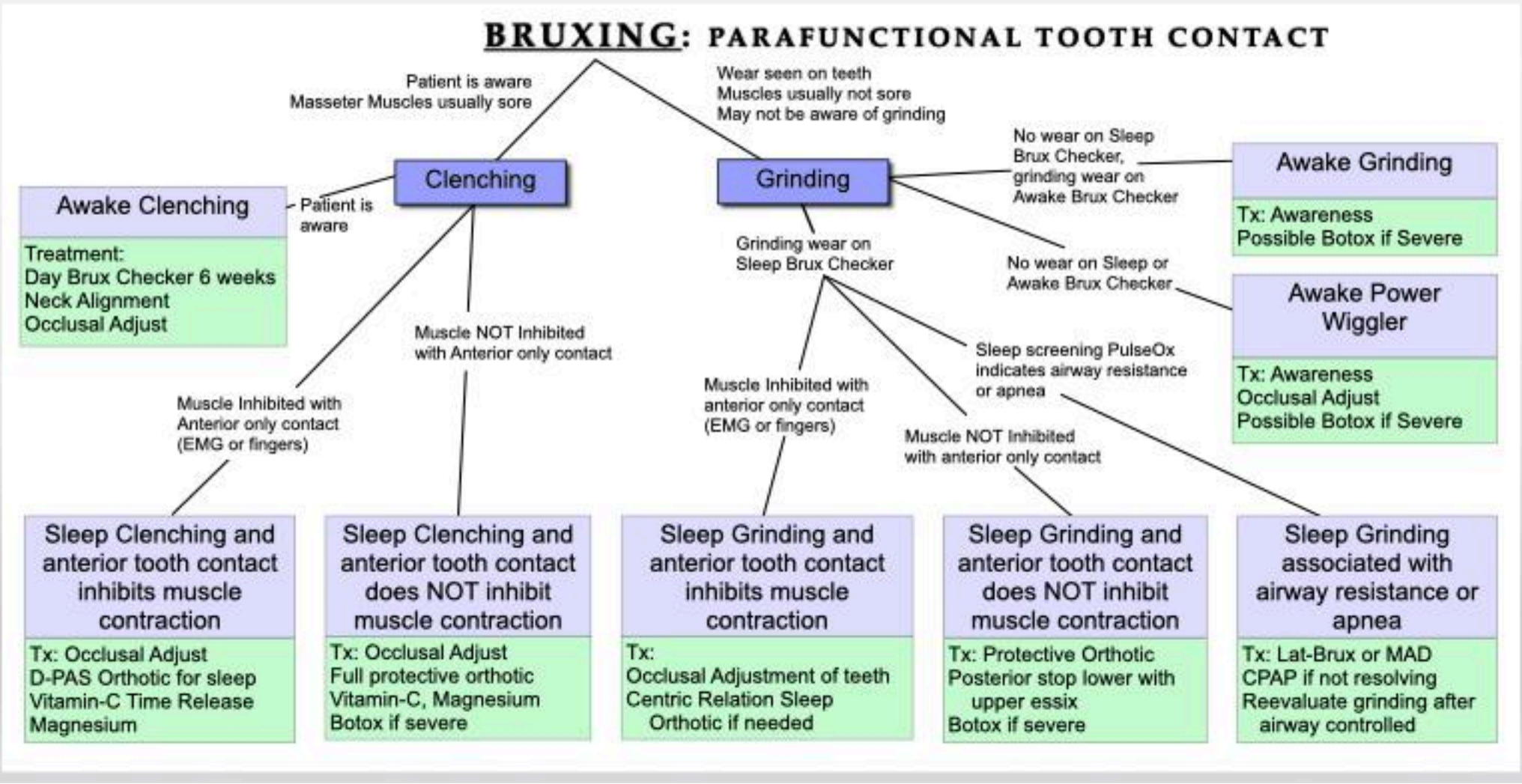
Brux-PAS
with lower Essix



Hard Lower Posterior Stop
with upper essix

Hard Lower Full Coverage
Centric Relation Orthotic

BRUXING: PARAFUNCTIONAL TOOTH CONTACT



5 questions that will help identify the specific bruxing disorder:

1. Does the patient grind or clench their teeth?
2. When does/did this occur: Awake or asleep, past or present?
3. Are the TMJ muscles inhibited from full contraction with anterior only contact?
4. If sleep grinding, is there an airway issue?
5. Does the dental orthotic make the airway better or worse?

1. Does the Patient Grind or Clench?

Clenching you squeeze your teeth together

Grinding you rub your teeth together

16 yo

Clenchers destroy the joint,
Grinders destroy the teeth

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

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

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

Parker Mahan-
"Women Hurt, Men destroy"

5 questions that will help identify the specific bruxing disorder:

1. Does the patient grind or clench their teeth?
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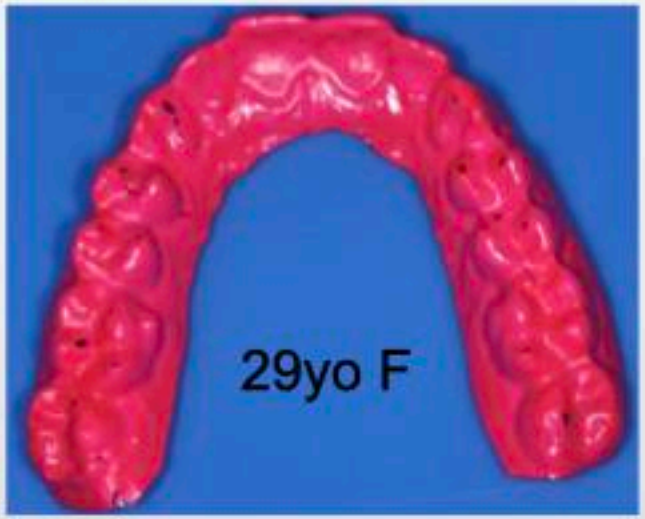
4. If sleep grinding, is there an airway issue?
5. Does the dental orthotic make the airway better or worse?

2. Does this occur awake or asleep?

Brux Checker
Great Lakes Orthodontics

0.1mm Mylar

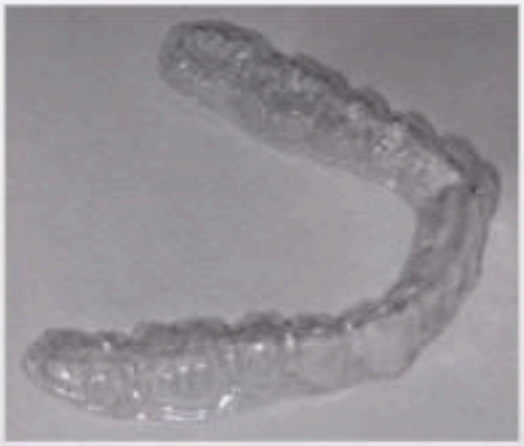
Made on Biostar Machine



Daytime Clenching- Clear Brux Checker

Increase awareness to break habit

Very thin: Similar to mylar used for composites



Great Lakes Orthodontics
Biostar Platzhalterfolie
Item Ref 3202.1

5 questions that will help identify the specific bruxing disorder:

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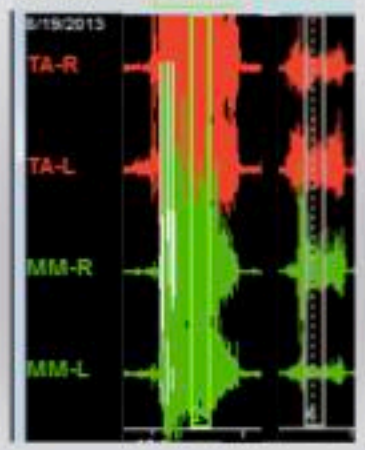
3. Are the TMJ muscles inhibited from full contraction with anterior only tooth contact?

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

Diagnostic
Palatal Anterior Stop
Orthotic

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

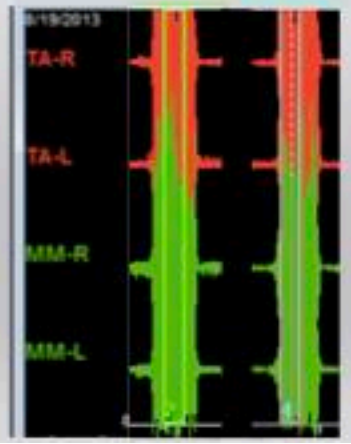
	Clench MaxIC	Anterior Stop D-PAS
	µV	µV
TA-R	100.6	15.7
TA-L	108.9	25.3
MM-R	115.4	25.5
MM-L	70.5	6.8



Major decrease in muscle power with D-PAS

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

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



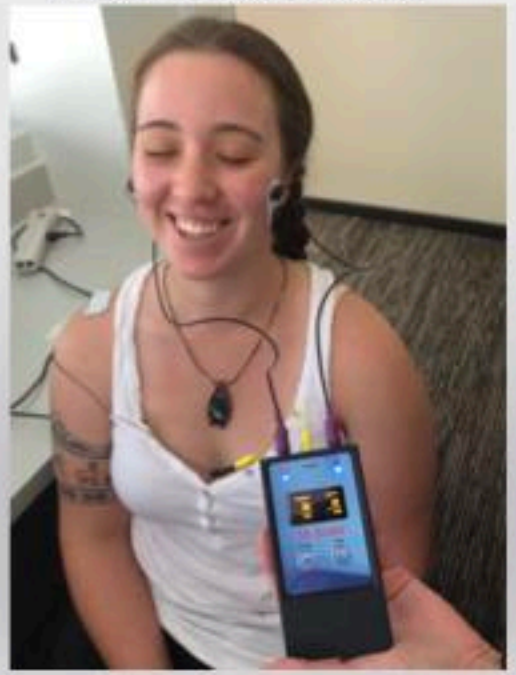
Muscle power same with D-PAS

Choosing the Correct Night Guard

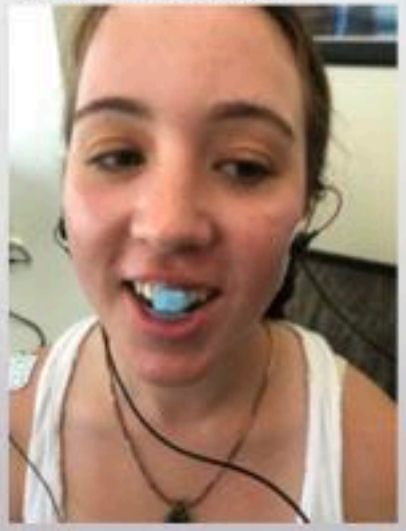
www.APSleep.com

M-Scan EMG
Electromyography

Clench back teeth



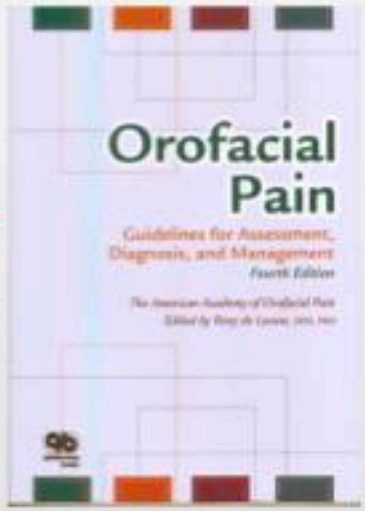
Clench
anterior stop



Can place moderate force on front teeth

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

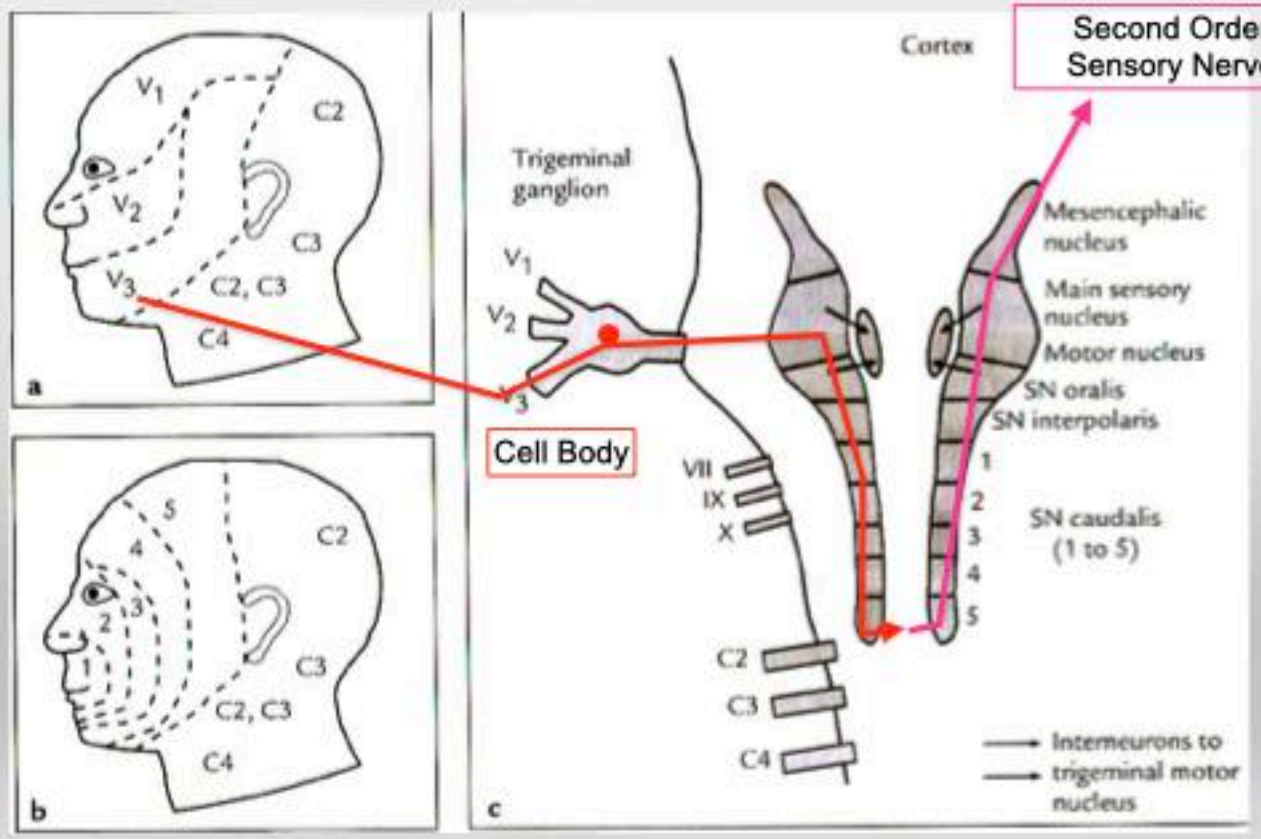
Trigeminal Ganglion-
Cell bodies of trigeminal primary sensory neurons
Trigeminal Nucleus
Connection of primary neurons with secondary neurons



Afferent
First Order
Sensory Nerve

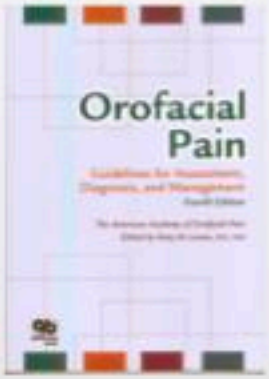
Second Order
Sensory Nerve

Cell Body



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

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



PDL Afferent
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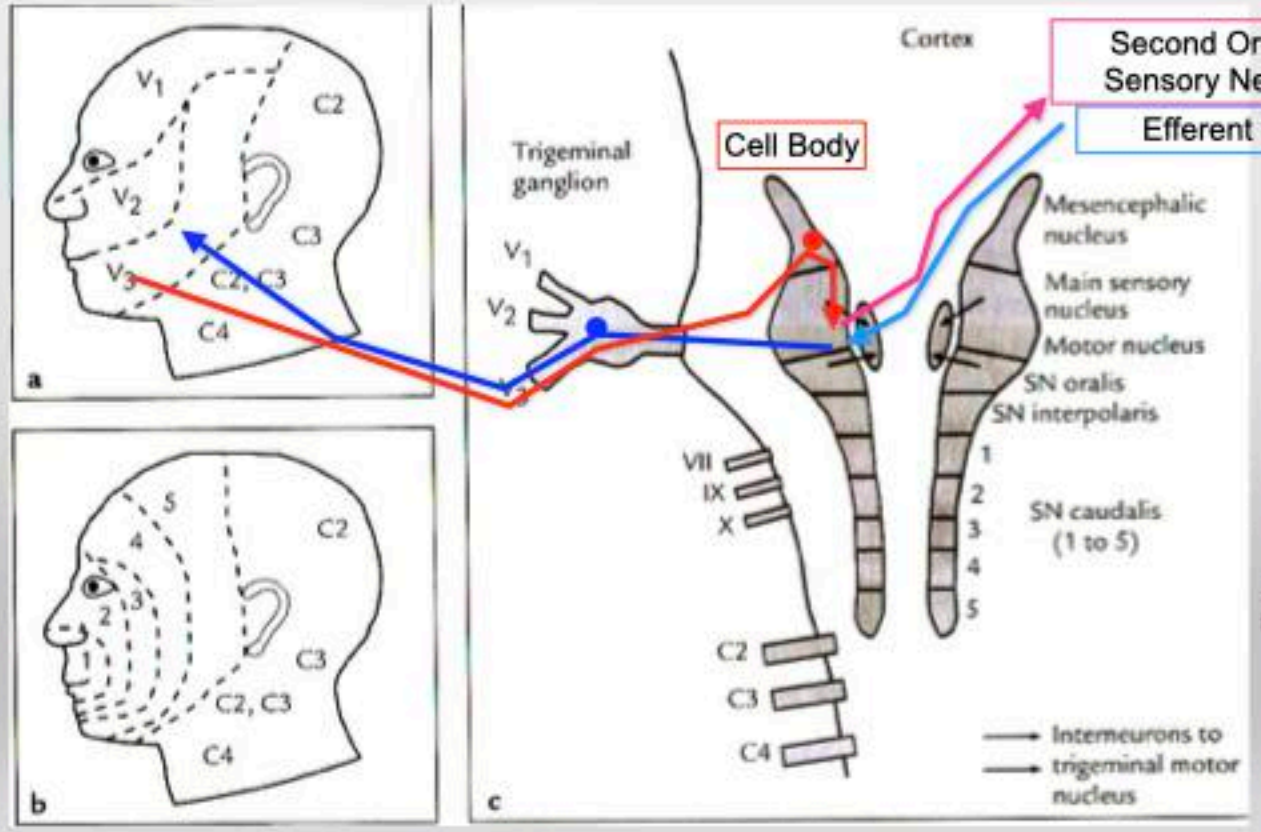
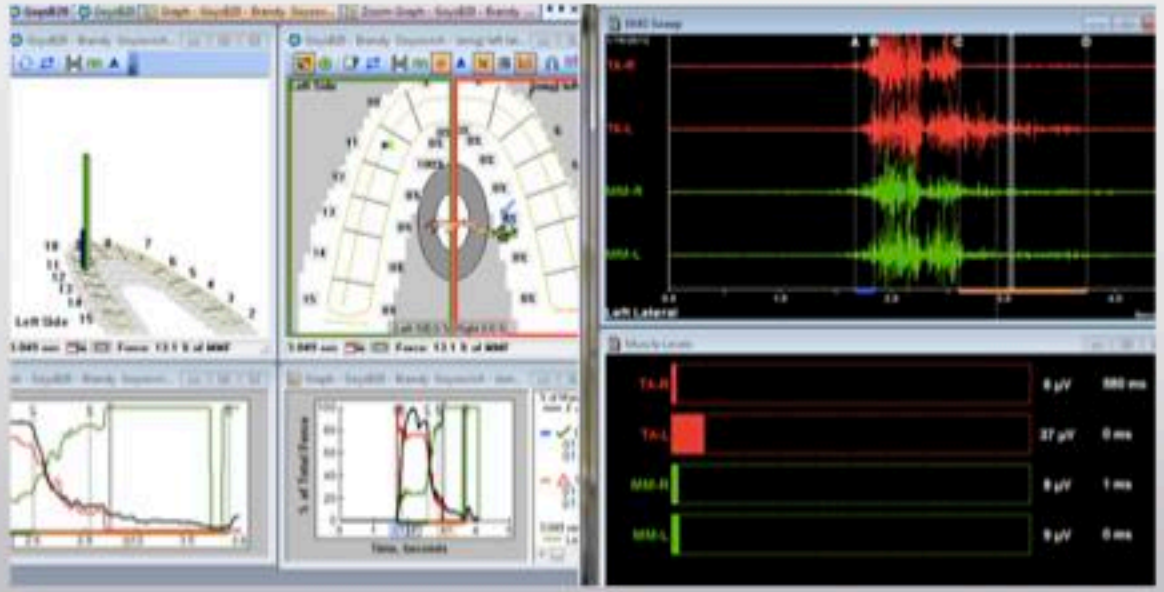
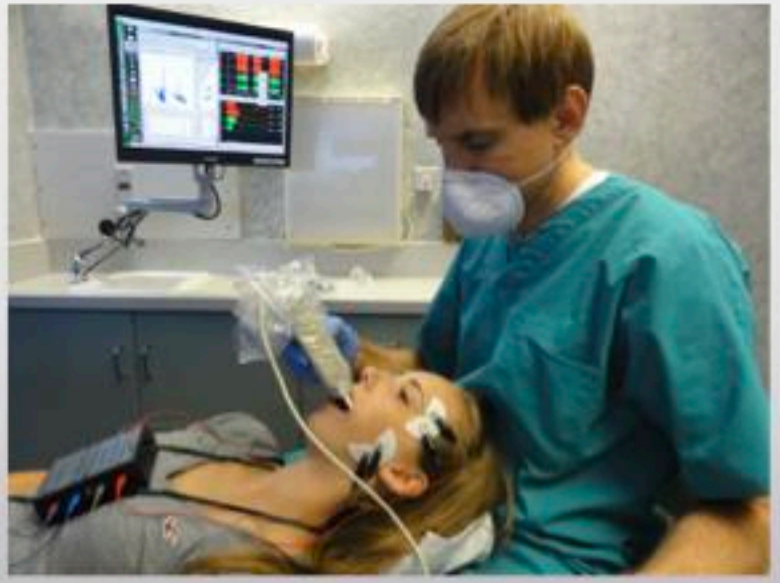


Blink and PDL only peripheral nerves with cell bodies in CNS

TScan EMG Link

We can measure muscle activity chairside and link it to occlusal contacts
Muscles are inhibited from firing with anterior only contact
Gives endpoint to occlusal adjustment

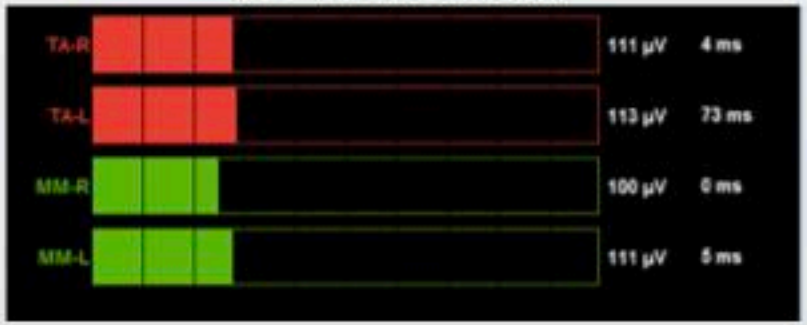


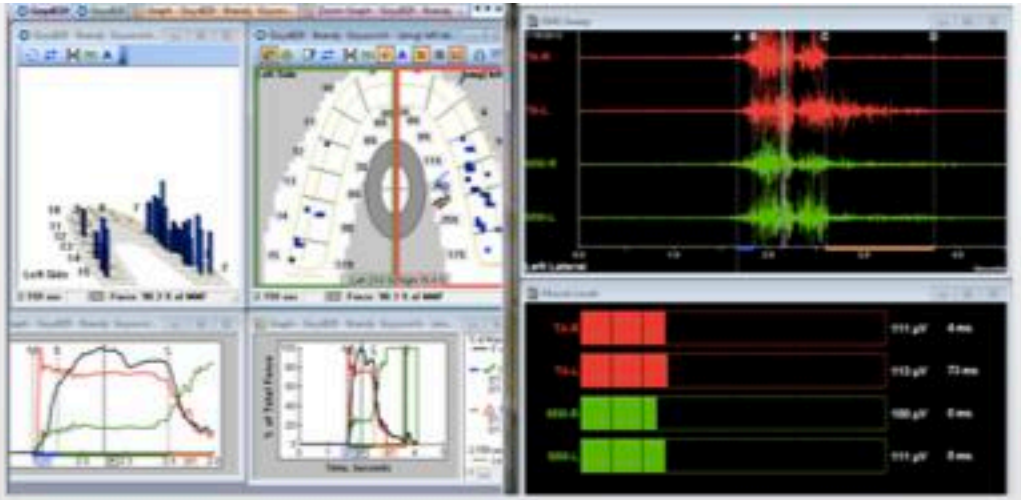


Williamson, E. H., Anterior Guidance: Its effect on electromyographic activity of the temporalis and masseter muscles. J Prosthet Dent 49-6:816-823, 1983.

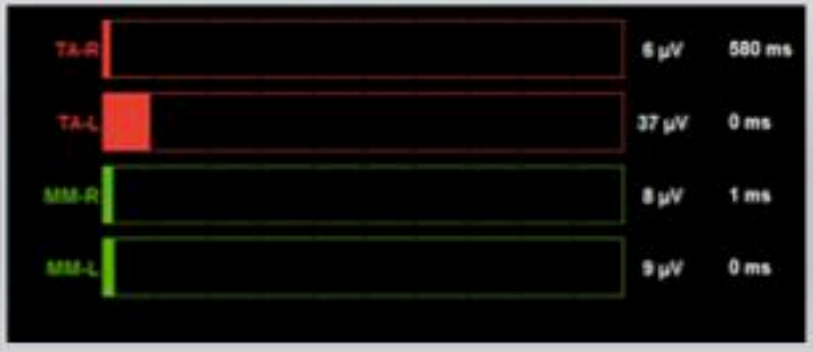
EMG Tscan- Masseter and Temporalis

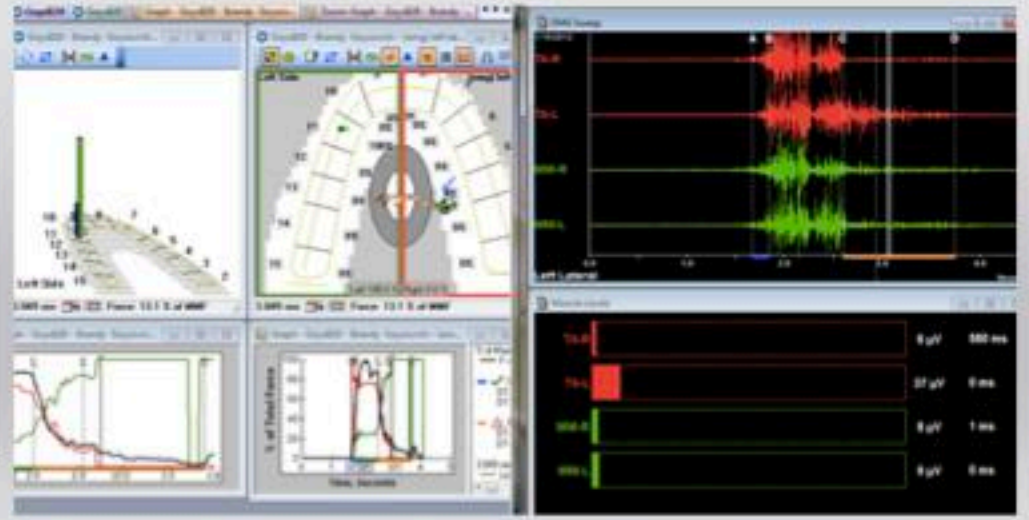
Maximum Intercuspation Clench
100-113 microvolts



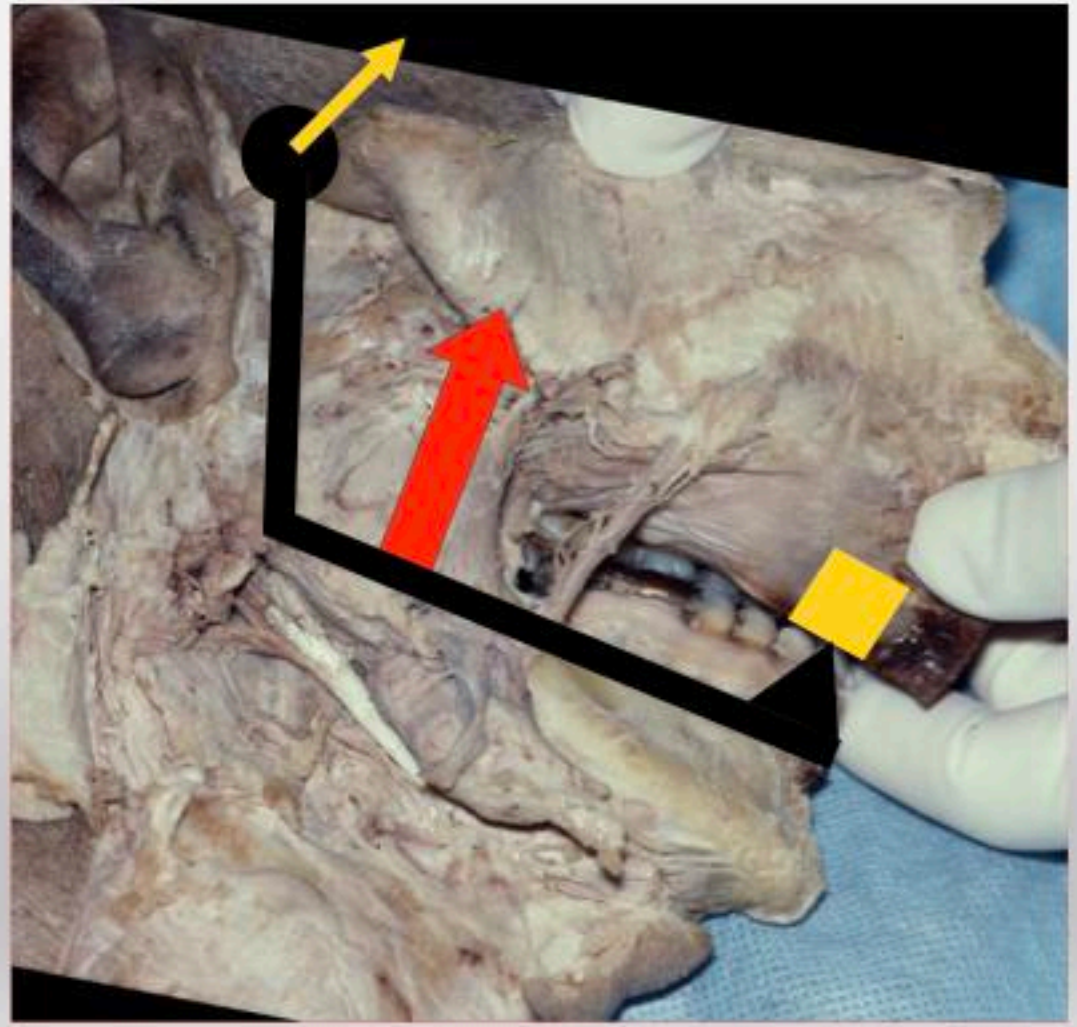


Left Lateral Excursion

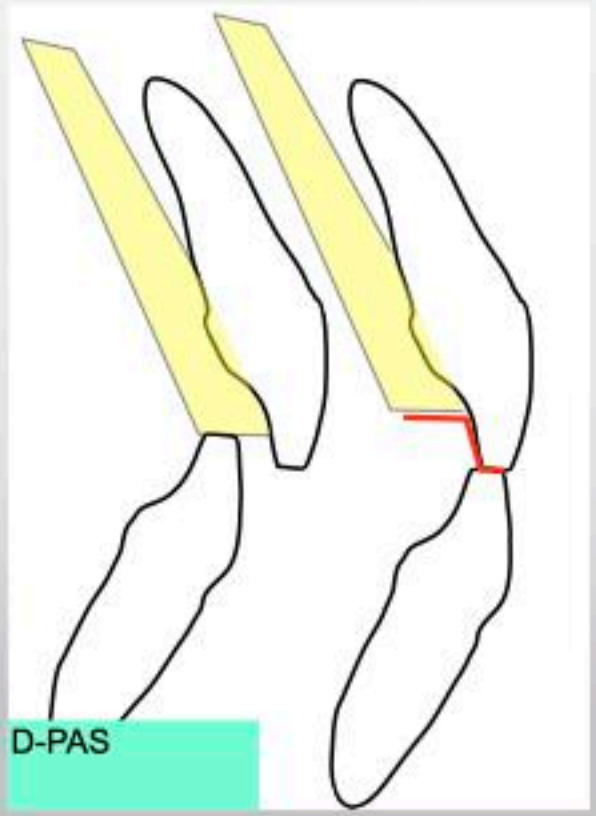




Biomechanics of Anterior Stop Orthotic



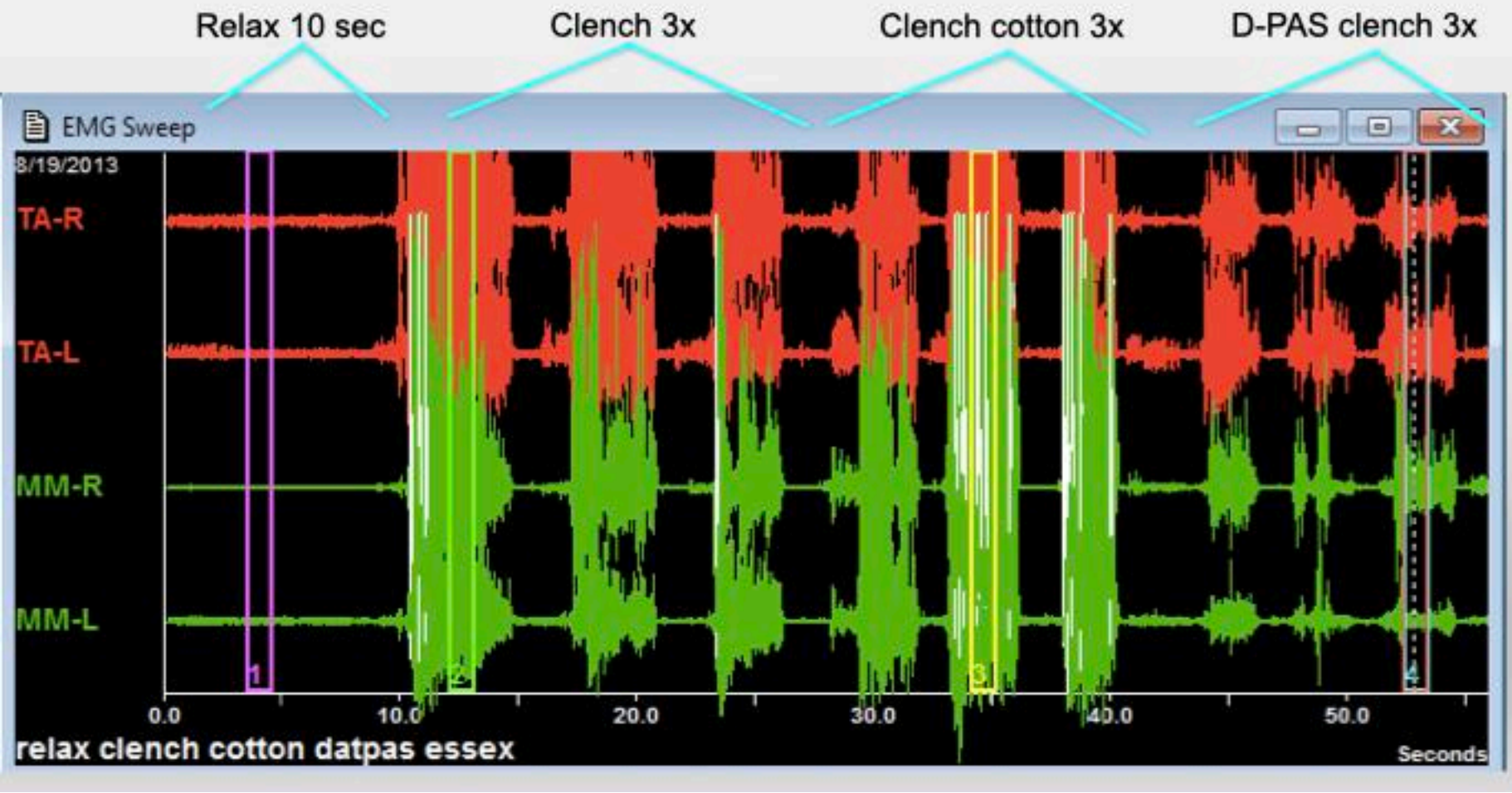
Diagnostic Palatal Anterior Stop
D-PAS



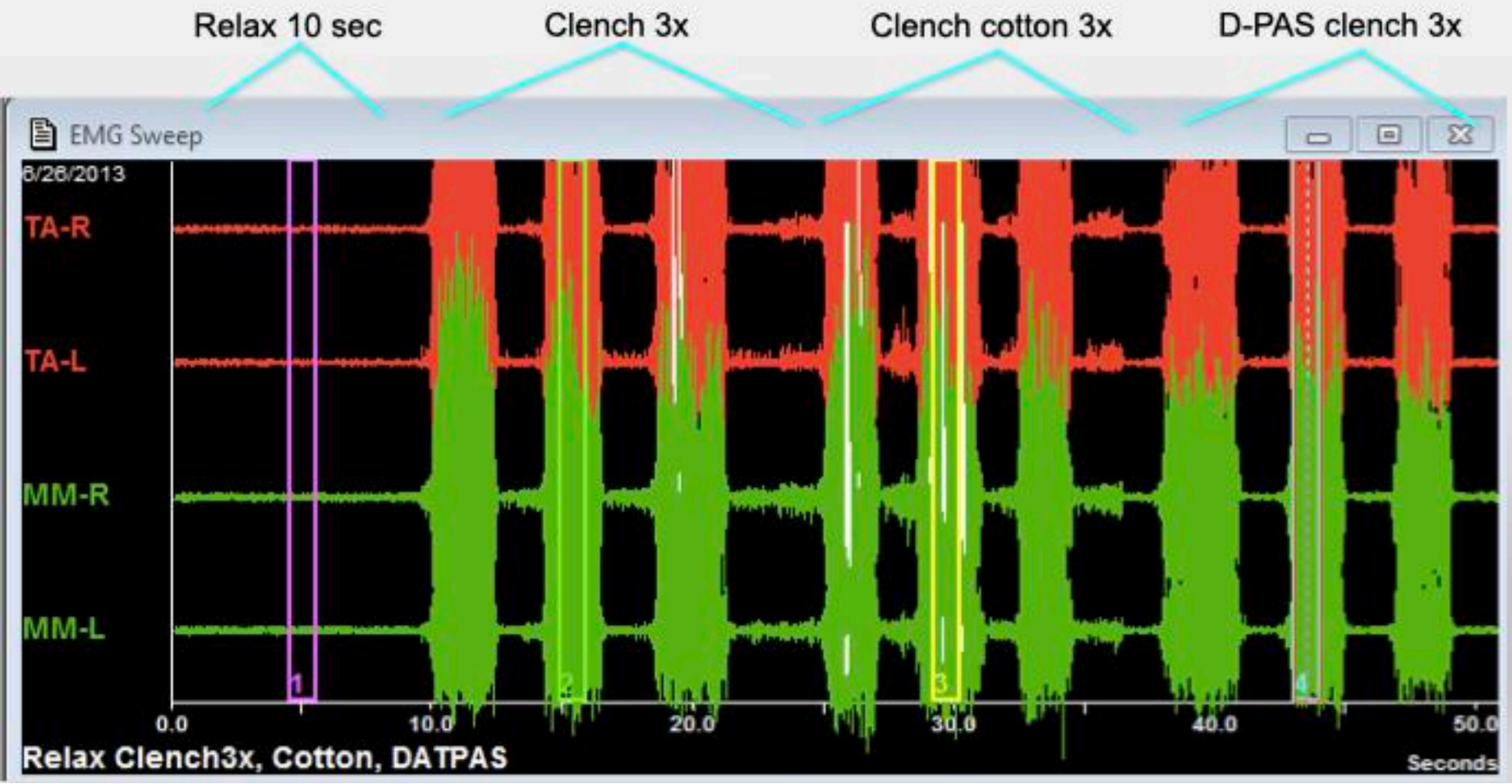
Basically an upper Hawley with anterior stop without clasps or wire

Muscle inhibition with anterior teeth only contact: D-PAS

50-90% decrease EMG



No muscle inhibition with anterior teeth only contact- D-PAS



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3. Are the TMJ muscles inhibited from full contraction with anterior only contact?
4. If sleep grinding, is there an airway issue?
5. Does the dental orthotic make the airway better or worse?

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

"Sleep Airway Screening"

High Resolution
Pulse Oximetry

Data every 1
second average
over 3 seconds

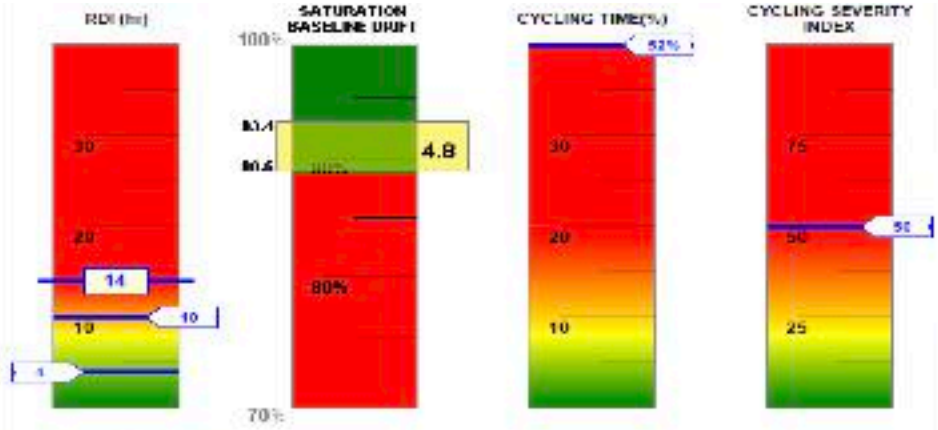
Patient Safety Inc.

SLEEPSAT

SATSCREEN

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

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



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

PATTERN BASED REPORT

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

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

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

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

TRADITIONAL REPORT

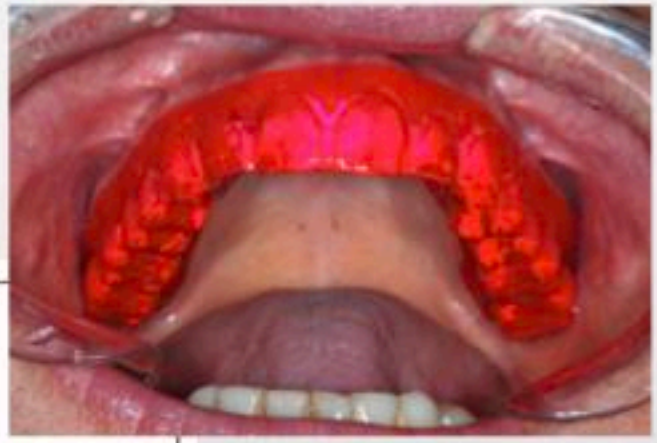
ODI4:	11
Total ODI4 Events:	58
Time in ODI4 Events:	00:29:26
Avg ODI4 Event Duration:	00:00:28
<=88% ODI4 Events:	23
<=88% Longest Duration:	00:01:21
Minimum SpO2:	84
Avg Low 10% SpO2:	86
Avg Low SpO2:	89
Avg Low SpO2 <=88%:	87

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

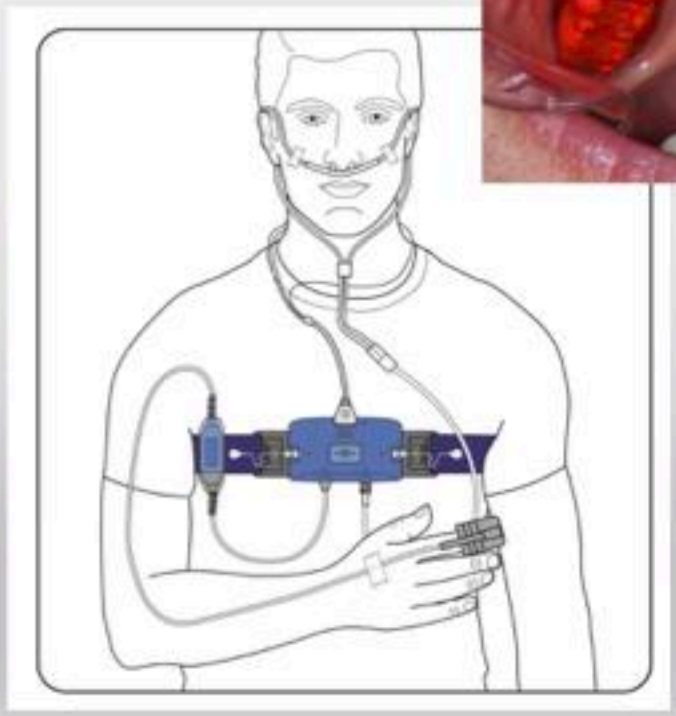
%SpO2	DURATION	%TOTAL
94-100	00:16:37	5%
88-94	04:57:26	91%
80-88	00:13:39	4%
70-80	00:00:00	0%
<= 70	00:00:00	0%
Total	05:27:42	100%
Motion Artifact	00:00:07	0.04%
Error Signal	00:00:05	0.03%

zMachine

zMachine + Brux Checker
+ Snore Lab



GENERAL sleep



Call (888) 330-4424

Use Code: DROTER to receive special offer

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

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

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

Date of Birth: 1998
Age: 20
Sex: F

Height: 63 Inches
Weight: 105 Pounds
BMI: 18.60

Note:

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

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

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

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

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

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

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

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

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

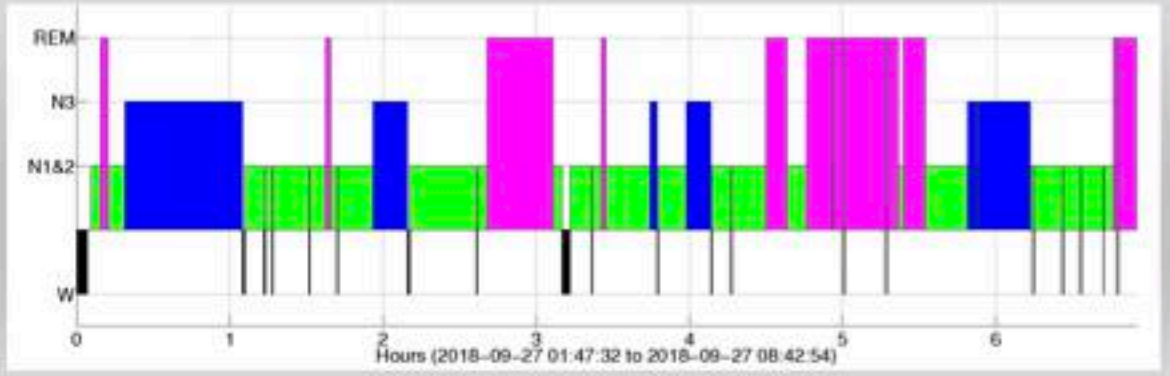
TRT is the total duration of the recording, TIB is the elapsed time from lights off to lights on; TST is the cumulative time scored as any stage of sleep; SE is 100x(TST÷TIB) expressed as a percentage; AHI is apneas + hypopneas per hour of sleep time; RDI is apneas + hypopneas + RERAs per hour of sleep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

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

Respiratory Events

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

Sleep Stages



5 questions that will help identify the specific bruxing disorder:

1. Does the patient grind or clench their teeth?
2. When does/did this occur: Awake or asleep, past or present?
3. Are the TMJ muscles inhibited from full contraction with anterior only contact?
4. If sleep grinding, is there an airway issue?
5. Does the dental orthotic make the airway better or worse?

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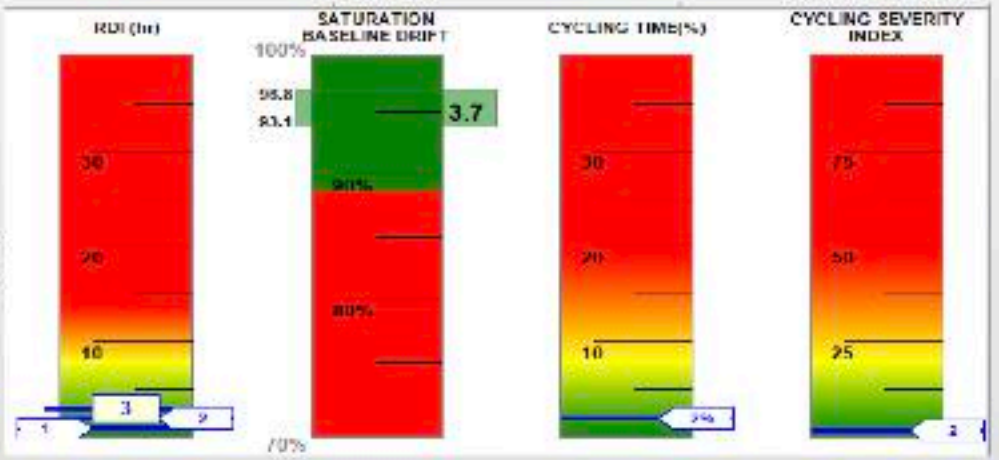
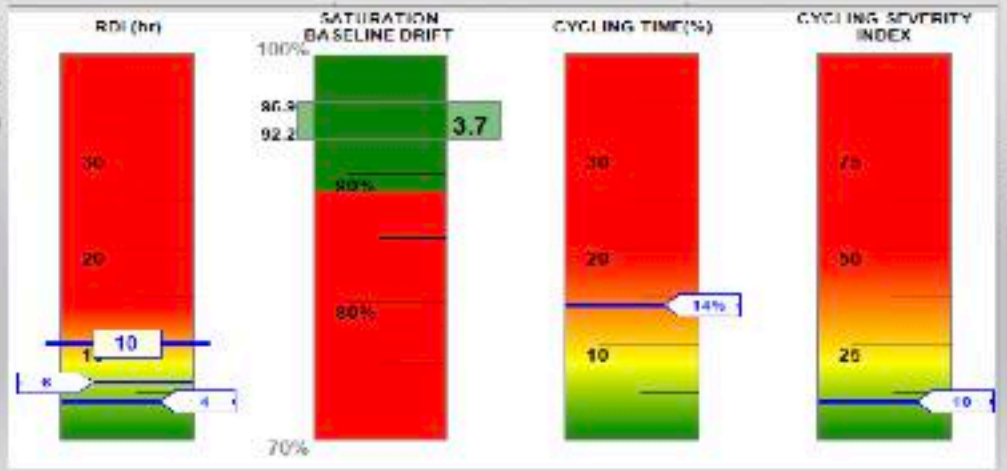
RDI= Respiratory Distress Index

Sometimes D-PAS makes airway better, sometimes worse

No dental orthotic
RDI = 3



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



High Resolution Pulse Oximetry

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

5 questions that will help identify the specific bruxing disorder:

1. Does the patient grind or clench their teeth?
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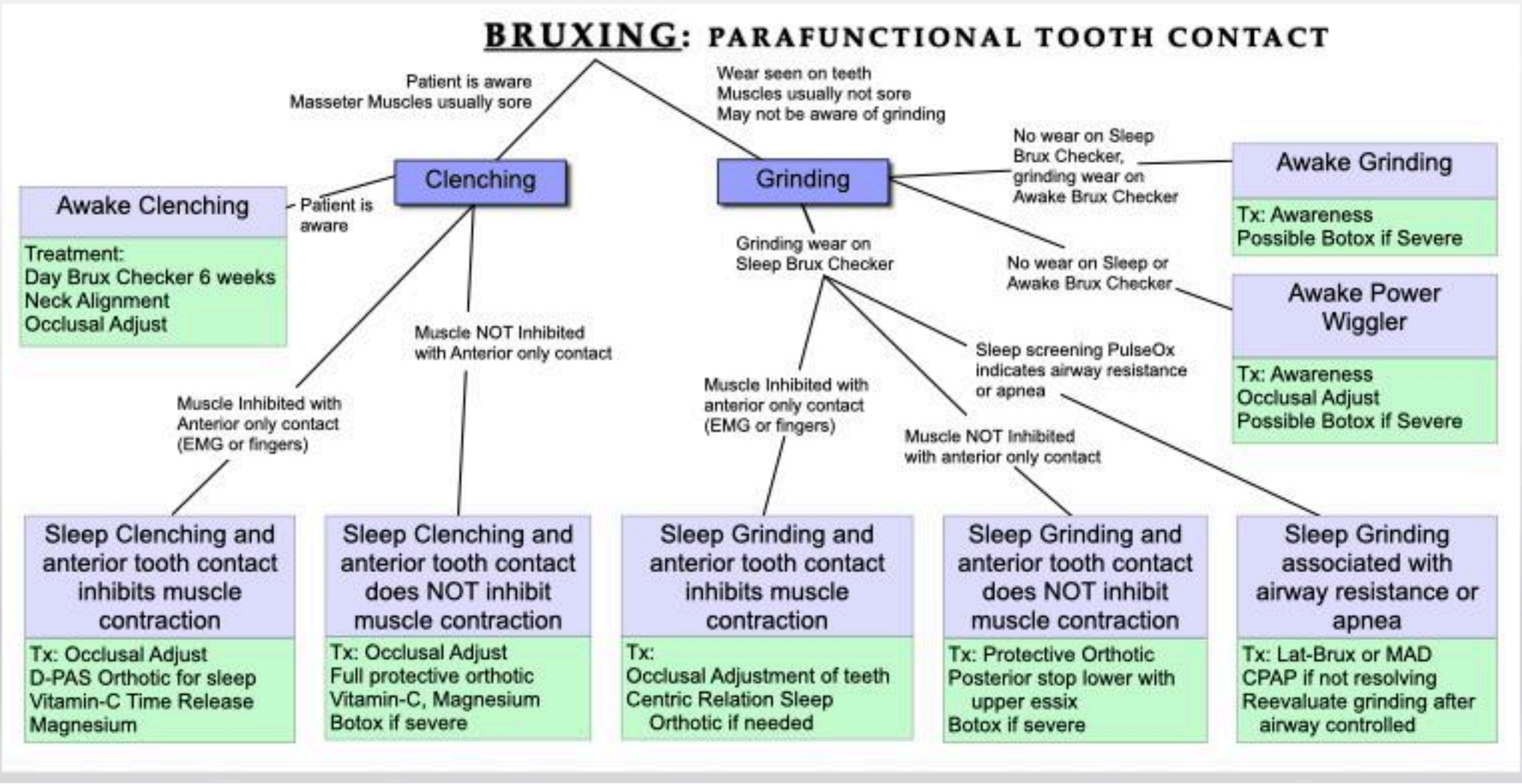
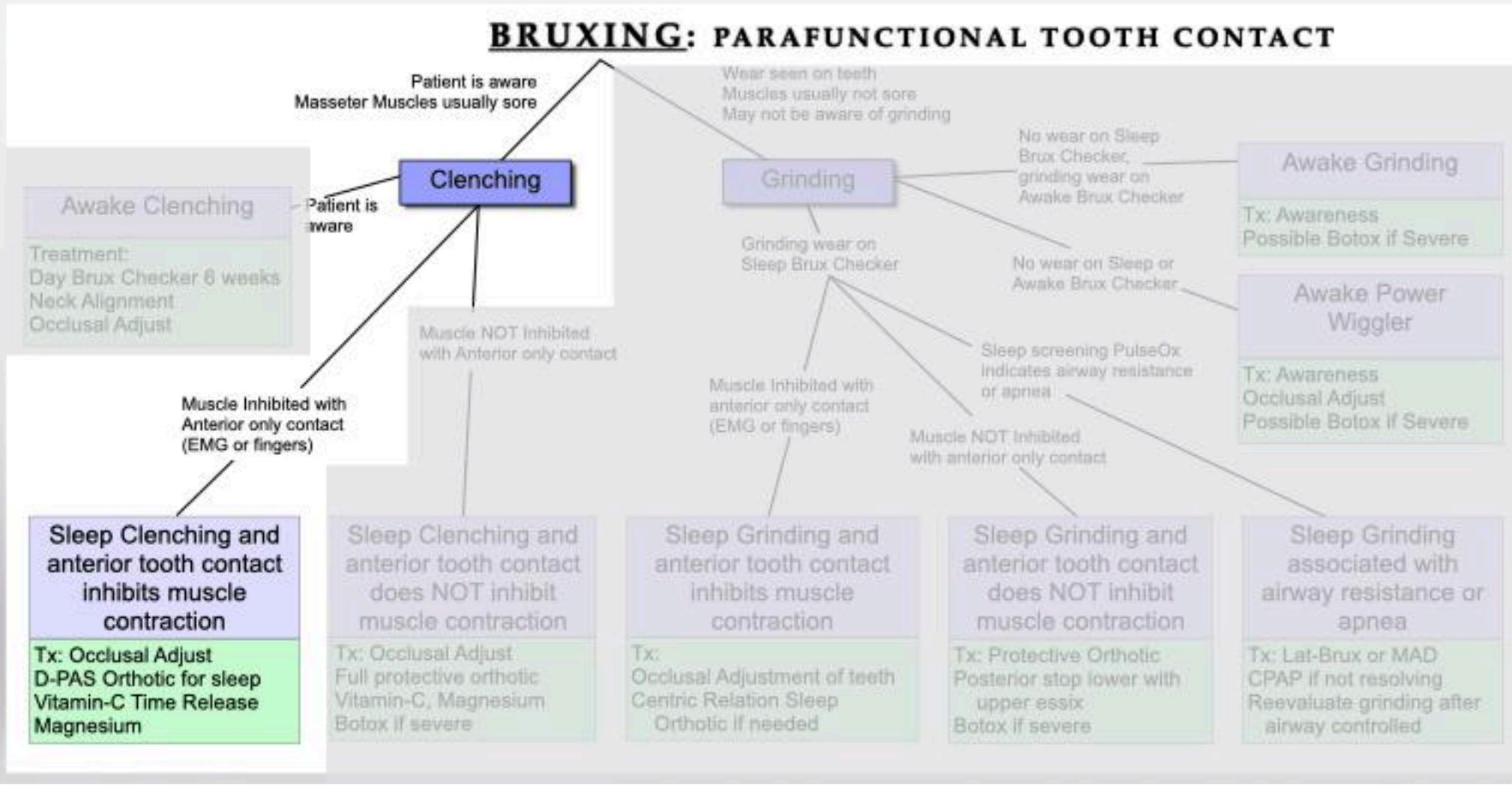
BRUXING: PARAFUNCTIONAL TOOTH CONTACT

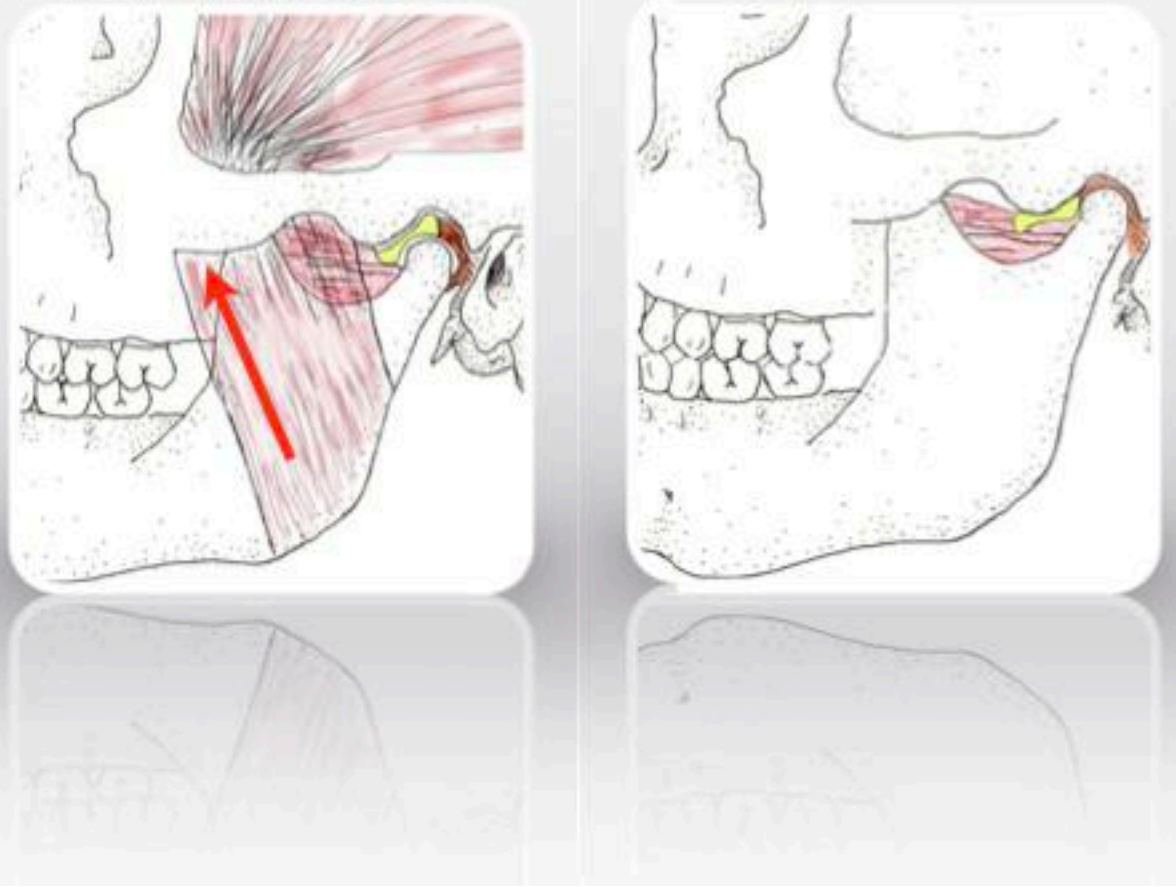


BRUXING: PARAFUNCTIONAL TOOTH CONTACT



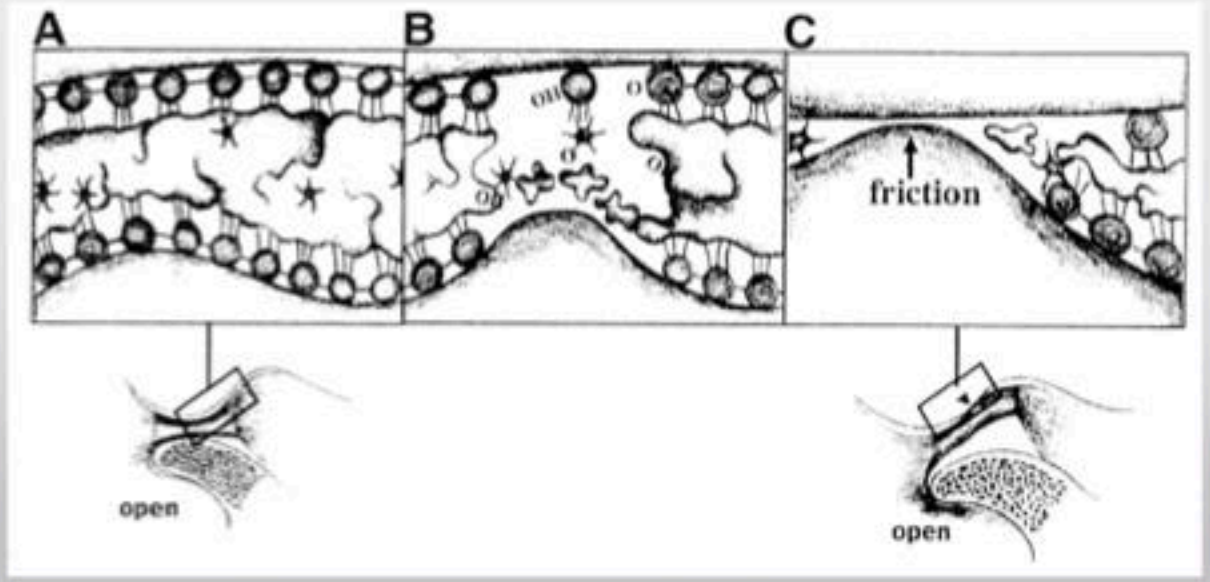
Clenching can cause disc subluxation

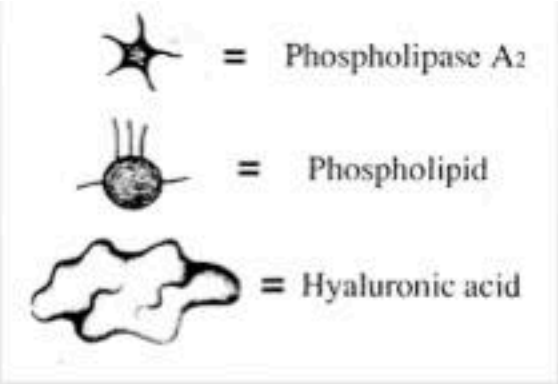
Chronic Micro Trauma from clenching



Clenching breaks down Hyaluronic Acid and Phospholipids

Creates "Sticky disc"





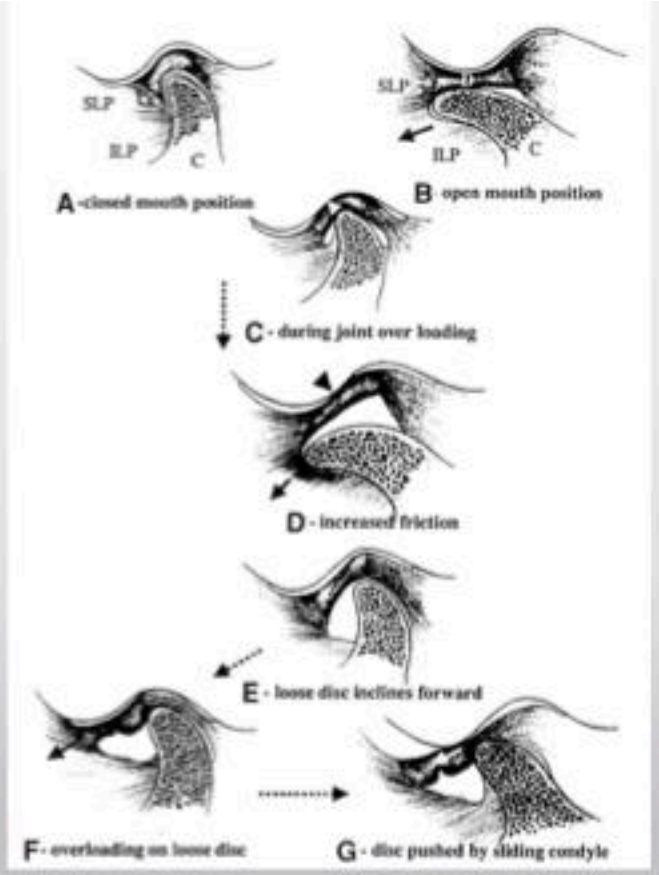
Nitzan, DW, The Process of lubrication impairment and its involvement in temporomandibular joint disc displacement: a theoretical concept, J Oral Maxillofac Surg. 59:36-45, 2001

Sticky Disc sticks as mandible moves

Ligaments loosen

Disc Distorts

Eventually ADD

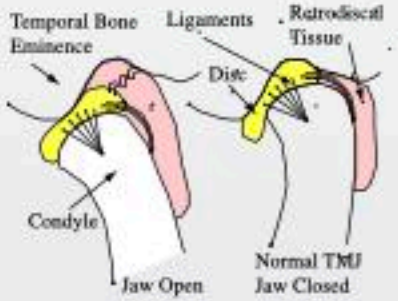


Dr. Dorit Nitzan

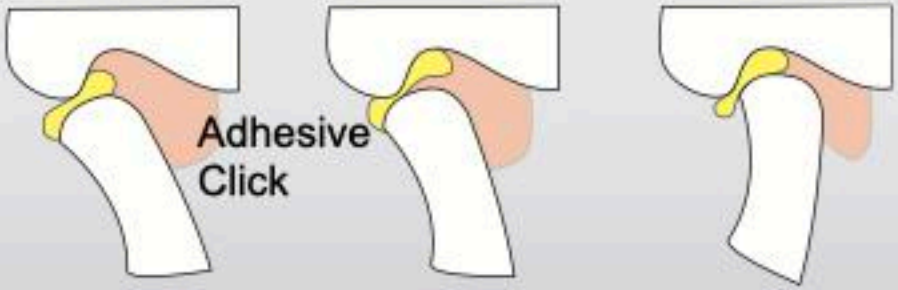
Nitzan, DW, The Process of lubrication impairment and its involvement in temporomandibular joint disc displacement: a theoretical concept, J Oral Maxillofac Surg. 59:36-45, 2001

Clenching can lead to disc dislocation

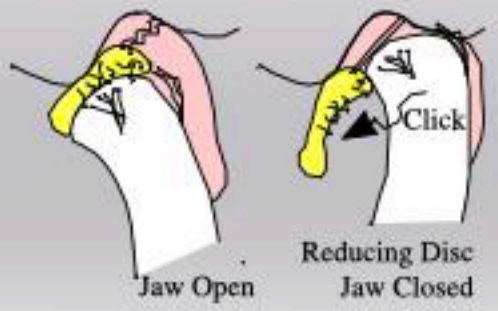
Normal



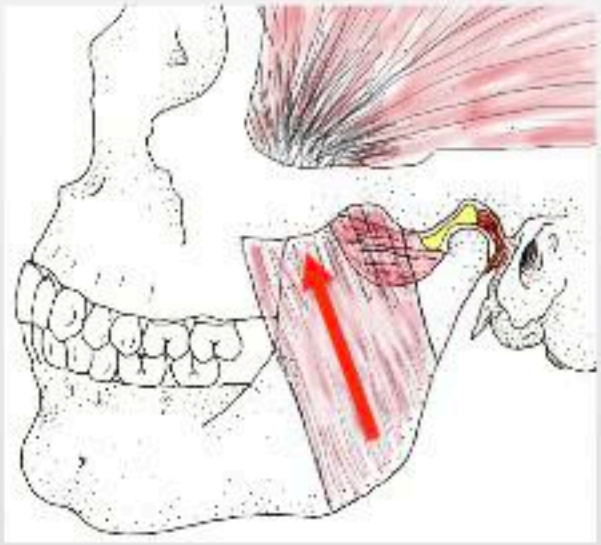
"Sticky Disc" - Clenching causes disc to stick in upper joint compartment. As condyle moves forward, disc distorts and eventually releases, making a clicking sound. On closing disc is slow to return, stretching discal ligaments.



Over time can lead to Anterior Disc Dislocation with Reduction



Hypoxia Re-perfusion Injury



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

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

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

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

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

Magnesium Nutritional Supplementation

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

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

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

www.naturalvitality.com

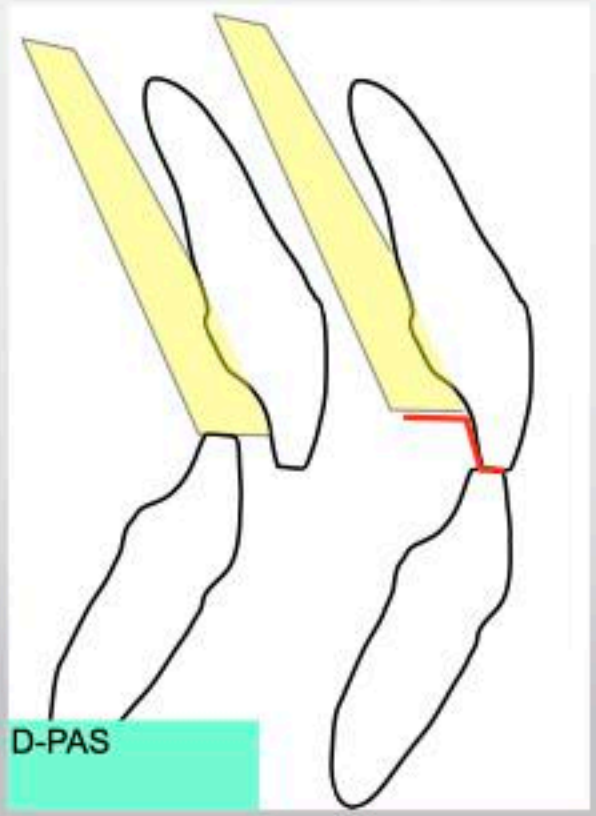
www.meminerals.com

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

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

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

Diagnostic Palatal Anterior Stop
D-PAS



Basically an upper Hawley with anterior stop without clasps or wire

Diagnostic Palatal Anterior Stop

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

Better- Decrease in Symptoms

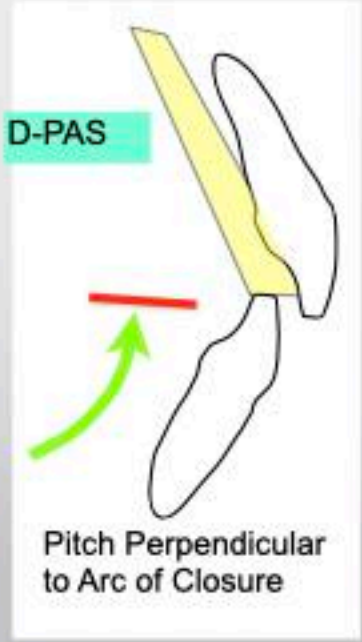
Sleep Clenching Inhibited: Wear D-PAS as night guard
Orthotic Improved Airway: D-PAS as night guard
Occlusal Muscle Disharmony: Occlusal Adjust

Worse- Increase in Symptoms

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

Stays the Same- No Change in Symptoms

Damaged TMJ are mechanically stable
Pain not related to occlusion



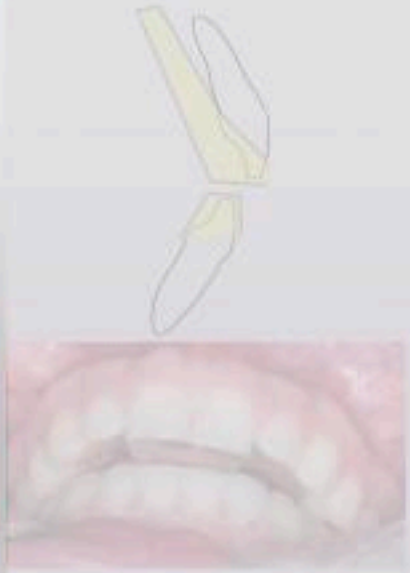
Stapelmann H, Türp JC. The NTI-tss device for the therapy of bruxism, temporomandibular disorders, and headache…..BMC Oral Health. 2008 Jul PMID: 18662411

Which Orthotic to use:

Sleep Clenching with anterior inhibition

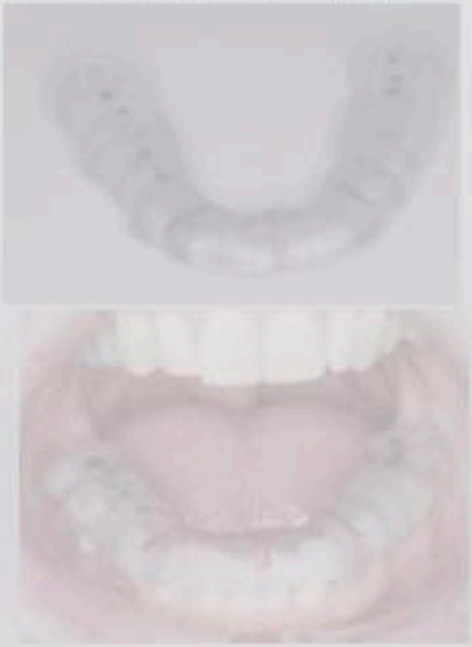
D-PAS
Diagnostic-
Palatal Anterior Stop

Brux-PAS
with lower Essix

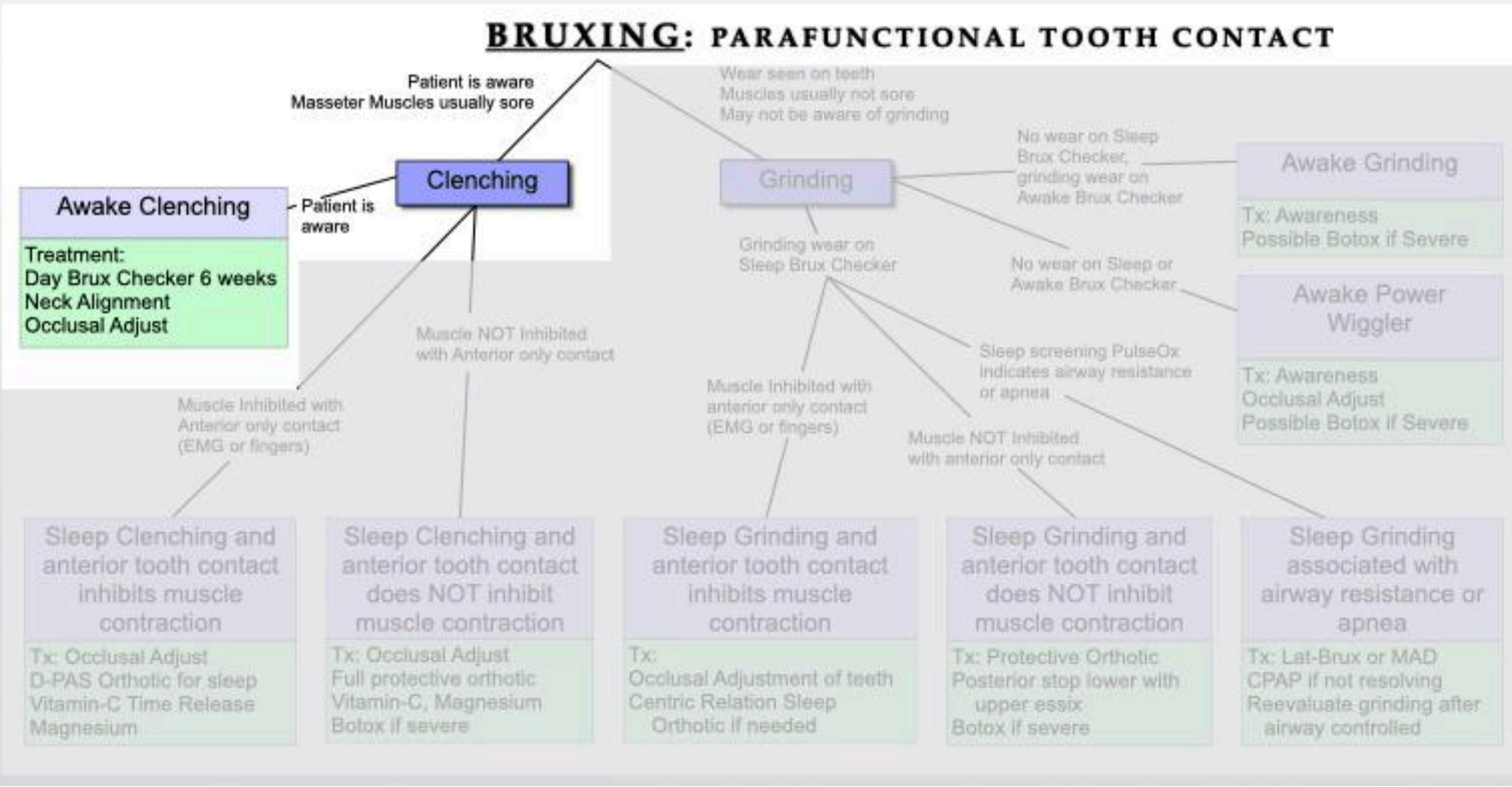


Hard Lower Posterior Stop
with upper essix

Hard Lower Full Coverage
Centric Relation Orthotic



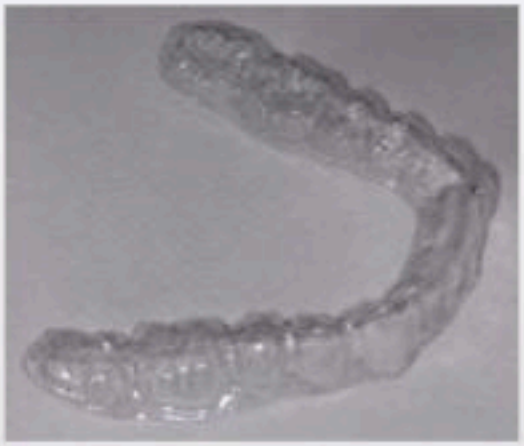
BRUXING: PARAFUNCTIONAL TOOTH CONTACT



Daytime Clenching- Clear Brux Checker

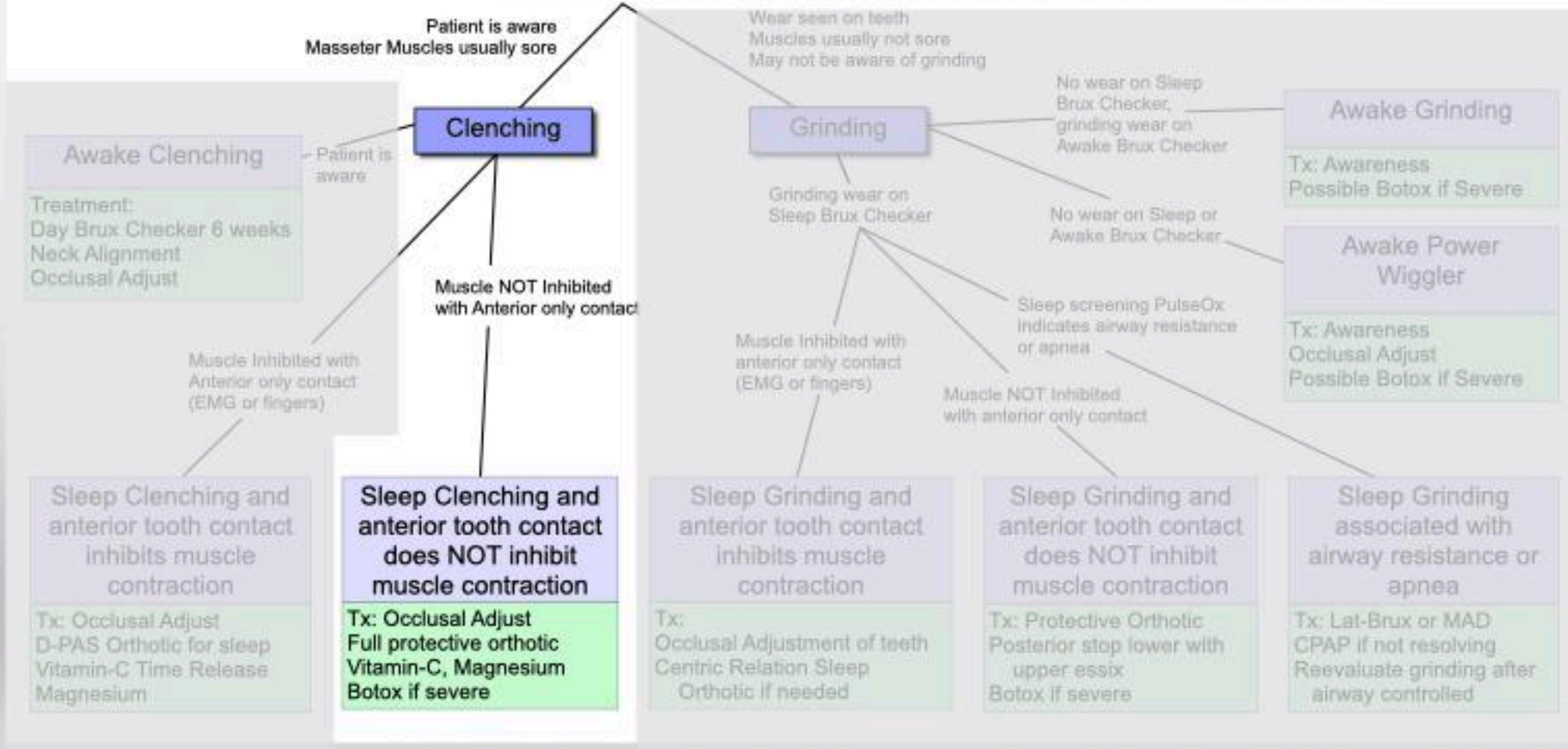
Increase awareness to break habit

Very thin: Similar to mylar used for composites



Great Lakes Orthodontics
Biostar Platzhalterfolie
Item Ref 3202.1

BRUXING: PARAFUNCTIONAL TOOTH CONTACT

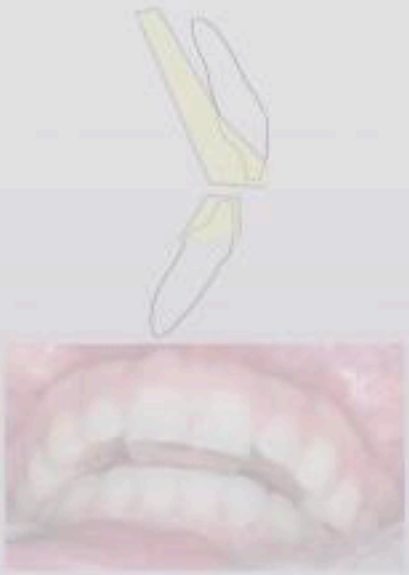


Which Orthotic to use:

Sleep Clenching with NO anterior inhibition

D-PAS
Diagnostic-
Palatal Anterior Stop

Brux-PAS
with lower Essix



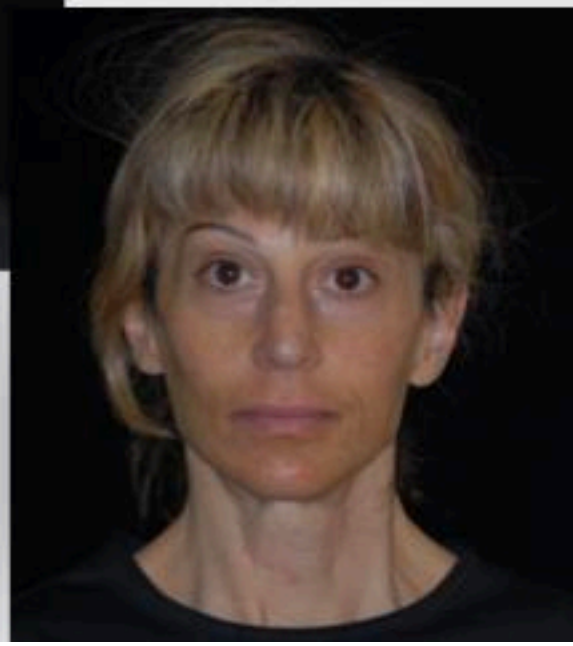
Hard Lower Posterior Stop
with upper essix

Hard Lower Full Coverage
Centric Relation Orthotic

Medications that affect Parafunction

Botox will decrease strength of bruxing contraction Decrease Masseter Hypertrophy

Botox injection
Masseter Muscles



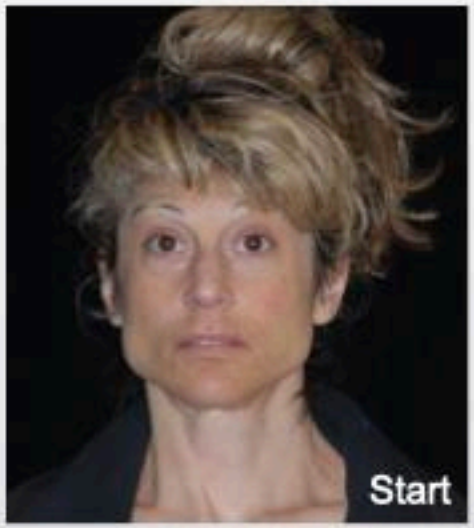
Need to address cervical and occlusal issues along with Botox therapy

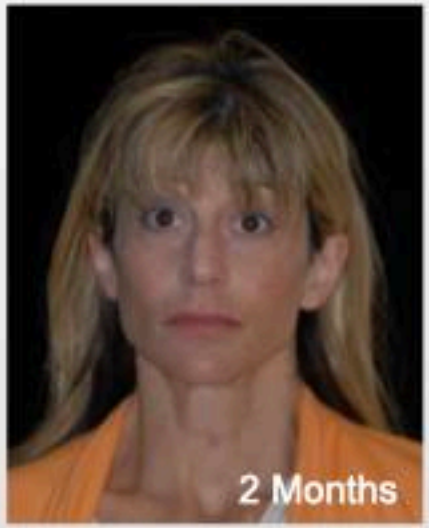
6 months

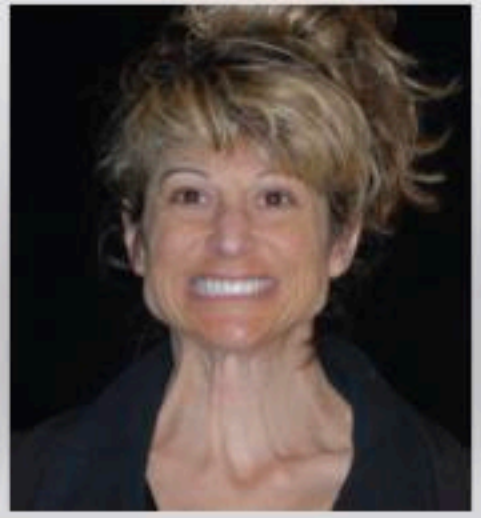
J Plast Reconstr Aesthet Surg. 2010 Dec;63(12):2026-31. Evaluation and selecting indications for the treatment of improving facial morphology by masseteric injection of botulinum toxin type A. Gaofeng L1, Jun T, Bo P, Bosheng Z, Qian Z, Dongping L.

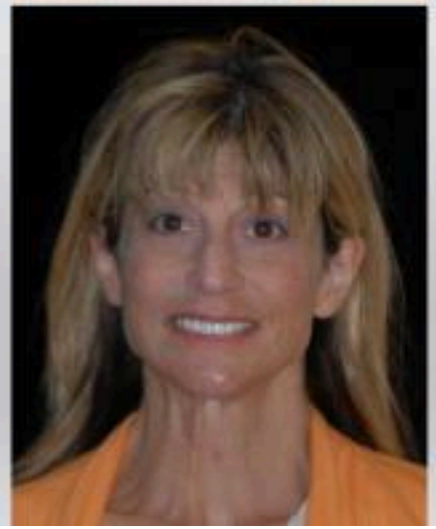
Medications that affect Bruxing

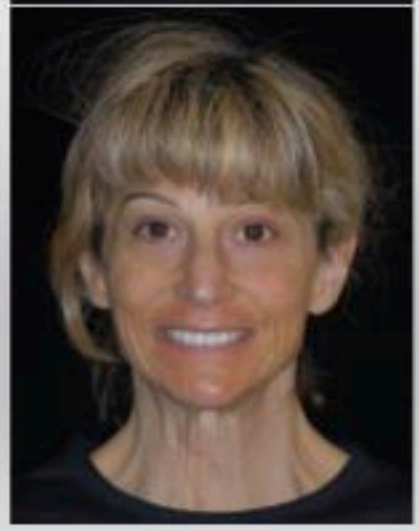
Botox injection
Masseter
Muscles











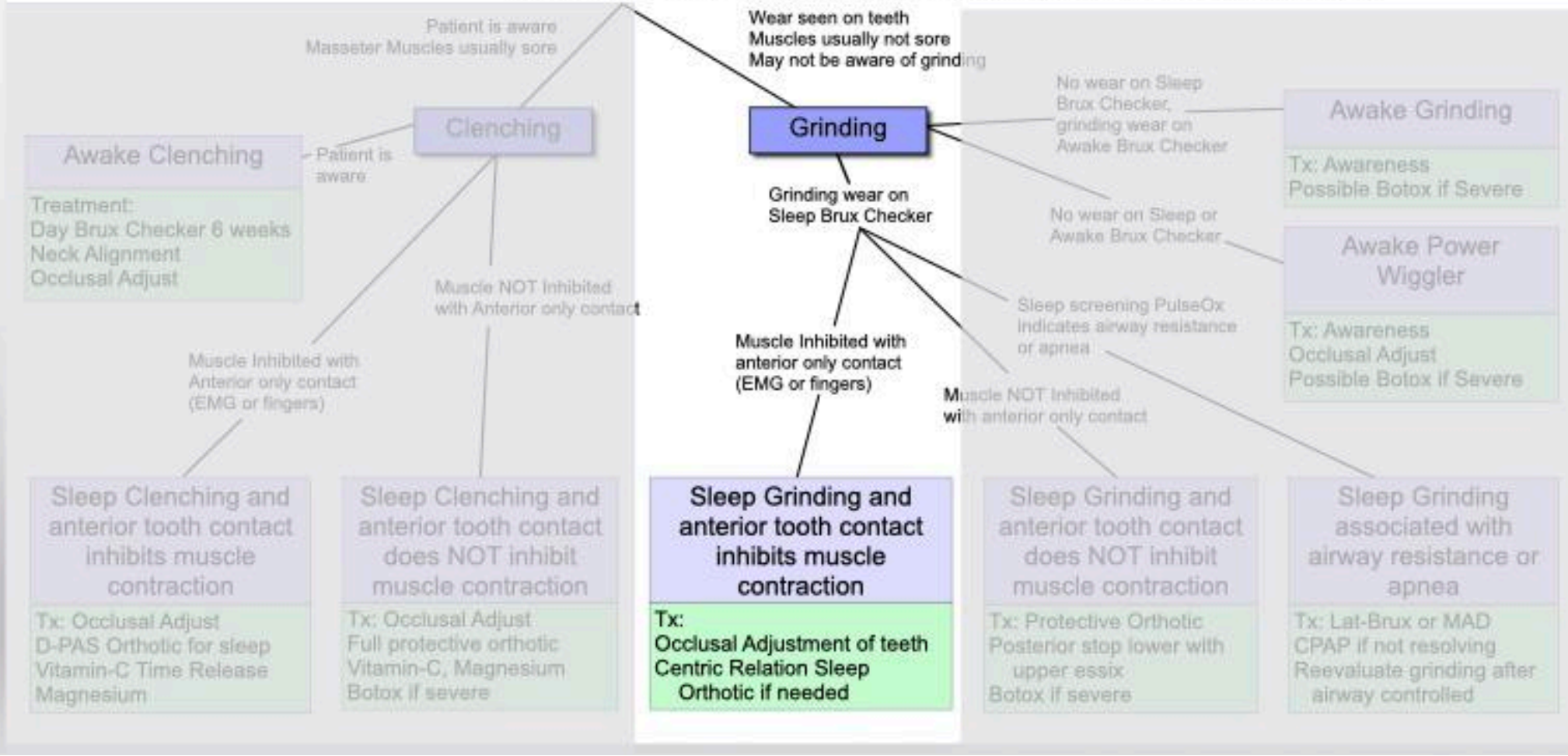
Medications that affect Bruxing

Selective Serotonin Reuptake Inhibitors
- SSRI that increase bruxing: Prozac, Zoloft
- SSRI neutral on bruxing: Cymbalta, Wellbutrin

Klonopin/Clonazepam (benzodiazepine)
- May decrease sleep bruxing
- Addiction potential, causes low BP
- Not a long term solution

Maria Clotilde Carra DMD, Nelly Huynh PhD, and Gilles Lavigne DMD PhD FRDC
Sleep Bruxism: A Comprehensive Overview for the Dental Clinician Interested in Sleep Medicine.
Dental Clinics of NA, 56(2), 387–413. doi:10.1016/j.cden.2012.01.003

BRUXING: PARAFUNCTIONAL TOOTH CONTACT

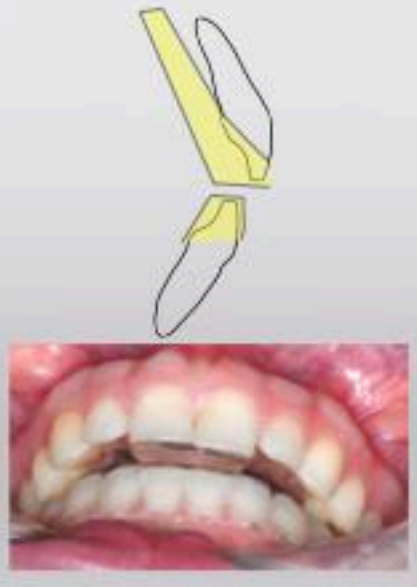


Which Orthotic to use:

Sleep Grinding with anterior inhibition

D-PAS
Diagnostic-
Palatal Anterior Stop

Brux-PAS
with lower Essix



Hard Lower Posterior Stop
with upper essix

Hard Lower Full Coverage
Centric Relation Orthotic

Anatomic Orthotic by Dr. Buzz Raymond

Pankey Study Clubs
Tanner Study Clubs

Occlusal Muscle Disharmony

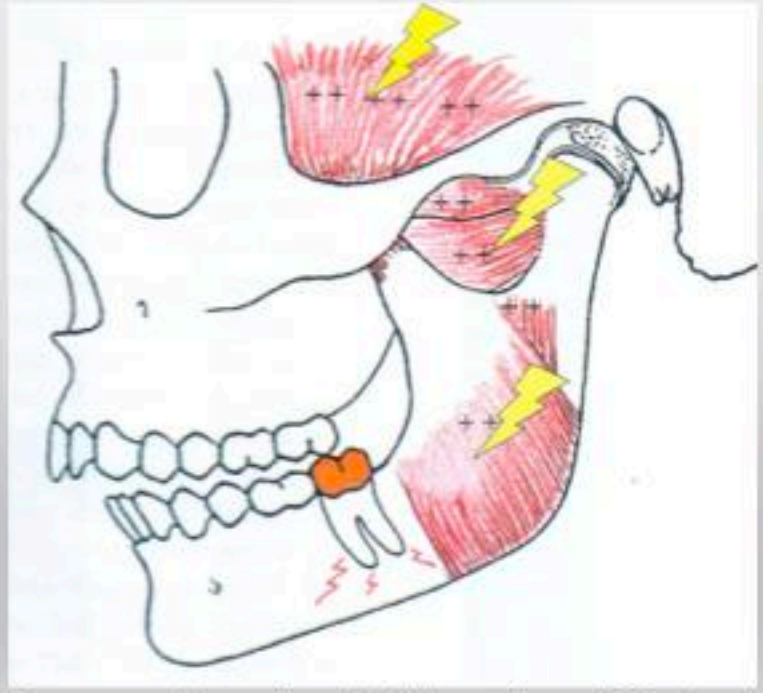
Uneven tooth contact with condyles fully seated triggers muscle activity

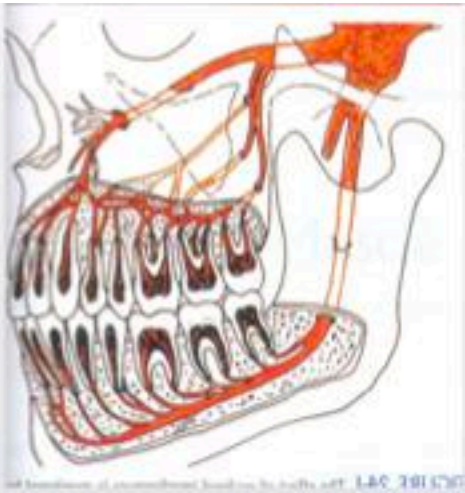
Lateral pterygoid fires out of sequence to create even tooth contact on closure

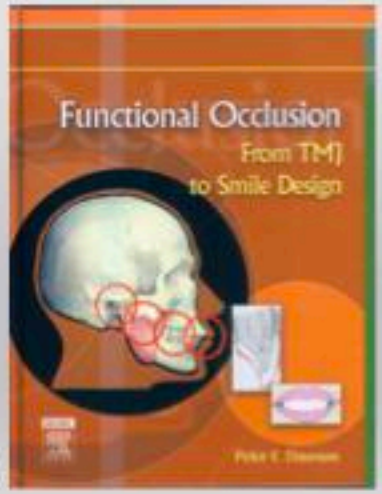
Disharmony in all muscles: Splinting/Bracing

Muscles sore from overuse

Muscles do not think- CNS input







from Dawson's Textbook, "Functional Occlusion"

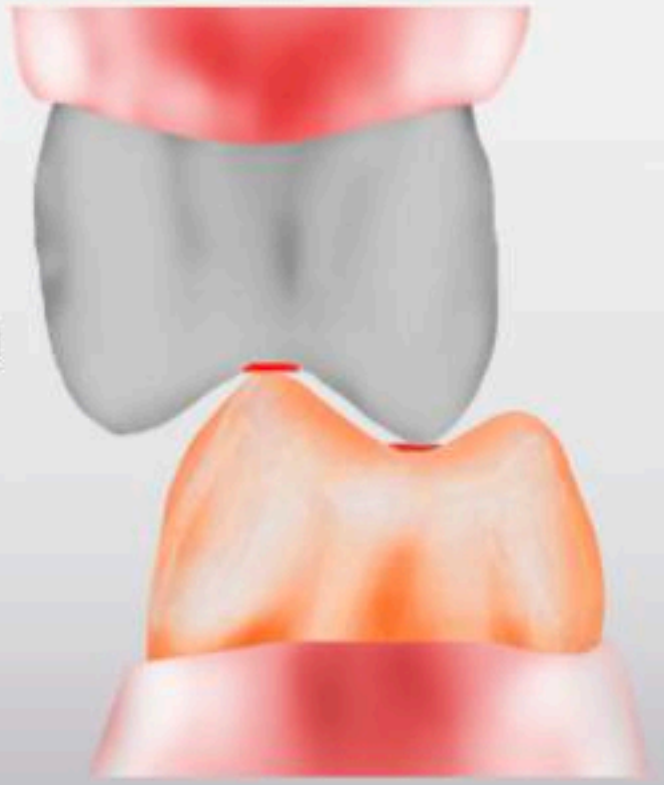
LD Pankey's 3 Rules of Occlusion

(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



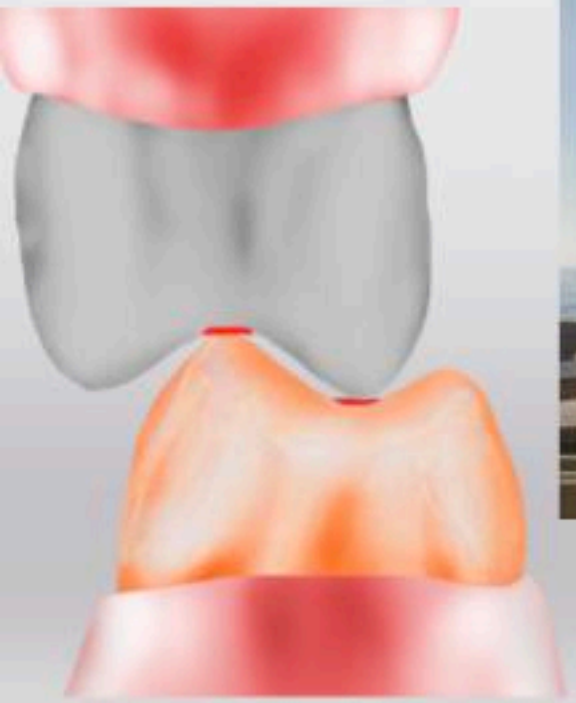
Drawing by Dr Jim Kessler

Why LD Never wrote a text book

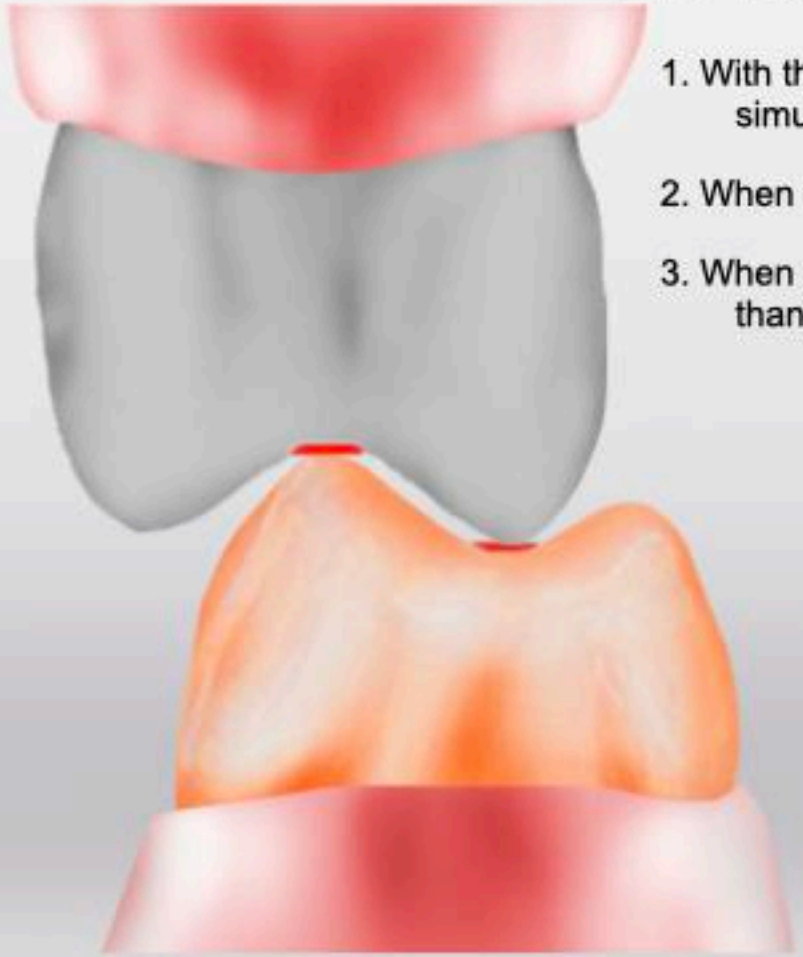
Slide by Dr John R Droter

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

Rule #2 = Flat Landing Area



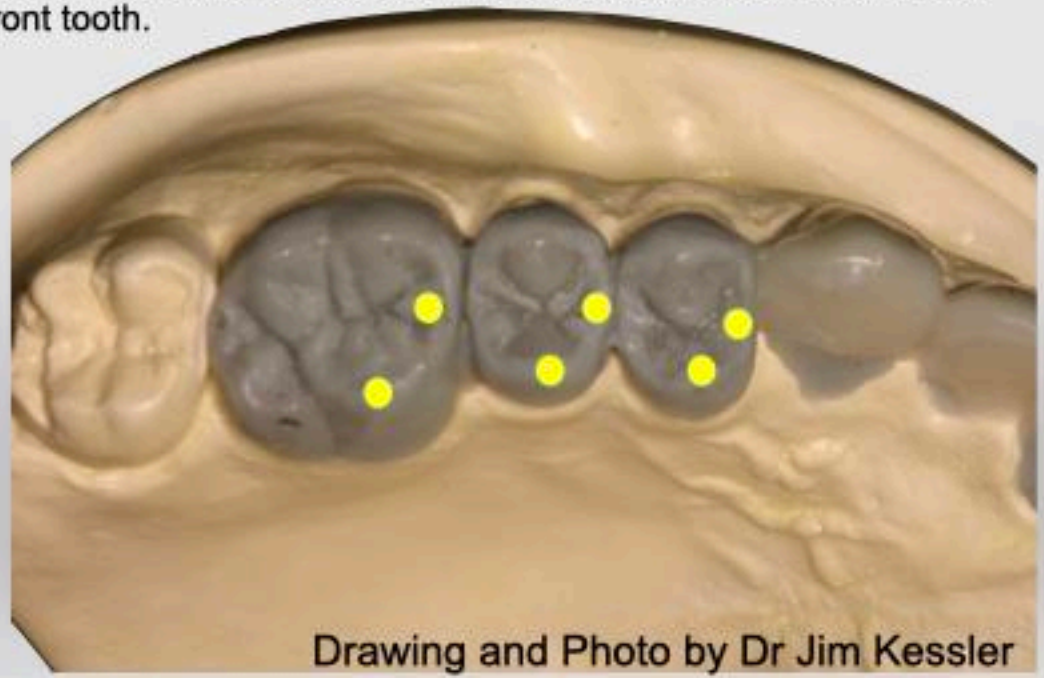
LD Pankey's 3 Rules of Occlusion (Clyde Schuyler)



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.



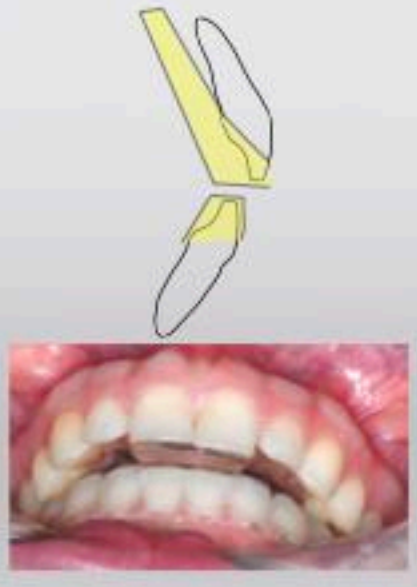
Drawing and Photo by Dr Jim Kessler

Which Orthotic to use:

Sleep Grinding with anterior inhibition

D-PAS
Diagnostic-
Palatal Anterior Stop

Brux-PAS
with lower Essix

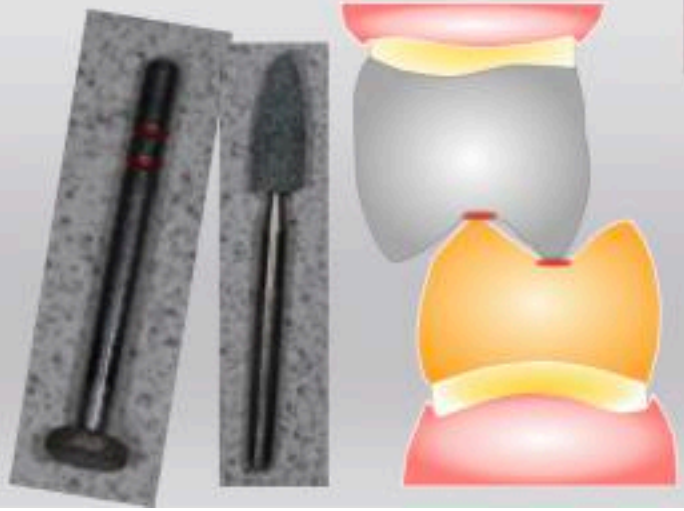


Hard Lower Posterior Stop
with upper essix

Hard Lower Full Coverage
Centric Relation Orthotic

The best orthotic may be no orthotic with teeth adjusted to a disclusion time of less than 400 mSec with T-Scan

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



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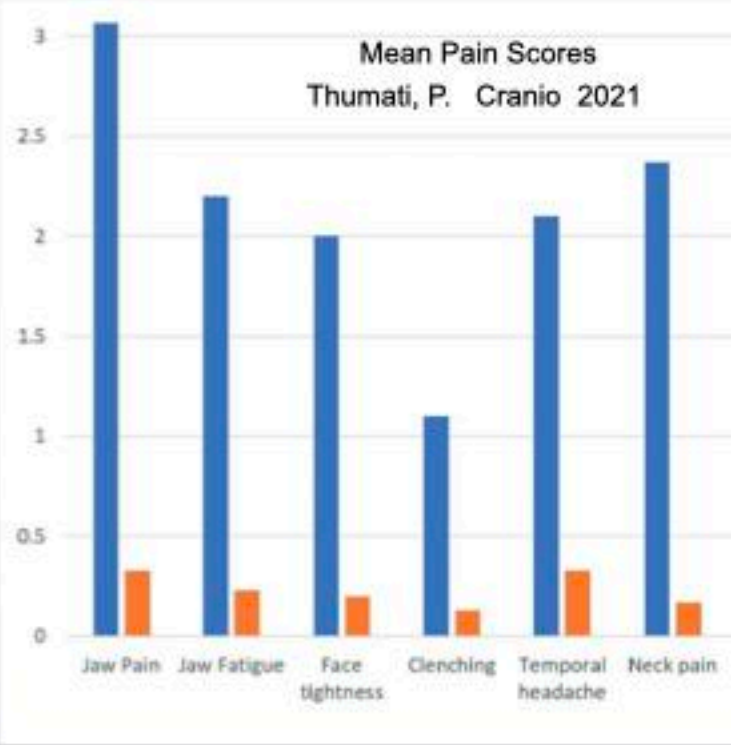


Kerstein, RB. Cranio 1995
Treatment of myofascial pain dysfunction syndrome with occlusal therapy to reduce lengthy disclusion time—a recall evaluation.

Thumati ,P. J Indian Prosthodont 2016
The effect of disocclusion time-reduction therapy to treat chronic myofascial pain: A single group interventional study with 3 year follow-up of 100 cases.

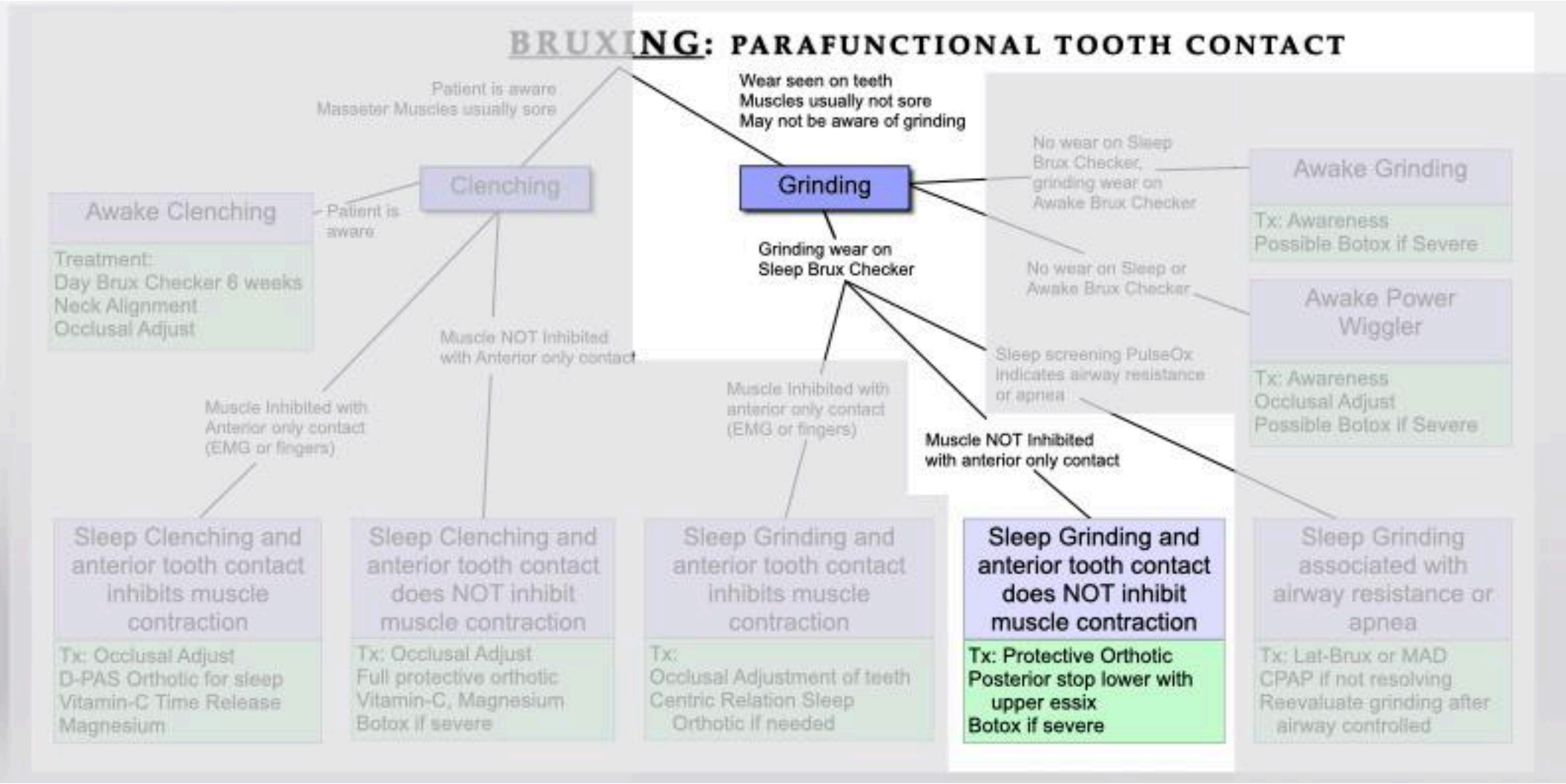
Thumati, P. Cranio 2021
A retrospective five-year survey on the treatment outcome of disclusion time reduction (DTR) therapy in treating temporomandibular dysfunction patients.

The best orthotic may be no orthotic with teeth adjusted to a disclusion time of less than 400 mSec with T-Scan

Table of Signs and Symptoms Associated with Bruxing

Patient Report with Bruxism None = 0, occasional = 1, often = 2, always = 3	Pre-treatment	Day 1 post	1 Week post	1 month post	12 months post
Aware of nighttime tooth grinding	88	38	21	20	11
Morning facial muscle soreness	89	38	2	2	0
Morning headache	94	31	23	20	3
Afternoon or evening headache	55	35	1	1	0
Teeth sensitive to cold	74	33	0	0	0
Daytime tooth clenching or grinding	48	36	9	7	1
Clinical examination never = 0, minor = 1, moderate = 2, severe = 3	p =	0.00078		0.00715	
	0.00408		0.02275		
Current Tooth Wear	57	57	57	57	57
Masseter muscle hypertrophy	49	49	15	15	15
Muscles tender to palpation	44	37	1	1	1
Wear facets	46	46	46	46	46
Indentations on the tongue	45	45	10	6	0
Linear Alba on inner cheek	15	15	4	4	0

Thumati, Kerstein, Radke. Advanced Dental Technologies & Techniques. December 2021
Bruxism Improvements After Disclusion Time Reduction (DTR) – A Pilot Study.


BRUXING: PARAFUNCTIONAL TOOTH CONTACT
Patient is aware
Masseter Muscles usually sore
Wear seen on teeth
Muscles usually not sore
May not be aware of grinding
Clenching
Grinding
Awake Clenching
Patient is aware
Treatment:
Day Brux Checker 6 weeks
Neck Alignment
Occlusal Adjust
No wear on Sleep Brux Checker, grinding wear on Awake Brux Checker
Awake Grinding
Tx: Awareness
Possible Botox if Severe
Grinding wear on Sleep Brux Checker
No wear on Sleep or Awake Brux Checker
Awake Power Wiggler
Tx: Awareness
Occlusal Adjust
Possible Botox if Severe
Muscle NOT Inhibited with Anterior only contact
Muscle Inhibited with Anterior only contact (EMG or fingers)
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Magnesium
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Tx: Occlusal Adjust
Full protective orthotic
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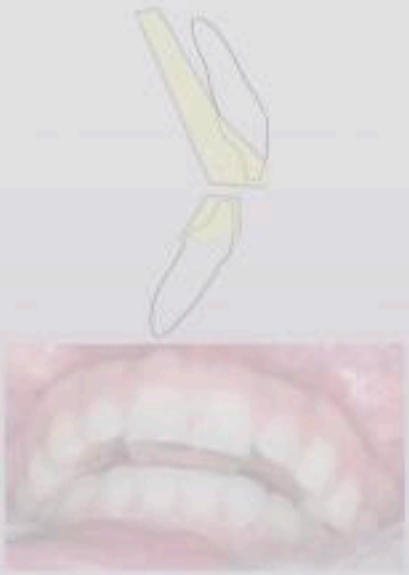
Sleep Grinding and anterior tooth contact inhibits muscle contraction
Tx:
Occlusal Adjustment of teeth
Centric Relation Sleep Orthotic if needed
Sleep Grinding and anterior tooth contact does NOT inhibit muscle contraction
Tx: Protective Orthotic
Posterior stop lower with upper essix
Botox if severe
Sleep Grinding associated with airway resistance or apnea
Tx: Lat-Brux or MAD
CPAP if not resolving
Reevaluate grinding after airway controlled

Which Orthotic to use:

Sleep Grinding with NO anterior inhibition

D-PAS
Diagnostic-
Palatal Anterior Stop

Brux-PAS
with lower Essix



Hard Lower Posterior Stop
with upper essix

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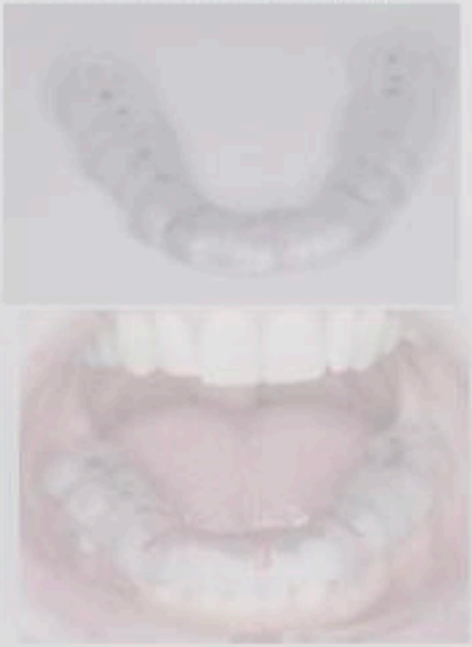
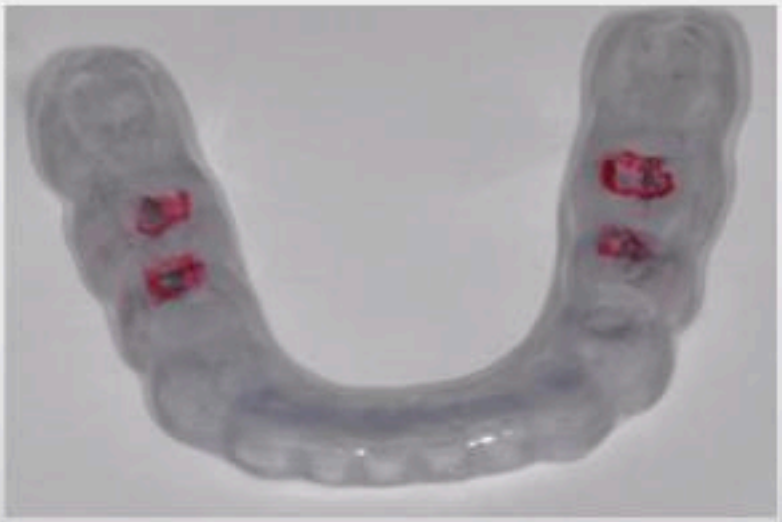


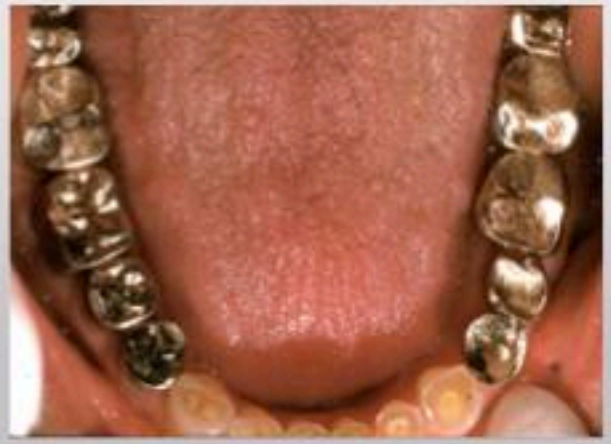
Lower Posterior Stop Night guard with upper Essix



Side to Side Severe Grinding

Sleep Disorder
?Airway Related?

How to Restore??



Lavigne GJ, Khoury S, Abe S, Yamaguchi T, Raphael K., Bruxism physiology and pathology: an overview for clinicians. J Oral Rehabil. 2008 Jul;35(7):476-94

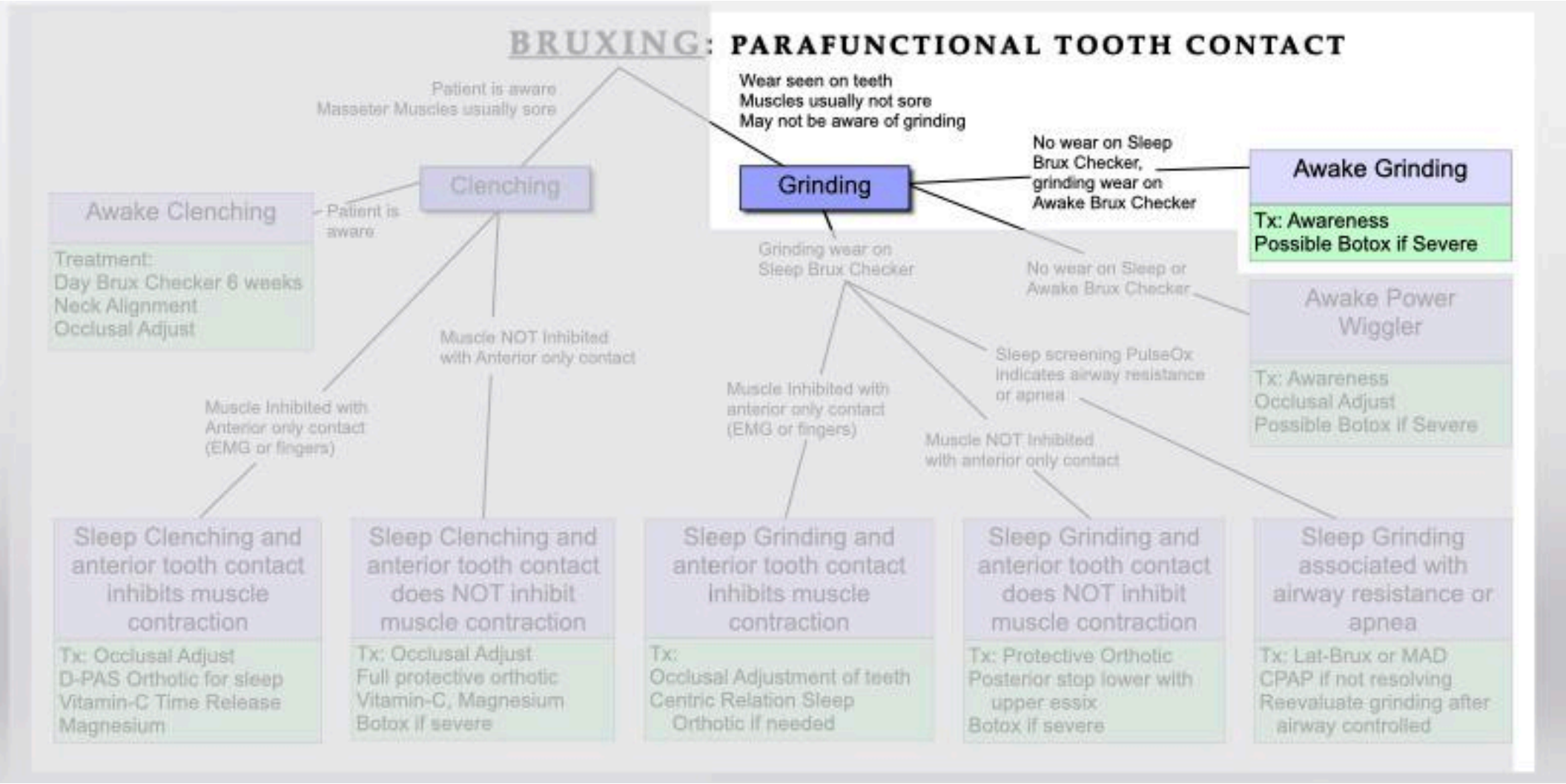
Delivery

5 years post tx

Key Point:
Build in group function
Side to Side Grinders.

Kids 25-35% Grind

Serra-Negra JM, Paiva SM, Seabra AP, Dorella C, Lemos BF, Pordeus IA., Prevalence of sleep bruxism in a group of Brazilian schoolchildren. Eur Arch Paediatr Dent. 2010 Aug;11(4):192-5.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Masseter Muscles usually sore
Clenching
Patient is aware
Awake Clenching
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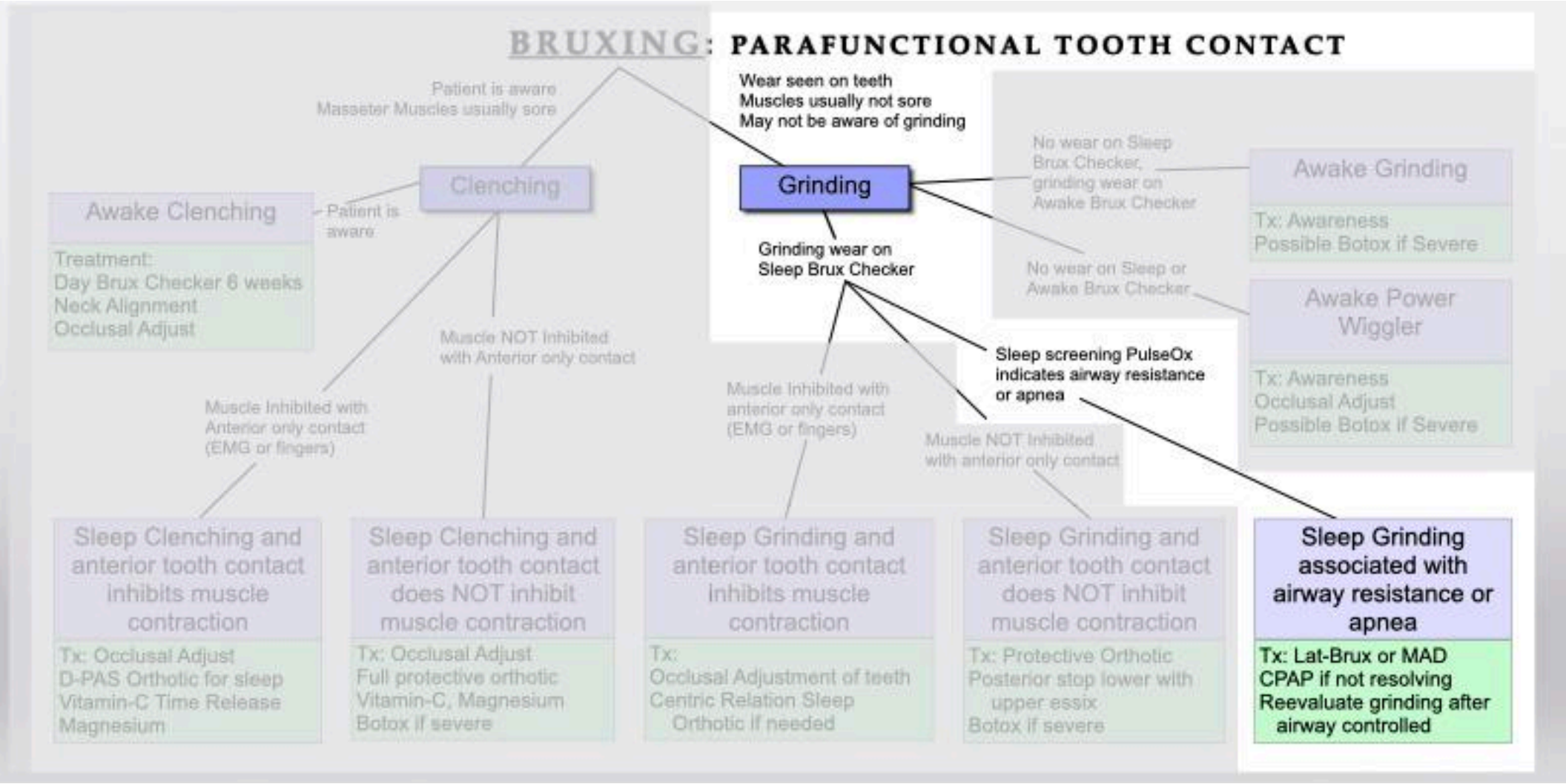
CPAP if not resolving
Reevaluate grinding after airway controlled

Fracture of porcelain and fracture of lower teeth 6 months
after delivery of full mouth crowns
(Not my crowns)

Occlusal Adjustment on curve Spee/Wilson
Set up group function
Long term Radica Temps 23-26
Pt reported crowns finally felt natural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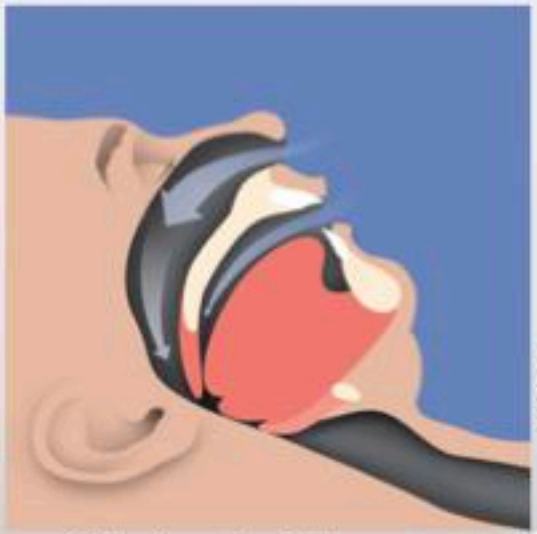
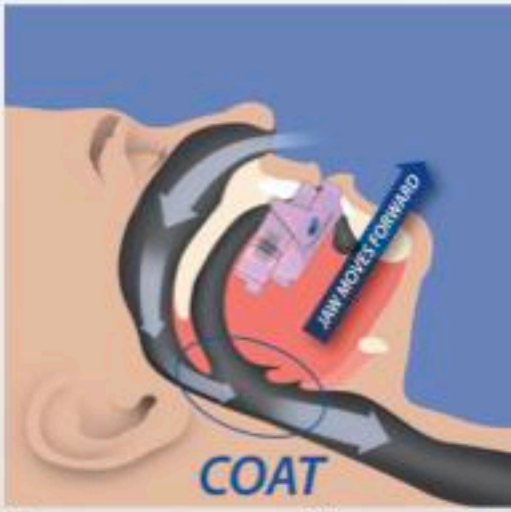
Mandibular Advancement Devices (MAD)
Open the airway by advancing the mandible and tongue

Normal Airway

Upper Airway Resistance
Snoring in men
Purring in women



Obstructed Apnea Airway



Airway opens with Mandibular Advancement

Better Solutions:
Treat Causes

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

example: worldwide insulin shortage

Disordered Breathing Disease Progression

Disease Stage 1

Predisposing Factors

Small Airway

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

Disease Stage 2

Compensation:
Airway Maintained

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

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

Disease Stage 3

Sleep
Airway Partial Collapse

Signs
- All of stage 1 and 2 plus…..
- Upper Airway Resistance
- 2-4% Drop O_2 Saturation
- RERA- Respiratory Arousals
- ⬇ Growth Hormone

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

Disease Stage 4

Sleep
Airway Full collapse

Signs
- All of stage 1, 2, 3 plus….
- 4%+ drop O_2 Saturation
- Apnea
- Cardiovascular Damage
- Elevated BP
- GERD
- Sleep Teeth Grinding

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

John R. Droter DDS

Disordered Breathing Disease Stage 4

OSA- Obstructive Sleep Apnea

AHI- Apnea Hypopnea Index

Apnea and Hypopnea events per hour

Apnea- Stop airflow for 10 seconds

Hypopnea- <50% airflow or 3+% O_2 Desaturation

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

Signs

- Apnea
- 4% drop O_2 Saturation
- Cardiovascular Damage
- Elevated BP
- GERD
- Sleep Teeth Grinding

Symptoms

- Not Waking Rested, Daily Fatigue
- Cognitive Impairment
- Worn Teeth

Irreversible Damage

John R. Droter DDS

Handout for Patients

www.drdroter.com

Disordered Breathing Disease Progression

Disease Stage 1	Disease Stage 2	Disease Stage 3	Disease Stage 4
Predisposing Factors	Compensation: Airway Maintained	Sleep Airway Partial Collapse	Sleep Airway Full collapse
Tongue Tie, Lip Tie Bottle Fed as Infant Dysfunctional Swallow Allergies Nasal Obstruction Large Tonsil Large Adenoids Large Tongue Mid-face Deficient Mandibular Deficient Small Airway	Signs Tongue Bracing Indents in Tongue Head Postured Forward Jaw Postured Forward Sore Masseters Sore Neck Muscles Mouth Breathing Symptoms Facial Ache Not Waking Rested Daily Fatigue Neck Soreness	Signs All of stage 1 and 2 plus.... Upper Airway Resistance 2% Drop O_2 Saturation RERA- Respiratory Arousals ⬇ Growth Hormone Symptoms Heart Rate Fluctuation Snoring or "Purring" Weight Gain Cognitive Impairment, ADD Hyperactivity	Signs All of stage 1, 2, 3 plus.... 3+% drop O_2 Saturation Apnea Cardiovascular Damage Elevated BP GERD Sleep Teeth Grinding Symptoms All of stage 2, 3 plus.... Worn Teeth

John R. Droter DDS

Disordered Breathing Disease Stage 4

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Signs
Apnea
3+% drop O_2 Saturation
Cardiovascular Damage
Elevated BP
GERD
Sleep Teeth Grinding

Symptoms
Not Waking Rested, Daily Fatigue
Cognitive Impairment
Worn Teeth

Irreversible Damage

John R. Droter DDS

John R. Droter, D.D.S.
4000 Mitchellville Rd., Suite B
Bowie, Maryland, 20716
301-805-9400
www.drdroter.com

Disordered Breathing is a very serious condition that can be fatal.

Young patients can be treated, older patients can only be managed.

There are many causes. This is not a single disease with a single treatment.

Causes:
Nasal Obstruction
Tonsil Adenoids Obstruct
Mouth breathing
Tongue hypertrophy
Tongue Adipose
Inflammation Pharyngeal Tissue
Central Apnea

New York 2013
Train took curve at 80mph
4 Dead, 61 Injured

Sleep Apnea

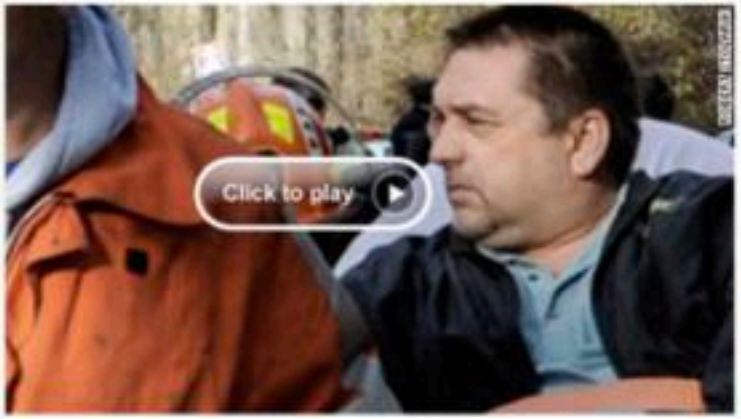
Look at neck Size:
17 inches or greater??

Train engineer 'was nodding off and caught himself too late,' union rep says

By Shimon Prokupecz, Mike Ahlers and Ray Sanchez, CNN
updated 7:21 PM EST, Tue December 3, 2013

BREAKING NEWS

Union rep: Train engineer was 'nodding off'



No sign brakes failed, says NTSB

William Rockefeller "caught himself too late" before the deadly Bronx train derailment, a union representative said. FULL STORY

- What did the engineer not say
- What it's like to be in a train crash
- Train took curve at 80 mph | Photos
- Opinion: High-tech trains safer?
- The safest spot on a train

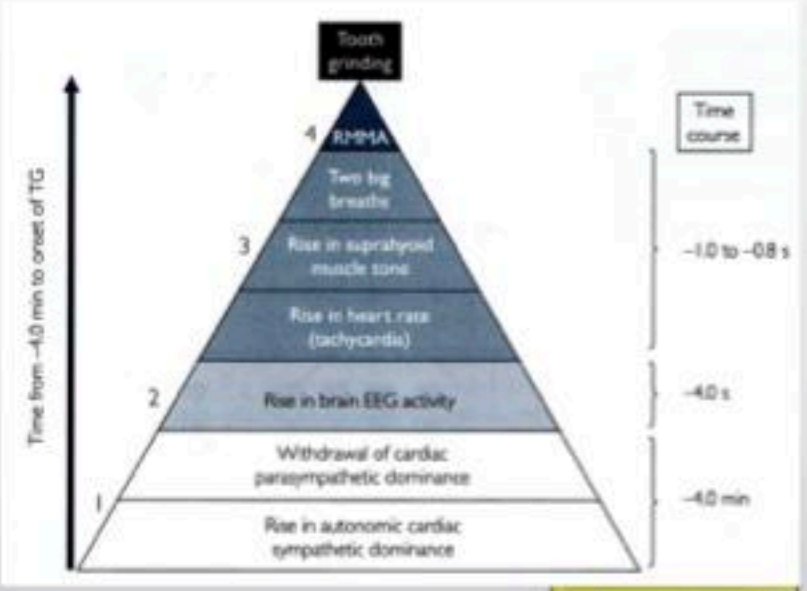
Obstructive Sleep Apnea OSA

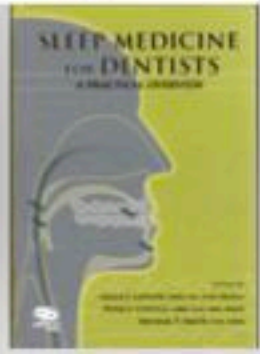
Mega Bus

Why are Airway and Sleep Grinding Related?

Sleep Grinding Preceding Events

- Rise in autonomic, cardiac sympathetic dominance
- Withdraw of cardiac parasympathetic dominance
- Rise in Brain EEG
- Rise in heart rate
- Rise in suprahyoid muscle tone
- Two big breaths
- Tooth Grinding- Rhythmic masticatory muscle activity





HUYNH, N., KATO, T., ROMPRE, P. H., OKURA, K., SABER, M., LANFRANCHI, P. A., et al. (2006). Sleep bruxism is associated to micro-arousals and an increase in cardiac sympathetic activity. *Journal of Sleep Research*, *15*(3), 339–346.

Lavigne, G. J., Cistulli, P. A., & Smith, M. T. (2009). Sleep medicine for dentists. *Chicago, IL: Quintessence*, *210*. Page 119

Is Sleep Grinding a parasympathetic response to quell the sympathetic response?

Rhythmic jaw movements lower heart rate

McLaughlin J, Powell DA. Pavlovian heart rate and jaw movement conditioning in the rabbit: effects of medial prefrontal lesions. Neurobiology of learning and memory. 1999;71(2):150–166

Schames SE, Schames J, Schames M, Chagall-Gungur SS
J Calif Dent Assoc. 2012 Aug;40(8):670-1, 674-6.
Sleep bruxism, an autonomic self-regulating response by triggering the trigeminal cardiac reflex.

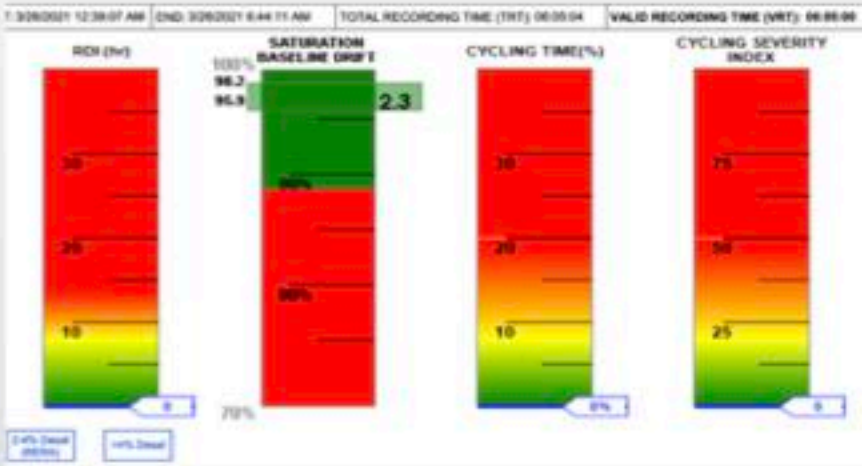
Sleep Simplified

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

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

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

Sat Screen by Patient Safety Inc



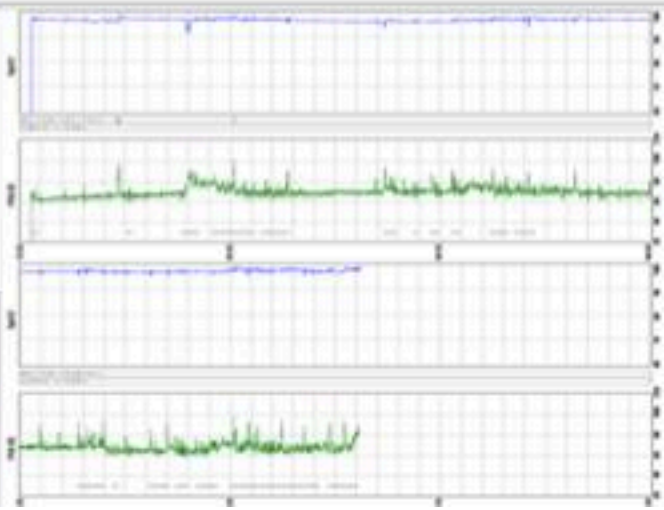
PULSE RATE DATA

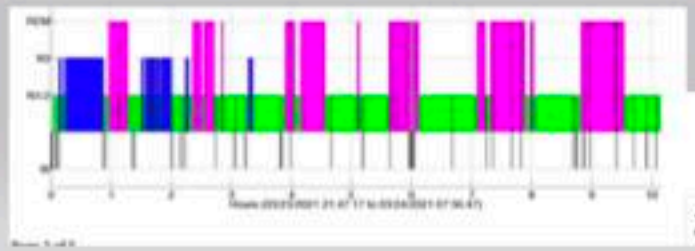
Autonomic Arousals

Index (#/hr): 23

Pulse Rate Range

Mean:	69
Min:	58
Max:	102





AHI: 0.5

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

zMachine: Interrupted Deep and REM

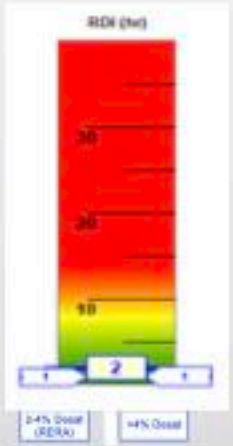
Age 16F
cc: Facial Pain, Excessive Daytime Fatigue

Age 16F
cc: Facial Pain, Excessive Daytime Fatigue

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

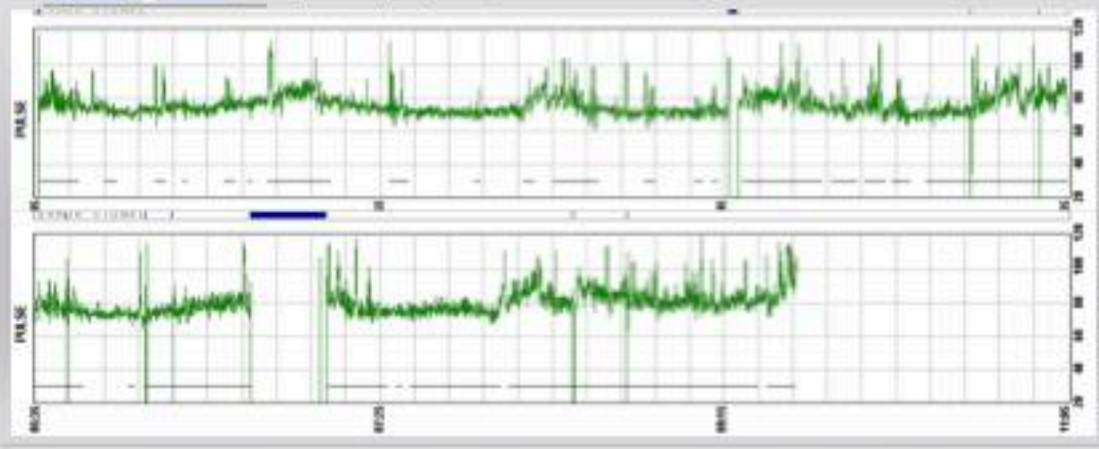
Sleep Latency Test
Dx: Narcolepsy
Recommend daytime medication

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



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

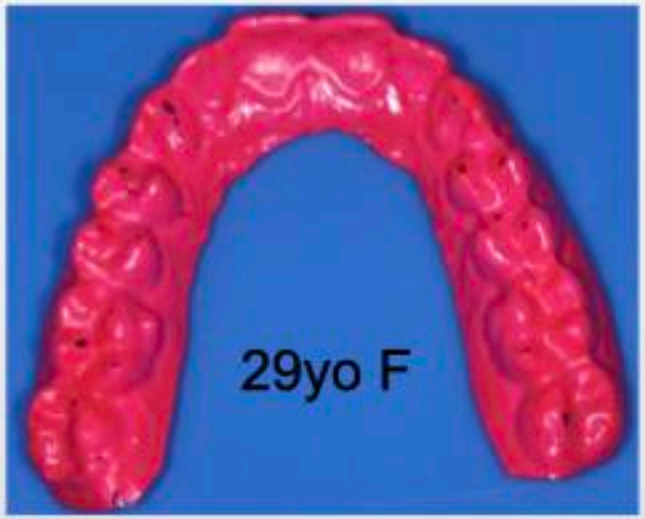
Heart Rate
>90 bpm
for 35 min



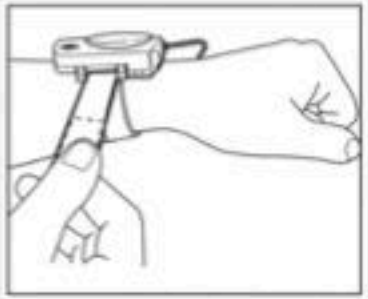
Brux Checker
Great Lakes Orthodontics

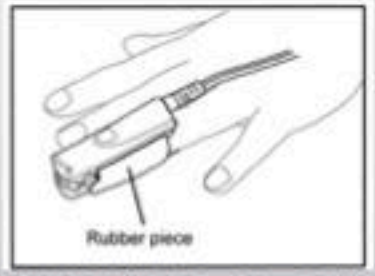
0.1mm Mylar

Made on Biostar Machine



If sleep grinding, is there an airway issue?
(Upper Airway Resistance or Obstructive Sleep Apnea)



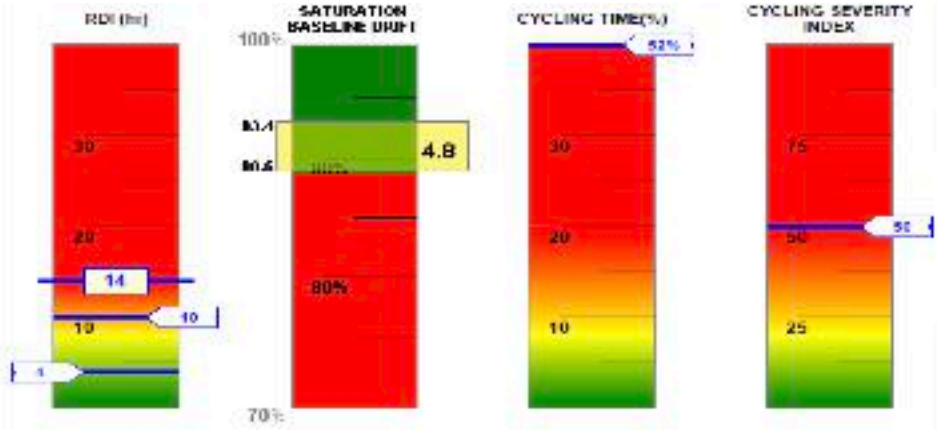


High Resolution
Pulse Oximetry

Data every 1
second average
over 3 seconds

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

Order PULSOX: Go to my website
jrdroter.com ….. Doctor Links



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

PATTERN BASED REPORT

OXYGEN SATURATION BASELINE ANALYSIS

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

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

SPO2 CYCLING

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

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

TRADITIONAL REPORT

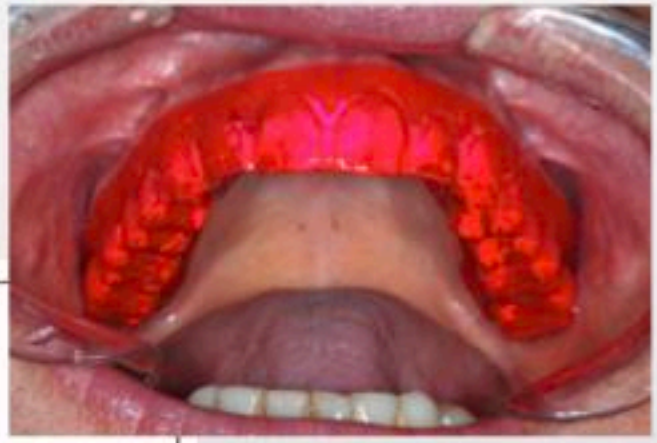
ODI4:	11
Total ODI4 Events:	58
Time in ODI4 Events:	00:29:26
Avg ODI4 Event Duration:	00:00:28
<=88% ODI4 Events:	23
<=88% Longest Duration:	00:01:21
Minimum SpO2:	84
Avg Low 10% SpO2:	86
Avg Low SpO2:	89
Avg Low SpO2 <=88%:	87

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

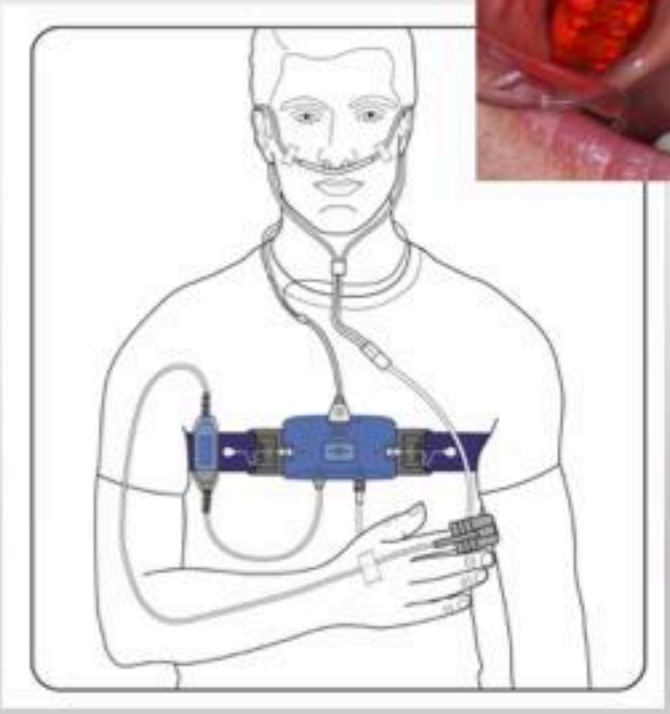
%SpO2	DURATION	%TOTAL
94-100	00:16:37	5%
88-94	04:57:26	91%
80-88	00:13:39	4%
70-80	00:00:00	0%
<= 70	00:00:00	0%
Total	05:27:42	100%
Motion Artifact	00:00:07	0.04%
Error Signal	00:00:05	0.03%

zMachine

zMachine + Brux Checker
+ Snore Lab



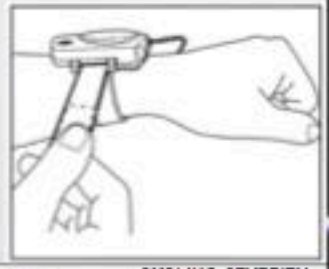
GENERAL sleep

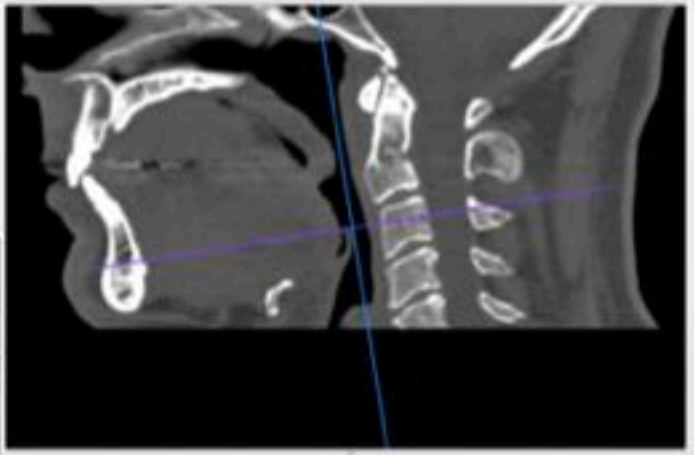


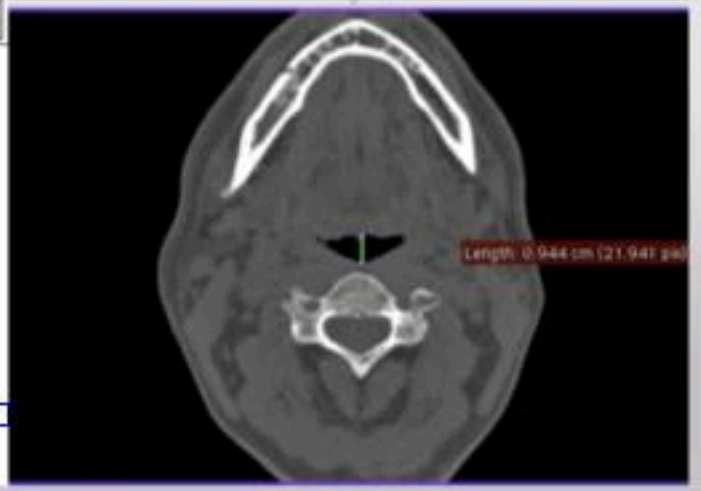
Call (888) 330-4424
Use Code: DROTER to receive special offer

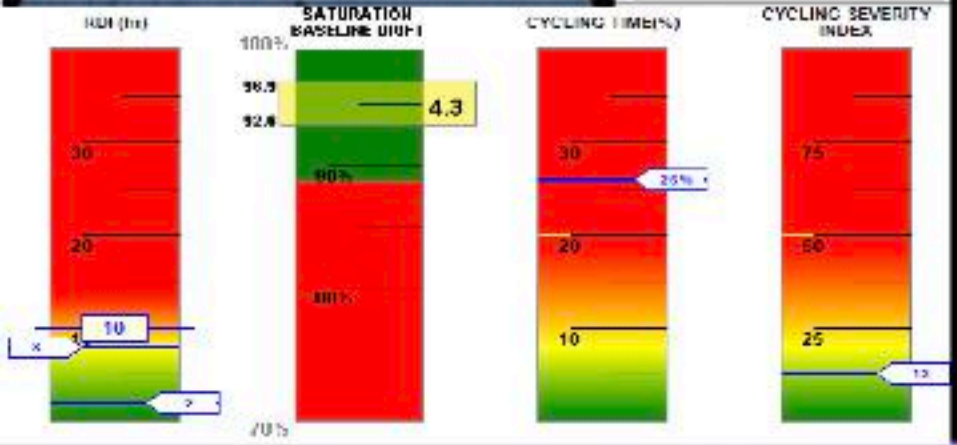
Also ask for access to Droter Modified Report

Mild Obstructive Sleep Apnea









Referred to pulmonologist
Medical Sleep Study
PSG- Polysomnogram
RDI 10

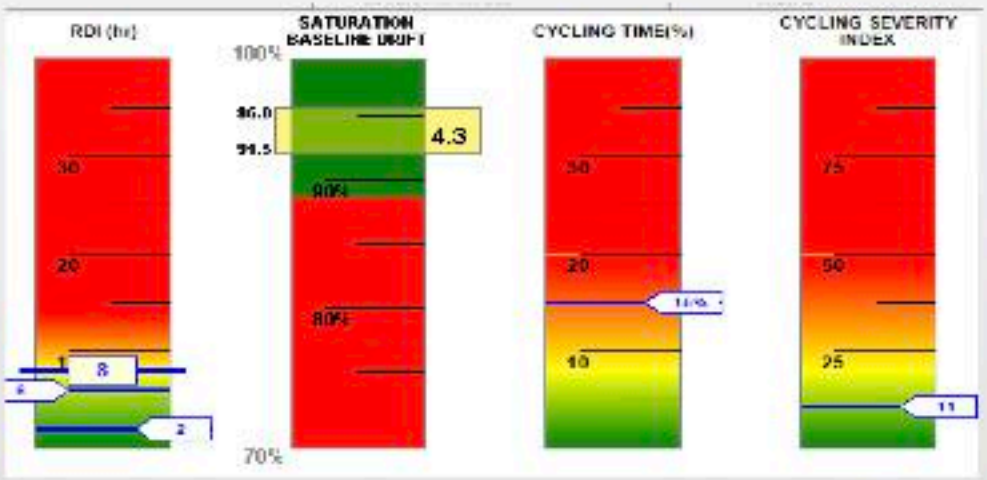
Home Sleep Airway Screening- RDI 10

RDI= Respiratory Distress Index

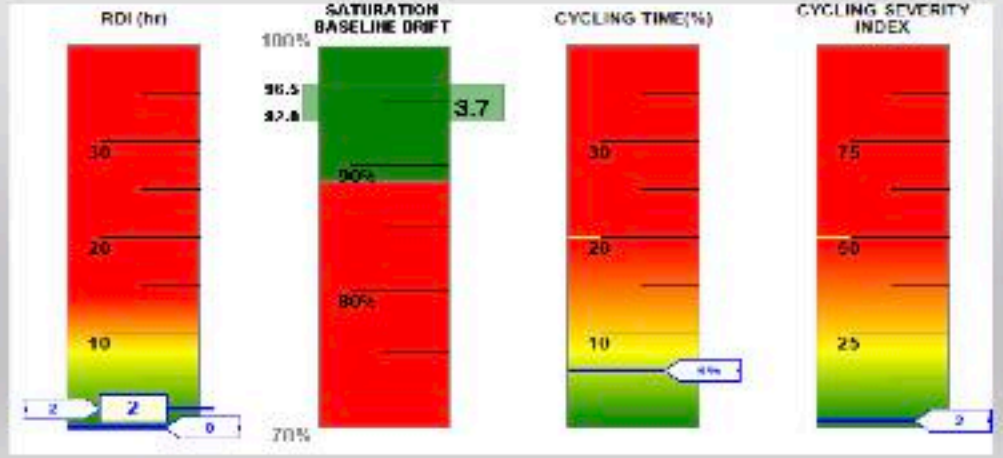
Mild OSA = 5-15 Apnea/hr

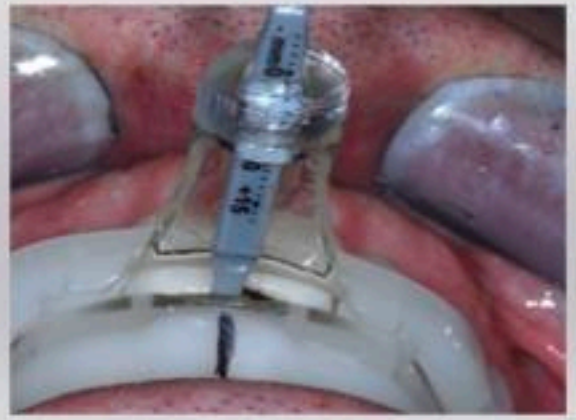
RDI= Respiratory Distress Index

MyTAP Mandible Advanced 4mm RDI 8



MyTAP Mandible Advanced 5mm RDI 2





Which Orthotic to use:

Sleep Grinding with airway issues

AHI 20+
I like to use CPAP

Apnea Hypopnea Index
AHI less than 5

Obstructive Sleep Apnea
AHI 5 to 20

Lat-Brux
Great Lakes Ortho

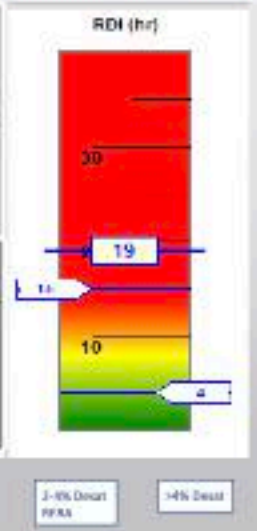
Nylon MAD
Great Lakes Ortho

Nylon Herbst
Great Lakes Ortho

Treating Common TMDs in a General Practice

Management

Diagnosis	Pattern	Treatment
Sleep Grinding Airway Related	Worn Teeth Upper Airway Resistance	Mandibular Advancement Appliance (after MD approves)



Pulse Ox Screening

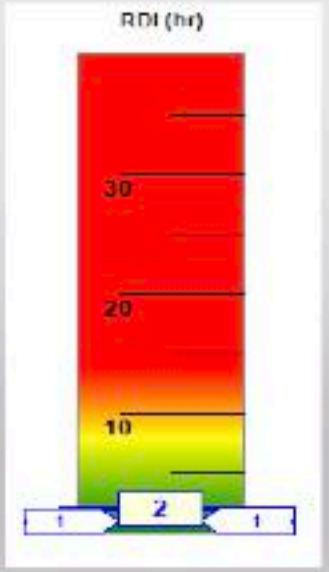
Refer to Medical Sleep Doctor

Get approval for Mandibular Advancement Appliance

Verify Airway Improves

19 events/hr before

2 events/hr with Orthotic



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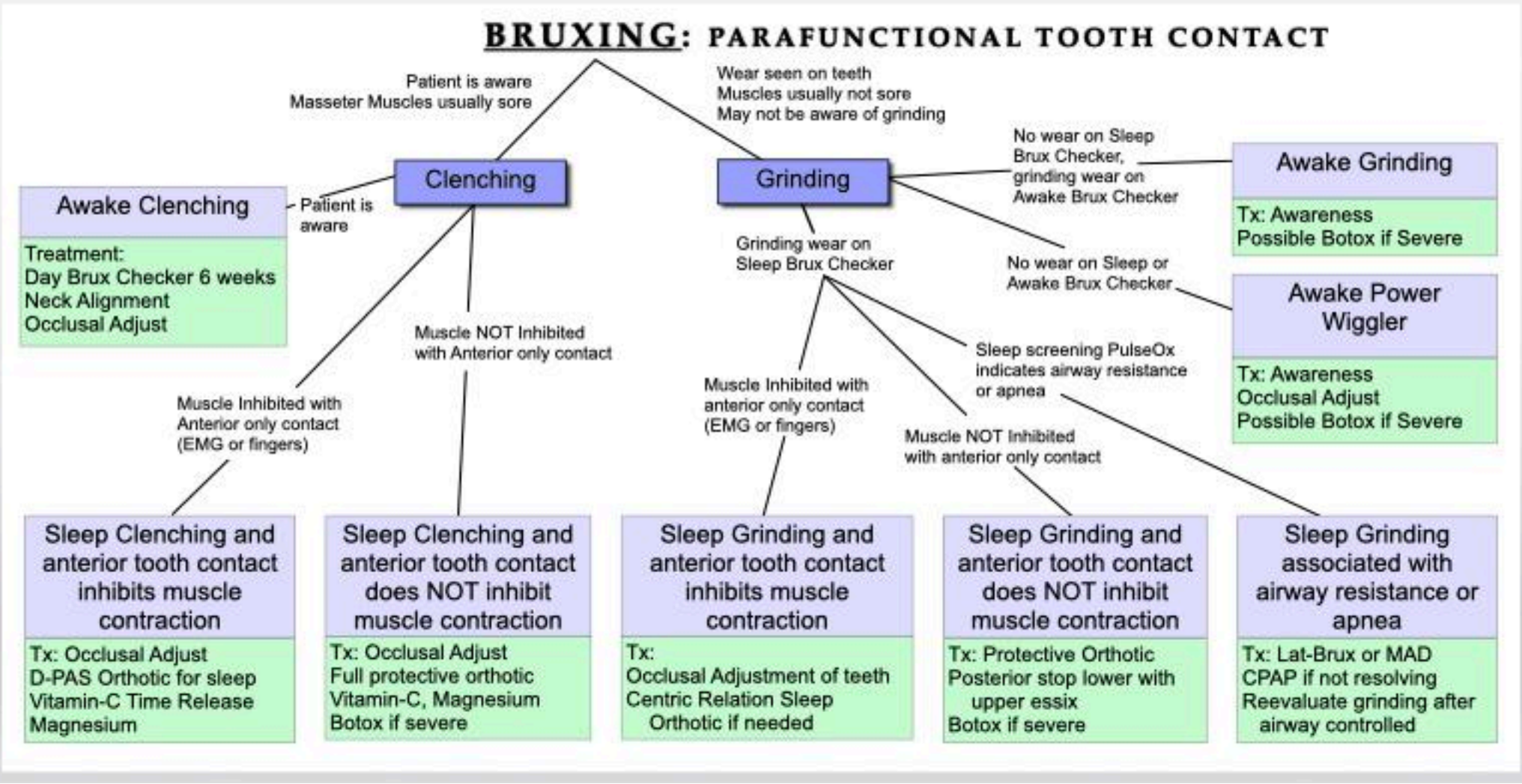
with data analysis Patient Safety, Inc.

Nylon MAD
Great Lakes Ortho

BRUXING: PARAFUNCTIONAL TOOTH CONTACT

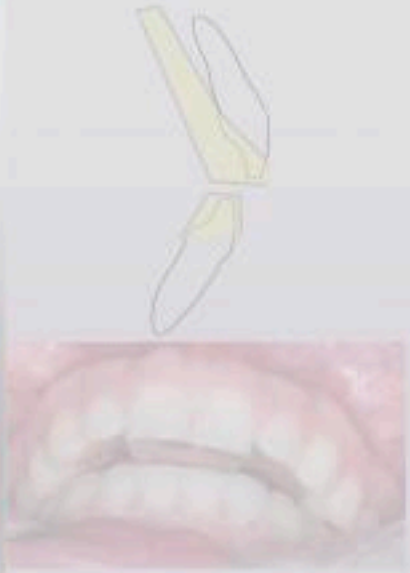


If you want super simple:

Sleep Clenching with anterior inhibition

D-PAS
Diagnostic-
Palatal Anterior Stop

Brux-PAS
with lower Essix



Everybody else

Hard Lower Posterior Stop
with upper essix

Hard Lower Full Coverage
Centric Relation Orthotic

Which Orthotic to use:

D-PAS
Diagnostic-
Palatal Anterior Stop

Manage Sleep Clenching with anterior inhibition
To diagnose Occlusal Muscle Dysfunction

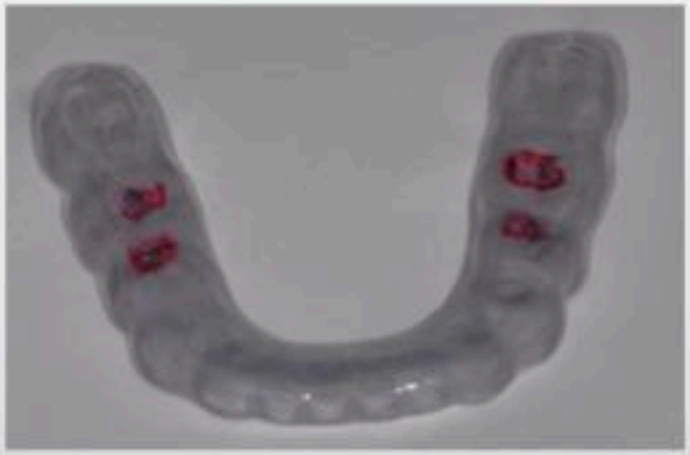
Which Orthotic to use:

Brux-PAS
with lower Essix

Sleep grinding with anterior inhibition
Sleep grinding with slight anterior inhibition
Sleep Clenching with only slight anterior inhibition
Power Wigglers: Grind Clench

Which Orthotic to use:

Hard Lower Posterior Stop
with upper essix



Sleep Clenching with NO anterior inhibition
Sleep Grinding with NO anterior inhibition

Which Orthotic to use:

Hard Lower Full Coverage
Centric Relation Orthotic

Sleep Clenching with NO anterior inhibition
Sleep Grinding with anterior inhibition
To Diagnose Occlusal Muscle Dysfunction

Which Orthotic to use:

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Great Lakes Ortho

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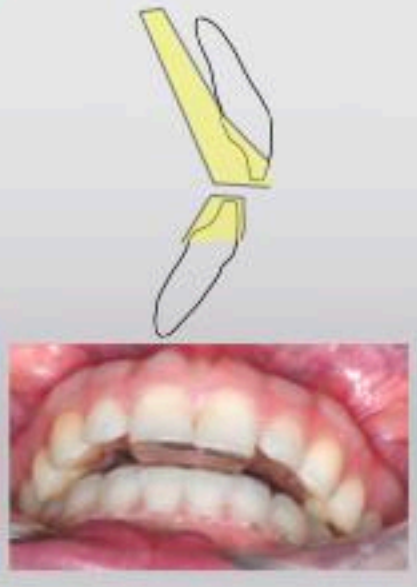
Great Lakes Ortho

Nylon Herbst
Great Lakes Ortho

Which Orthotic to use:

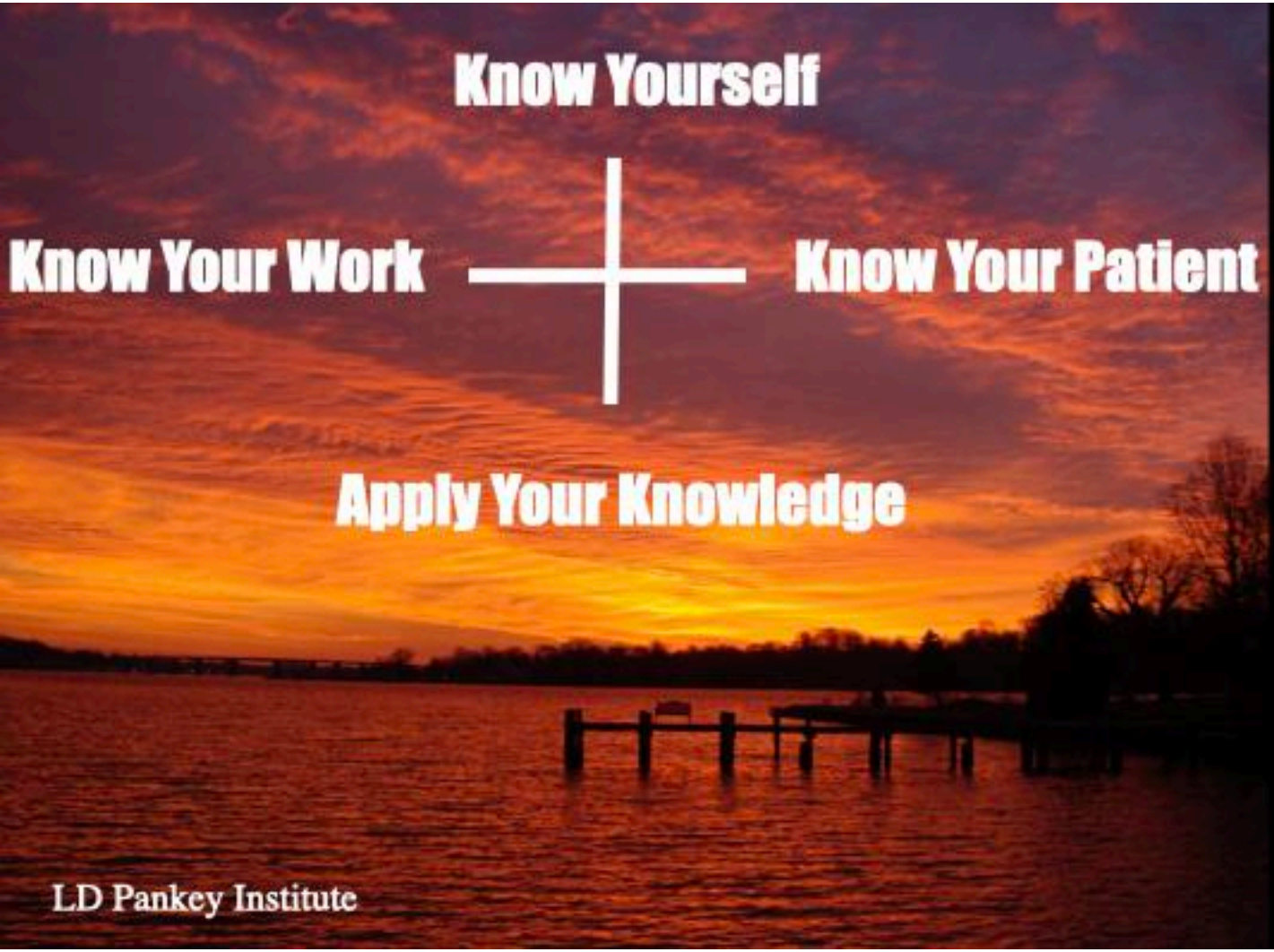
D-PAS
Diagnostic-
Palatal Anterior Stop

Brux-PAS
with lower Essix



Hard Lower Posterior Stop
with upper essix

Hard Lower Full Coverage
Centric Relation Orthotic



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