

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

**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


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

Parker Mahan-  
"Women Hurt, Men destroy"

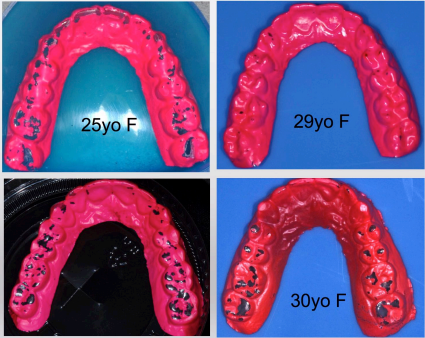
2. Does this occur awake or asleep?

Brux Checker  
Great Lakes Orthodontics

0.1mm Mylar



Made on Biostar Machine



**Treatment (Management) Uses**


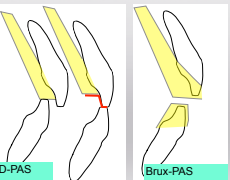
D-PAS  
Diagnostic Palatal Anterior Stop Orthotic

Educational: Patient awareness of problem

Sleep Clenching with muscle inhibition:  
D-PAS wear during sleep

Sleep Grinding with muscle inhibition:  
Brux-PAS wear during sleep.  
Increase vertical of D-PAS,  
Add lower essex

Assist in cranial bone alignment



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

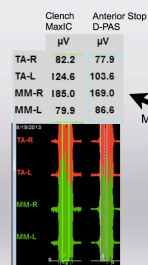
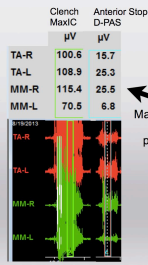


3. Are the TMJ muscles inhibited from full contraction with anterior only tooth contact?

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

Another Patient with muscles NOT inhibited by anterior only contact

Major decrease in muscle power with D-PAS


Muscle power same with D-PAS



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

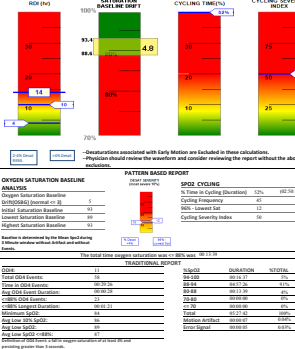
High Resolution  
Pulse Oximetry

Data every 1  
second average  
over 3 seconds

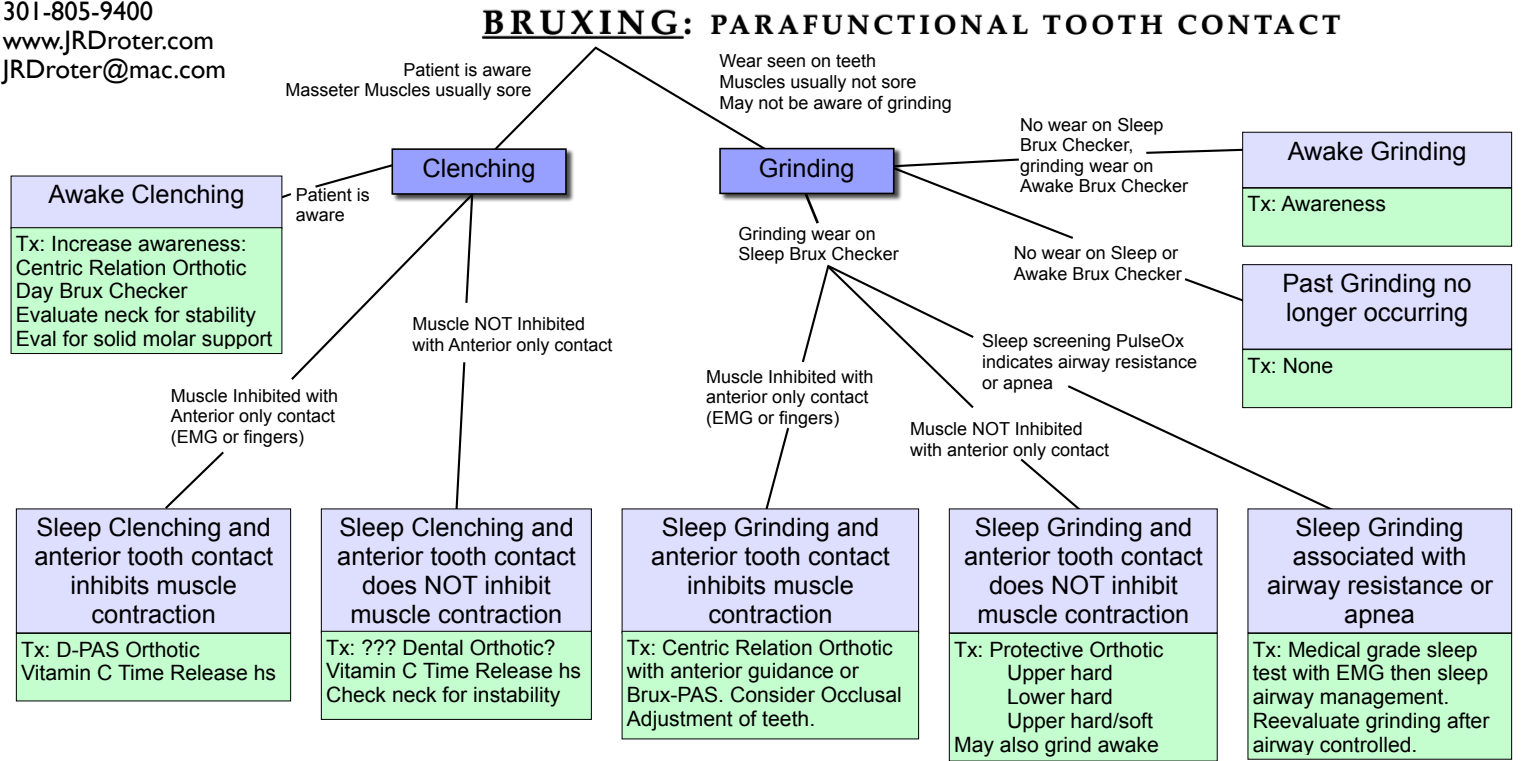


PULSOX 300i, Konica Minolta  
with data analysis Patient Safety, Inc.

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An upper anterior stop orthotic is very effective in both diagnosing and controlling sleep clenching. Vertical dimension is opened a minimal amount (1mm), just enough so posterior teeth do not contact on clenching. Any tooth contact in excursions is not relevant as the patient does not move the jaw parafunctionally in excursions. A full coverage orthotic is contraindicated as it may increase the power of the clenching.

These are difficult patients to treat as there is no way to decrease the forces with an orthotic. The benefit of an orthotic is questionable but a full coverage orthotic may help with force absorption.

A full coverage centric relation orthotic with anterior guidance will work well. A lower is preferred over an upper as it is more comfortable and less intrusive for most patients. It must be hard, fit solidly on the teeth, and not have any rocking or squishing movements. A relined of the orthotic is very beneficial to assure a proper fit. A dual arch anterior stop orthotic can also work well (Upper palatal anterior stop orthotic with a lower essex, Brux-PAS)

The goal is to protect the teeth and distribute the forces across as much surface area as possible. Upper is preferred as it reinforces the maxilla. The lower arch is contained within the upper and can better resist excessive force. Material may be hard, hard with a soft liner, or soft rubber. My preference is a hard orthotic but patients may prefer one material over the other. This is the only indication for a hard/ soft orthotic. The hard/ soft orthotic is often mis-prescribed by many practitioners.

Sleep grinding can occur in response to microarousals in patients with upper airway resistance (snoring) or with obstructive sleep apnea. A home sleep screening with a high resolution pulse oximeter (PULSOX 300i, Konica Minolta with data analysis Patient Safety, Inc.) is an effective way to identify patients who may have airway related grinding. Patients who have signs and symptoms of airway deficiencies are then referred to a pulmonologist for a medical sleep study. Appropriate therapies are then prescribed which may include CPAP or a dental mandibular advance orthotic. The sleep grinding needs to be reevaluated after the airway issues are have been resolved.

**Sleep Disordered Breathing Disease Progression**

Disease Stage 1 and 2

"Adaptation" - Airway maintained but:

Signs  
Sleep Bruxing (grinding)- Tooth Wear  
Tongue Bracing- Indents in tongue  
Sore Masseters  
RERA- Respiratory Related Arousal  
Heart Rate Elevation and Fluctuations  
Growth Hormone Suppression  
Daytime head forward posture

Symptoms  
Not Waking Rested  
Daily Fatigue  
Cognitive Impairment

Disease Stage 3

Airway Partial Collapse

Signs  
All of stage 1 and 2  
Upper Airway Resistance  
2% drop O<sub>2</sub> Saturation

Symptoms  
Snoring  
Not Waking Rested  
Daily Fatigue  
Cognitive Impairment

Disease Stage 4

Airway Full collapse

Signs  
All of stage 1, 2, 3  
3+% drop O<sub>2</sub> Saturation  
Cardiovascular Damage  
Elevated BP  
GERD

Symptoms  
Apnea  
Snoring  
Not Waking Rested  
Daily Fatigue  
Cognitive Impairment

**Sleep 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- 3+% O<sub>2</sub> Desaturation

AHI 1-4 "Normal" ??

AHI 5-15 Mild OSA

AHI 15-30 Moderate OSA

AHI 30+ Severe

Irreversible Damage

**Key Features of D-PAS**


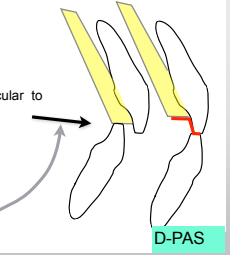
To Optimize Results:

- Relined so forces go into whole maxilla
- Pitch is perpendicular to arc of closure
- Minimal change in vertical
- Nothing wraps around the buccal (Every tooth is free to move buccally)

**Must Reline**

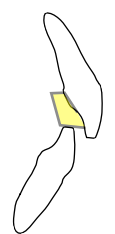
Most cases you will reline whole D-PAS  
Can just reline anterior if good retention.  
Must reline at lease cuspid to cuspid.

Basically it is a relined upper Hawley Orthotic with no buccal restrictions, with an anterior stop added.  
Similar Orthotics- Hawley with anterior stop, Kois, Cranham, Hegyi DATA



D-PAS: Diagnostic Palatal Anterior Stop

Vertical is opened a minimal amount (1mm). Natural Teeth will eventually contact in excursive movements.



Brux-PAS with lower Essex

Anterior stop extends beyond incisal edges #8, 9. All excursive contact on anterior stop



Upper Hard CR Orthotic



Naval CC



Myerson EMA

<u>Bruxing Differential Diagnosis:</u> Awake Clenching Awake Grinding          Sleep Clenching and anterior tooth contact inhibits muscle contraction Sleep Clenching and anterior tooth contact does NOT inhibit muscle contraction Sleep Grinding and anterior tooth contact inhibits muscle contraction Sleep Grinding and anterior tooth contact does NOT inhibit muscle contraction Sleep Grinding associated with airway resistance or obstructive sleep apnea	<u>Diagnostic Tests for Occlusal Muscle Disorder, Bruxing</u> Night 1- Brux Checker Day 1- Brux Checker Clear Night 2,3- Pulse Ox Sleep Screening Night 3,4- D-PAS and Pulse Ox Night 5,6- D-PAS Re-evaluate Brux-PAS with lower essex
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Which Dental Orthotic for Bruxing?

Bruxing is not a single disorder. Bruxing as defined by the American Academy of Orofacial Pain (2008) is “A diurnal or nocturnal parafunctional activity that includes clenching, bracing, gnashing and grinding of teeth.” Bruxing includes both grinding and clenching, both awake and asleep. There are many different disorders under the umbrella term of bruxing. Each different disorder requires a different therapy to be most effective. Identifying the specific bruxing disorder and then administering the most effective therapy will improve patient outcomes.

5 Questions that will help identify the specific bruxing disorder

1. Does the patient grind or clench their teeth?

Clenching- Teeth are squeezed together  
Patient is aware that they clench  
Masseter is sore, Masseter is strong  
Slight wear around tooth contacts  
Fremitus of teeth on tapping  
TMJ cartilage becomes damaged

Grinding- Teeth are rubbed together  
Observable tooth wear  
Strong Masseter and Temporalis  
Slight to no soreness of TMJ muscles  
If tooth mobility, will be on excursions
2. When does/did this occur: Awake or asleep, past or present?

Identifying whether the patient is bruxing while awake, asleep, or both is critical. A sleep dental orthotic will be useless if the parafunction is done while awake. Utilizing Brux Checker (Great Lakes Orthodontics) will identify if grinding or clenching is occurring during sleep. The device is a very thin 0.1mm material that has one side covered with red ink that will rub off under load. It is worn for one night of sleep. The wear pattern, or lack thereof, can be observed the next day. If no results, repeat. If no wear pattern is seen after 3 nights of sleep, bruxing is not occurring. Clenching will appear as small marks around tooth contacts, whereas grinding will appear as large streaks on the teeth being rubbed and will correspond to the areas of tooth wear. Brux Checker will identify if grinding is ongoing or if it was a past event that is now no longer occurring. A clear version of Brux Checker (Great Lakes Orthodontics) is also available for awake brux testing. Microetching the surface of the clear 0.1 mm material will allow identification of awake.
3. Are the TMJ muscles inhibited from full contraction with anterior only contact?

Contact of a posterior tooth is required to allow full contraction of the masseter, temporalis and medial pterygoid muscles in a healthy individual. With only anterior teeth contacting, there is a muscle inhibition that occurs decreasing the strength of muscle contraction by 50-80%. In some individuals this inhibition does not occur as they have full strength on both posterior or anterior only tooth contact. This muscle inhibition can be detected clinically by either utilizing electromyography (EMG) or by direct muscle palpation. To directly palpate the muscles, the clinician places their hands on the masseter and temporalis muscles while the patient squeezes their teeth together as hard as they can in maximum intercuspation. This test can then be repeated with anterior only tooth contact and the two results compared. While not as precise as an EMG, the presence or absence of muscle inhibition can be effectively determined. Whether this inhibition occurs or not, will affect orthotic choice. With muscle inhibition present, an orthotic that has anterior only contact or immediate anterior guidance will decrease the forces and thereby decrease the damage. Patients where full power always occurs are the most difficult to treat. Therapy is aimed at distributing the destructive forces evenly across as much surface area as possible to minimize the destruction.
4. If sleep grinding, is there an airway issue?

Sleep grinding can occur in response to microarousals in patients with upper airway resistance (snoring) or with obstructive sleep apnea. The grinding pattern observed is lateral (side to side) and does not usually involve a protrusive movement. A home sleep screening with a high resolution pulse oximeter (PULSOX 300i, Konica Minolta with data analysis Patient Safety, Inc.) is an effective way to identify patients who may have airway related grinding. Patients who have signs and symptoms of airway deficiencies are then referred to a pulmonologist for a medical sleep study. Appropriate therapies are then prescribed which may include CPAP or a dental mandibular advance orthotic.
5. Does the dental orthotic make the airway better or worse?

Dental orthotics can affect the airway during sleep. Opening the vertical dimension as occurs in all dental orthotics can help open the airway in some patients, while in others it can increase airway resistance. Neuromuscular orthotics with the jaw slightly forward may be beneficial to the airway in some cases. A dual arch mandibular advancement orthotic may or may not be effective. It is important to measure in a reliable manner what effect the orthotic has on the airway since the orthotic may be beneficial or detrimental to the patient's sleep respiration. Utilizing a high resolution pulse oximeter (PULSOX 300i, Konica Minolta with data analysis Patient Safety, Inc.) is an effective way to determine an orthotic's effect on the airway during sleep. The sleep grinding need to be reevaluated after the airway issues have been resolved.

<u>Genesis of Sleep Bruxing</u> <sup>3</sup> Rise in autonomic cardiac sympathetic dominance Withdraw of cardiac parasympathetic dominance Rise in brain EEG activity Rise in heart rate Rise in suprahyoid muscle tone Two big breaths Rhythmic masticatory muscle activity (RMMA)	<u>Increasing Severity of Airway Obstruction</u> Snoring Upper Airway Resistance Syndrome (UARS) Partial collapse of airway Obstructive sleep apnea (OSA) Mild Apnea Hypoxia Index (AHI) 5-15 Moderate AHI 15-30 Severe AHI 30+   Both UARS and OSA will lead to Respiratory Event Related Arousals (RERA)
<u>Medications that affect Bruxing:</u> SSRI that increase bruxing: Prozac, Zoloft SSRI neutral on bruxing: Cymbalta, Wellbutrin Clonazepam may decrease bruxing- addiction potential, causes low BP	

Some observations from my practice:

Airway related grinding is a lateral movement of mandible.  
In patients who grind laterally, centric relation equals maximal intercuspation.  
Do not build anterior guidance with posterior disclusion when restoring a severe lateral grinder.  
Soft orthotics increase the muscle force of clenching or grinding.  
Full coverage hard orthotics can increase clenching in clenchers.  
Patients with neck stability issues will splint both neck and TMJ muscles.  
Clenching can be a neck stability issue

Some stuff from the literature:

Grinding and clenching are different disorders.<sup>3,5</sup>  
Most Sleep Bruxing occurs in light sleep- Stage 2. Most Sleep related breathing events occur in light sleep stage 2 and REM.<sup>3</sup>  
Night grinding can be related to upper airway resistance and/or obstructive sleep apnea.<sup>1,2,3,8</sup>  
Sleep grinding occurs after a micro arousal.<sup>1,3,9</sup>  
Repetitive jaw movements in rabbits decreases heart rate, a parasympathetic activity.<sup>6</sup>  
Grinding of teeth is a parasympathetic activity and will help to offset the increase in heart rate from the micro arousal.<sup>1,9</sup>  
Tooth wear is exacerbated due to an increase in friction between teeth during sleep.<sup>3</sup>  
There is very little saliva made at night.<sup>3</sup>

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