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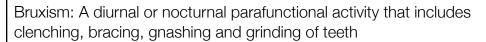
# **Bruxism: Revisiting an Old Problem with New Questions** and Unique Solutions

# **CORE Concept** Wear and TMD are multifactoral

HOW vs. WHY wear occured

Breathing trumps stomatognathic system

Mechanical solutions ignore biologic problems



Wear is nocturnal

Fracture and wear are diurnal





# **Bruxism Misconceptions**

Force 25-50% MVC not 6x higher

Tribology: study of interacting surfaces in relative motion; relationship between lubrication, friction and wear

Pattern is lateral nocturnally; protrusive is diurnal



#### **Bruxism Facts**

% Population varies with specificity of question- 60% occasional, 5-15% routine

PSG Bruxer: >4 episodes per hour, >25 bursts per hour and >1 noise 30% children 5-6 yo brux and decreases to 3% > 60 yo





## **Sleep Terminology**

**Sleep-Disordered Breathing (SDB)-** wide-spectrum of sleep-related breathing abnormalities; those related to upper airway resistance include snoring, UARS and OSA

Apnea- breathing stops for at least 10 seconds during sleep or a 4% drop in blood oxygen saturation

**Hypopnea**- partial airway blockage or decrease in breathing; reduction in airflow 50% or greater, 3% or greater SO2 drop

**Apnea-Hypopnea Index (AHI)- a**verage number of apneas and hypopneas per hour of sleep; mild 5-15, moderate 15-30, severe >30

**Respiratory Disturbance Index (RDI)-** measure of severity of sleep apnea, including number of sleep disruptions and desaturations. Counts the number of arousals caused by respiratory effort (RERA)

**Respiratory Effort Related Arousal (RERA)-** arousal caused by respiratory effort not including apnea or hypopnea

**Upper Airway Resistance Syndrome (UARS)-** repetitive increases in resistance to airflow in the upper airway leading to RERAs and daytime fatigue. SO2 levels remain normal

Rhythmic Masticatory Muscle Activity/ Sleep Bruxism (RMMA/SB)- RMMA can include swallowing or non-functional movements but also include nocturnal bruxism

**Polysomnography (PSG)**- A test that records multiple physiological variables during sleep (including brain waves, electrical activity of muscles, eye movement, breathing rate, blood pressure, blood oxygen saturation, and heart rhythm). The test is usually conducted in a sleep lab and involves direct observation of the person during sleep.

**Esophageal Pressure Monitoring (Pes)-** Esophageal pressure monitoring can be performed during polysomnography with a thin, water-filled catheter connected to a transducer. The resulting quantitative assessment of respiratory effort aids in the diagnosis of sleep-related breathing disorders not routinely picked up during PSG. Monitoring esophageal pressure in such patients during polysomnography may allow identification of a subset who demonstrate repetitive, gradual increases in negative intrathoracic pressures and respiratory effort that terminate in arousals. This condition, called the upper airway resistance syndrome (UARS), responds to the same treatments used for obstructive sleep apnea.

**Pulse Oximetry-** a <u>non-invasive</u> method allowing the monitoring of the <u>oxygenation</u> of a patient's <u>hemoglobin</u> and pulse rate.

**Continuous Positive Airway Pressure (CPAP)-** A machine supplies positive air pressure to inflate the airway like a balloon which eliminates blockages and prevents the collapse of the upper airway during sleep. Air pressure is delivered through a hose to a mask that fits over the nose, or both nose and mouth.

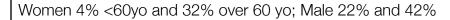
Mandibular Advancement Appliance (MAA), Mandibular Advancement Device (MAD)- oral appliance used to protrude the mandible creating a tightening of the oral airway and advancement of the tongue in an effort to open the airway



# **Sleep Apnea and Age**

2-10% children apnea, greatest at 5 yo with adenotonsillar hypertrophy

Increasing with obesity





# **Sleep Apnea and Inflammatory Cascade**

Disease induction due to inflammatory cascade

Children and adults same effect

Adenotonsillar tissue in OSA kids different than infection- Greater inflammatory proliferation

#### Why people brux?

Stress

Neurochemical

Occlusion

Protecting or improving airway

Inverse relationship between bruxism and apnea





# Sleep Issues

**Sleep Stages-** Non-Rem 1-3 (lightest to deepest), 90-110 minute cycle ends in REM; Non-Rem decreases through night and REM increases

Arousal Response- short duration excitation from deep to light sleep

#### Sleep Disturbance:

**Snoring-** sound from air turbulence, risk factor of apnea, 40% nonobese social snores had apnea

**UARS or IFL**- increase inspiratory effort creating a microarousal

**Apnea-** central, obstructive or mixed; obstructive most common



#### **Developmental, Anatomy**

**Pediatric SDB-** more prone to damage from SDB, occasional snoring important risk factor

**Craniofacial changes-** High, narrow palates, class II, anterior open bites, retroclined anteriors, forward head posture, lower tongue

Obesity magnifies problem

Tooth wear in children sign of airway problem

Delay in treatment leads to irreversible changes

**Treatment options-** T&A, RPE, sinus meds/improve nasal airway, weight loss, Combination, CPAP



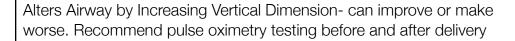


# Why Do Splints Work?

Idealize Occlusion?

Reduce Muscle Activity?

Eliminates Bruxing?





#### **UARS**

Increased inspiratory effort and increased sleep micro-arousals

AHI<5, SO2 >92%, RERAs

Younger, female, lower BMI

Headaches, GERD, depression, anxiety, bruxism, TMD

More sleep-onset insomnia, difficulty returning to sleep, fatigue

Misdiagnosed as chronic fatigue, fibromyalgia, IBS, migraines

Treatment CPAP or MAA

Children affected





## **Bruxism TRIAD**

# Sleep Bruxism, OSA, GERD

#### **Sleep Stages**

**Microarousal:** bruxism during periods, Experimental MA create grinding in SB

Sleep Apnea: Snoring, UARS, Apnea-Hypopnea

**OSA:** cessation 10 sec, desaturation 4%, 2% women, 4% men, >50

yo

**AHI:** Mild 5-15, Moderate 15-30, Severe >30

OSA highest risk factor for bruxism

RMMA opens upper airway and decreases resistance

CPAP improves airway and resolves bruxism

MPA moves mandible forward, improves airway and reduces bruxism

Nightguard worsens OSA

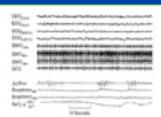
**GERD:** pH 1-2, Maxillary molar palatal surface most affected, damage

positional

pH4 triggers RMMA- swallowing and bruxism

PPI reduces GERD and 40% bruxism

CPAP and MPA reduce GERD







Diurnal Bruxism 63% diurnal, 16% nocturnal, 21% both Protrusive Pattern, Predictors not the same	
Stress: linked to daily stress Salivary cortisol levels reduced by clenching or chewing Front teeth increased proprioception	
Airway, Exercise  Protrusive mandibular movement opens airway  Strength and endurance improved	11 80
Neurochemical: Dopamine related diurnal clenching  Daytime orthosis wear indicates grinding  "Comforting"	