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

CORE Concept	
Wear and TMD are multifactoral Mechanical solutions ignore biologic problems HOW vs. WHY wear occured Breathing trumps stomatognathic system	
Bruxism: A diurnal or nocturnal parafunctional activity that includes clenching, bracing, gnashing and grinding of teeth 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)- average 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 non-invasive method allowing the monitoring of the oxygenation of a patient's hemoglobin 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

Women 4% <60yo and 32% over 60 yo; Male 22% and 42%

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% non-obese 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? Alters Airway by Increasing Vertical Dimension- can improve or make worse. Recommend pulse oximetry testing before and after delivery	

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	
Neurochemical: Dopamine related diurnal clenching Daytime orthosis wear indicates grinding “Comforting”