Egyptian Prosthodontic Association (EPA Newsletter)

Modern Insights into Bruxism

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Modern Consensus

Bruxism has become increasingly prevalent in recent years. It is no longer regarded as a disorder or parafunctional habit involving teeth grinding. Instead, it is recognized as a muscle activity that can serve as either a risk factor or a protective factor for various clinical conditions [1]. Bruxism is defined as "a repetitive jaw-muscle activity characterized by clenching or grinding of the teeth and/or by bracing or thrusting of the mandible" [1,2]. It can occur during wakefulness (awake bruxism) or sleep (sleep bruxism) [1,2]. Awake bruxism typically manifests as silent, static clenching; whereas, awake grinding is often linked to medication use or neurological disorders [3]. Sleep bruxism is associated with significantly higher occlusal forces than those observed during wakefulness [4]. The condition is most prevalent in individuals aged 20 to 40 and tends to decline with age [2].

Risk Factors

Several factors contribute to the hyperactivity of masticatory muscles, increasing susceptibility to bruxism [5,6]. These include genetic predisposition, psychosocial factors such as anxiety or stress [2], and physiological factors like sleep disorders, abnormal neurotransmitter levels (serotonin, dopamine, norepinephrine), and certain medications [5,6] . Migraines have also been associated with increased bruxism episodes [7]. Lifestyle factors, including smoking, alcohol, caffeine consumption, and drug abuse, have similarly been linked to bruxism [5,6].

Positive and Negative Consequences

Bruxism may lead to several adverse effects, including masticatory muscle hypertrophy, enamel wear or cracking, fractured teeth or restorations, hypersensitivity, dental pain, and periodontal issues such as widened periodontal ligament space and increased mobility [3,4,6] . While not all patients with orofacial pain have bruxism [3],

excessive muscle activity can cause fatigue, temporomandibular joint (TMJ) pain [5], and functional limitations, such as difficulty in opening the mouth, chewing, and performing daily tasks [6,8,9].

Conversely, bruxism may offer protective benefits during sleep. It can help maintain airway patency in individuals with obstructive sleep apnea or stimulate saliva production in cases of gastroesophageal reflux [3]. However, the precise mechanisms remain unclear [3].

Diagnosis

Bruxism is diagnosed through self-reports, clinical examination, electromyography (EMG), or polysomnography (PSG) [3].

Self-reports

Self-reported questionnaires and clinical interviews help gather relevant data on bruxism behavior and contributing factors [9], though they often lack precision [3].

Clinical assessment

Clinical assessment focuses more on the consequences of bruxism than on bruxism itself [9]. Observations may include dental signs or soft tissue changes such as tongue scalloping, linea alba, or traumatic lesions, as well as pain in the TMJ region [9]. However, some signs (e.g., enamel wear) may have multiple causes, and TMJ disorders are not exclusively associated with bruxism [3]. Additionally, differentiating between awake and sleep bruxism through clinical signs alone can be challenging [9].

Electromyography

Electromyography (EMG) is used to evaluate both awake and sleep bruxism. It records muscle electrical activity during movement, providing data on duration, intensity, and force of muscle activity [3]. Sensors are placed on the skin overlying the temporalis or masseter muscles [3]. However, EMG cannot detect grinding noises or distinguish bruxism from talking, swallowing, or lip biting [3]. Recently, portable EMG devices have been developed to enhance usability [10] (see Figure 1).

Polysomnography

Polysomnography (PSG) remains the gold standard for diagnosing sleep disorders, including sleep bruxism[3]. It includes EMG, electroencephalography, electrocardiography (ECG), and audio-visual recordings [3], allowing for differentiation of bruxism from other orofacial movements. However, PSG is complex, requires specialized equipment, and is typically performed in a sleep laboratory [3].

Recent advances

Recent developments include force-sensing oral appliances, such as night guards equipped with embedded pressure sensors, which can monitor bruxism activity during sleep [11] (see Figure 2).

Figure 1: Ultra-miniature portable electromyographic devices used for bruxism detection. *Courtesy of* **Mikami S. et al.**[10]

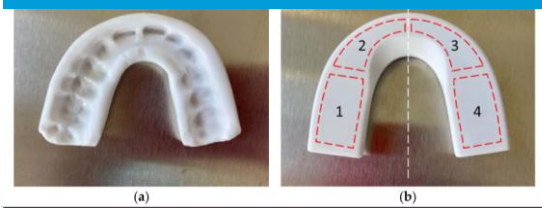

Figure 2: Force-sensing oral appliance. (a) Top view showing the maxillary arch impression. (b) Occlusal plane view with four embedded pressure sensors. *Courtesy of* **Maoddi P. et al.**[11]

Treatment and Prevention

Occlusal splints

Occlusal splints are considered the gold standard in bruxism management [8]. They primarily address symptoms of sleep bruxism [5] by interrupting destructive behaviors, reducing muscle hyperactivity [4], redistributing condylar shear forces [8], protecting teeth and joints, and restoring periodontal proprioception [8].

However, their effectiveness depends on consistent daily use [4,8]. Long-term use may cause discomfort [4,8] and, in some cases, increase clenching or grinding [5]. Furthermore, evidence on their effectiveness in reducing sleep bruxism episodes remains controversial [4].

Cognitive behavioral therapy

Cognitive behavioral therapy—including counseling, relaxation training, lifestyle modifications, and sleep hygiene education—has shown benefit in alleviating bruxism without adverse effects [4].

Biofeedback therapy

Biofeedback therapy is applicable to both awake and sleep bruxism [3]. Devices deliver auditory feedback or vibratory/electrical stimulation when muscle activity exceeds a set threshold. This method has significantly reduced sleep bruxism events [4]. Some occlusal splints also release a bad taste upon clenching or grinding to discourage the behavior [3].

Pharmacological therapies

Pharmacological therapies such as anticonvulsants, antidepressants, serotonergic and dopaminergic agents, beta-blockers, proton-pump inhibitors, and muscle relaxants have been explored for bruxism management [4,6].

However, these medications may cause gastrointestinal symptoms (e.g., abdominal pain, diarrhea, constipation, nausea), hypotension, sleep disturbances, and, with prolonged use, neurological issues like dementia [4].

Botulinum toxin type-A (Botox) injections

Botulinum toxin type-A (Botox) injections into the masseter or temporalis muscles, alone or combined with splints, have proven effective in reducing muscle contraction strength [5], alleviating pain [6,8], and improving mouth opening [8]. However, the effects are temporary [4 8].

It is essential for clinicians and patients to recognize bruxism's risk factors and consequences to develop appropriate, individualized treatment strategies.

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