BMJ Best Practice

Bruxism

Straight to the point of care

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Summary

Bruxism is an umbrella term grouping together different motor phenomena of jaw muscles, including teeth grinding, teeth clenching and bracing or thrusting of the mandible.

Can occur during sleep (sleep bruxism) or wakefulness (awake bruxism).

Etiology is mainly dependent on central factors (stress sensitivity, emotions, personality features, sleep regulation, autonomic nervous system).

Bruxism may result in tooth wear or cracks, dental restoration or implant failure, jaw muscle hypertrophy, pain and/or fatigue in jaw muscles, temporal headache, toothache, temporomandibular disorders, disturbance of bed partner's sleep, and reduction in overall quality of life.

Treatment is symptomatic and depends on the presence of clinically relevant consequences rather than the presence of bruxism itself.

Management options include counseling, different types of oral appliances, cognitive-behavioral approaches, physical therapy, and, rarely, relaxant drugs for short-term use.

Treatment of any conditions associated with bruxism should also be optimized.

Definition

Historically, classifications and definitions of bruxism have varied widely. Classical bruxism activities involve clenching or grinding of the teeth; however, there is an emergent consensus that bruxism may involve masticatory muscle activity without tooth contact, for example, bracing which describes maintaining a certain mandibular position and thrusting which describes forcefully moving the mandible in a forward or lateral direction.

An international consensus meeting in 2017 defined bruxism as follows:[1]

Sleep bruxism (SB): a masticatory muscle activity during sleep that is characterized as rhythmic (phasic) or nonrhythmic (tonic) and is not a movement disorder or a sleep disorder in otherwise healthy individuals.

Awake bruxism (AB): a masticatory muscle activity during wakefulness that is characterized by repetitive or sustained tooth contact and/or by bracing or thrusting of the mandible and is not a movement disorder in otherwise healthy individuals.

SB and AB are considered as separate conditions. Both definitions emphasize masticatory muscle activity because this may have clinical consequences.[1]

Bruxism can be considered a risk factor for negative oral health consequences, rather than a disorder per se. The bruxism construct has evolved over the years to consider the phenomenon a motor activity that may be a sign of an underlying condition, represent a normal variation of behavior in otherwise healthy individuals, or a protective factor associated with one or more positive health outcomes (e.g., restoring airway patency after sleep apnea events or releasing emotional tension).[2]

Epidemiology

Current epidemiologic knowledge is mostly related to sleep bruxism (SB).[7] Data on the prevalence and natural course of awake bruxism (AB) is limited given that most data comes from retrospective self-reports at single observation points.[8] [9] Such studies are subject to recall bias and lack information about the frequency of symptoms.

One systematic review examining the global prevalence of SB and AB in adult and pediatric populations reported a prevalence of 21% and 23%, respectively.[10] The prevalence of SB, based on polysomnography (PSG), was estimated to be 43%. Another systematic review which examined the prevalence of SB in children alone reported a range of 3.5% to 40.6%.[11] However, it is important to note that the interpretation and generalization of prevalence data should be approached with caution given the poor methodologic quality of available literature. Potential diagnostic shortcomings are present in most included studies as diagnoses may be based, exclusively, on patients' or parents' self-reported data.[8] [11] [12] In an epidemiologic PSG study, the prevalence of SB, screened by questionnaires and confirmed by PSG, was 5.5%.[13] With PSG used exclusively as the criterion for diagnosis, the prevalence was 7.4% (without taking into account the presence or absence of self-reported SB complaints). With questionnaires alone, prevalence increased to 12.5%.

A positive association has been observed between SB and insomnia, higher degree of schooling, and a normal/overweight body mass index.[13] Bruxism may show a sex predilection and be more common among women.[10] [14] Prevalence has been shown to decrease with age.[8]

Etiology

The etiology of bruxism is a complex and controversial issue, especially the different manifestations relating to the circadian rhythm (i.e., sleep and awake). The condition should be viewed as a muscle behavior that reflects the presence of one or more underlying conditions or factors.[15]

Many etiologic theories for sleep bruxism (SB) have been proposed. The multifactorial model to explain its onset, postulating that a complex set of factors interact with central nervous system function and sleep regulation, seems to be the most plausible hypothesis.[16] [17] Consensus suggests an ongoing paradigm shift from peripheral (i.e., occlusal) to central (i.e., stress, emotions, personality) regulation.[18] However, the belief that bruxism and dental (mal-)occlusion (the bite) are causally related has not been fully abandoned.

One review determined that neither occlusal interferences nor factors related to the anatomy of the orofacial skeleton are involved in the etiology of bruxism.[19] The lack of association of bruxism with occlusal morphology has important ethical implications for the dental profession.[20]

The etiologic focus in SB is mainly on central factors, such as psychosocial disorders (e.g., stress sensitivity, anxious personality traits), physiologic-biologic factors (e.g., neurochemicals), genetics, and exogenous factors (e.g., smoking).[21] [22] [23] [24] [25] [26] [27] [28] In comparison, awake bruxism (AB) is associated with emotional tension or psychosocial disorders causing prolonged contraction of masticatory muscles. It may be the result of a transient anxious reaction to stressful daily events or related to a more chronic anxiety disorder.[21]

Trait anxiety is associated with both increased masseter muscle activity and intensity of wake-time tooth clenching episodes and, therefore, with an increased occurrence of AB episodes.[29] [30]

Pathophysiology

Most literature on bruxism pathophysiology focuses on SB and comparatively little is known about the actual cascade of events leading to AB.

SB is part of a complex arousal response of the central nervous system, and features a combination of all bruxism activities, e.g., short- or long-lasting tonic clenching and phasic grinding of masticatory muscles, with or without teeth contact.[31]

AB is commonly characterized by teeth contacting habits or mandible bracing. This leads to the hypothesis that AB is mainly a consequence of stress sensitivity, such as stereotyped reaction to external stressors.[21]

The study of bruxism pathophysiology also involves its relationship with potential clinical implications. Prosthodontic complications, mechanical tooth wear and pain in the jaw muscles or the temporomandibular joints (TMJ), are examples of potential negative outcomes due to bruxism.[3] [4] [5][6]

The relationship between bruxism and pain is controversial, with contrasting literature findings.[6] Investigations based on self-reported or clinical bruxism diagnosis show a positive association with TMJ pain, but studies based on polysomnography (PSG) or electromyography (EMG) to diagnose bruxism show a much lower association with TMJ symptoms in general.[6]

Hypotheses to explain such contrasting findings suggest that bruxism, and consequently jaw muscle EMG activity, decreases with pain chronicity.[32] In addition, PSG/EMG devices can only offer a count of sleep bruxism episodes, without any information on the actual amount of muscle work or bruxism during wakefulness.

One study showed that patients with temporomandibular disorders (TMD)-related pain have elevated background levels of muscle activity during sleep, which may be indicative of tonic, prolonged, low intensity mandible bracing that provokes exhaustion of muscle fibers and joint load.[33] The amount of muscle work, in turn, is related to trait anxiety scores.[22]

Classification

Historically, classifications of bruxism have varied widely. An international consensus meeting in 2017 defined and classified bruxism as follows:[1]

- Sleep bruxism (SB): a masticatory muscle activity during sleep that is characterized as rhythmic (phasic) or nonrhythmic (tonic) and is not a movement disorder or a sleep disorder in otherwise healthy individuals.
- Awake bruxism (AB): a masticatory muscle activity during wakefulness that is characterized by repetitive or sustained tooth contact and/or by bracing or thrusting of the mandible and is not a movement disorder in otherwise healthy individuals.

The international consensus also proposed that bruxism may be classified according to clinical consequences:[1]

- Not a risk factor or protective factor: bruxism is a behavior that does not cause harm.
- A risk factor: bruxism is associated with one or more negative health outcomes. These include temporomandibular joint pain, masticatory muscle pain, excessive tooth wear and prosthodontic complications.[3] [4] [5] [6]

- A protective factor: bruxism is associated with one or more positive health outcomes. These may include preventing collapse of the upper airway while sleeping in patients with obstructive sleep apnea, releasing emotional tension, or promoting salivation to protect the teeth in patients with gastroesophageal reflux disease.[2]

Case history

Case history #1

A 52-year-old man presents with a severely worn dentition with less than one third of the incisors left. The excessive wear has started to bother him from an aesthetic point of view and causes difficulties with biting and chewing food. He has no complaints of pain or stiffness in the jaw muscles. However, he often wakes with hypersensitive teeth that gradually improve during the day. He is aware of his tooth-grinding habit both when awake and during sleep. His bruxism worsened after a traumatic head injury.

Case history #2

A 22-year-old woman presents with moderate dull pain in the jaw-closing muscles and frequent temporal headaches. The symptoms are worse in the morning and she has a feeling of fatigued and tense jaw muscles on waking. The symptoms have lasted for 2 months and she feels increasingly stressed because of an upcoming deadline at work. She has to work long hours, has increased caffeine intake, resumed smoking cigarettes, and is sleeping less than optimal. Her partner has reported that she makes tooth-grinding sounds during sleep.

Approach

Bruxism can represent a normal variation of behavior in otherwise healthy individuals, as well as a phenomenon associated with a number of clinical problems. A certain amount of bruxism-related motor activity is not necessarily pathologic, though it may reflect the presence of one more underlying conditions or factors.[2] [15] [47]

Approaches for assessing bruxism can be noninstrumental (history and clinical exam) or instrumental (using investigations). Instrumental approaches for sleep bruxism (SB) involve polysomnography (PSG) or electromyography (EMG) recordings, while ecologic momentary assessment (EMA) is a promising approach to awake bruxism (AB) diagnosis.[1] [9]

The early clinical diagnosis of possible and probable bruxism is primarily based on noninstrumental methods which do not allow for SB and AB to be accurately distinguished.[1] Validated research diagnostic criteria for a definite diagnosis exist only for SB and are based on PSG recordings.[48] [49] However, it is important to note these criteria were validated in a small sample of carefully selected individuals who may not be representative of the full spectrum of people with bruxism. Furthermore, PSG/SB criteria may only provide a partial picture of the complex range of jaw-muscle activities incorporated within the construct of bruxism and so are further limited in this regard.[50] No definitive criteria have yet been established for AB.

The assessment and diagnosis of bruxism is challenging given the subjectivity of self-reports and the divergent diagnostic criteria and outcomes reported in clinical research studies. Tools for standardizing bruxism assessment are in development but require further testing and are yet to be validated.[51] [52]

Noninstrumental approach: history

History taking via structured questionnaires, interviews, and more general self-reported measures is useful to gather preliminary information on bruxism activities, the presence of clinical consequences, and possible risk factors. This information is a subjective view, but informs the later steps of diagnosis.[53]

Bruxism activities

- The history should explore behaviors of teeth grinding and/or clenching as well as jaw bracing and/or thrusting during sleep and wakefulness.
- It may be helpful for the patient (and any bed partners) to keep a diary to note the nature and frequency of these activities. Parents/caregivers should also be advised to keep a record of these behaviors in children.

Nonfunctional oral habits

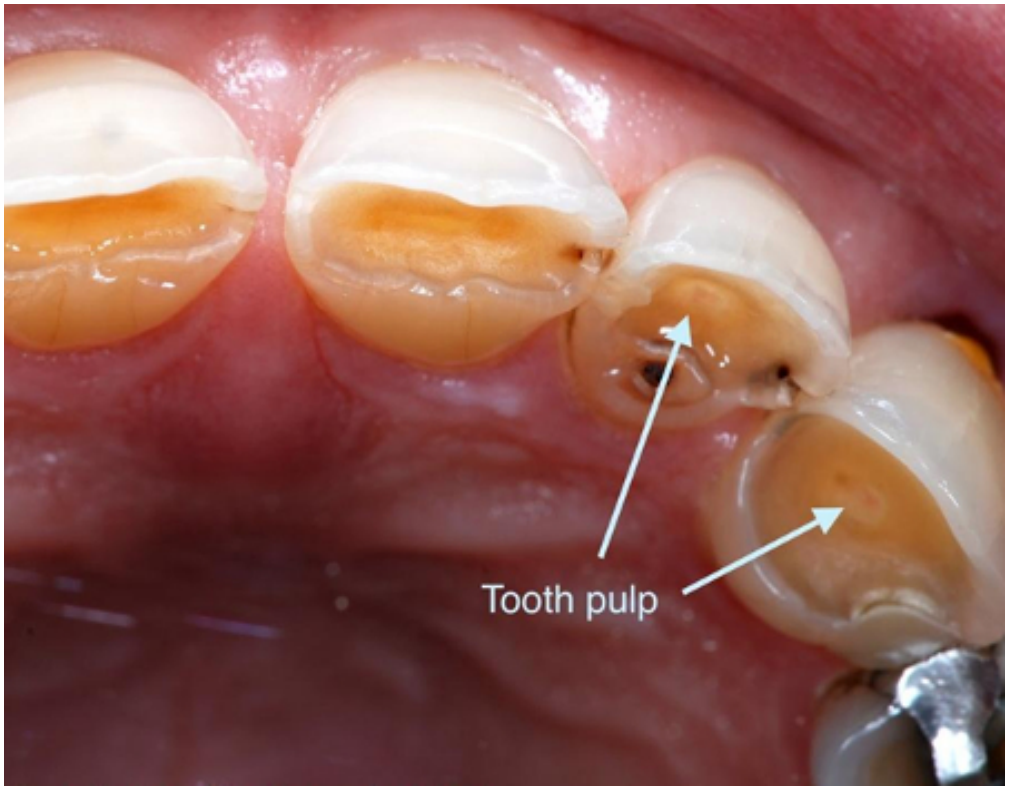
- Habits such as biting activities (chewing gum, tooth-tapping, nail-biting, object-biting e.g., pencils), and movements involving soft-tissues (cheek-, lip-, or tongue-biting, grimacing, tongue pushing against teeth, licking lips, tongue protrusion) may be present.[54] Association of these habits with bruxism has been reported, especially in children and adolescents, and they may suggest an anxious personality that is also associated with awake bruxism.[55] [56]

Functional symptoms

- Functional symptoms should be elicited. Prolonged clenching may be a causative factor for some symptoms, such as the difficulty to open the mouth wide on awakening.[57] Prolonged bruxism overload may also increase the frequency and duration of lock episodes in people with intermittent locking.[58]

Pain

- The relationship between bruxism and pain in the jaw muscles and/or temporomandibular joints (TMJ) is controversial.[6] However, the presence of jaw muscle pain and fatigue in the morning may lead to a suspicion of sleep-time teeth clenching.
- A history of pain symptoms in the orofacial pain area should be collected including:
  - Tooth soreness and/or hypersensitivity
    - If bruxism-related attrition reaches the dentine, the tooth pulp may become more sensitive to cold air or liquids.[54] However, this phenomenon is not pathognomonic, because it can also be caused by other conditions (e.g., dental malocclusion). In addition to hypersensitivity, people with bruxism may experience tooth soreness, especially in the morning after prolonged sleep-time clenching.



Bruxism-related attrition reaching the dentine may result in tooth soreness and hypersensitivity
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  - Jaw muscle pain
    - Both SB and AB may be associated with jaw muscle pain. The relationship is not linear, and depends on several factors. There is some consensus that clenching-type activity during the day is associated more with jaw pain than tooth grinding during sleep. If present, pain is often worst upon awakening.[59]
  - Temporomandibular joint pain
    - Investigations based on self-reported or clinical bruxism diagnosis showed a positive association with TMJ pain, although studies based on more quantitative

and specific methods to diagnose bruxism showed much lower association with temporomandibular disorder (TMD) symptoms in general.[6]

- Headache
    - Empiric observations suggest that bruxism may be associated with temporal headaches. Literature on the topic is scarce and mainly based on observations in children.[60]
- When pain is present, its location and perceived intensity can be assessed using visual analog scales or the McGill Pain Questionnaire. The psychosocial effects of the pain should also be explored.[61] [62]

Family and personal history

- The history should explore any relevant family history. Twin studies and analyses of familial distribution indicate a genetic determinant in sleep bruxism.[43] However, because bruxism is a complex motor behavior, it is unlikely to be explained by a single gene expression, and genetic-environmental interaction is likely to be involved.[44]
- Personal history of bruxism activities should also be elicited as bruxism may sometimes persist from childhood into adulthood.[44]

Risk factors for bruxism

Specific factors may influence bruxism onset or exacerbation and should, therefore, also be explored as part of patient history.

- Medication and illicit drug use: use of medications (selective serotonin-reuptake inhibitors, dopamine antagonists) and illicit drugs (ecstasy, cocaine) can contribute to the development of bruxism and should be specifically elicited.[40] [41][42]
- Smoking, caffeine, and alcohol consumption: all of these factors can exacerbate SB, although the specific mechanisms are unclear.[34] [35]
- Sleep disorders: obstructive sleep apnea and snoring have been indicated as strong risk factors for SB.[36] [37]
- Stress and anxiety: assessment of stress and anxiety levels should be undertaken as part of the history. Psychosocial factors (i.e., stress sensitivity, anxious personality traits) and psychopathologic symptoms (e.g., neuroticism) are linked to bruxism.[21] [22] [23] [63]
- Neurologic diseases: bruxism may be part of the clinical picture of other well-known primary motor disorders, such as dystonia, dyskinesia, extrapyramidal disorders, and other neurologic conditions.[45]

Noninstrumental approach: clinical exam

The clinical assessment for the diagnosis of probable bruxism includes a complete dental examination, an inspection of the cheek and tongue mucosa, and evaluation of the jaw muscles and TMJ.[1] It is not possible to discriminate clinically between signs of past and ongoing bruxism.

Teeth and periodontium signs

- Tooth wear
    - Tooth wear is considered the typical bruxism sign, but is not a reliable diagnostic factor because of the high prevalence of tooth wear in populations of non-bruxing people.[5]

Tooth enamel chippings, cracks, and fractures of natural teeth together with attrition, abfraction, and abrasion due to ceramics

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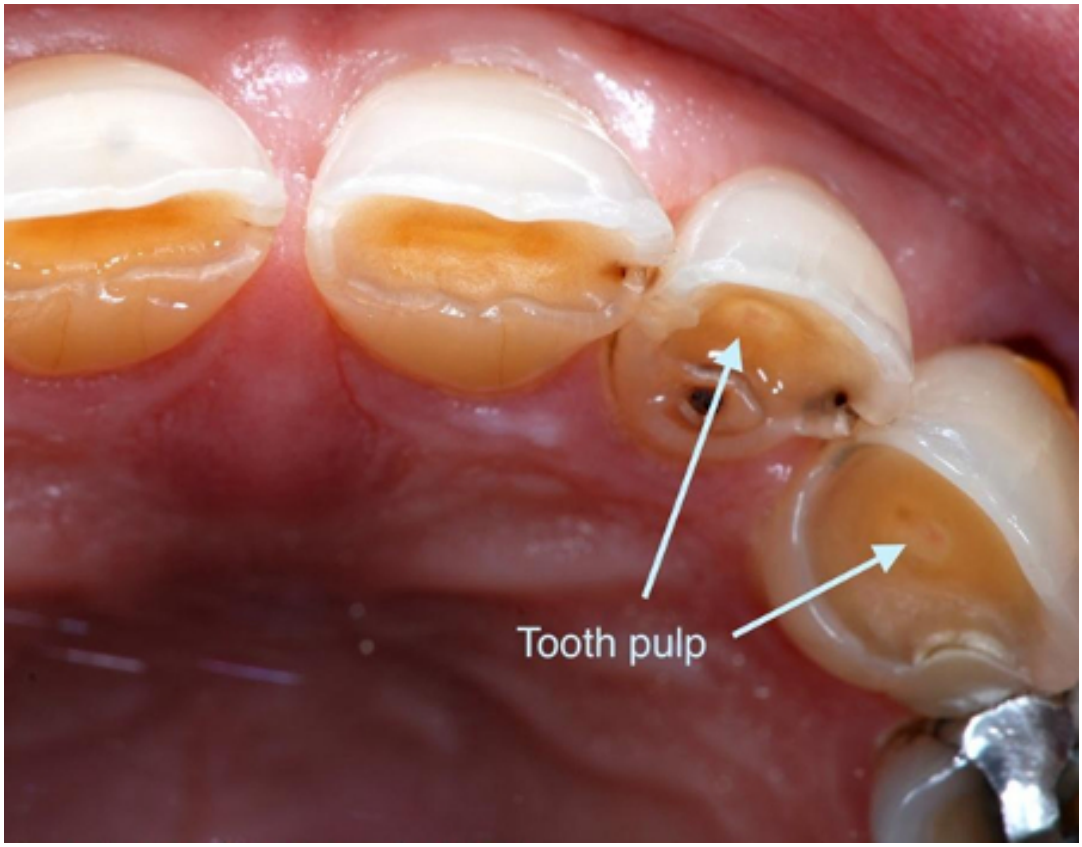
- Tooth wear has a multifactorial etiology including: dental attrition (intrinsic mechanical tooth wear caused by tooth-to-tooth contact), abrasion (extrinsic mechanical tooth wear caused by a foreign element, such as a hard bristle toothbrush, rubbing on the teeth), abfraction (intrinsic mechanical tooth wear caused by occlusal forces such as bruxism), and erosion (extrinsic and intrinsic chemical tooth wear).



Bruxism-related attrition reaching the dentine may result in tooth soreness and hypersensitivity

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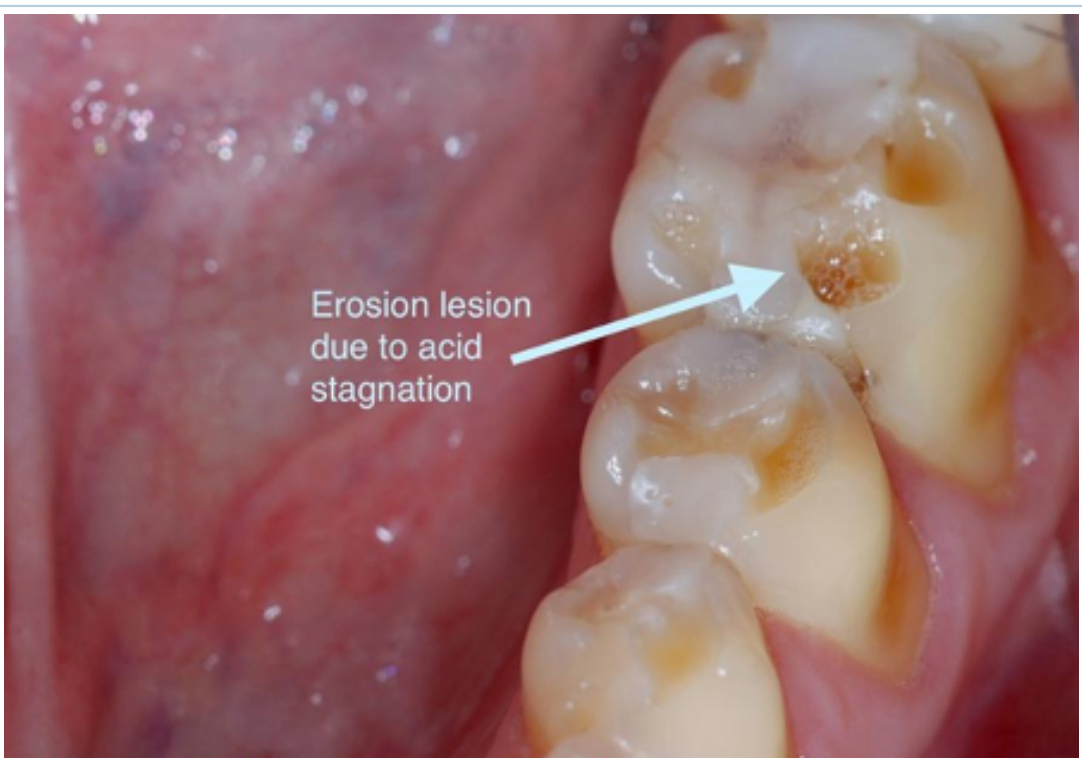

Erosion lesion

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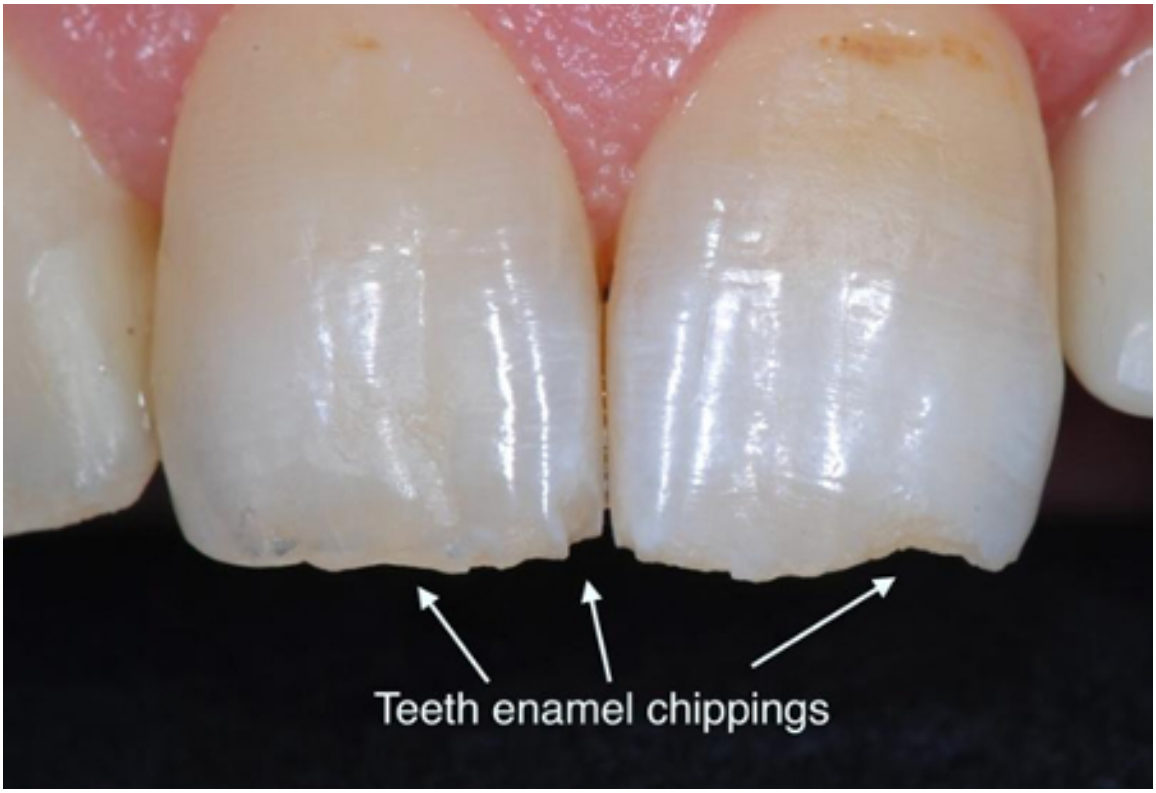
- Reliable discrimination between the different causes of tooth wear is challenging due to the difficulties of distinguishing between functional and nonfunctional tooth wear patterns. Moreover, some forms of bruxism may not cause clinically detectable tooth wear.
- The location and amount of tooth wear should be recorded, especially if evaluation on dental casts is used.[64] A useful tool, the Tooth Wear Evaluation System (TWES) 2.0, has been proposed which has been shown to have acceptable reliability.[65] [66]
- In people with bruxism, tooth wear often presents as wear facets on canines and incisors. Findings suggestive of bruxism include tooth wear affecting at least 1 sextant of the dentition, with enamel reduction to dentine and some loss of crown height.[5]

Tooth enamel chippings, cracks, and fractures of natural teeth

- Despite not being pathognomonic of bruxism, signs of tooth enamel chipping, teeth fractures, or cracks may indicate the presence of bruxism activities. In particular, enamel chippings may be clinically relevant when occurring on multiple teeth.



Tooth enamel chippings

From the collection of Dr Alessandro Bracci

Tooth fracture

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Dental restoration failures

- These range in severity from detachment of esthetic fillings with poor retention, to fractures of composites or ceramics. Chipping of restorations and de-cementation of crowns and bridges may also be observed in people with bruxism.
- For dental implants, bruxism is unlikely to be a risk factor for biologic complications (e.g., implant survival, bone loss, gingival attachment loss), but may be a risk factor for mechanical complications (e.g., screw loosening, fractures of restorations).[67] [68]

An example of a fracture of dental implant components

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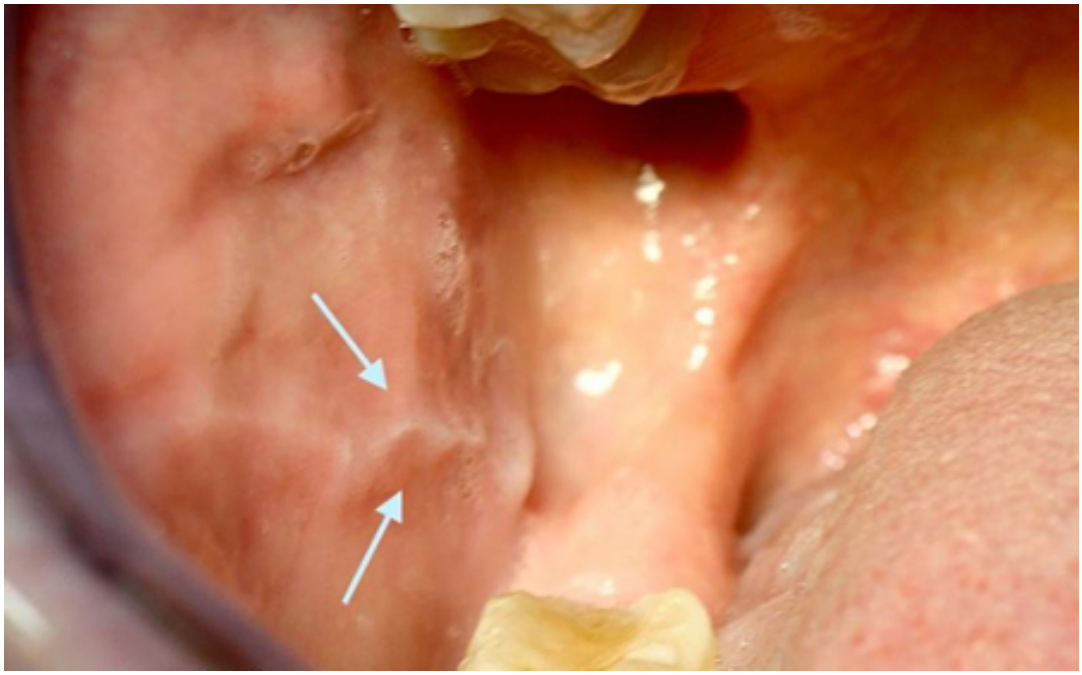
Periodontal problems

- Based on literature findings, there is no evidence of a direct relationship between bruxism and periodontal status (e.g., bone loss, gingival attachment loss, inflammation); however, patients may present with periodontal problems on exam.[69] [70]

Mucosal signs

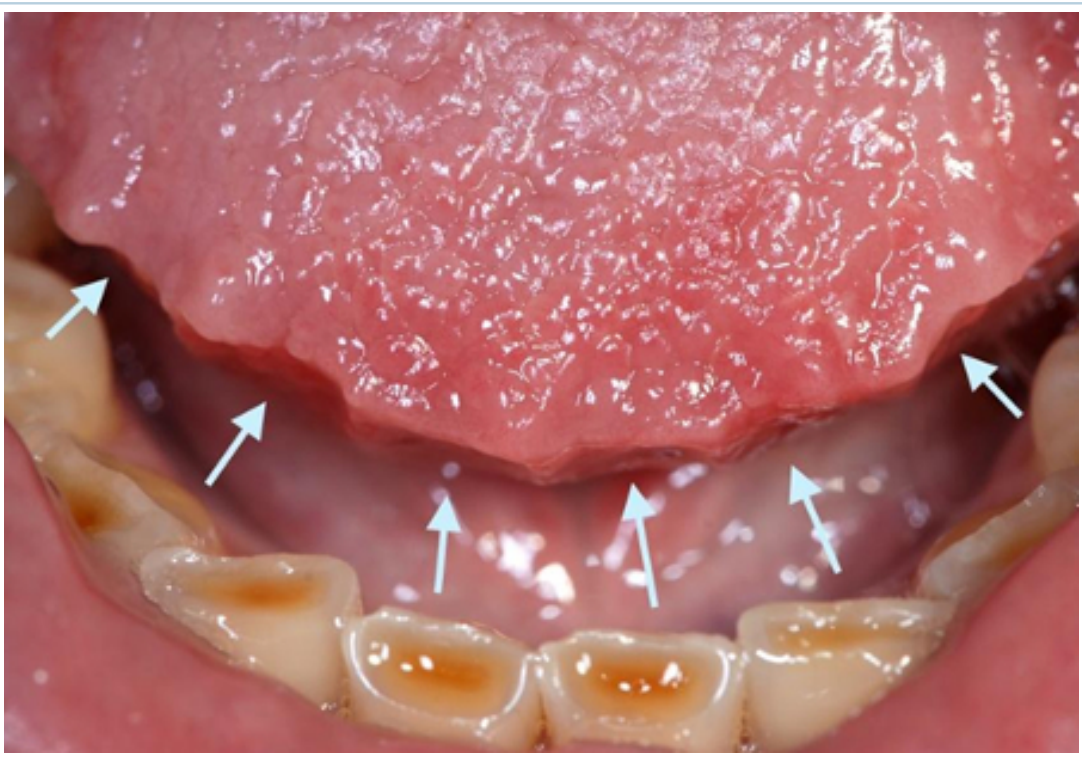
- Linea alba (white line)
    - May be present. Linea alba is a hyperkeratosis of the oral mucosa in the cheeks, representing a sort of dental impression on the inside surface of the cheek. It is usually bilateral and is a common feature of patients with teeth clenching habits, such that it may be considered the main clinical marker of clenching-type bruxism. Its presence and severity depend, at least in part, on the teeth morphology. Intense and prolonged clenching may cause more marked signs on the cheek mucosa.



Linea alba (white line) is a hyperkeratosis of the oral mucosa in the cheeks, representing a dental impression on the inside surface of the cheek

From the collection of Prof Daniele Manfredini

- Tongue scalloping
  - Tongue mucosa may show indentations.[54] This sign features indented lateral tongue borders, usually bilateral and partly depending on the inclination of the antagonist teeth.



Tongue scalloping

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- Traumatic lesions

- Severe clenching may also be responsible for traumatic lesions of the tongue or cheek mucosae, initially manifesting with small petechial hemorrhages around the linea alba and possibly resulting in white lesions.
- Another possible sign is unusual keratinization of the lip.

Muscle signs

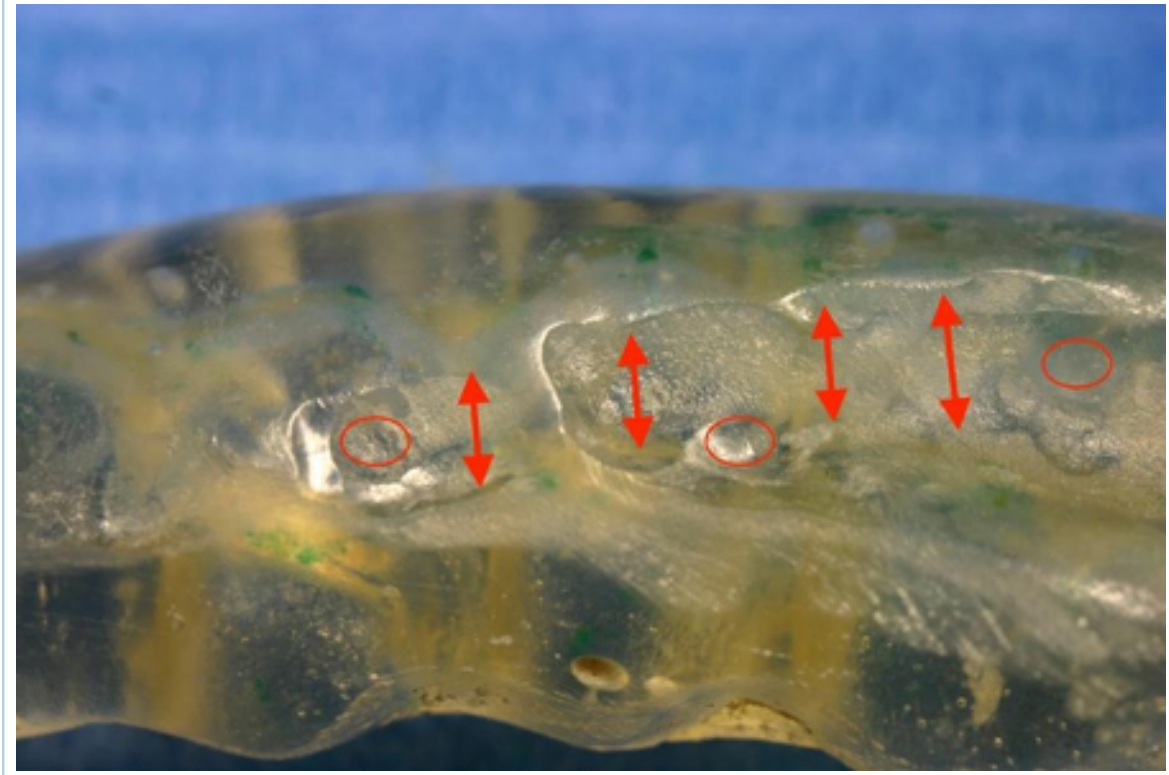
- Jaw muscle exam
  - The masticatory muscles (masseter and temporalis, in particular) should be tested for pain on palpation and during opening and closing of the jaw. In some patients, bruxism can sensitize the muscles, making palpation and normal oral functions, such as biting or wide jaw-opening, uncomfortable even in the absence of clinically relevant pain.[59]
- Muscle hypertrophy
  - Repeated activation of jaw muscles can lead to a functional hypertrophy, most noticeably as a training effect on the masseter muscles.[54] It is likely that such hypertrophy is the result of prolonged jaw clenching in predisposed patients with short-faced morphology, and it has also been described (rarely) in the temporalis muscles.[71]
  - Palpation of the increase in jaw muscle volume with maximal voluntary contraction can give an indication of possible hypertrophy. Another possible approach to evaluation is visible hypertrophy when the muscles are relaxed, thus possibly affecting facial aesthetics.

TMJ signs

- Disc and joint degeneration
  - The relationship between bruxism and TMD, has not been clarified.[6] [72] The TMJ may be overloaded in conditions of prolonged clenching activities and this may put the joint at risk of disc abnormalities and articular degeneration.
  - The patient's dental occlusion may exacerbate the negative effects of bruxism on the joints.[73] [74] In cases of intermittent closed locking, locks occur more frequently and are of longer duration in the presence of bruxism.
- TMJ pain
  - To confirm the presence of TMJ pain, positive dynamic/static tests, which have a high specificity but low sensitivity, should be used. To rule out TMJ pain, negative palpation tests which have a high sensitivity should be carried out.[75]
  - When TMJ pain is present, intensity assessment strategies should follow the same protocols as for pain in the jaw muscles.

Oral appliances wear

- The literature on the validity of examining wear on the oral appliances for the diagnosis of ongoing bruxism is poor. Nonetheless, such a method represents an option for clinicians to evaluate the presence (and type) of bruxism activities.
- Patterns of wear differ from clenching-type to grinding-type movements, even if a combination of the two is also frequent.



Oral appliance wear

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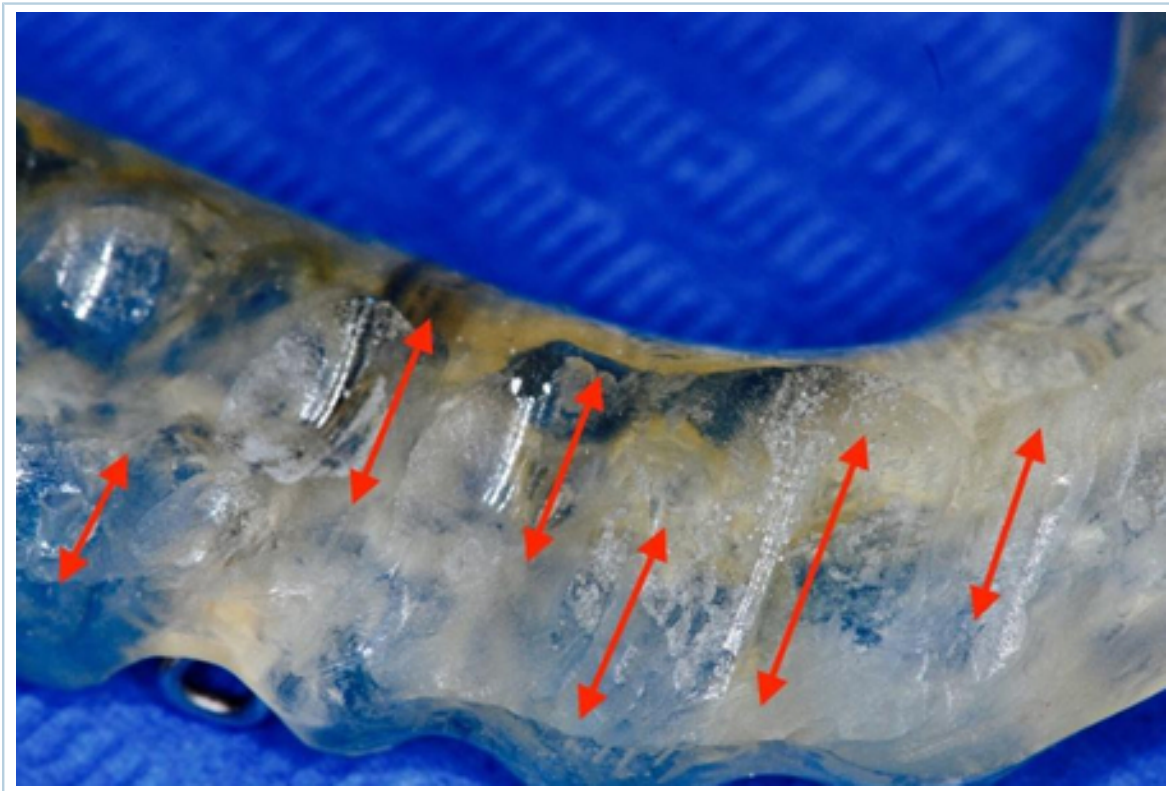

Oral appliance wear

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Instrumental approaches: use of recording devices

The intensity and duration of specific masticatory muscle activity cannot be quantified easily via self-reported measures.[76] One of the limitations is that the bruxism-psyche relationship could alter self-reporting, reflecting distress rather than masticatory muscle activity.

Instrumental approaches for assessment are currently available for both forms of bruxism.

A definite diagnosis of bruxism as a motor phenomenon can be achieved through measurement of jaw muscle activity.[1]

In cases of SB, the relationship of bruxism with other sleep arousal parameters should be assessed with PSG, combined with audio and video recordings.[1] Alternatively, portable EMG devices for in-home recordings may be used to demonstrate masticatory muscle motor activity.

For AB, hour-long wake time EMG recordings are the theoretical standard of reference but are rarely practical. Alternative strategies for a definite diagnosis of AB come from recording techniques based on EMA, which require a real-time appraisal of AB behaviors at different recording moments during the day.[1] [77]

EMG

- Can provide evidence of AB and SB.
- Some diagnostic strategies based on single- or multi-channel ambulatory EMG recordings have been proposed.[78] [79] [80]
- Portable EMG recorders provide the clinician with the number of jaw muscle activities per hour during the sleep or awake state. They can be used in patients with self-reports of moderate to severe SB, excessive tooth wear, or repeated fractures/failures of dental restorations.
- Portable devices offer easier availability and lower-level technical equipment with respect to PSG; however, costs limit their full introduction into the clinical setting.
- A review of the diagnostic accuracy of portable EMG recorders, and validity testing showed that multi-channeled devices may be accurate even with a single night of use, while multiple nights with single-channel devices are required to achieve sufficient agreement with PSG/SB diagnosis.[32] [78] [80] If limited-channel ambulatory EMG monitoring of SB is used (which evaluates only facial muscles), care must be taken that other potential sleep disorders are not missed. Use of sleep disorder questionnaires, such as the Epworth Sleepiness Scale and Pittsburgh Sleep Quality Index (PSQI) questionnaires, is advisable in this situation.

PSG

- PSG shows the number of bruxism events per hour of sleep and is the definitive test for a SB diagnosis, but it has limited use due to high costs and very low availability.[1] [81]
- A SB event is defined as a contraction of the right masseter muscle exceeding 20% of maximum voluntary contraction (MVC). Based on its duration, an event can be classified as tonic (single EMG burst >2 seconds), phasic (three or more bursts lasting 0.25 to 2 seconds), or mixed (a combination of the two types).
- Patients with self-reports of severe SB, pain, poor sleep, and other significant sleep disorders (e.g., obstructive sleep apnea) may be candidates for a PSG evaluation with a sleep specialist. Based on findings from a validation study, over 80% of people with severe bruxism are correctly identified by a PSG study.[49] See Diagnostic criteria .

EMA

- EMA involves repeated, real-time sampling of subjective behaviors and experiences about jaw muscle activities at certain time points during wakefulness (e.g., symptoms, affect, behavior, feeling, cognition).[77] It is an alternative to wake-time EMG to achieve a definite AB diagnosis.[9]
- Patients can use EMA to report the conditions of their jaw muscles such as relaxed jaw muscles, teeth contact, teeth-clenching, teeth-grinding, jaw-clenching without teeth contact (i.e., bracing).
- Progress in smartphone technology has opened up a new era for EMA, as data collection for clinical and research purposes can now be conducted using a tool that is already a part of daily life for a large percentage of the population.[82] [83]
- The development of EMA strategies has allowed for the evaluation of real-time AB behavior frequency compared to the self-reported activities identified in questionnaires.[9]

History and exam

Key diagnostic factors

bruxism activities: teeth grinding/clenching, jaw bracing/thrusting (common)

- Can occur during sleep or wakefulness. Classic bruxism involves teeth grinding/clenching, but bruxism can also involve masticatory muscle activity without tooth contact.[16]
- Bed partners may complain about grinding noises or tapping sounds during sleep. Can give rise to relationship problems and reduced quality of life.

oral parafunctions (common)

- Habits such as biting activities (chewing gum, tooth-tapping, nail-biting, object-biting, e.g., pencils), and movements involving soft-tissues (cheek-, lip-, or tongue-biting, grimacing, tongue pushing against teeth, licking lips, tongue protrusion) may be present.[54]
- Association of oral parafunctions with bruxism has been reported, especially in children and adolescents, and may suggest an anxious personality that is also associated with awake bruxism.[55] [56]

tooth wear (common)

- Tooth wear is considered the typical bruxism sign, but is not a reliable diagnostic factor because of the high prevalence of tooth wear in populations of nonbruxing people.[5]

Tooth enamel chippings, cracks, and fractures of natural teeth together with attrition, abfraction, and abrasion due to ceramics

From the collection of Dr Alessandro Bracci

- Often present as wear facets on canines and incisors in people with bruxism. Findings suggestive of bruxism include tooth wear affecting at least one sextant of the dentition, with enamel reduction to dentine and some loss of crown height.[5]

jaw muscle and/or temporomandibular joint (TMJ) pain (common)

- Bruxism can be associated with pain, fatigue, stiffness, and other symptoms in the jaw-closing muscles (masseter and temporalis). If present in patients with sleep bruxism, the pain is often worst upon awakening.[59] Investigations based on self-reported or clinical bruxism diagnosis showed a positive association with TMJ pain, but studies based on more quantitative and specific methods to diagnose bruxism showed much lower association with temporomandibular disorders symptoms in general.[6]

jaw muscle tenderness (common)

- Bruxism may sensitize the jaw muscles, making palpation and normal function such as biting or wide jaw opening uncomfortable.[59]

stress and anxiety (common)

- Psychosocial factors (i.e., stress sensitivity, anxious personality traits) and psychopathologic symptoms (e.g., neuroticism) are linked to bruxism, particularly awake bruxism.[21]

caffeine, smoking, or alcohol use (common)

- Considered strong risk factors for bruxism.[34] [35]

history#bf sleep disorders (uncommon)

- Obstructive sleep apnea and snoring have been indicated as strong risk factors for sleep bruxism.[36] [37]

selective serotonin-reuptake inhibitor or dopamine antagonist use (uncommon)

- Can contribute to the development of bruxism.[40] [41]

ecstasy or cocaine use (uncommon)

- Can be a contributory factor in bruxism.[42]

jaw muscle hypertrophy (uncommon)

- Repeated activation of jaw muscles can lead to a functional hypertrophy, most noticeably of the masseter muscle.[54] Palpation of the increase in jaw muscle volume with maximal voluntary contraction can give an indication of possible hypertrophy.

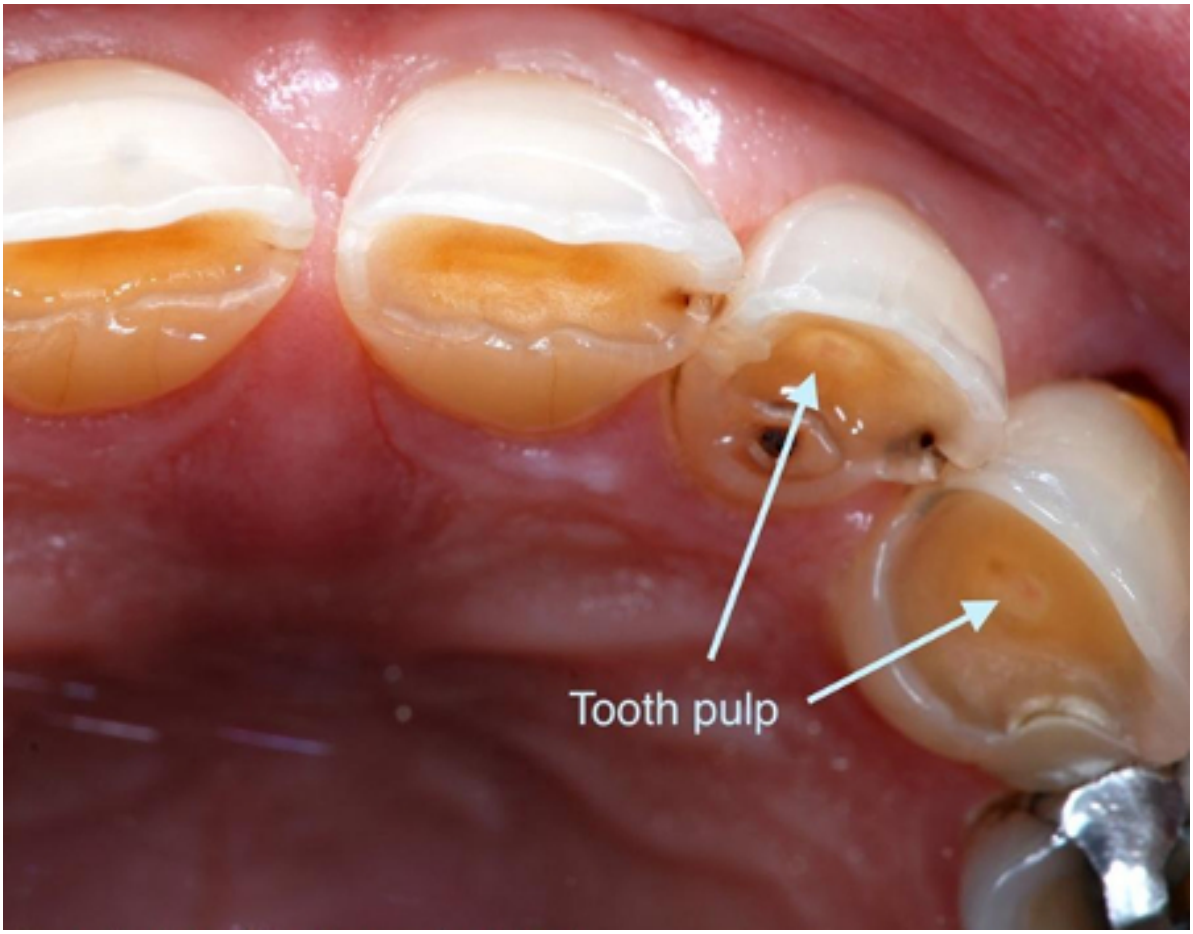
Other diagnostic factors

headache (common)

- Bruxism may be associated with temporal headaches. Literature on the topic is scarce and mainly based on observations in children.[60]

tooth soreness and/or hypersensitivity (common)

- If the attrition reaches the dentine, the tooth pulp may become more sensitive to cold air or liquids.[54] However, this phenomenon can also be caused by other dental pathologies (e.g., caries).



Bruxism-related attrition reaching the dentine may result in tooth soreness and hypersensitivity

From the collection of Dr Alessandro Bracci

- People with bruxism may also experience tooth soreness, especially in the morning after prolonged sleep-time clenching.

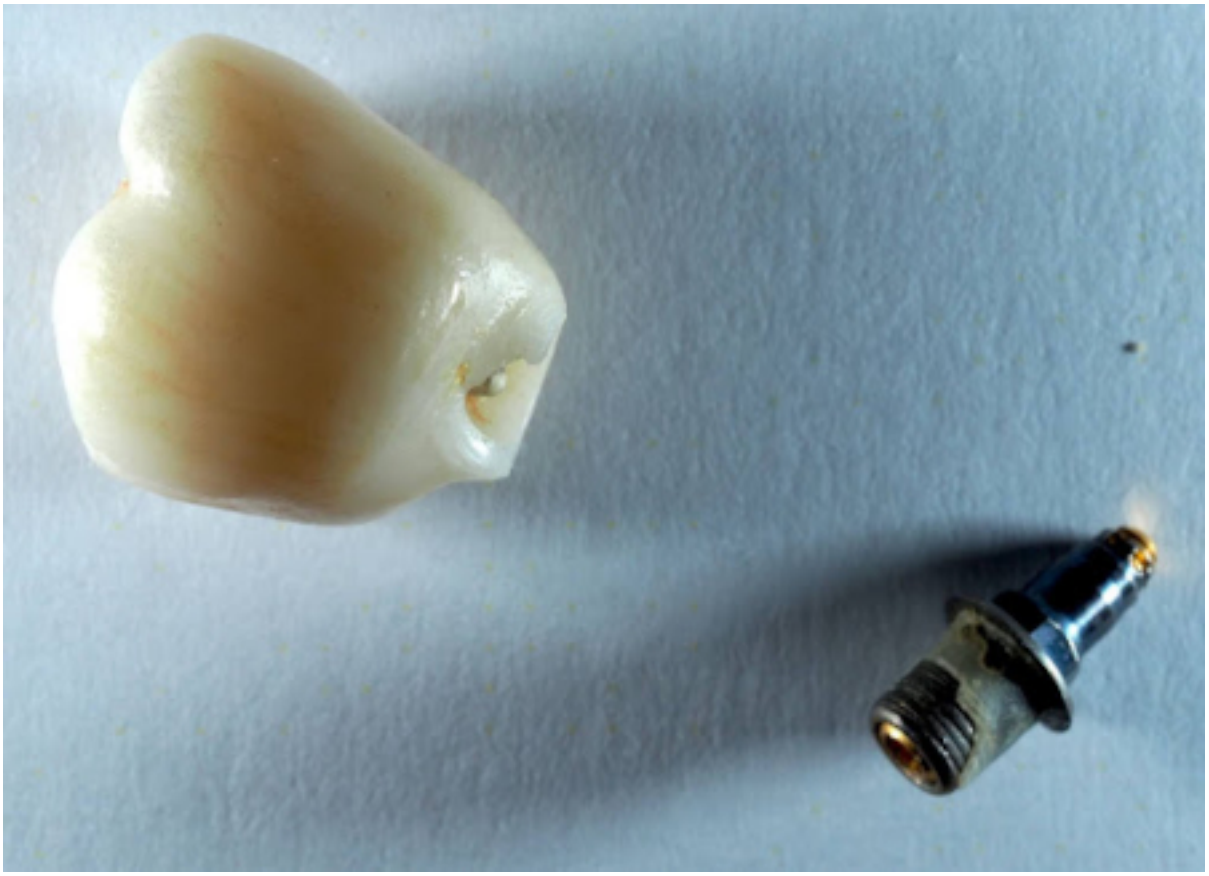
history of temporomandibular disorder (TMD) (uncommon)

- The relationship between bruxism and TMD has not been clarified.[6] [72] The TMJ may be overloaded in conditions of prolonged clenching activities and this may put the joint at risk of disk abnormalities and articular degeneration.

dental restorations and/or implant failure (uncommon)

- Range in severity from detachment of esthetic fillings with poor retention, to fractures of composites or ceramics.[54] Chipping of restorations and decementation of crowns and bridges may also be observed. For dental implants, bruxism is unlikely to be a risk factor for biologic complications

(e.g., implant survival, bone loss, gingival attachment loss), but may be a risk factor for mechanical complications (e.g., screw loosening, fractures of restorations).[67] [68]

- 

An example of a fracture of dental implant components

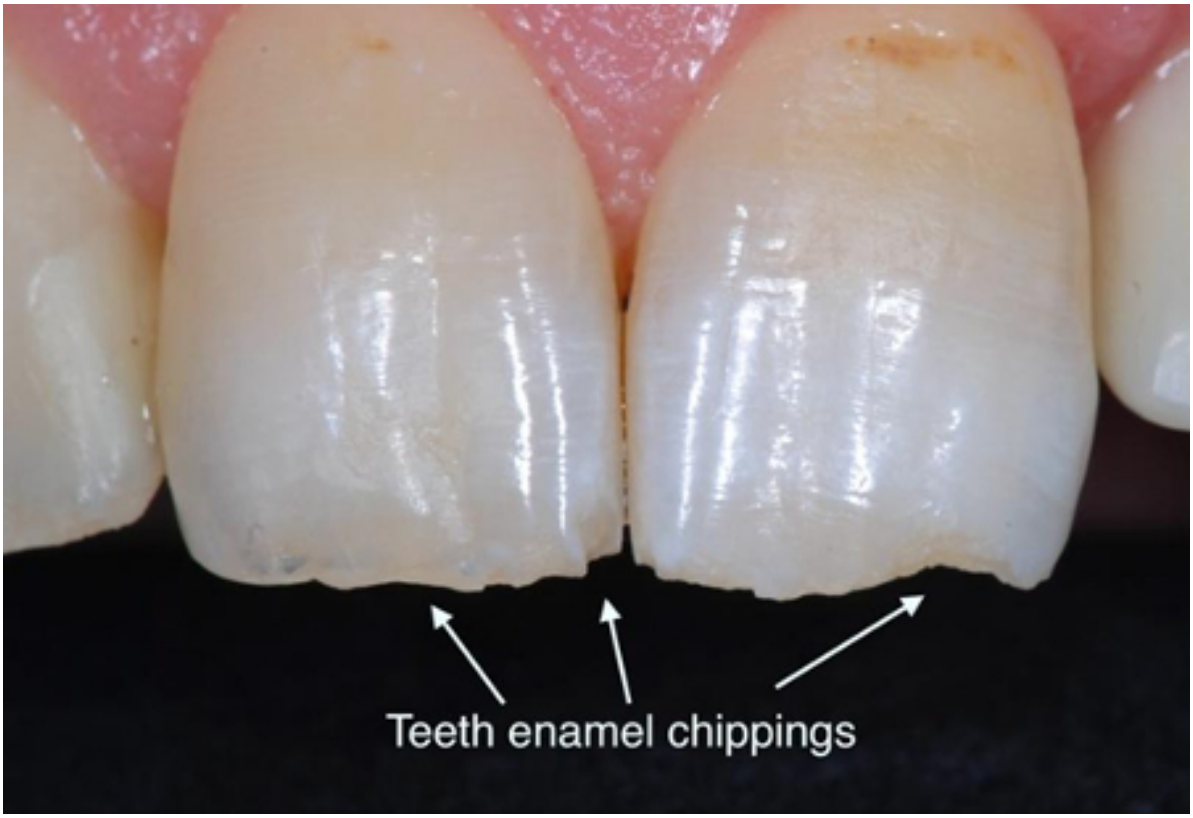
From the collection of Dr Alessandro Bracci; used with permission

periodontal problems (uncommon)

- There is no evidence of a direct relationship between bruxism and periodontal status (e.g., bone loss, gingival attachment loss, inflammation); however, patients may present with periodontal problems on exam.[69] [70]

tooth chippings, cracks, and fractures (uncommon)

- Signs of tooth enamel chipping, teeth fractures, or cracks of natural teeth may indicate the presence of bruxism activities. In particular, tooth enamel chippings may be clinically relevant when occurring on multiple teeth.



Tooth enamel chippings

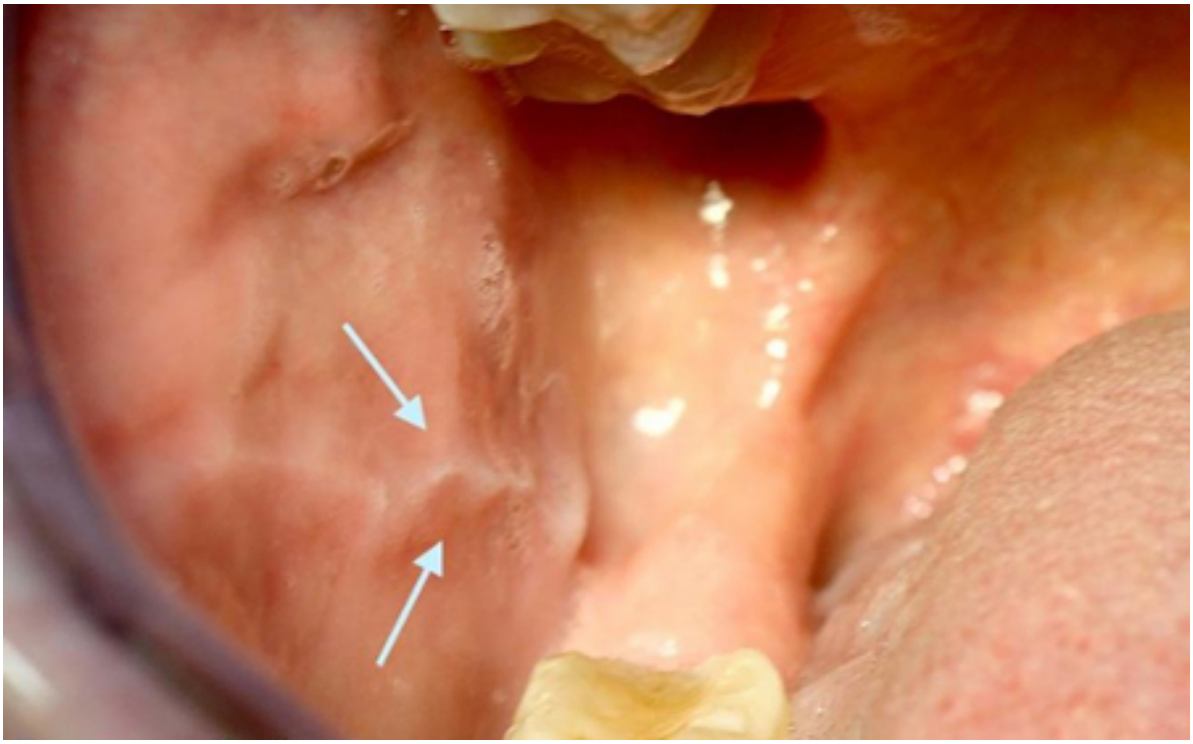
From the collection of Dr Alessandro Bracci

Tooth fracture

From the collection of Prof Daniele Manfredini

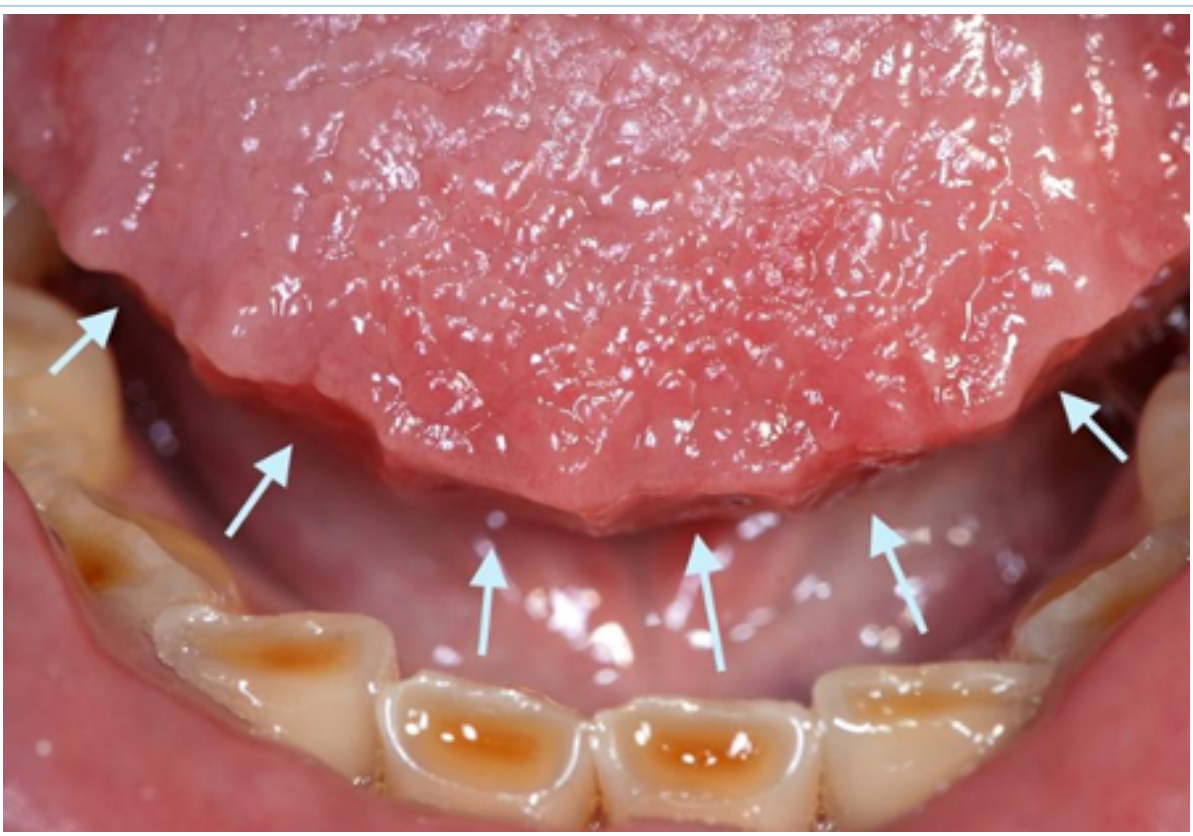
oral mucosal changes (uncommon)

- Bruxism and related oral parafunctions can lead to linea alba, indentations and/or traumatic lesions on the tongue or cheek, or unusual keratinization of the lip.[54]



Linea alba (white line) is a hyperkeratosis of the oral mucosa in the cheeks, representing a dental impression on the inside surface of the cheek

From the collection of Prof Daniele Manfredini



Tongue scalloping

From the collection of Dr Alessandro Bracci

Risk factors

Strong

smoking, caffeine, alcohol consumption

- All of these factors exacerbate sleep bruxism (SB), although the specific mechanisms are unclear.[34] [35]
- Smoking as a risk factor suggests that nicotinic receptors are involved, possibly through an effect on the cholinergic system and impact on vigilance and brain-arousal networks. There is also the hypothesis that smoking habits are linked to stress and personality traits which may be the true risk factor for bruxism.
- One systematic review found that smoking showed a moderate association with SB.[35] A higher association was noted in current smokers (Odds ratio [OR] 2.8, 95% confidence interval [CI] 2.2 to 3.5), and a weaker association in patients smoking ≤20 cigarettes per day (OR 1.3, 95% CI 1.1 to 1.5). A moderate association was reported for alcohol intake (OR 1.9, 95% CI 1.2 to 2.8). In comparison, caffeine was noted to have a weaker association with SB (OR 1.4, 95% CI 1.2 to 1.8).

stress sensitivity and anxious personality traits

- A literature review concluded that awake bruxism is associated with psychosocial factors and psychopathology such as stress and anxiety.[21] A possible explanation of this correlation is that individuals with certain psychological profiles may try to release emotional tension by engaging in bruxism activities.

snoring, obstructive sleep apnea, and other sleep disorders

- Obstructive sleep apnea (OSA) and snoring have been indicated as risk factors for sleep bruxism (SB).[36] [37] One systematic review found that SB was moderately associated with snoring (Odds ratio [OR] 2.6, 95% CI 1.5 to 4.4) and OSA (OR 1.8, 95% CI 1.2 to 2.6).[35]
- Apneic events may be part of a cascade of events that result in a bruxism-like jaw movement in an attempt to put the mandible forward and restore upper airway patency, even if evidence is lacking about the actual prevalence of this kind of relationship within the full spectrum of individuals with SB and apnea.[38]
- Other sleep disorders may be associated with SB as part of complex central nervous system phenomena occurring during sleep.[39]

medication and illicit drug use

- Antidepressant medication, such as selective serotonin-reuptake inhibitors, may trigger bruxism in susceptible individuals.[40] Dopaminergic antagonists have also been reported to exacerbate bruxism.[41]
- Cocaine and methylenedioxymethylamphetamine (ecstasy) can also lead to bruxism.[42]

Weak

genetic predisposition

- Twin studies and analyses of familial distribution indicate a genetic determinant in sleep bruxism.[43] Bruxism may sometimes persist from childhood into adulthood.[44] However, because bruxism is a complex motor behavior, it is unlikely to be explained by a single gene expression, and genetic-environmental interaction is likely involved.[27]

primary motor disorders

- Bruxism may be part of the clinical picture of other well-known primary motor disorders, such as dystonia, dyskinesia, extrapyramidal disorders, and other neurologic conditions.[45] [46]

Tests

1st test to order

Test	Result
clinical diagnosis • The early clinical diagnosis of possible and probable bruxism is primarily based on noninstrumental approaches: history taking (i.e., structured questionnaires, interviews, and more general self-reported measures) and clinical exam (including a complete dental exam, an inspection of the cheek and tongue mucosa, and evaluation of the jaw muscles and temporomandibular joint).[1] • Clinical diagnosis does not allow for sleep bruxism and awake bruxism to be accurately distinguished.	**possible or probable bruxism**
polysomnographic (PSG) study • PSG shows the number of bruxism events per hour of sleep and is the definitive test for sleep bruxism (SB) diagnosis, but it has limited use due to high costs and very low availability.[1] [81] • Patients with self-reports of severe bruxism, pain, poor sleep, and other significant sleep disorders (e.g., apnea) may be candidates for a PSG evaluation with a sleep specialist. • Over 80% of people with severe bruxism are correctly identified by a PSG study.[49] • A SB event is defined as a contraction of the right masseter muscle exceeding 20% of maximum voluntary contraction (MVC). Based on its duration, an event can be classified as tonic (single EMG burst > 2 seconds), phasic (3 or more bursts lasting 0.25 to 2 seconds), or mixed (a combination of the two types).	**positive for SB if: >4 bruxing episodes per hour of sleep; >6 bruxism bursts per episode and/or 25 bruxism bursts per hour sleep; and >1 bruxing episode with grinding noise**

Other tests to consider

Test	Result
electromyography (EMG) • Can provide evidence of both awake bruxism (AB) and sleep bruxism (SB) by recording the number of jaw muscle activities per hour during the sleep or awake state. • Diagnostic strategies based on single- or multi-channel ambulatory EMG recordings have been proposed.[78] [79] [80] A review of the diagnostic accuracy of portable EMG recorders, and validity testing showed that multi-channelled devices may be accurate even with a single-night use, while multiple nights with single-channel devices are required to achieve sufficient agreement with polysomnography (PSG)/SB diagnosis.[32][78] [80] • Portable devices offer easier availability and lower-level technical equipment with respect to PSG; however, costs limit their full introduction into the clinical setting. • EMG can be used in patients with self-reported moderate to severe SB, excessive tooth wear, or repeated fractures/failures of dental restorations. • If limited-channel ambulatory EMG monitoring of people with SB is used (evaluates only facial muscles), care must be taken that other potential sleep disorders are not missed. Use of sleep disorder questionnaires, such as the Epworth Sleepiness Scale and Pittsburgh Sleep Quality Index (PSQI) questionnaires, is advisable in this situation.	**cut-off criteria not established, but repeated measurements can provide insight into individual variations in EMG activity**
ecological momentary assessment (EMA) • Proposed as an alternative option to wake-time electromyography to achieve a definite awake bruxism (AB) diagnosis. • Involves repeated, real-time sampling of subjective behaviors and experiences about jaw muscle activities at certain time points during wakefulness (e.g., symptoms, affect, behavior, feeling, cognition).[77] [82] [83] Allows patients to report the conditions of their jaw muscles such as: relaxed jaw muscles, teeth contact, teeth-clenching, teeth-grinding, jaw-clenching without teeth contact (i.e., bracing). • Progress in smartphone technology has opened up a new era for EMA, as data collection for clinical and research purposes can now be conducted using a tool that is already a part of daily life for a large percentage of the population.[82] [83] •	**appraisal of AB with current behaviors and experiences in real time (no established AB diagnostic criteria)**

Differentials

Condition	Differentiating signs / symptoms	Differentiating tests
Oromandibular dystonia	• Slow, twisting, repetitive muscle spasms that affect the mandible, tongue, and lips.[84] Often associated with dystonia of the neck muscles (cervical dystonia/ spasmodic torticollis), eyelids (blepharospasm), or larynx (spasmodic dysphonia). Sleep bruxism can also be present.	• No differentiating tests. Clinical diagnosis.
Huntington disease	• Hereditary neurodegenerative condition characterized by irregular, unpredictable choreic body movements.[84] Sleep bruxism may also be a feature. • Neurologic evaluation identifies characteristic cognitive impairment (e.g., concentration impairment, task apathy, and anxiety), behavioral features (e.g., irritability, impulsivity), and motor features (e.g., chorea, twitching/restlessness, bradykinesia/rigidity).	• Genetic testing confirms gene with an expanded trinucleotide CAG repeat (the mutant allele).
Tourette syndrome	• Repetitive, irregular, stereotyped, suppressible movements (tics) of the eyes, face, and neck. May occur during light nonrapid eye movement (non-REM) sleep, sleep stage shifts, and microarousals and awakenings.[84]	• No differentiating tests. Clinical diagnosis.
Hemifacial spasms	• Unilateral, nonepileptic twitches of the face also during sleep.[84]	• Needle EMG shows irregular, brief, high-frequency bursts (150-400 Hz) of motor unit potentials, which correlate with clinically observed facial movements.
Parkinson disease	• Multisystem neurologic syndrome characterized by hypokinetic movements due to muscle stiffness and resting tremor. Caused	• Dopaminergic agent trial shows improvement in symptoms.

Condition	Differentiating signs / symptoms	Differentiating tests
	by degeneration of the dopaminergic system. Swallowing difficulties and drooling may persist during sleep, whereas resting orolingual tremor is absent.[84]	
Tardive dyskinesia	• Neuroleptic-induced abnormal oromandibular movement disorder eventually associated with sleep bruxism.[84] May feature any or all of movement of the lips and tongue (grimacing, smacking, pursing, sticking out the tongue), rapid blinking, impaired finger movement or "fluttering," rapid movements of the arms, toe tapping, moving the leg up and down, twisting and bending of the torso (in extreme cases).	• No differentiating tests. Clinical diagnosis.
REM-behavior disorder	• Act out dramatic and/or violent dreams so may involve limbs. Often involves grunting or shouting. Usually seen in men ≥60 years old.	• Polysomnographic video recording shows increase in muscle tone associated with the EEG pattern of REM sleep (in contrast to the EEG pattern of REM sleep associated with an absence of muscle tone in healthy individuals). Video shows body movements coinciding with the EEG pattern of REM sleep.

Criteria

American Academy of Sleep Medicine[85]

Sleep-related bruxism:

- A: The presence of repetitive jaw-muscle activity characterized by grinding or clenching of the teeth in sleep
- B: The presence of one or more of the following clinical symptoms or signs consistent with the above reports of tooth-grinding or clenching during sleep:
  - Abnormal tooth wear
  - Transient morning jaw muscle pain or fatigue, or temporal headache

2017 international consensus panel on the assessment of bruxism[1]

Proposed diagnostic grading for sleep and awake bruxism:

- Possible sleep/awake bruxism is based on a positive self-report only
- Probable sleep/awake bruxism is based on a positive clinical inspection, with or without a positive self-report
- Definite sleep/awake bruxism is based on a positive instrumental assessment, with or without a positive self-report and/or a positive clinical inspection.

It should be stressed that research is needed to establish the reliability, validity, and responsiveness to this proposed grading system.

Research diagnostic criteria for sleep bruxism (SB)[48] [49]

Polysomnographic (PSG) diagnostic cut-off criteria for SB:

- >4 bruxism episodes per hour of sleep
- >6 bruxism bursts per episode and/or 25 bruxism bursts per hour sleep
- >1 bruxism episode with grinding noise

These criteria are not strictly related to the presence of clinical symptoms. For instance, patients with <4 episodes per hour sleep may still have a clinically significant condition due to pain.[48]

Note that these criteria have been validated in a small sample of carefully selected individuals who may not be representative of the full spectrum of people with bruxism.[86] Additionally, PSG/SB criteria may provide only a partial picture of the complex range of jaw-muscle activities incorporated within the construct of bruxism and so are further limited in this regard.[50]

Approach

Despite numerous case reports, evidence for the treatment of bruxism remains limited and there is no curative treatment.[87] [88] It is important to note, however, that bruxism behavior itself does not mandate treatment in all cases.[47]

Bruxism can be considered a risk factor for negative oral health consequences, rather than a disorder per se. The bruxism construct has evolved over the years to consider the phenomenon a motor activity that may be a sign of an underlying condition, represent a normal variation of behavior in otherwise healthy individuals, or a protective factor associated with one or more positive health outcomes (e.g., in restoring airway patency after sleep apnea events or releasing emotional tension).[2]

Overtreatment of sleep bruxism (SB) and awake bruxism (AB) is, therefore, a concern. Management should be guided by the presence of clinical symptoms and consequences for each motor activity.

While there is no consensus on what warrants treatment, bruxism should be treated if it causes, or threatens to cause, severe negative effects on oral health (e.g., severe tooth wear or jaw muscle symptoms) or is detrimental to general wellbeing (e.g., it is causing relationship conflicts with bed partners).[89]

Current treatment approaches are mainly symptomatic strategies which aim to control and/or prevent the clinical consequences of bruxism.[87] [90] There is a lack of evidence to define a standard reference approach for SB and AB management, with the exception of oral appliance use.[87] Performing irreversible occlusal changes, when the only purpose is to reduce bruxism activities or to decrease pain symptoms in the jaw muscles and/or the temporomandibular joint (TMJ), is not recommended.[19]

Bruxism management should be based on conservative approaches, such as the multiple-P approach:[87] [90]

- Plates (oral appliances)
- Pep talk (counseling)
- Pills (drugs)
- Psychology (cognitive-behavioral strategies)
- Physical therapy (exercises of the jaw muscles).

Studies of conservative management approaches are scarce; however, given the relative safety of such strategies, it is prudent to recommend their inclusion in multimodal treatment protocols to maximize clinical benefit.

SB and AB may have very similar clinical consequences. Thus, the treatment approach to AB will be specified here only in terms of the differences (where present) with respect to SB.

Patient education and counseling

Patients can play an important and active role in the self-care program of bruxism.

Education about bruxism and its pathophysiology, as well as the potential negative clinical consequences is key. Discussions around bruxism pathophysiology - in particular, education regarding the central, and not peripheral, etiology - are important to reduce the potential risk for dental overtreatment.

Patients with AB should be informed that tooth contact should only occur during chewing and swallowing, and that prolonged tooth contact (with or without bracing/thrusting of the jaw) can lead to damage.[91]

Patients should, therefore, be advised to try to maintain teeth apart and jaw muscles relaxed when not engaging in those activities.

Given the importance of psychological factors in the onset and maintenance of clenching activities, counseling must be directed towards stress management and lifestyle modification (reduction of smoking, caffeine, and alcohol use), as well as sleep hygiene instruction for patients with SB (e.g., sleep environment management, light and noise reduction, sleeping on a comfortable mattress, late-evening work or exercise avoidance).[90]

Physical therapy

Physical therapy is an important treatment option in patients with jaw muscle pain and fatigue.[92] A standard physical therapeutic regimen has not been established, and different protocols seem to be associated with similar effectiveness.[93]

Instruction on how to relax the jaw, with a focus on creating space between the mandible and maxilla without tooth contact, is useful as part of a self-care program, particularly for patients with AB.

Exercises may be very simple, for example stretching the jaw muscles by opening the mouth wide and repeating 10 times once or twice per day, or by repeated lateral movements from right-to-left and vice versa.

Along with the positive effects on pain and jaw range of motion, physical therapy may also be useful for helping patients to become more conscious of the state of their jaw muscles; this actively involves the patient in the treatment regimen, and enhances counseling and cognitive behavioral strategies.

Biofeedback and cognitive behavioral approaches

Biofeedback is based on the concept that bruxism can be controlled once a certain stimulus makes the patient aware of the motor phenomenon. A stimulus (e.g., auditory, visual, electrical, vibratory) instructs the patient to consciously regulate bruxism behaviors. However, existing studies are small and did not report that biofeedback is effective.[94] [95] Possible explanations for the findings relate to the lack of adoption of correctional strategies, (i.e., concrete explanations on how to reverse the habits). Thus, the use of electromyographic biofeedback strategies alone, not in association with cognitive-behavioral approaches, may have important limitations for routine use.[96] One systematic review did not find evidence to support biofeedback to treat SB.[97]

CBT may be performed in conjunction with psychologists, and aims to help patients control emotional and psychosocial factors that may be associated with bruxism onset and perpetuation. More focused cognitive behavioral approaches with frequent follow-up may be indicated to reverse more chronic stress-induced bruxism and to relax the jaws.[98]

Oral appliances

Oral appliances, such as occlusal splints, are commonly used in the management of bruxism and may be indicated to protect the teeth from bruxism-related trauma. However, evidence and clinical experience indicate that their true efficacy to reduce SB activity is, at best, transient, with no long-term effects.[99] [100] For AB, the use of oral appliances during the day is often limited by patient compliance and psychosocial considerations.

Various oral appliances have been shown to have some level of efficacy in reducing SB activity, suggesting a placebo effect related to transient reduction in sleep-time masticatory muscle activity,

possibly due to the need for reorganizing motor unit recruitment.[101] [102] [103] A placebo-effect hypothesis supports the observation that intermittent oral appliance use is more effective at reducing SB than continued use.[104] However, one systematic review investigating the efficacy of occlusal splints in bruxism treatment found insufficient evidence that splints provide benefit over no treatment, other oral appliances, transcutaneous electrical nerve stimulation (TENS) or pharmacologic therapy.[105]

Despite this uncertainty over their true efficacy, the use of oral appliances is indicated in patients with severe and progressing tooth wear and/or repeated fractures or failures of dental restorations to protect teeth and restorations from trauma. Full-arch appliances should be used since long-term use of anterior contact appliances, even if potentially useful for symptom reduction, may be associated with unwanted side effects related to dental occlusion changes.[106] [107] Likewise, 24-hour appliance use is not recommended due to the risk of creating iatrogenic changes in occlusal contact patterns.

In patients with concurrent sleep-disordered breathing, prescription of appliances should be discussed with a sleep medicine specialist, especially considering the risk that obstructive sleep apnea may be induced or worsened with a stabilization appliance.[108] [109]

Oral appliances may be used as part of a CBT regimen to teach patients with AB to avoid unnecessary tooth contact and gain awareness of their behaviors.

Pharmacologic treatments

Pharmacologic approaches may reduce SB compared with placebo, but there are potential side effects associated with long-term use.[87] [90] Therefore, drugs are not indicated as a first-line approach. Clonazepam may be used as a short-term option; however, due to possible dependency it should not be used in the long-term management of SB.[110]

There is a paucity of evidence to document the effect of pharmacologic treatments in AB. However, in patients with severe jaw muscle pain that does not respond to other treatments, short-term use of mild analgesics may help to alleviate pain.

Nonpharmacologic treatments

For patients with significant jaw muscle pain, nonpharmacologic approaches include the use of: TENS, acupuncture, and heat or cold packs, but the level of evidence supporting these approaches is modest.[111]

Management of bruxism in children

Parents or caregivers should be counseled about bruxism. In particular, it is important to reassure that sleep bruxism in children decreases progressively after the age of 9 to 10 years, and that most children with bruxism do not continue bruxing in adolescence or adulthood.[11]

No evidence currently exists to recommend specific therapeutic options for bruxism in children.[112] [113] Psychosocial and muscular relaxation techniques may be the best option for young children (<6 years), but more robust studies are needed to support this recommendation.[112] [113] [114][115] Physical therapy may also be considered in children with jaw muscle pain and fatigue. However, given the natural history of the condition, an observation-only approach may be appropriate in some cases.

Hard or rigid splints should not be used due to the ever-changing occlusal conditions in children. If a soft splint is used, close monitoring is required to avoid disturbing the development of the occlusion. Splints are used in selected cases of SB when there is significant and progressive tooth wear.

Treatment algorithm overview

Please note that formulations/routes and doses may differ between drug names and brands, drug formularies, or locations. Treatment recommendations are specific to patient groups: see disclaimer

Acute			(summary)
awake bruxism			
	adult	1st	patient education and counseling
		adjunct	physical therapy
		adjunct	biofeedback and/or cognitive behavioral therapy
		adjunct	oral appliances
		adjunct	nonpharmacologic analgesic therapy
		adjunct	mild analgesics
	child	1st	observation + parent/caregiver education and counseling
		adjunct	relaxation techniques
		adjunct	physical therapy
sleep bruxism			
	adult	1st	patient education and counseling
		adjunct	physical therapy
		adjunct	oral appliances
		adjunct	short-term clonazepam
	child	1st	observation + parent/caregiver education and counseling
		adjunct	physical therapy
		adjunct	relaxation techniques
		adjunct	soft occlusal splint

MANAGEMENT

Treatment algorithm

Please note that formulations/routes and doses may differ between drug names and brands, drug formularies, or locations. Treatment recommendations are specific to patient groups: see disclaimer

Acute

awake bruxism

adult

1st **patient education and counseling**

» Patients can play an important and active role in the self-care program of bruxism.

» Education about bruxism and its pathophysiology, as well as the potential negative clinical consequences is key.

» Discussions around bruxism pathophysiology - in particular, education regarding the central, and not peripheral, etiology - are important to reduce the potential risk for dental overtreatment.

» Patients should be informed that tooth contact should only occur during chewing and swallowing, and that prolonged tooth contact (with or without bracing/thrusting of the jaw) can lead to damage.[91] Patients should, therefore, be advised to try to maintain teeth apart and jaw muscles relaxed when not engaging in those activities.

» Given the importance of psychologic factors in the onset and maintenance of clenching activities, counseling must be directed towards stress management and lifestyle modification (reduction of smoking, caffeine, and alcohol use).

adjunct **physical therapy**

Treatment recommended for SOME patients in selected patient group

» Physical therapy can be useful in the management of jaw muscle pain and fatigue.[92] For example, stretching the jaw muscles by wide opening of the mouth repeated 10 times 1 or 2 times per day, or by repeated lateral movements from right to left and vice versa, can be beneficial.

» Instruction on how to relax the jaw, with a focus on creating space between the mandible and maxilla without tooth contact, is also useful as part of a self-care program.

» Along with the positive effects on pain and jaw range of motion, physical therapy may also

Acute

be useful for helping patients to become more conscious of the state of their jaw muscles; this actively involves the patient in the treatment regimen, and enhances counseling and cognitive behavioral strategies.

» A standard physical therapeutic regimen has not been established, and different protocols seem to be associated with similar effectiveness.[93]

adjunct **biofeedback and/or cognitive behavioral therapy**

Treatment recommended for SOME patients in selected patient group

» The potential benefit of biofeedback and cognitive behavioral treatment (CBT) to manage bruxism has always been advocated in the clinical setting, but there is a lack of evidence to support their effectiveness.[94] [95]

» CBT may be performed in conjunction with psychologists.

» It aims to help patients control emotional and psychosocial factors that may be associated with bruxism onset and perpetuation.

adjunct **oral appliances**

Treatment recommended for SOME patients in selected patient group

» Oral appliances, such as occlusal splints, may be indicated to protect the teeth from bruxism-related trauma. However, one systematic review investigating the efficacy of occlusal splints in bruxism treatment found insufficient evidence that splints provide benefit over no treatment, other oral appliances, transcutaneous electrical nerve stimulation (TENS), or pharmacologic therapy.[105]

» The use of oral appliances during the day is often limited by patient compliance and psychosocial considerations.

» Oral appliances are indicated in patients with severe and progressing tooth wear and/or repeated fractures or failures of dental restorations to protect teeth and restorations from trauma. Full-arch appliances should be used since long-term use of anterior contact appliances, even if potentially useful for symptom reduction, may be associated with unwanted side effects related to dental occlusion changes.[106] [107] Likewise, 24-hour appliance use is not recommended due to the risk of

Acute

creating iatrogenic changes in occlusal contact patterns.

» Oral appliances may be used as part of a cognitive behavioral regimen to teach patients to avoid unnecessary tooth contact and gain awareness of their behaviors.

adjunct **nonpharmacologic analgesic therapy**

Treatment recommended for SOME patients in selected patient group

» For patients with significant jaw muscle pain other nonpharmacologic approaches include: TENS, acupuncture, and heat or cold packs, but the level of evidence supporting these approaches is modest.[111]

adjunct **mild analgesics**

Treatment recommended for SOME patients in selected patient group

Primary options

» acetaminophen: 325-1000 mg orally every 4-6 hours when required, maximum 4000 mg/day

OR

» ibuprofen: 400-800 mg orally every 6-8 hours when required, maximum 3200 mg/day

» There is a paucity of evidence to document the effect of pharmacologic treatments in awake bruxism; however, in patients with significant jaw muscle pain that does not respond to other treatments, short-term use of mild analgesic may be used to alleviate symptoms.

child **1st** **observation + parent/caregiver education and counseling**

» Given the natural history of bruxism in children, an observation-only approach may be appropriate in some cases.

» Parents or caregivers should be counseled about bruxism. Discussions around bruxism pathophysiology, as well as the potential negative clinical consequences is key. In particular, education regarding the central, and not peripheral, etiology - is important to reduce the potential risk for dental overtreatment.

» Parents/caregivers should be informed that tooth contact in their child should only occur during chewing and swallowing, and that prolonged tooth contact (with or without bracing/

Acute

thrusting of the jaw) can lead to damage.[91] Advise that their child try to maintain teeth apart and jaw muscles relaxed when not engaging in those activities.

» Given the importance of psychologic factors in the onset and maintenance of clenching activities, counseling must be directed towards stress management and lifestyle modification (reduction in caffeinated drinks).

adjunct **relaxation techniques**

Treatment recommended for SOME patients in selected patient group

» Psychosocial and muscular relaxation techniques may be the best option for young children (<6 years), but more robust studies are needed to support this recommendation.[112] [113] [114][115]

adjunct **physical therapy**

Treatment recommended for SOME patients in selected patient group

» Physical therapy can also be useful in the management of jaw muscle pain and fatigue. For example, stretching the jaw muscles by wide opening of the mouth repeated 10 times once or twice per day, or by repeated lateral movements from right to left and vice versa, can be beneficial. Instruction on how to relax the jaw, with focus on creating space between the mandible and maxilla without tooth contact, is also useful as part of a self-care program.

» Along with the positive effects on pain and jaw range of motion, physical therapy may be useful for helping patients to become more conscious of the state of jaw muscles; this actively involves the patient in the treatment regimen, and enhances counseling and cognitive behavioral strategies.

» A standard physical therapeutic regimen has not been established.

sleep bruxism

adult **1st** **patient education and counseling**

» Patients can play an important and active role in the self-care program of bruxism.

» Education about bruxism and its pathophysiology, as well as the potential negative clinical consequences is key.

Acute

» Discussions around bruxism pathophysiology - in particular, education regarding the central, and not peripheral, etiology - are important to reduce the potential risk for dental overtreatment.

» Given the importance of psychologic factors in the onset and maintenance of clenching activities, counseling must be directed towards stress management and lifestyle modification (reduction of smoking, caffeine, and alcohol use), as well as sleep hygiene instruction (e.g., sleep environment management, light and noise reduction, sleeping on a comfortable mattress, late-evening work or exercise avoidance).[90]

adjunct **physical therapy**

Treatment recommended for SOME patients in selected patient group

» Physical therapy can be useful in the management of jaw muscle pain and fatigue. For example, stretching the jaw muscles by wide opening of the mouth repeated 10 times once or twice per day, or by repeated lateral movements from right to left and vice versa, can be beneficial. Along with the positive effects on pain and jaw range of motion, physical therapy may be useful for helping the patient to become more conscious of the state of their jaw muscles.

» A standard physical therapeutic regimen has not been established, and different protocols seem to be associated with similar effectiveness.[93]

adjunct **oral appliances**

Treatment recommended for SOME patients in selected patient group

» Oral appliances, such as occlusal splints, may be indicated to protect the teeth from bruxism-related trauma. However, evidence and clinical experience indicate that their true efficacy to reduce SB activity is, at best, transient, with no long-term effects.[99] [100]

» Various oral appliances have been shown to have some level of efficacy in reducing SB activity, suggesting a placebo effect related to transient reduction in sleep-time masticatory muscle activity, possibly due to the need for reorganizing motor unit recruitment.[101] [102] [103] A placebo-effect hypothesis supports the observation that intermittent oral appliance use is more effective at reducing SB than continued use.[104] However, one systematic review investigating the efficacy of occlusal splints in bruxism treatment found insufficient evidence

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that splints provide benefit over no treatment, other oral appliances, TENS, or pharmacologic therapy.[105]

» Oral appliances are indicated in patients with severe and progressing tooth wear and/or repeated fractures or failures of dental restorations to protect teeth and restorations from trauma. Full-arch appliances should be used since long-term use of anterior contact appliances, even if potentially useful for symptom reduction, may be associated with unwanted side effects related to dental occlusion changes.[106] [107] Likewise, 24-hour appliance use is not recommended due to the risk of creating iatrogenic changes in occlusal contact patterns.

» In patients with concurrent sleep-disordered breathing, prescription of appliances should be discussed with a sleep medication specialist, especially considering the risk that obstructive sleep apnea may be induced or worsened with a stabilization appliance.[108] [109]

adjunct **short-term clonazepam**

Treatment recommended for SOME patients in selected patient group

Primary options

» clonazepam: 1 mg orally once daily at bedtime

» May reduce SB compared with placebo. Clonazepam can be used as a short-term option, however, due to possible dependency it should not be used in the long-term management of sleep bruxism.[110]

child **1st** **observation + parent/caregiver education and counseling**

» Given the natural history of bruxism in children, an observation-only approach may be appropriate in some cases.

» Parents or caregivers should be counseled about bruxism. Discussions around bruxism pathophysiology, as well as the potential negative clinical consequences is key. In particular, education regarding the central, and not peripheral, etiology - is important to reduce the potential risk for dental overtreatment.

» Parents/caregivers should be reassured that sleep bruxism in children decreases progressively after the age of 9 to 10 years, and

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that most children with bruxism do not continue bruxing in adolescence or adulthood.[11]

» Given the importance of psychologic factors in the onset and maintenance of clenching activities, counseling must be directed toward stress management and lifestyle modification (reduction in caffeinated drinks), as well as sleep hygiene instruction (e.g., sleep environment management, light and noise reduction, sleeping on a comfortable mattress, late-evening exercise avoidance).[90] [114]

adjunct **physical therapy**

Treatment recommended for SOME patients in selected patient group

» Can be useful in the management of jaw muscle pain and fatigue. For example, stretching the jaw muscles by wide opening of the mouth repeated 10 times once or twice per day, or by repeated lateral movements from right to left and vice versa, can be beneficial.

» Along with the positive effects on pain and jaw range of motion, physical therapy may be useful for helping patients to become more conscious of the state of jaw muscles; this actively involves the patient in the treatment regimen, and enhances counseling and cognitive behavioral strategies.

» A standard physical therapeutic regimen has not been established.

adjunct **relaxation techniques**

Treatment recommended for SOME patients in selected patient group

» Psychosocial and muscular relaxation techniques may be the best option for young children (<6 years), but more robust studies are needed to support this recommendation.[112] [113] [114][115]

adjunct **soft occlusal splint**

Treatment recommended for SOME patients in selected patient group

» Treatment with soft occlusal splints is indicated in selected cases with significant and progressive tooth wear. Close monitoring is required to avoid changes in occlusion.

Emerging

Contingent stimulation

Application of electrical stimuli to the trigeminal area is known to elicit an inhibitory reflex response in contracting jaw-closing muscles. This principle can be used for contingent stimulation when the jaw muscles become active during bruxism behaviors.[116] Once jaw muscle activity exceeds a threshold, a train of electrical, nonpainful pulses are applied to the skin, which inhibits muscle contraction. One proof-of-concept study indicated a 40% decrease in jaw-muscle activity during sleep with this stimulation.[96] A preliminary polysomnographic study has also shown that contingent, nonpainful electrical stimuli do not cause significant disturbances in sleep quality or additional micro-arousals.[117] However, more research is needed to establish the efficacy of biofeedback devices.[97] Ambulatory electromyography (EMG) devices may have the potential to be used in primary care settings for monitoring purposes and for intervention with increased jaw-muscle activity.[54] Various types of stimuli (vibration, auditory, taste) have been used to unlearn the increased jaw-muscle activity, but the level of evidence in support of these techniques is very low.[87] [90] One study providing an electrical stimulus to the masseter muscle to suppress its sleep time activity supports the effectiveness of such stimulation to reduce sleep bruxism (SB).[118]

OnabotulinumtoxinA

Injections into the masseter and/or temporalis muscles for the management of sleep bruxism have been described in case series that indicate success in decreasing bruxism activity; however, the level of evidence for its use is low, and this treatment modality is typically restricted to patients resistant to other conventional treatments.[90] [119] The effects of botulinum toxin on bruxism show a reduced intensity but not frequency of SB episodes, which suggests that such peripherally acting drugs do not affect the genesis of SB episodes.[120] [121] Several studies demonstrated significant decreases in jaw-muscle EMG activity during sleep for up to 12 weeks following administration of botulinum toxin in the masseter muscles.[87] Although some evidence advocates for the use of botulinum toxin injections into the jaw muscles as a safe and effective treatment option for otherwise healthy people with bruxism, a conservative approach and restricting the use of botulinum toxin to more extreme cases seems warranted.[122] [123] [124]

Hydroxyzine

Preliminary evidence indicates that hydroxyzine (an antihistamine with skeletal muscle relaxing properties) could be effective for parent- or caregiver-reported bruxism in children, but its routine use is not recommended due to risk-to-benefit considerations.[125]

Secondary prevention

Bruxism prevention should be viewed as secondary (i.e., prevention of its negative clinical consequences) or tertiary (i.e., reduction of the negative impact of clinical consequences).

From a dental perspective, it is important to emphasize that occlusal therapies (restorations, equilibration and any irreversible occlusal changes) are not recommended as a prevention strategy for management of bruxism.[19] In addition, they should be considered sources of unnecessary over-treatment, and the ethical concerns associated with such procedures should be always borne in mind.[130] [131]

Negative consequences of bruxism, such as severe tooth wear, fracture of dental restorations, or dental implant complications, may be prevented with the use of of oral appliances such as occlusal splints.[99]

Future studies on prevention strategies may benefit from the inclusion of cognitive behavioral re-education approaches, based on the emerging consensus of bruxism as a behavior that mirrors underlying conditions.[47] [132]

Patient discussions

Patients can play an important and active role in the self-care program of bruxism. Education on the need to maintain teeth apart and jaw muscles relaxed as much as possible (for patients with awake bruxism), and the strategies to manage stressful situations, should be reinforced on a constant basis.

FOLLOW UP

Monitoring

Monitoring

Screening for tooth wear, jaw-muscle function, and oral parafunction should be part of the yearly dental exam. Progression of tooth wear can be evaluated by clinical photos or dental study casts.

Oral splints need to be checked for fit and comfort at regular intervals (at 1 week and 1 month after delivery, and then once or twice per year) to avoid iatrogenic changes in occlusion.

Ambulatory electromyography devices can be used to monitor effects of intervention, such as oral splints or behavioral approaches.

Complications

Complications	Timeframe	Likelihood
tooth wear	**long term**	**high**
Tooth clenching may not cause obvious tooth wear. In addition, tooth wear is not a direct measure of current bruxism activity but rather of the accumulated effects.[54] If severe, tooth wear may necessitate dental rehabilitation (fillings, crown, bridges).[126]		
jaw muscle hypertrophy	**long term**	**medium**
Repeated activation of jaw muscles can lead to a functional hypertrophy, most noticeably as a training effect on the masseter muscles.[54] This may be a cosmetic problem for some individuals. It is likely to be reversible if jaw muscles become less active.		
jaw muscle pain	**variable**	**medium**
The relationship between bruxism and jaw muscle pain is not linear.[6][59] There is evidence that patients with high levels of sleep bruxism have fewer muscle problems than patients with low levels of sleep bruxism.[48][127] Awake bruxism appears to be a significant risk factor for jaw muscle pain.[128] [129]		
temporomandibular disorders (TMD)	**variable**	**medium**
Self reported bruxism and clinically diagnosed bruxism are positively associated with temporomandibular joint (TMJ) pain, although studies based on more quantitative methods to diagnose bruxism showed a lower association.[6] Treatment of underlying bruxism should help relieve symptoms and prevent progression of TMD.		

Prognosis

Prognostic data on bruxism are conditioned by limitations of current knowledge of bruxism as a behavior or treatment-demanding disorder.[47]

One systematic review noted that sleep bruxism (parent- or caregiver-reported tooth-grinding) in children progressively decreases after the age of 9 to 10 years and that most children do not continue bruxing in adolescence and adulthood.

In adults, bruxism prevalence has been shown to decrease with age.[8]

It is likely that the described fluctuation of bruxism over time is influenced by changes in patients' psychologic or physical health.

Key articles

- Lobbezoo F, Ahlberg J, Raphael KG, et al. International consensus on the assessment of bruxism: report of a work in progress. J Oral Rehabil. 2018 Nov;45(11):837-44. Full text (https://onlinelibrary.wiley.com/doi/10.1111/joor.12663) Abstract (http://www.ncbi.nlm.nih.gov/pubmed/29926505?tool=bestpractice.bmj.com)
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Images

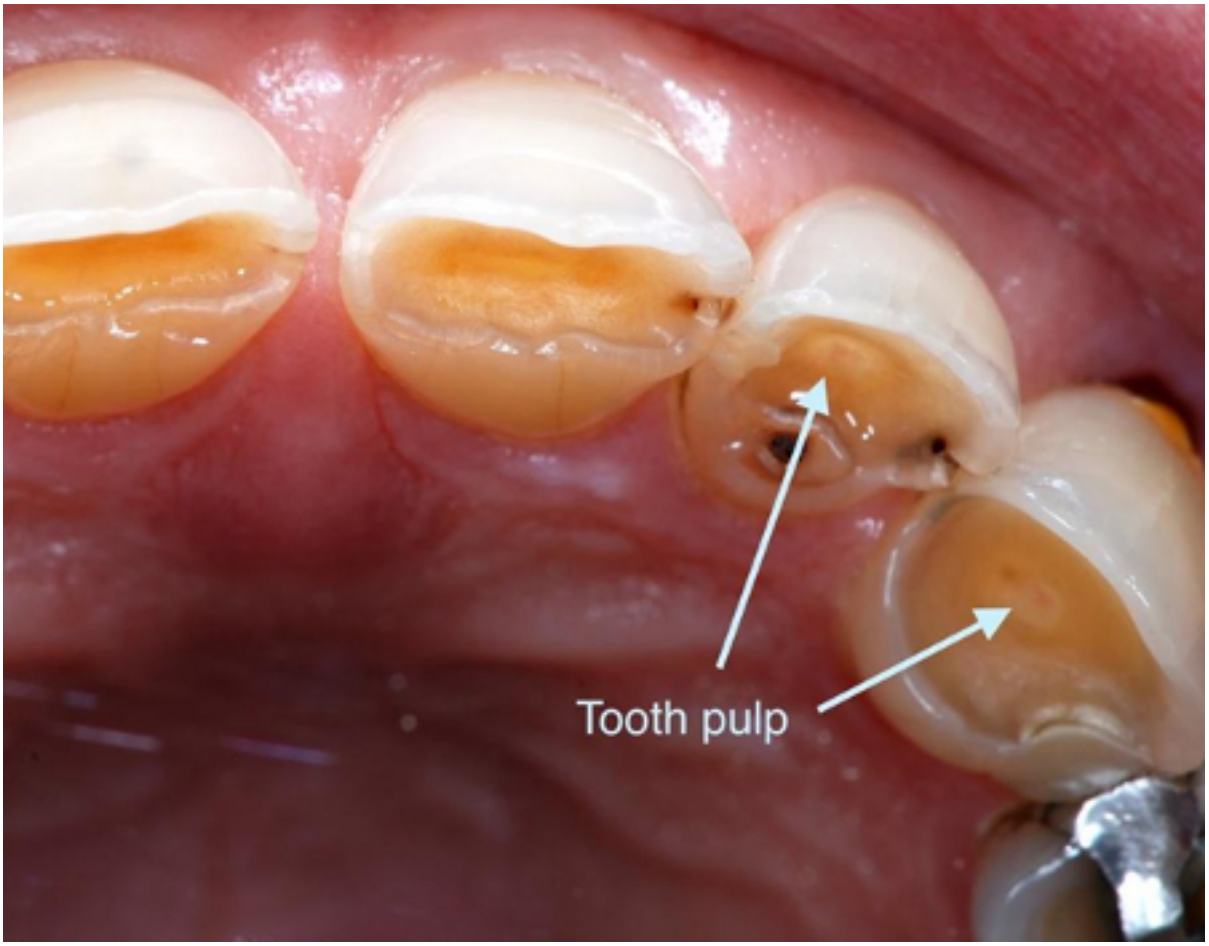

Figure 1: Bruxism-related attrition reaching the dentine may result in tooth soreness and hypersensitivity

From the collection of Dr Alessandro Bracci

Figure 2: Tooth enamel chippings, cracks, and fractures of natural teeth together with attrition, abfraction, and abrasion due to ceramics

From the collection of Dr Alessandro Bracci

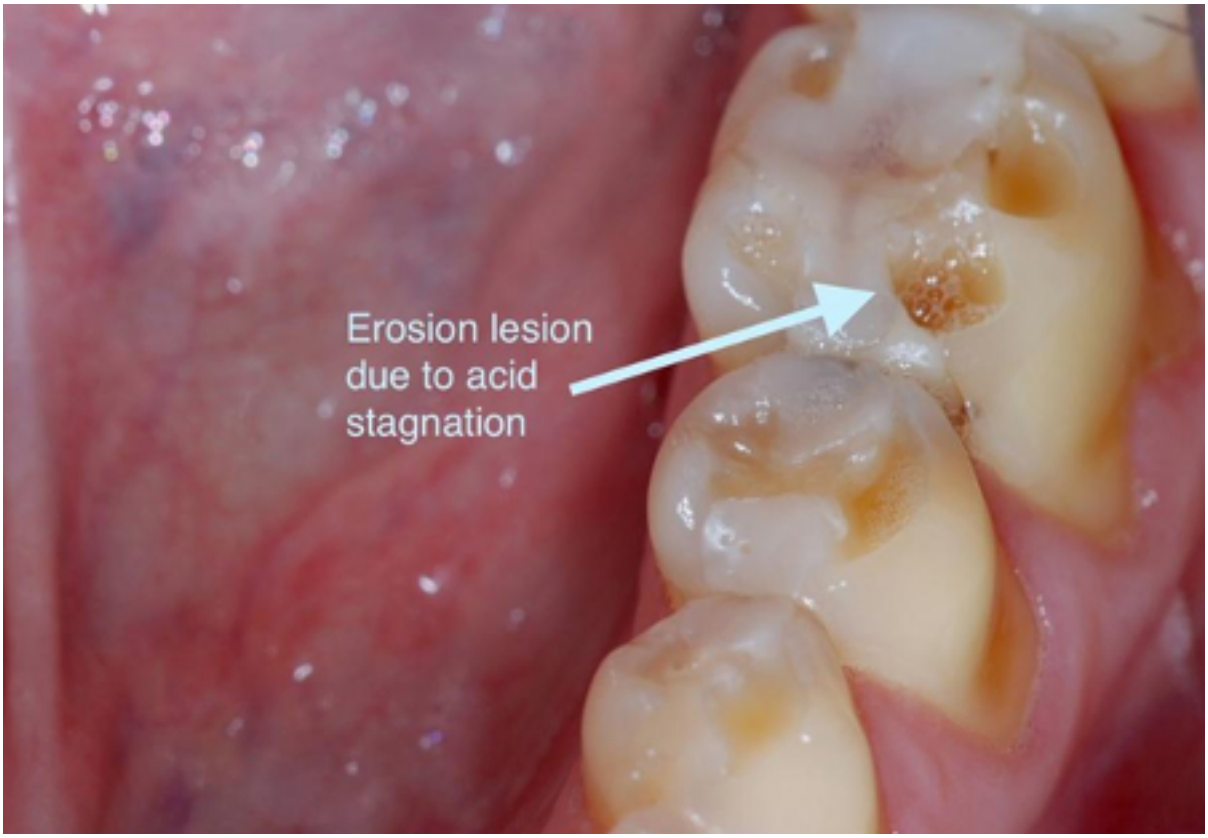

Figure 3: Erosion lesion

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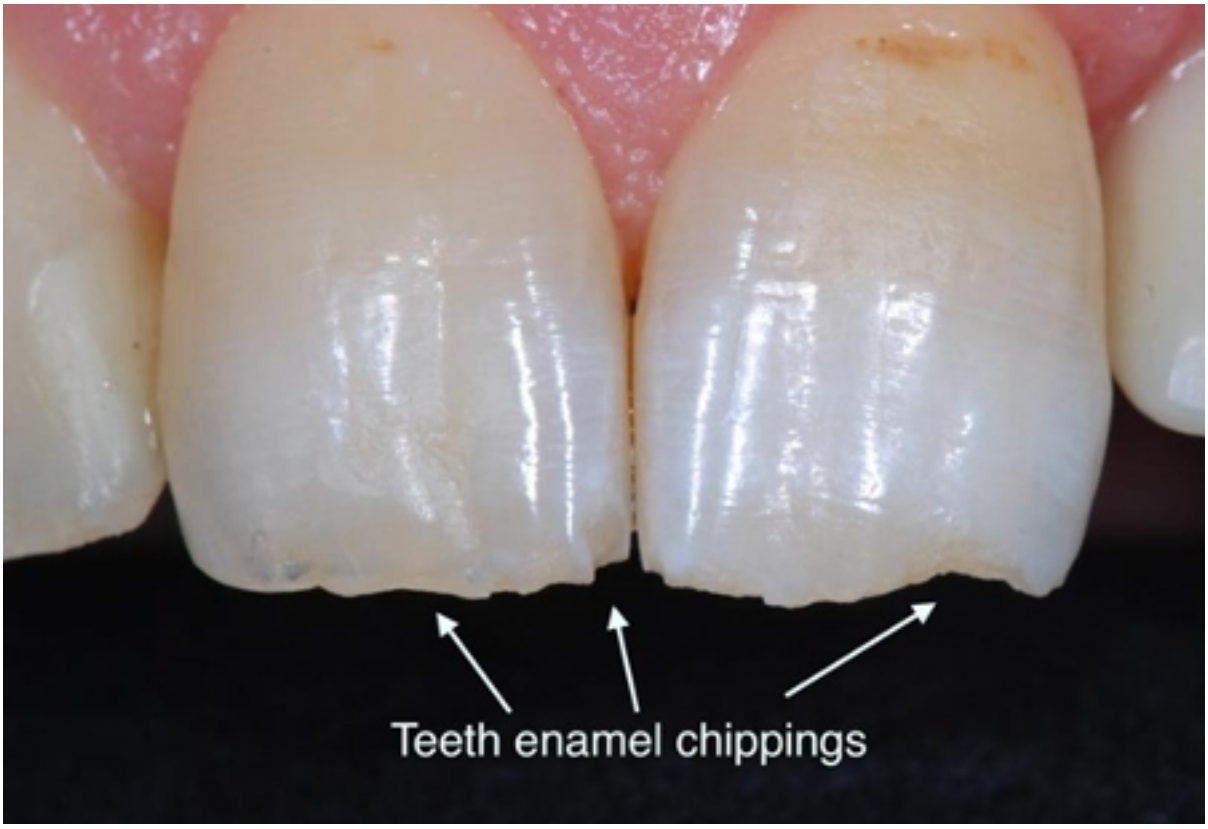

Figure 4: Tooth enamel chippings

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Figure 5: Tooth fracture

From the collection of Prof Daniele Manfredini

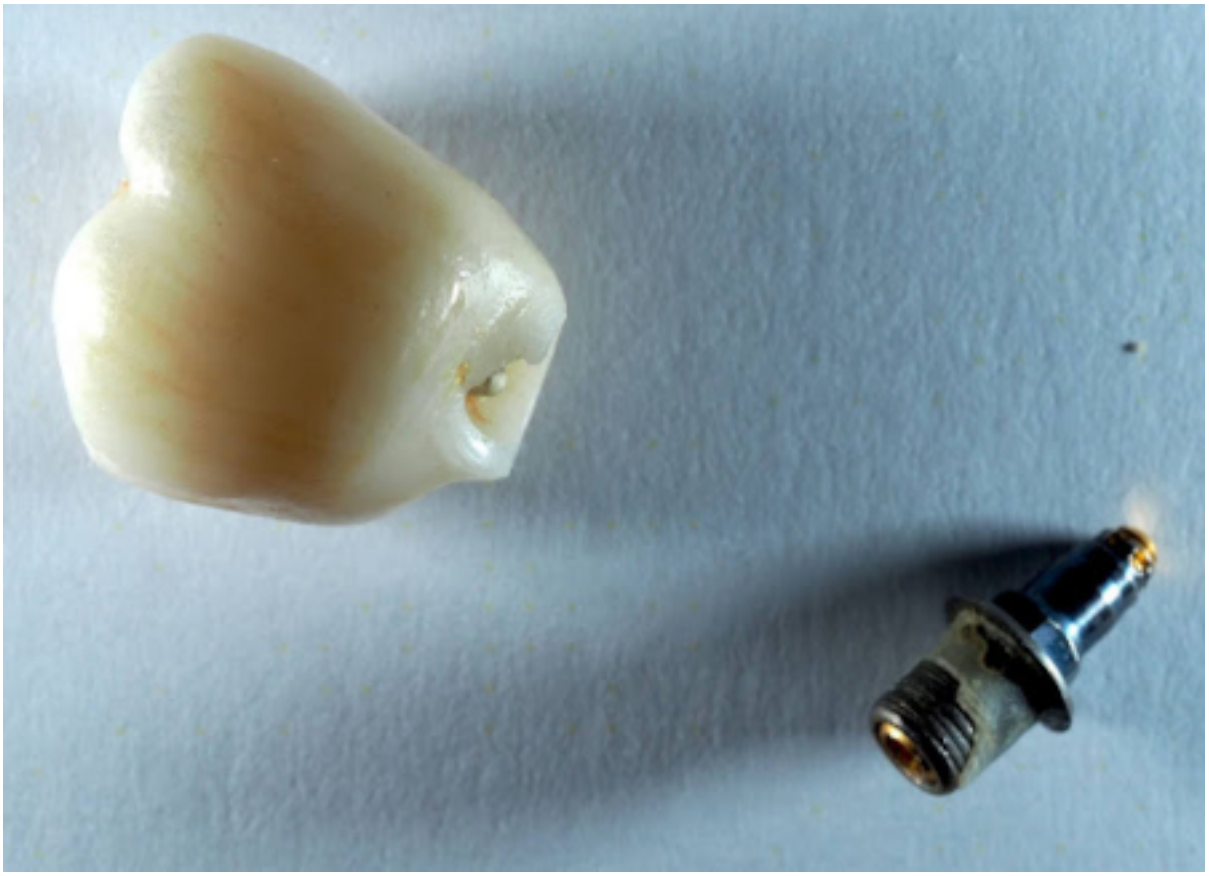

Figure 6: An example of a fracture of dental implant components

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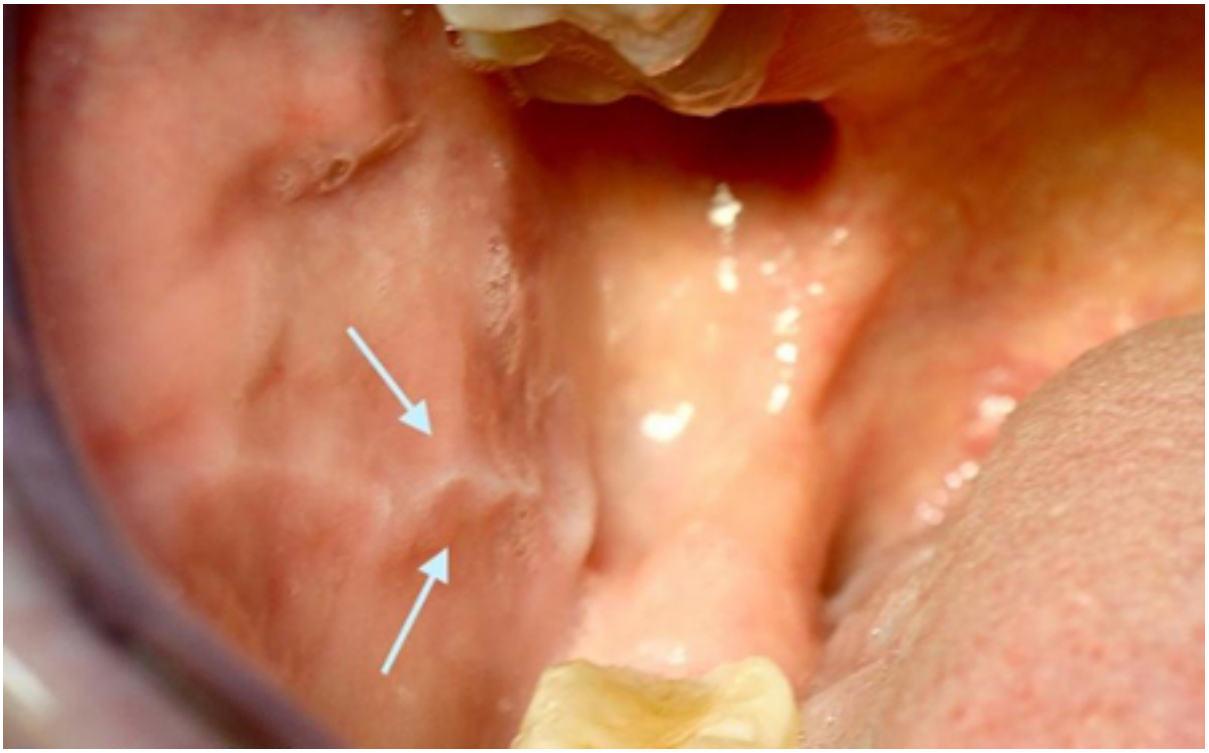

Figure 7: Linea alba (white line) is a hyperkeratosis of the oral mucosa in the cheeks, representing a dental impression on the inside surface of the cheek

From the collection of Prof Daniele Manfredini

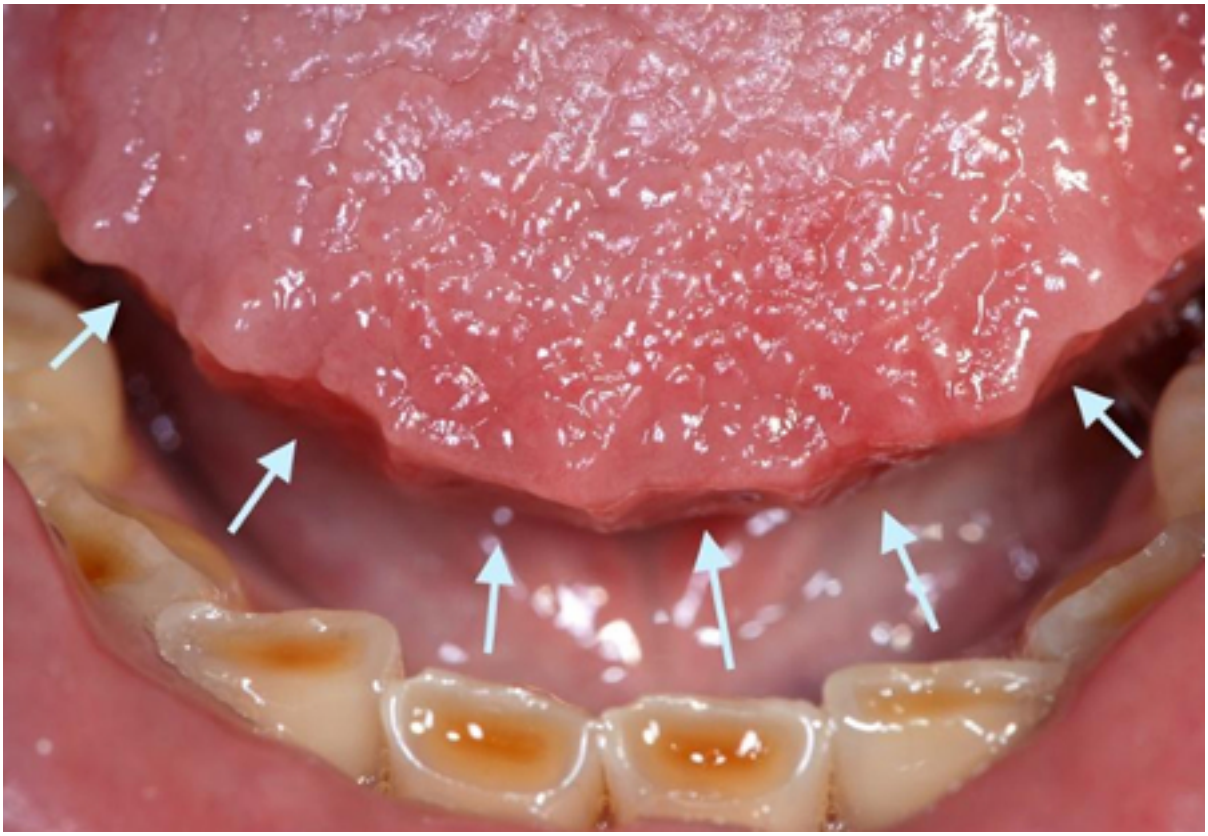

Figure 8: Tongue scalloping

From the collection of Dr Alessandro Bracci

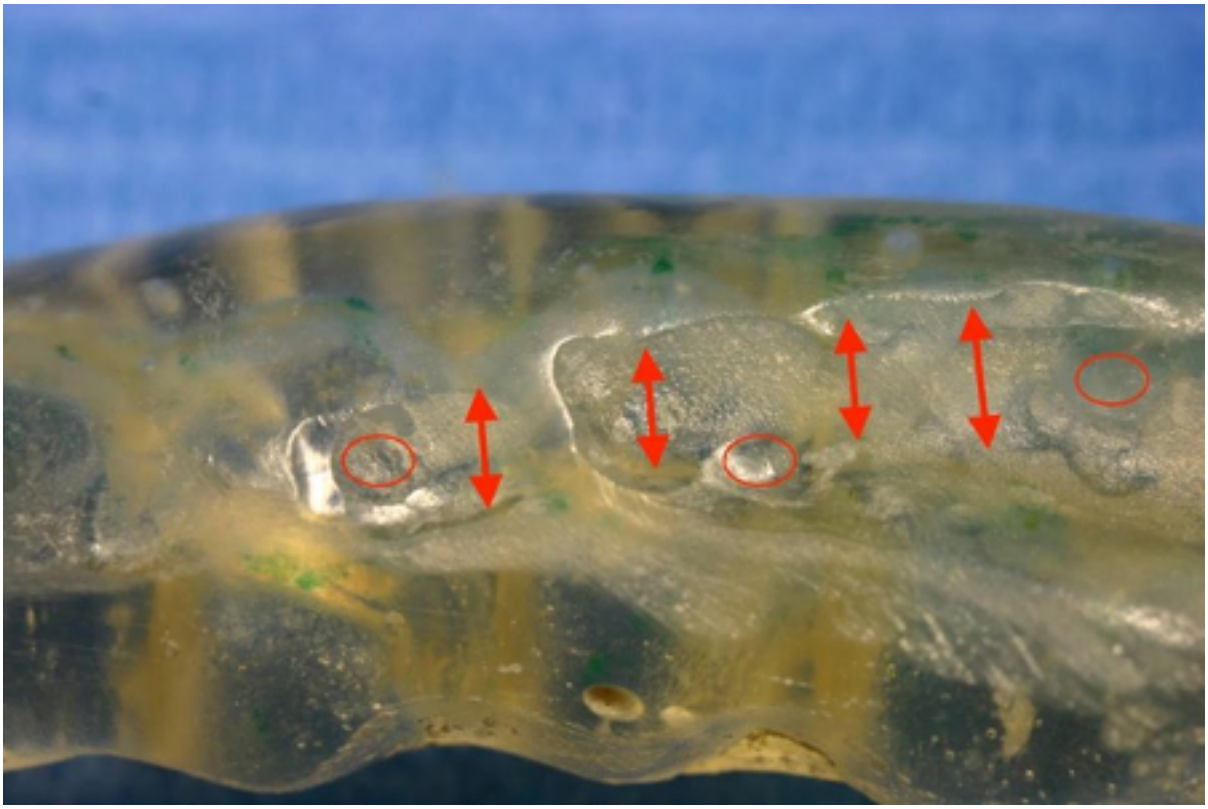

Figure 9: Oral appliance wear

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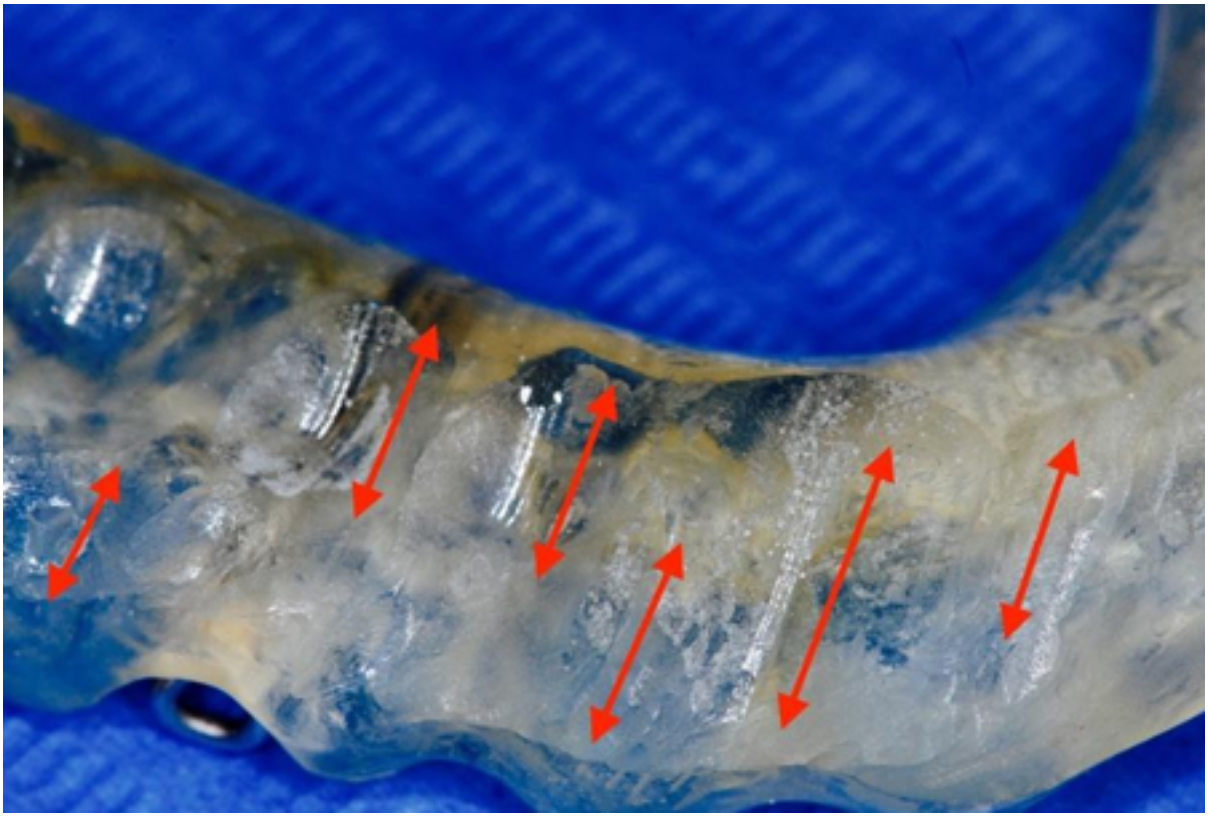

Figure 10: Oral appliance wear

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This approach is in line with the guidance of the International Bureau of Weights and Measures Service.

Figure 1 – BMJ Best Practice Numeral Style

5-digit numerals: 10,000

4-digit numerals: 1000

numerals < 1: 0.25

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