

Symposium - The worn dentition - del 2

Host

The Danish Dental Association (Tandlægeforeningen)

Date

03.11.2023

Reservations

All reservations of the correct reproduction of the course material in the notes are taken by the author.

Top 3 Dental Insights

1. Bruxism can be normal or pathological

Repetitive jaw muscle activity characterized by tooth clenching, teeth grinding and/or jaw thrusting. Bruxism occurs in 2 different manifestations: during sleep or wakefulness.

Bruxism is an awakening reaction ("micro-arousal") from a deeper sleep state to a lighter sleep state and occurs as part of the activation of the autonomic nervous system. Bruxism can also be referred to as Rhythmic Masticatory Muscle Activity (RMMA).

Normal sleep bruxism ("normo-bruxism") has beneficial effects

Mouth-pharynx lubrication
Improved airway/pH regulation
Tooth contact
Jaw movement

Pathological sleep use disorder ("pato-bruxism") has negative effects

Tooth wear
Muscle hypertrophy
Sounds and noises
Headaches
Pain and aches
Predominance of CNS factors that amplify bruxism (CNS stimulants such as nervousness, medication, coffee)

Bruxism is closely related to the CNS. Sleep bruxism is related to altered CNS control of jaw muscle activity.

Treatment of bruxism

Pills

- Worsens bruxism: Dopamine antagonists (antipsychotics) and SSRI/SNRI (antidepressants).
- Reduces bruxism: Sedatives and anxiolytics (clonazepam), alpha-adrenergic drugs (clonidine), muscle relaxants (cyclobenzapine) and botulinum toxin.

Physiotherapy

- Jaw jogging, stretching, massage, heat/cold.

Pep talk

- Relaxation, air between the teeth, avoiding tooth contact, awareness of when tooth contact, jaw tension, EMA (brux apps) can increase awareness.

Plates

- Flat stabilization splints (must cover all teeth in the dental arch to prevent elongation). It's not what you do, but how you use it! Continuous use of occlusal splints (vs intermittent use) is important to reduce bruxism but more permanently, however, the occlusal splint provides an "acute" positive effect that can be used intermittently.

Bruxism can be treated with several combinations.

2. Tooth wear, malocclusion and dystonia

Tooth wear and malocclusion

More people retain their teeth throughout their lives, so it's very relevant to talk about tooth wear. Many patients seek orthodontic treatment for cosmetic/esthetic reasons and social acceptance.

For example, it is much better to treat a deep bite with steep incisors and wear at 18 years old than at 47 or 69 years old when the teeth may have worn down completely. Prevention and treatment of deep bite is often offered in pediatric dentistry, but it can be difficult to diagnose.

Anterior guidance can reduce the risk of posterior wear but increase the risk of anterior wear. Bruxism and other parafunctions can exacerbate tooth wear. There is a likely correlation between tooth wear and few posterior occluding pairs (POPs) and Shortened Dental Arch (SDA).

Tooth wear and dystonia

It's not only bruxism that can cause tooth attrition. Sleep bruxism and wake bruxism can cause attrition. Waking bruxism can be confused with other movement disorders.

Oromandibular dystonia, including dyskinesia, occurs during wakefulness, involves chewing muscles and can cause tooth wear and other damage to the teeth.

Dystonia rarely causes pain, while pain is often seen in TMD and bruxism. Dystonia inhibits facial expression and social interaction and can cause severe tooth wear.

Dystonia is a motor network disorder due to biochemical changes in the basal ganglia and cerebellum or their connections to the rest of the brain. Most dystonias are primary (idiopathic, i.e. without a clear cause). Secondary (acquired) dystonias are on the rise and are often caused by antipsychotic medication, Parkinson's disease medication, repetitive movements, head trauma or tumors.

Oromandibular dyskinesia (jaw, mouth and tongue) is most commonly caused by medication side effects and results in abnormal involuntary movements. Severe tooth wear can occur, similar to dystonia, although the etiology is different. Even if the medication is discontinued, it does not guarantee the cessation of dyskinesia.

Dystonia cannot be cured, but can be alleviated medically with clonazepam or botox, physiotherapy or deep brain stimulation (DBS) with high-frequency stimulation that inhibits the pathological activity in the basal ganglia.

3. Erosive tooth wear

Look for patterns, and not individual acids.

Timing of toothbrushing is not important. Delaying toothbrushing after acid intake can actually increase erosion.

Saliva pellicle is different in people with eroded teeth vs people with non-eroded teeth.

The term “abfraction” should not be used anymore. Abfraction can’t be reproduced in the lab, but they CAN be reproduced with abrasive toothbrushing and toothpaste.

Acid intake during the day

1 acid a day or less: no tooth wear

2 acids a day: x2,33

3 acids a day: x13,5

4 acids a day: high risk of tooth wear

Notice the jump from 2 to 3 acids during the day! It matters to get the patient to reduce their acid intake to max 2 acids a day.

Reflux does not necessarily affect the teeth, unless it comes into the oral cavity. Stomach acid is pH 2, but when it enters the mouth it’s up to pH 4.

The acid challenge can’t be undone completely. Drinking water or milk after an acid challenge can help, but also swirl the acid around the mouth. The best thing to do is reduce acid challenges and frequency. The pH of the mouth needs time to recover to neutral.

Prediction of future tooth wear

The biggest predictor of future tooth wear, is previous tooth wear.

Intraoral scanners can monitor extremely small changes in enamel surface tooth wear lesions.

Why does cupping always start mesially on the first molar? Even though there is not cupping yet, the surface erosive lesion is already happening deeper in the enamel along the enamel prisms orientation.

That was Top 3 Dental Insights.

Get the rest of the notes below and as a PDF at the bottom of this mail.

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Bruxism - more than grinding your teeth?

V/ Peter Svensson, Dentist, PhD, Dr. Odont, Section for Orofacial Pain, IOOS

Peter is a consultant for the products GrindCare and Palpeter.

YES bruxism is more than grinding your teeth.

Bruxism definition

Repetitive jaw muscle activity characterized by tooth clenching, teeth grinding and/or jaw thrusting. Bruxism occurs in 2 different manifestations: during sleep or while awake. Suspected bruxism is categorized into: possible, probable or definite.

Bruxism is an awakening reaction ("micro-arousal") from a deeper sleep stage to a lighter sleep stage and occurs as part of the activation of the autonomic nervous system. Bruxism can also be referred to as Rhythmic Masticatory Muscle Activity (RMMA).

Bruxism facts

Occurs in 5-8% in sleep.

Occurs in 20% during wakefulness.

More common in children than adults.

Occurs equally in women and men.

Not a pathological condition such as dystonia or sleep disorder.

Normal sleep bruxism ("normo-bruxism") has appropriate effects

Mouth-pharynx lubrication

Airways better/pH regulation

Tooth contact

Jaw movement

Pathological sleep bruxism ("pato-bruxism") has negative effects

Tooth wear

Muscle hypertrophy

Sound noise

Headaches
Pain and suffering
Predominance of CNS factors that amplify bruxism (CNS stimulants such as nervousness, medication, coffee)

The brain is less active in sleep bruxers than controls.
Bruxism is probably an "over-learned" condition.
Bruxism is closely related to the CNS. Sleep bruxism is related to altered CNS control of jaw muscle activity. However, the relationship between sleep bruxism and wake bruxism is not yet clear.

Cortical plasticity can be measured with Transcranial Magnetic Stimulation, which measures muscle activity in that part of the brain. With stronger brain stimulation, there is a stronger muscle response.

Occlusion (e.g. supracontacts) and facial morphology are not critically involved in bruxism.

Can bruxism be inhibited?

Neither pain nor exercise can inhibit bruxism. This indicates a disrupted central modulation of muscle activity. Researchers are currently investigating how to inhibit muscle activity.

Source: *Boscato et al, Sci Rep, 2022.*

Utilism comorbidity:

There is a bidirectional relationship between obstructive sleep apnea (OSA) and gastroesophageal reflux (GERD) and erosion, which are risk factors for each other.

"STOP-BANG" questionnaire.

OSA + GERD + Bruxism = TMD
These conditions often occur simultaneously.

Sleep users experience not only pain, but also muscle fatigue, soreness, tension and stiffness, as well as psychosocial impact.

"BruxApp" = Bruxism Smart Application for Assessment
"STAB" = Standardized Tool for the Assessment of Bruxism
"BruxScreen" = Questions about tooth clenching, teeth grinding, jaw clenching, wake/sleep, frequency, symptoms (pain/discomfort/tension/fatigue), frequency, jaw locking.

Treatment of bruxism

Pills

- Worsens bruxism: Dopamine antagonists (antipsychotics) and SSRI/SNRI (antidepressants).
- Reduces bruxism: Sedatives and anxiolytics (clonazepam), alpha-adrenergic drugs (clonidine), muscle relaxants (cyclobenzapine) and botulinum toxin.

Physiotherapy

- Jaw jogging, stretching, massage, heat/cold.

Pep talk

- Relaxation, air between the teeth, avoiding tooth contact, awareness of when tooth contact, jaw tension, EMA (brux apps) can increase awareness.

Plates

- Flat stabilization splints (must cover all teeth in the dental arch to prevent elongation). It's not what you do, but how you use it! Continuous use of occlusal splints (vs intermittent use) is important to reduce bruxism but more permanently, however, the occlusal splint provides an "acute" positive effect that can be used intermittently.

Bruxism can be treated with several combinations.

An OSA patient may find it harder to breathe if they are given a bite splint that further blocks airflow.

There is a lot of research being done on biofeedback stimulation therapy for sleep bruxism.

We still need to understand the shift/balance from normal physiological to pathophysiological bruxism, as well as the importance of comorbidities.

Malocclusion and tooth wear

V/ Morten Gotfredsen Laursen, orthodontist

More people retain their teeth throughout their lives, so it is very relevant to talk about tooth wear. Research disagrees about tooth wear.

For example, it is much better to treat a deep bite with steep incisors and wear at the age of 18 than at 47 or 69, when the teeth may have worn down completely.

Anterior guidance can reduce the risk of posterior wear but increase the risk of anterior wear. Bruxism and other parafunctions can exacerbate tooth wear.

Treatment goals:

Intrusion of over-erupted incisors

Gingival leveling and CL II correction

Restoration of incisors

Orthodontics and plastic restorations can make a huge difference to smile and function.

Prevention and treatment of deep bite is often offered in pediatric dentistry, but it can be difficult to diagnose.

Many patients seek orthodontic treatment for cosmetic/aesthetic reasons and social acceptance.

There is a likely correlation between tooth wear and few posterior occluding pairs (POPs) and Shortened Dental Arch (SDA).

"The Smile" optimal proportions.

Restoration is an interdisciplinary collaboration between ortho, orthodontics and prosthetic reconstruction.

Erosive tooth wear: Current and future diagnostic tools

V/ Saoirse O'Toole

Show me your teeth and I will tell you who you are" - George Cuvier

Causes of tooth wear

- Diet
- Toothbrushing
- Medical conditions (previous or current)
- Bruxism

Look for patterns, and not individual acids.

Timing of toothbrushing is not important. Delaying toothbrushing after acid intake can actually increase erosion.

The term "abfraction" should not be used anymore. Abfraction can't be reproduced in the lab, but they CAN be reproduced with abrasive toothbrushing and toothpaste.

Saliva pellicle is different in people with eroded teeth vs people with non-eroded teeth.

HCl can penetrate the pellicle.

Citric acid?

Patients taking xerogenic medication use have tooth wear IF they also have xerostomia.

Radiation patients with ultra dry mouths have enamel-dentin delineating, where enamel and dentin lets go of each other.

Acids remove the smear layer and open up the dentin tubules.

Acid intake during the day

- 1 acid a day or less: no tooth wear
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- 3 acids a day: x13,5
- 4 acids a day: high risk of tooth wear

Notice the jump from 2 to 3 acids during the day! It matters to get the patient to reduce their acid intake to max 2 acids a day.

Reflux does not necessarily affect the teeth, unless it comes into the oral cavity.

Calcium phosphate biotesting can be bonded directly onto a tooth, to monitor whether the patient has GERD and exposure of HCl and citric acid from the stomach. Stomach acid is pH 2, but when it enters the mouth it's up to pH 4.

Prediction of future tooth wear

The biggest predictor of future tooth wear, is previous tooth wear.

Intraoral scanners can monitor extremely small changes in enamel surface tooth wear lesions.

Opensource software "WearCompare" from Leeds Dentistry can quantify tooth wear with alignment algorithms.

It's important that the computer software and AI can detect and measure the tooth wear.

Humans and AI's learn very differently. AI has to be trained very precisely, while humans can think creatively without having trained with the exact data.

Ingrid Daubechies' 2012 Talk on Algorithms on Biological Changes in Primates.

An erupted tooth has a lot of different morphological textures (many different data sets), while a worn tooth does not. Complex big data sets are hard to understand, and they have to be categorized into something simpler fx red, yellow, green. Data sharing network of scans between several universities can give big enough data sets (King's College, among others).

Rubens Spin-Neto has developed an exciting dental MRI of soft and hard dental tissue. MRI is non-radiation, and has great potential.

Why does cupping always start mesially on the first molar? Even though there is not cupping yet, the surface erosive lesion is already happening deeper in the enamel along the enamel prisms orientation.

The acid challenge can't be undone completely. Drinking water or milk after an acid challenge can help, but also swirl the acid around the mouth. The best thing to do is reduce acid challenges and frequency. The pH of the mouth needs time to recover to neutral.

Asthma medication can result in tooth wear. Asthma and reflux can make each other worse in a two-way relationship.

Neuromuscular disorders and tooth wear

V/ Merete Bakke

Dystonia vs bruxism.

It's not only bruxism that can cause tooth attrition. TMD is a group of conditions related to the jaw joints and masticatory muscles. TMD can cause attrition. TMD dysfunction is a sub-condition. Sleep bruxism and wake bruxism can cause attrition. Waking bruxism can be confused with other movement disorders.

Oromandibular dystonia

Oromandibular dystonia, including dyskinesia, occurs during wakefulness, involves chewing muscles and can cause tooth wear and other dental damage.

Dystonia rarely causes pain, while TMD and bruxism often cause pain.

Assessment and treatment should be done in collaboration with the patient's doctor.

Dystonia is a motor network disorder due to biochemical changes in the basal ganglia and cerebellum or their connections to the rest of the brain. Most dystonias are primary (idiopathic, i.e. without a clear cause). Secondary (acquired) dystonias are on the rise and are often caused by antipsychotic medication, Parkinson's disease medication, repetitive movements, head trauma or tumors. Dystonia worsens in stressful situations or with specific movements or tasks. Dystonia (spasms) only occur during wakefulness. Patients often come up with compensatory countermovements on their own. Dystonia inhibits facial expression and social interaction and can cause severe tooth wear.

Oromandibular dyskinesia

Oromandibular dyskinesia (jaw, mouth and tongue) is often caused by medication side effects and causes abnormal involuntary movements. Severe tooth wear can occur, similar to dystonia, although the etiology is different. Even if the medication is discontinued, it does not guarantee the cessation of dyskinesia.

Treatment of dystonia

Dystonia cannot be cured, but can be alleviated medically with clonazepam or botox, physical therapy or deep brain stimulation (DBS) with high-frequency stimulation that inhibits the pathological activity of the basal ganglia.

That was Dental Insights. Thank you for being here. ❤️

Dental love, Anne Mette