BRUXISM & SLEEP

Evidenced Based Approach

Jeff Wyscarver, RPSGT, President DDME
Who is DDME

➢ DDME has 30 Years of Experience in Sleep.

➢ DDME entered the Dental Market in 2010

➢ DDME started diagnosing patients with apnea for dentists and soon found a major problem in dentist’s approach to Bruxism.

➢ We have applied experience to develop monitoring techniques that allow for the prevention, early detection and improved treatment of Bruxism. We developed the ABI Index™
Here is a quote from leaders at Mayo Clinic:

“Bruxism may be mild and may not even require treatment. However, it can be frequent and severe enough to lead to jaw disorders, headaches, damaged teeth and other problems. Because you may have sleep bruxism and be unaware of it until complications develop, it’s important to know the signs and symptoms of bruxism and to seek regular dental care.”

- Sleep labs could diagnose Bruxism or refer patients to dentists, but they don’t.
- Relationship between OSA and Bruxism varies from patient to patient
- We believe the Dentist should assess patients and work with the Medical Community on the appropriate treatment to address upper airway and jaw disorders.

The end result will be early detection of parafunctional Bruxism before symptoms appear, prior to damage, and the treatment of patients will be more appropriate.
TECHNICAL REQUIREMENTS

• Audio to assess snoring and tooth grinding
• 2 channels of respiratory effort – Central Apnea
• 2 channel amplifier - EMG
• Long term data acquisition – 8 hours
• Bruxism analysis and reports
• Affordable to purchase 5K
• Inexpensive to use $15/test
• Front office implementation

High clinical Yield

What is the “value” of the data? Are decisions based on the data effective?
How is this process achieved?
The Bruxism Monitor is a recording device that is simple to use for both the patients and clinicians. An office can be fully functional with 1 hour of training performed via the internet and phone.

The Bruxism Monitor comes with software that automatically generates reports and provides the data for the dentist to disposition their patients. This process of generating the report takes less than 5 minutes.

<table>
<thead>
<tr>
<th>Monitor\Effort Belts</th>
<th>Masseter</th>
<th>Flow</th>
<th>Oximeter</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1" alt="Monitor Effort Belts" /></td>
<td><img src="image2" alt="Masseter" /></td>
<td><img src="image3" alt="Flow" /></td>
<td><img src="image4" alt="Oximeter" /></td>
</tr>
</tbody>
</table>

Step 1. Clip the Bruxism Monitor to the pajamas then snap on the effort belts
Step 2. Place the masseter EMG lead
Step 3. Place the cannula in the nares
Step 4. Place the wireless oximeter on the wrist and finger

A Word about “Evidenced Based”
THE DATA

- 400uV in amplitude
- Oxygen level SpO2
- Flow from cannula
- Backup Flow
- Respiratory Effort Belts
- Flow Limitation
- Heart Rate
- Audio volume in dB’s
Why Jaw EMG During Sleep

• What information does the dentist use to make a decision?

• What tools are available – Grindcare, Myotronics?
Why Jaw EMG During Sleep

- It is well documented Bruxism is a common sleep disorder and it is also known the traditional sleep community largely ignores the issue. Moreover, the chin EMG measured in the sleep lab is intended to gauge muscle tone for the purpose of scoring REM sleep, not bruxism.

- Bruxism is generally an involuntary activity and can not be adequately measured in the awake state.

- It is critical to establish if there is synchrony between disordered breathing and jaw EMG activity. (note, did not imply a causal effect)

Surface EMG on a patient complaining of jaw clicking
Why Jaw EMG with Sleep

Same Patient – Now what would you do?
A Word About RMMA

Sleep bruxism (SB) is a stereotyped movement disorder that is characterized by rhythmic masticatory muscle activity (RMMA) and tooth grinding.

“What… did he just say that”

Evidence has suggested that SB is associated with sleep arousals and that most RMMA episodes are preceded by physiologic changes occurring in sequence…


“In the present study, sleep bruxism could be predicted reasonably well with the ASDA clinical criteria (except for tooth wear) and could be confirmed by use of polysomnographic cut-off values of over 4 bruxism episodes per hour and/or 25 bursts of bruxism per hour of sleep…”

Lavigne et al. j Dent Res 75(l) 1996
When the jaw EMG muscle is active in conjunction with apneas, the general approach is first to treat the apneas and the jaw EMG will fix itself. This approach assumes the jaw EMG is caused by the disordered breathing.

If we compare jaw EMG to PLMD and we see a similar relationship between limb movement and disordered breathing, not many clinicians would assume the limb movements are resolved when the patient’s apnea is successfully treated.

Does the patient have persistent RLS or PLMD symptoms? Same approach with the jaw muscle only now you can easily gather objective evidence of any remaining jaw muscle activity with a follow-up measurement.
Disposition Matrix Evidence Based

1. **Normal**: This patient has no evidence of TMD\Bruxism, snoring or airway issues.

2. **Snoring Only**: This patient did not demonstrate significant airway issues except for snoring. The dentist has evidence they are not “Silencing” the apneic.

3. **Airway Issues**: This patient demonstrated high likelihood of disordered respirations. The dentist should refer this patient out to a sleep lab and have the patient diagnosed by a Board Certified Sleep Physician. DDME provides this service.

4. **Excessive Jaw EMG**: This patient demonstrated significant jaw EMG in the absence of disordered respirations. Important treatment recommendations can be made based on this information.

5. **Excessive jaw EMG and airway issues**: This is a complex patient whose disease(s) need to be managed in tandem, not in isolation. The TMD\Bruxism and airway issue co-exist and affect each other in a complex way. One cannot assume by managing one, the other will improve.
Collecting objective data is the first step

- Establish the bite force and frequency
- Determine the presence (or not) of OSA
- Determine the presence (or not) abnormal Jaw EMG, bruxism or teeth clenching
- These results will be used to disposition your patient

### Bruxism Overview

<table>
<thead>
<tr>
<th></th>
<th>Count</th>
<th>Index (#/h)</th>
<th>Shortest (s)</th>
<th>Longest (s)</th>
<th>Average (s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bruxism Episodes</td>
<td>20</td>
<td>3.1</td>
<td>2.1</td>
<td>9.6</td>
<td>4.4</td>
</tr>
<tr>
<td>Phasic Ep</td>
<td>10</td>
<td>1.6</td>
<td>2.1</td>
<td>8.9</td>
<td>4.6</td>
</tr>
<tr>
<td>Tonic Ep</td>
<td>9</td>
<td>1.4</td>
<td>2.3</td>
<td>8.2</td>
<td>3.7</td>
</tr>
<tr>
<td>Mixed Ep</td>
<td>1</td>
<td>0.2</td>
<td>9.6</td>
<td>9.6</td>
<td>9.6</td>
</tr>
<tr>
<td>w. Tooth</td>
<td>0</td>
<td>0.0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Bruxism Bursts</td>
<td>53</td>
<td>8.2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All Bursts</td>
<td>208</td>
<td>32.4</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Bruxism Episodes Index:** 3.1 /h  
**Apnea to Bruxism Index:** 0.3 /h  
**Bruxism Bursts Index:** 8.2 /h  
**Arousal to Bruxism Index:** 0.0 /h

**AHI** 13.1  
**ODI** 6.4  
**Snore Index** 0.4%

AHI is the number of Apneas and Hypopneas per hour. ODI is the number of oxygen desaturations per hour. Snore Index is the percentage of time spent snoring versus the total time spent in bed.
### Disposition Score Card

<table>
<thead>
<tr>
<th>Snoring Above 75dB</th>
<th>AHI Above 5</th>
<th>Bruxism Above 5</th>
<th>Disposition</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Normal</td>
</tr>
<tr>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>Snoring Only</td>
</tr>
<tr>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>OSA Only</td>
</tr>
<tr>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Bruxism Only</td>
</tr>
<tr>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Snore\Bruxism</td>
</tr>
<tr>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Complex</td>
</tr>
</tbody>
</table>

Based on the results found in the Respiratory Report and the Bruxism Report, all patients will fall into one of the categories. Based on your treatment approach, a plan based on objective evidence can be implemented.
Considerations: Avoid treating only one of the conditions as it is difficult to manage these interacting disorders in isolation. Also only managing one may worsen the other.
What is Behind the Numbers

What will happen to the jaw when these apneas are resolved?

Jaw EMG event greater than 150uV proceeds apnea
Proceeds respiratory Events
Crescendo Snoring

Snoring is a serious condition

Not obstructive

No oxygen desaturation
Sleep Apnea - Central

Central and Mixed apnea patients should be avoided in general.

How does the dentist know if a patient has central apnea?

THIS CENTRAL APNEIC SNORES LOUDLY
Risks of Treating Bruxism

Aggravation of respiratory disturbances by the use of an occlusal splint in apneic patients: a pilot study.

Gagnon Y, Mayer P, Morisson F, Rompré PH, Lavigne GJ.
Faculty of Dental Medicine, University of Montreal, Canada.

Abstract

PURPOSE: This pilot study was designed to test the hypothesis that the use of a single oral splint may aggravate respiratory disturbance in sleep apneic patients.

MATERIALS AND METHODS: A group of 10 patients with a history of snoring and a recording night confirming a diagnosis of sleep apnea were included. Patients were then invited to spend 2 nights in the sleep laboratory: night 2 to establish baseline data (baseline night) and night 3, 1 week later, to assess the influence of an occlusal maxillary splint on sleep (splint night). The following variables were analyzed under blind conditions: total sleep time, sleep efficiency and number of awakenings, microarousals, apnea-hypopnea index per hour of sleep (AHI), respiratory disturbances index per hour of sleep (RDI), and percentage of sleeping time with snoring.

RESULTS: No statistically significant difference in AHI was noted between baseline and splint nights. However, four patients experienced an aggravation in apnea diagnosis category on the night they used the splint. The AHI was increased by more than 50% in 5 of the 10 patients. The RDI showed a 30% increase from baseline to splint nights. The percentage of sleeping time with snoring also increased by 40% with the splint.

CONCLUSION: This open study suggested that the use of an occlusal splint is associated with a risk of aggravation of respiratory disturbances. It may therefore be relevant for clinicians to question patients about snoring and sleep apnea when recommending an occlusal splint.
Mandible position and activation of submental and masseter muscles during sleep

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The purpose of the present study was to determine whether changes in jaw position and activation of masseter muscles occur during sleep in normal subjects and in patients with OSA. If the mandible moved during sleep, we wished to learn how its movement related to apneas and to activation of the masseter and submental muscles. We also wished to learn whether the masseter had a pattern of activation similar to that of the submental muscles.

RESULTS

Jaw position. Jaws of patients with OSA were open more than those of normal subjects at end expiration and end inspiration when all 12 breaths were compared and also when only those during apnea were compared (Fig. 3). Jaws of both normal subjects and patients with OSA were open significantly more at end inspiration than at end expiration in both non-REM (NREM) and REM sleep (Figs. 3 and 4).
Risk Management

What NOT to do…

Our approach is evidence based and provides vital information to avoid some of the unfortunate outcomes such as:

- Placing a snore appliance in an patient with OSA
- Worsening an OSA patient by placing an occlusal splint
- Treating a patient with Central Apnea using an oral appliance

Occlusal Splint

Reposition the tongue?

Snore Appliance

Silence the apnea?

Apnea Appliance

Central apnea and bruxism?

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1. Aggravation of Respiratory Disturbances by the Use of an Occlusal Splint in Apneic Patients: A Pilot Study. Yves Gagnon, DMD, MSc/Pierre Mayer, MD/Florance Morisson, DMD, PhD/Pierre H. Rompré, MSc/Gilles J. Lavigne, DMD, MSc, PhD
Questions and Answers

Thank You