

Sleep Bruxism protects the upper airway against obstruction in patients with TMJ dysfunction and is reduced by PAP therapy

Jerald H. Simmons, MD ^{1,2} and Ronald S. Prehn, DDS ^{1,3}

Introduction:

We have previously presented clinical data of patients with TMJ dysfunction and Sleep Bruxism who improved with PAP treatment. In this previous study we postulated that sleep bruxism functions to protect the airway from obstruction. In our current study we present the findings of 5 patients with TMJ dysfunction in whom additional EMG analysis was performed in attempt to characterize the changes in EMG activity associated with the obstructive breathing. Since Sleep Bruxism protects the airway many of these patients fall into the Upper Airway Resistance Syndrome (UARS) category and therefore esophageal pressure (Pes) monitoring is required to quantify the obstruction. We sought to provide objective NPSG data to support our claim.

Methods:

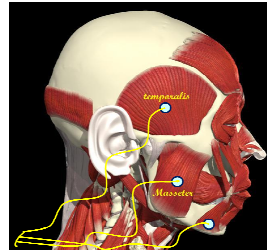
Patients presenting with TMJ dysfunction had NPSG's with additional EMG data collected from the temporalis and masseter muscles bilaterally, in addition to the submental (chin) region. Pes monitoring (pressure within the esophagus) was attempted as part of the NPSG study. Digital analysis such as integration of the EMG signal was not available so Bruxing was determined as EMG reaching 20% of the maximal EMG demonstrated on voluntary bruxing during bio-cals. Bruxing was further broken down into both tonic and phasic forms. Tonic Sleep Bruxism was defined as EMG activity above the 20% maximal threshold in a sustained fashion and Phasic Sleep Bruxism was defined as transient increases (less than 10 seconds) in EMG above the 20% maximal threshold. The diagnostic studies were assessed to determine the association of Tonic Sleep Bruxism with degrees of airway obstruction. Additionally, data from the CPAP titration studies were compared to the data from the diagnostic studies, to determine differences in the occurrence of Tonic Sleep Bruxism during optimal CPAP pressures compared to the patients baseline sleep data.

Results:

There were 5 patients included in this study, all were female (ages 21 to 67, ave 50). Only 4 of the 5 patients had Pes monitoring done with the NPSGs. On the diagnostic studies 3 of the 5 patients demonstrated Tonic Sleep Bruxism associated with reduced airway obstruction. 4 of the 5 patients demonstrated reduction in Sleep Bruxism with the addition of CPAP. These same 4 demonstrated clinical improvement in TMJ symptoms with the use of CPAP.

Conclusion:

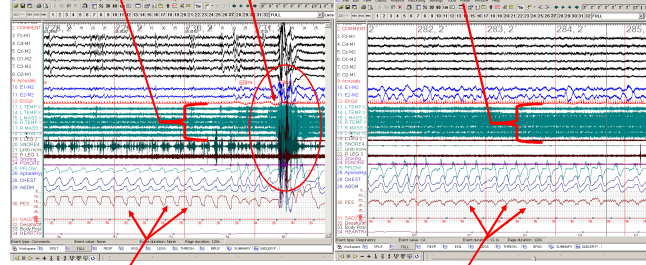
Our previous claims regarding sleep bruxism have been mainly derived by clinical outcome data. Many of our patients have the UARS and the Pes monitoring is necessary to provide objective assessments of obstruction. This study measured EMG of the temporalis and masseter muscles to characterize a reduction in EMG activity associated with increased obstruction in the Pre-treated patient and in the setting of CPAP where the pressure provides a method of protection, thus allowing the muscles of the upper airway—including the masseter—to relax. This data adds to the growing body of evidence that we have presented, which is; 1) Sleep Bruxism is a protective compensatory process aimed to improve airway obstruction and 2) treatment with positive airway pressure improves Sleep Bruxism, most likely by eliminating the need for the protection Sleep Bruxism provides. This new methodology of tabulating EMG on polysomnography that we implemented may find a wider utilization however, further assessment is needed.



To better characterize the muscle activity of the mandible and obtain assessment of an association between upper airway muscle tone—with airway obstruction— additional EMG electrodes have been utilized. We recorded the facial EMG, using 9 referencing configurations. Within these different channels, we used a mono-polar type approach, referencing an "active" EMG channel to a "silent" reference over the mastoid region (M1 and M2), in order to allow for better localization of muscle group activity.

Muscle Tone Inversely Related to Upper Airway Obstruction

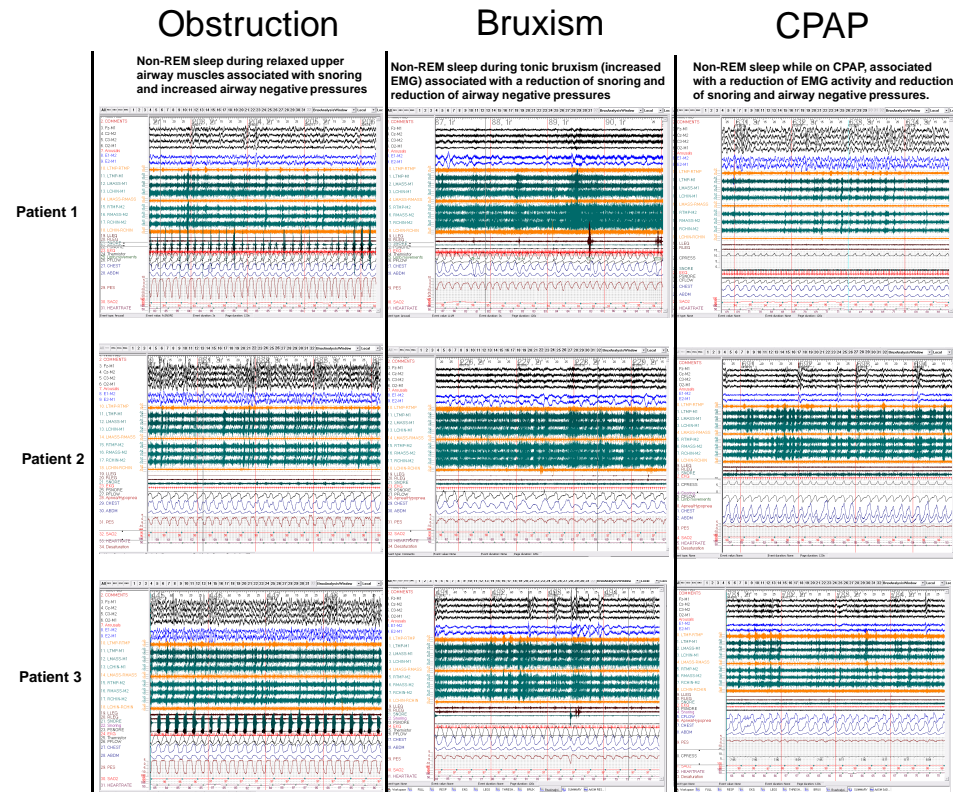
Decreased Muscle Tone when not Bruxing Phasic Bruxing Event Increased Muscle Tone Associated with Tonic Bruxing



Higher Pes pressures (more negative Pressure from greater airway obstruction)

Lower Pes pressures (less negative Pressure from less airway obstruction)

This graphic is from prior presentations and publications on this topic. Simmons, J. CDA Journal, Vol 40 No 2 p 159, 2012



Authors Affiliations:

1. Sleep Education Consortium, Inc, Houston, TX
3. Center for Facial Pain and Dental Sleep Medicine, The Woodlands, TX,

2. Comprehensive Sleep Medicine Associates, Houston, TX,