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BRIEF COMMUNICATION

Sleep bruxism associated with obstructive sleep apnoea syndrome – A pilot study using a new portable device

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Abstract Sleep bruxism (SB) and obstructive sleep apnoea syndrome (OSAS) share common pathophysiologic pathways.

We aimed to study the presence and relationship of SB in a OSAS population.

Patients referred with OSAS suspicion and concomitant SB complains were evaluated using a specific questionnaire, orofacial evaluation and cardio-respiratory polygraphy that could also monitor audio and EMG of the masseter muscles.

From 11 patients studied 9 had OSAS. 55.6% were male, mean age was 46.3 ± 11.3 years, and apnea hypopnea index of 11.1 ± 5.7/h. Through specific questionnaire 55.6% had SB criteria. Orofacial examination (only feasible in 3) confirmed tooth wear in all. 77.8% had polygraphic SB criteria (SB index > 2/h). Mean SB index was 5.12 ± 3.6/h, phasic events predominated (72.7%). Concerning tooth grinding episodes, we found a mean of 10.7 ± 9.2 per night. All OSAS patients except two (77.8%) had more than two audible tooth-grinding episodes. These two patients were the ones with the lowest SB index (1.0 and 1.4 per hour). Only in one patient could we not detect tooth grinding episodes. There was a statistically significant positive correlation between tooth grinding episodes and SB index and phasic event index ($R = 0.755$, $p = 0.019$ and $R = 0.737$, $p = 0.023$ respectively, Pearson correlation).

Mean apnoea to bruxism index was 0.4/h, meaning that only a minority of SB events were not secondary to OSAS. We could not find any significant correlation between AHI and bruxism index or phasic bruxism index ($R = -0.632$ and $R = -0.611$, $p > 0.05$, Pearson correlation).

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This pilot study shows that SB is a very common phenomenon in a group of mild OSAS patients, probably being secondary to it in the majority of cases. The new portable device used may add diagnostic accuracy and help to tailor therapy in this setting.

Introduction

Sleep bruxism (SB) is a very frequent sleep-related movement disorder, characterized by the grinding of teeth and rhythmic masticatory muscle activity that may contribute to increased risk of hypertension and eventually cardiovascular disease.[1]

Obstrutive sleep apnea syndrome (OSAS) is also a highly prevalent sleep disorder, strongly associated with major cardiovascular complications.[2]

In 1986 Phillips et al.[3] demonstrated a positive relationship between sleep apnea and tooth-clenching episodes, likely to result from the frequent arousals following apneic episodes. In fact, more recent studies show that 35% of tooth grinders also present snoring and 16.7% present OSAS and close to 30% of OSAS patients complain of bruxism.[4]

Polysomonographic criteria remain the gold standard for SB,[5] however new valid portable instrumental diagnostic approaches are emerging.[6]

The aim of our pilot study was to evaluate the presence and relationship of SB in a population of OSAS using a new cardio-respiratory polygraphy device that can monitor audio and EMG of the masseter muscles.

Methods

Inclusion criteria: all consecutive patients aged between 18 and 90 years, referred for suspicion of OSAS and SB. Exclusion criteria: cognitive disability, avoidance of performance of the home sleep study and other diseases that increase the risk of SB.[7] Every single patient answered a questionnaire including six bruxism questions[8] and filled in a general sleep disorders questionnaire (SDQ).[9] Patients with both OSA symptoms and at least one positive question on the bruxism questionnaire[8] were selected.

In three cases we performed orofacial examination checking for clinical signs associated with SB.[10,11]

The diagnosis of OSAS and bruxism was based on home portable cardiorespiratory polygraphy (Nox-T3 device, ResMed), that included monitoring of heart rate, nasal airflow, snoring, chest wall and abdominal excursion, oxygen saturation and body position. This device also recorded audio and bilateral masseter EMG (Fig. 1). Patients were classified as bruxers according to the following criteria[5,12]: SB index of >2.0 events was used to define sleep bruxism (mild bruxism was defined as $\geq$2.0/h and severe bruxism as $\geq$4.0/h)[13]; a minimum of 2 audible tooth-grinding episodes confirmed with audio recordings (coincident with the EMG bursts) corroborated the diagnosis.[5]

Bruxism episodes were classified as: phasic, tonic or mixed based on the AASM criteria.[14] To be considered bruxism, EMG activity had to be at least twice the amplitude of the background EMG. Moreover EMG bursts should not be separated by >3 s to be considered part of the same episode.

Relationship between SB episodes and respiratory events were analyzed through the apnoea to bruxism index defined by the number of episodes per hour of sleep (phasic, tonic and mixed) where apnoea was scored after each episode of bruxism.

Sleep technicians carried out a manual analysis of the recordings, scoring respiratory events according with established criteria.[15]

The Noxturnal software offered automatic bruxism analysis of both phasic and tonic events along with bruxism reports, developed by the manufacturer according to the standards set out in the Principles and Practices of Sleep Medicine, 4th edition (Nox Medical's Noxturnal Software Version 3.1.1).[16] The same technician double checked the automatically analyzed events by consulting the audio recordings, which made the scoring result more precise.

Patients were diagnosed with OSAS if they had an apnoea/hypopnea index (AHI) of $\geq$15 events/h or $\geq$5 events/h plus symptoms. Severity was defined according to AHI: AHI > 5/h, 15/h and 30/h, which were respectively considered mild, moderate and severe OSAS.[15]

When enrolling, all patients provided written informed consent and the study was approved by the Ethical Committee of Centro Hospitalar São João (CES no. 278.14).

Demographic data, information on smoking habits, medical background and sleep history were also collected. Subjective sleepiness was measured using the Epworth Sleepiness Scale (ESS),[17] height, weight, neck circumference and arterial blood pressure were also measured.

Statistical analysis

Quantitative data were described by the calculation of the mean and standard deviation. Qualitative variables were expressed in number of events and were compared with Chi-square test. Spearman correlation was performed to measure the linear correlation between metric variables.

Statistical analysis was performed using software Statistical Package for the Social Science v. 22.0 (SPSS 22) and the statistical significance was set at p value < 0.05.

Results

During the study period (March–June 2015), 46 patients were referred for suspected OSAS but without any positive questions on the bruxism questionnaire.[8] From 11 with OSAS suspicion and least one positive question on the bruxism

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