

Articles of the Month – May 2022

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MAD

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Equal effect of a non-custom versus a custom mandibular advancement device in treatment of obstructive sleep apnea

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Study objectives: Numerous types of mandibular advancement devices (MADs) are available to treat patients with obstructive sleep apnea (OSA), varying from non-custom to custom devices. Only a limited number of studies have been performed to determine whether a non-custom MAD could be used to predict treatment success of a custom MAD. In this study, we investigated the potential of a new generation non-custom MAD, by comparing its effectiveness with a custom MAD. We hypothesize that the effectiveness of the devices is similar with regard to both objective (polysomnography; PSG) and self-reported (questionnaires, adherence, and patient satisfaction) outcomes.

Methods: Single-center prospective randomized cross-over study including a consecutive series of patients with OSA. Patients were randomized to start either with the non-custom or custom MAD. Both MADs were applied for 12 weeks, followed by a PSG with MAD *in situ* and questionnaires. After the first 12 weeks of follow-up, a wash out period of one week was applied. Equal effectiveness was defined as no significant differences in both objective and self-reported outcomes between both devices.

Results: Fifty-eight patients were included; forty completed the full follow-up. The median apnea-hypopnea index significantly reduced from 16.3 [7.7; 24.8] events/h to 10.7 [5.6; 16.6] events/h with the custom MAD ($p=0.010$) and to 7.8 [2.9; 16.1] events/h with the non-custom MAD ($p<0.001$). Self-reported outcomes significantly improved in both groups. No significant differences were found between both devices.

Conclusions: The effectiveness of a non-custom and custom MAD is comparable, which suggest that a non-custom MAD can be used as a selection tool for MAD treatment eligibility to improve MAD treatment outcome.

EADSM comment: Non-custom device designs seem to continuously develop in their quality, which is of interest for easy prediction purposes.

The outcome of oral appliance therapy on position-dependent obstructive sleep apnea: A multicenter randomized controlled trial

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Introduction: This multicenter trial on patients with obstructive sleep apnea (OSA) treated with an oral appliance aimed to determine the effect of sleeping positions.

Methods: A cohort of 314 patients with OSA were enrolled and evaluated at 8 weeks and 1 year, focusing on treatment effects. At baseline and the 2 follow-ups, new polygraphic registration comparing the proportion of treatment responders without position-dependent OSA (non-position-dependent OSA [non-POSA]) and with POSA was used.

Results: At the 8-week and 1-year follow-up, 205 and 139 patients were included, respectively. The proportion of responders (apnea-hypopnea index [AHI] <10 and/or ≥50% reduction in AHI) was 56% for the non-POSA group and 69% for the POSA group (not significant [NS]). The responders increased at the 1-year follow-up: 68% and 77% for the non-POSA and POSA groups (NS), respectively. The absolute change in AHI in all sleeping positions at 8 weeks was -12.9 (interquartile range, -25.0 to -0.5) in the non-POSA group and -10.5 (interquartile range, -19.9 to -5.3; NS) in the POSA group. However, the decrease in supine AHI was significantly greater among subjects with POSA. In contrast, the decrease in nonsupine AHI was significantly greater in the non-POSA group, an effect that remained at the 1-year follow-up.

Conclusions: Our hypothesis that subjects with POSA at baseline would have a higher treatment response rate after oral appliance treatment compared with subjects without POSA was rejected. However, those with POSA had a significantly higher supine AHI decrease, and those without POSA had significantly less nonsupine AHI.

EADSM comment: In contrast to the article from April-22 (Lee et al.) and some other publications, this article does not show that supine-dependency is a predictor of success for MAD. There are previous articles that show that this variable predicts success and studies that do not. It seems that studies that use only monoblock devices that prevent from mouth opening show a positive result and those who use bi-block devices or a mix of devices do not. There are also a number of ways to define supine-dependency and treatment success. If supine dependency is defined as a doubled frequency supine versus non-supine, many quite severe patients are included. A patient with a higher non-supine index have more pharyngeal narrowing laterally, which has been related to a poor response with MAD. It is of importance to control for a number of factors, such as weight, age, sex in prediction studies. It will be of interest to read what future prediction studies that also consider non-anatomical factors such as loop gain in the sleep recordings, since the dominant importance of AHI has been debated.

The effect of continuous positive airway pressure and mandibular advancement device on sleep bruxism intensity in obstructive sleep apnea patients

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Abstract

We aimed to evaluate and compare the effects of continuous positive airway pressure (CPAP) and mandibular advancement device (MAD) in reducing the intensity of sleep bruxism (SB) in patients with obstructive sleep apnea (OSA). Forty-eight adults with OSA were subjected to single-night full polysomnography (PSG) in the Sleep Laboratory of the Wrocław Medical University. The respiratory events and bruxism episodes were scored according to the standards of the American Academy of Sleep Medicine. The patients were assigned to the CPAP treatment or the MAD treatment in accordance to apnea-hypopnea index (AHI). The second PSG examination was conducted during the MAD or CPAP treatment to assess the effect of treatment on bruxism episode index (BEI) and AHI. The mean AHI and mean BEI in the study material were estimated to be 30.05 ± 15.39 and 5.10 ± 5.31 , respectively. The bruxism parameters were significantly decreased in both the CPAP and MAD groups. Compared to the MAD, the CPAP treatment was more effective in reducing AHI; however, there was no significant difference in effectiveness of CPAP and MAD treatment in BEI reduction. Both CPAP and MAD treatments were effective against SB coexisting with OSA. Due to the application of these treatment options, the risk of OSA should be estimated in patients with SB.

EADSM comment: Some more insight about relationships between sleep bruxism and sleep related breathing.

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Bidirectional relationships of comorbidity with obstructive sleep apnoea

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Abstract

Obstructive sleep apnoea (OSA) is frequently associated with comorbidities that include metabolic, cardiovascular, renal, pulmonary and neuropsychiatric. There is considerable evidence that OSA is an independent risk factor for many of these comorbidities but, more recently, there is evidence that some of these comorbidities may predispose to the development of OSA. Thus, there is growing evidence of a bidirectional relationship between OSA and comorbidity, especially for heart failure, metabolic syndrome and stroke. Potential mechanisms of bidirectional relationships differ in individual comorbidities with fluid retention and redistribution being especially important in heart failure and end-stage renal disease, whereas neural mechanisms may be more important in diabetes mellitus and stroke. The evidence for other comorbidities, such as hypertension and atrial fibrillation, support these being more a consequence of OSA with limited evidence to support a bidirectional relationship. The present review explores the evidence for such bidirectional relationships with a particular perspective on comorbidities that may predispose to OSA. The impact of therapy in bidirectional relationships is also reviewed, which highlights the clinical importance of accurate diagnosis. This aspect is especially true of COPD, where the identification of co-existing OSA has important implications for optimum therapy.

EADSM comment: Interesting review highlighting that not only OSA may cause other diseases, but also the reverse.

Head rotation improves airway obstruction, especially in patients with less severe obstructive sleep apnea without oropharyngeal collapse

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Purpose: Head rotation is thought to have an effect on obstructive sleep apnea (OSA) severity. However, keeping the head rotated fully during sleep is difficult to maintain, and the effect of head rotation is not the same in all OSA patients. Thus, this study aimed to identify whether less head rotation has an effect on airway patency and determine the responder characteristics to the head rotation maneuver (HRM).

Methods: We recruited 221 patients who underwent overnight polysomnography and drug-induced sleep endoscopy (DISE) in a tertiary hospital from June 2019 to July 2020. Airway patency and the site of airway collapse were determined in the supine position with the head at 0, 30, and 60 degrees of rotation (HRM0°, HRM30°, and HRM60°, respectively) during DISE. The site of collapse was determined using the VOTE classification system: the velum (palate), oropharyngeal lateral walls, tongue base, and epiglottis. Each structure was labeled as 0, 1, or 2 (patent, partially obstructed, and completely obstructed, respectively). Airway response to the HRM30° and 60° and the clinical characteristics associated with airway opening were analyzed.

Results: The study population had a median age of 52 (25-61) years, a body mass index of 26.7(24.6-29.4) kg/m², and the apnea-hypopnea index (AHI) of 28.2(13.7-71.9) events/h. HRM influenced airway patency positively not only with HRM60° (p<0.001) but also following limited rotation (HRM30°, p<0.001). Patients with tongue base (40.0% with HRM 60°) and epiglottic (52.6% with HRM 60°) collapse responded particularly well to HRM. Multivariate analysis revealed that lower AHI (p<0.001) and an absence of oropharyngeal lateral walls collapse (p = 0.011) were significant predictors of responders to HRM.

Conclusion: Head rotation improved airway obstruction in OSA patients, even with a small degree of rotation, and should be further explored as a potential form of therapy in appropriately selected patients.

EADSM comment: Head position is probably of more importance for sleep disordered breathing than we consider today and this study shows that only minor changes in head position during sleep might be of importance.

CPAP

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Cardiovascular Benefit of CPAP in Adults with Coronary Artery Disease and OSA without Excessive Sleepiness

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Rational: Randomized controlled trials of continuous positive airway pressure (CPAP) in patients with obstructive sleep apnea (OSA) have not demonstrated protection against adverse cardiovascular outcomes. Recently, observational studies revealed that OSA-related cardiovascular risk is concentrated in patients with an elevated pulse rate response to respiratory events (Δ HR). Here, in this post-hoc analysis of a prospective clinical trial, we test the hypothesis that a greater pre-treatment Δ HR is associated with greater CPAP-related protection against adverse cardiovascular outcomes.

Methods: Δ HR was measured from baseline polysomnography of RICCADSA randomized controlled trial (patients with coronary artery disease [CAD] and OSA [apnea-hypopnea-index ≥ 15 events/h] with Epworth Sleepiness Scale score < 10); (NCPAP:Ncontrol=113:113; male=85%; age=66 \pm 8 [mean \pm SD] yr). The primary outcome was a composite of repeat revascularization, myocardial infarction, stroke, and cardiovascular mortality. Multivariable Cox regression assessed whether the effect of CPAP was moderated by Δ HR (treatment-by- Δ HR interaction).

Results: The CPAP-related reduction in risk rose progressively with increasing pre-treatment Δ HR (interaction hazard ratio [95%CI]: 0.49 [0.27, 0.90] per SD increase in Δ HR, $p < 0.05$). This means that in patients with a Δ HR of 1SD above the mean (i.e. 10 beats/minute), CPAP was estimated to reduce cardiovascular risk by 59 [6, 82] % ($p < 0.05$), but no significant risk reduction was estimated in patients with a mean Δ HR (6 beats/minute; CPAP risk reduction = 16 [-53, 54] %, $p = 0.6$).

Conclusions: The protective effect of CPAP in patients with CAD and OSA without excessive sleepiness was modified by the Δ HR. Specifically, patients with higher Δ HR exhibit greater cardiovascular benefit from CPAP therapy.

EADSM comment: New insights in the debate, whether non-sleepy patients benefit from OSA treatment in terms of cardiovascular risks. A new predictor of interest is presented; heart rate.