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2025 AADSM Annual Meeting Abstracts and Case Reports

Disclaimer: The following are the abstracts and case reports accepted for the 2025 Annual Meeting.

Abstracts and case reports do not follow the same peer-review process followed for the submission of original research articles for the Journal of Dental Sleep Medicine. Rather, all submissions were blind peer-reviewed for acceptance by members of the AADSM Scientific Committee. The committee uses criteria to score research abstracts which include (but are not limited to) applicability to dental sleep medicine, novelty, clarity, proper research methodology and data analysis, well-founded conclusions and creativity. Criteria to score case reports include (but are not limited to) applicability, uniqueness, clarity, well-founded discussion and creativity.

It is important to keep in mind that abstracts and case reports presented at the Annual Meeting are intended to spur education and discussion for both attendees and authors.

Brand names are not permitted to be used in titles and are limited to two references within the submission body. Furthermore, the abstracts include author disclosures of any conflicts of interest or affiliation with a company. If a company or governmental body provided any financial support for the research, this is also disclosed. The AADSM does not endorse or recommend any products or services presented in these abstracts.

CASE REPORT #001

DOES THIS PATIENT HAVE OSA? A CLINICAL QUESTION PROVOKED BY MULTI-NIGHT REMOTE PHYSIOLOGIC MONITORING WITH A NOVEL INTRAORAL OXIMETER

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Introduction: Research demonstrates that single night testing is associated with frequent misclassifications of OSA severity, due to pervasive night to night variability in patient physiology, bedtime behaviors and activities. In turn, misclassifications from single night testing are inexorably linked with up to 30% and 15% rates of under and over treatment, respectively, skewing diagnoses, treatment plans, economics, reimbursement decisions and patient outcomes.

Report of Case: A patient (Male, Age 49, BMI 28) is fitted with a novel, medically validated, intraoral oximeter device following routine screening. The novel intraoral oximeter device (ProSomnus RPMO_2, Pleasanton, CA, USA) is an overlay of the maxillary dentition with a PPG sensor that is wholly embedded and placed anteriorly in apposition to the buccal mucosa.

The patient wore the intraoral oximeter for five consecutive nights. After nightly use and removal each morning, physiologic data from the previous night was discharged from the device to a patient smartphone app via Bluetooth, then uploaded to the cloud using cellular or WIFI where it was accessed and displayed by the healthcare provider in a secure web portal.

SPO2, Pulse Rate, Usage Time, and Oxygen Desaturation Index were recorded and reported nightly. The patient exhibited nightly use times of 242, 331, 506, 489 and 538 mins; SPO2 values of 96%, 96%, 93%, 95% and 89%; pulse rate values (bpm) 82, 84, 84, 91 and 95; ODI of 3.2, 3.6, 5.2, 3.2 and 1.2 events per hour respectively. Mean nightly use time was 421 +/- 128 mins, mean SPO2 was 94% +/- 3%, mean pulse rate was 87 +/- 6 bpm, and mean ODI was 3.3 +/- 1.4 events/hr.

Discussion: Does this patient have OSA? How might one treatment plan this patient? Would insurance cover the treatment for this patient?

This case exemplifies the night-to-night variability of key respiratory parameters that is often present in patients with OSA. This discussion is indicative of the types of questions provoked by continuous monitoring data. For one of the five nights, ODI was, indeed, 5.2 events per hour, perhaps indicative of mild OSA. But mean ODI over the five nights was 3.3, perhaps indicative of a non-elevated sleep apnea risk profile. Pulse rate was elevated on all nights with more significant elevation on 2 of 5 nights. Oxygen presented below 90% on 1 of 5 nights.

Support: Device provided courtesy of ProSomnus Sleep Technologies.

Note: Len Liptak discloses a financial interest in ProSomnus Sleep Technologies.

ABSTRACT #002

RAPID DOSE TITRATION MODEL: REDUCING TREATMENT TIME IN ORAL APPLIANCE THERAPY FOR OSA

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Introduction: Reducing patient treatment times using telemedicine, pre-collected patient information, online scheduling and improved clinical workflows have been successful. Precision medical manufacturing utilizing digital scanning, AI design and robotic manufacturing have further streamlined oral appliance therapy treatments for obstructive sleep apnea. One remaining opportunity is finding the therapeutic dose of mandibular advancement in a timely fashion. This often takes 4-8 weeks and elongates the total treatment time. This protocol demonstrates how a rapid titration technique can establish the appropriate dose in just a few days and significantly reduce treatment time.

Methods: 20 consecutive patients (12 mild 5 moderate and 3 severe, average AHI of 13.75) were treated using the rapid titration protocol, a novel HSAT Ring and Precision Oral Appliance Therapy. Patients were first seen for an intraoral records appointment. Digital scans of both arches, a maximum intercuspal position and construction bite were taken and sent to the medical device manufacturer for device construction. Two weeks later, patients were fitted with their appliance, given post operative guidance, the ring and explicit written instruction on advancing 1mm each day for 5 days. They returned in one week with the ring for a physical data upload and determination of the appropriate dose /advancement and were referred for the follow up efficacy test.

Results: 90% were successfully treated to and AHI below 10 and a 50% improvement. The average total treatment time was 27 days from the records appointment to conformed therapeutic dose position. No patients experienced any unusual temporomandibular discomfort, tooth pain or other untoward side effects that would compromise this protocol from being implemented.

Conclusions: The combination of a rapid titration protocol using the Belun Tech HSAT ring and the ProSomnus EVO precision oral appliance provided a significant condensation of the time to treatment. It was well supported by the explicit instructions, device and test simplicity and excellent patient communication.

Support: No support was provided for this study.

CASE REPORT #003

MINIMALLY INVASIVE MANAGED CARE; A NEW WAY TO TRIAGE TREATMENT IN OSA

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Introduction: The movement towards managed care and the application of minimally invasive techniques continues to transform healthcare. Creating a more efficient, patient centric health care system will require additional collaboration and evaluation of treatment modalities utilizing the appropriate metrics. This report demonstrates how a significantly more expensive surgical procedure option was prioritized over a non-surgical alternative with non-inferior efficacy, adherence and effectiveness.

Report of Case: Mary C. a 67year old female presented with a diagnosis of OSA. Diagnostic AHI was 34, NADIR, 80% and time under 90% was 2%. She was convinced her 56 YO mother's (early onset dementia) and 56 YO father's (stroke) deaths were caused by sleep apnea. The family had routinely joked about both parents loud snoring and periods of stopped breathing. Mary failed CPAP after trying several different masks and settings. She was subsequently referred to an ENT for consultation for hypoglossal nerve stimulation surgery. She quickly became non adherent to the treatment because of the "shocking feeling" she experienced in her tongue. She also reported not feeling like she was sleeping better. Records were taken for an oral appliance, which was delivered two weeks later. After some titration to adjust the dose, she was confirmed in the optimal treatment position and re-tested. Her efficacy AHI was 9, NADIR 91% and her time under 90% O2 improved to 0.0%.

Discussion: Consideration for the invasiveness, analysis of cost and the demonstrated effectiveness of treatment modalities, should all be utilized in a matrix when deciding the best course of patient care. Hypoglossal nerve stimulation surgery ranges from $30,000 to $40,000. Using CMS schedules and reimbursements as a guide, CPAP is almost $5,000 over a 5-year DME lifespan. CMS oral appliances allowance vary from $1,300—$1,800 depending on jurisdiction. The STAR trial for HNS surgery demonstrated 68% efficacy and 71% adherence (48% MDA for severe only) below 20 AHI). CPAP yields 99% efficacy and 56% adherence (55% MDA all severities below 5 AHI). Precision mandibular advancement devices demonstrate 85% efficacy and an objective adherence of 83% (70% MDA all severities below 10 AHI). Similar to the conclusions of the FLOSAT (First Line OSA Therapy) trial, and protocol in someNordic countries, we should give greater consideration to a less expensive, more effective on-surgical treatment solution.

Support: No support

ABSTRACT #004

A DIGITAL PROTOCOL TO IDENTIFY AND PREVENT CONSTRUCTION BITE ERRORS

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Introduction: The fabrication of a precision oral appliance to treat OSA requires accurately recording the prescribed starting mandibular advancement dose using a construction bite. A horizontal bite gauge is commonly used to measure and set the vertical and horizontal position of the lower jaw. Construction bite midline can be skewed to one side or the other due to provider error or inaccurate patient movement. This often presents in treatment as unilateral joint or muscle pain. The purpose of this paper is to present a digital protocol to verify the midline position of the construction bite.

Method: Upper and lower arch digital scans were taken (Medit i700) on ten patients to create 3-D digital models of the arches. A 3 mm bite fork and horizontal bite gauge (George Gauge, Great Lakes Technologies) was used on all patients to measure and set the construction bite position. Digital scans of the MIP bite were taken. Digital scans of this construction bite position with the gauge in place were taken. Using the multi-occlusion function in the scan software the provider can verify the midline in MIP. The provider can then switch to the digital scan of the construction bite. When switching between these two scan images the provider can visualize the movement of the lower jaw as well as visualize the midline position of the construction bite on the digital model. The provider can immediately identify if the lower jaw skewed to one side resulting in a midline shift. If there is a midline shift the provider can correct and repeat the process to mitigate errors.

Result: Of the ten patients scanned, seven were found to have midline construction bite discrepancies. These discrepancies were identified immediately using the protocol and the scan software. In all cases the provider was able to take a new construction bite. The scan image of this second bite was used manufacture the medical device.

Conclusion: This proposed digital protocol resulted in an immediate view of the midline position, and lower jaw movement in the construction bite when compared to the MIP bite. This protocol will result in less errors when taking the construction bite, allowing a more precise fabrication of the oral appliance which should increase patient comfort and decrease the TMJ/TMD side effects that can occur with an oral appliance fabricated from a construction bite with a midline discrepancy and skewed jaw position.

Support: No support

CASE REPORT #005

MANAGEMENT OF OBSTRUCTIVE SLEEP APNEA IN AN EDENTULOUS PATIENT USING AN ATTACHED BILATERAL COMPRESSION ORAL APPLIANCE: A CASE STUDY

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Introduction: This case study explores the effective treatment of a patient with obstructive sleep apnea (OSA) using a custom oral appliance, despite the patient being edentulous on the upper ridge.

Report of Case: Referred by her primary care physician to determine if sleep apnea could be contributing to her existing co-morbidities—excessive daytime sleepiness, snoring, hypertension, hyperlipidemia, obesity, and GERD—the physician sought to assess whether sleep apnea was hindering the patient's weight loss progress, which had plateaued, despite her receiving semi-glutide injections. After a telemedicine consultation with a board-certified sleep physician, who ordered and interpreted a home sleep study, the diagnosis of OSA was confirmed. During the consultation, all treatment options were discussed, including CPAP, oral appliance therapy, and surgery. The patient had previously tried CPAP 8 years ago but was unable to adhere to it due to claustrophobia and difficulty managing the hoses. After reviewing the benefits and challenges of each option, the patient chose the oral appliance as her preferred treatment, understanding the expected outcomes and compliance requirements, with a focus on follow-up adjustments. Given her edentulous upper ridge and full lower dentition, an attached bilateral compression oral appliance with a soft liner was designed for comfort and retention. The appliance was customized to securely hold onto the upper denture ridge without causing discomfort, and the patient was instructed to remove her upper denture while wearing the oral appliance at night. Scans of the patient's upper and lower ridges were taken with an iTero scanner, and wax rims were fabricated and used to establish the correct initial bite position using the airway metric system. The patient's initial bite position was set at 50% protrusion, later adjusted forward 2.5mm based on follow-up Home Sleep Test (HST) titration results and subjective findings. The patient reported significant improvements, including better sleep quality, increased energy, and fewer nighttime awakenings. She also noted that snoring was no longer an issue, as confirmed by the Snore Lab app. The patient consistently wears the appliance every night, throughout the entire night, without removing it during sleep. Follow-up HST

results showed a reduction in the Apnea-Hypopnea Index (AHI) to below 5, with no significant oxygen desaturation or excessive wakefulness, confirming the appliance's effectiveness.

Discussion: The patient, who has lost an additional 25 pounds since her last visit, expressed satisfaction with the device's comfort and its positive impact on her sleep. No claustrophobia was reported. Follow-up visits are scheduled to adjust the device as needed. This case demonstrates the successful use of oral appliance therapy in edentulous patients with OSA, providing an effective alternative to CPAP for those intolerant to the machine.

Support: No support provided for this case

ABSTRACT #006

DOSAF: A NOVEL TOOL FOR CHAIRSIDE OSA RISK STRATIFICATION

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Introduction: Sleep disorders affect roughly 70 million adult Americans, and 85-90% of sleep disorders are undiagnosed. Severe OSA is associated with increased mortality, largely from affected co-morbidities that include hypertension, diabetes, obesity, and depression. Patients who have OSA present with dental characteristics such as severe attrition of occlusal surfaces; large tongue and uvula; scalloping of the tongue; bilateral linea alba; narrow arch form; high palate; and Modified Mallampati scores of 3 or greater. Dentists and dental students have a unique opportunity to identify the orofacial manifestations common to patients who have OSA.

Methods: A literature review was first performed to identify the frequently cited features in patients who have OSA. With the goal of identifying the prevalence of these characteristics in OSA-positive patients, de-identified subjects with previously diagnosed OSA at NYU College of Dentistry were evaluated for common orofacial features. The top 8 common findings were used to yield a novel instrument, the DOSAF (Dental Obstructive Sleep Apnea Form).

The DOSAF screens for the following risk factors: attrition; linea alba; scalloped tongue; Mallampati score greater than 1; wide head to neck ratio; convex geniohyoid muscle; hypertension; and brachycephalic profile. OSA risk, according to the DOSAF, is stratified as low (presence of 0-2 risk factors), intermediate (presence of 3-4 risk factors), or high (presence of 5-8 risk factors). For the subset of patients studied, the DOSAF risk was compared to that of the standard STOP-BANG medical questionnaire to test for the accuracy and validity of the DOSAF tool.

Results: In a comparative analysis of subjects from NYU College of Dentistry, 70% of patients demonstrated identical risk between the STOP-BANG questionnaire and the DOSAF instrument. However, there were inaccuracies with data collection that affected 20% of the results. With those data points complete, the accuracy has the potential to be over 90% consistent with STOP-BANG.

Conclusions: The DOSAF questionnaire, when integrated into comprehensive dental examinations, offers dentists a valuable tool for identifying patients at risk for OSA. The tool consists of characteristics that dentists evaluate daily in the healthcare setting. Recognizing these risk factors enables practitioners to refer patients for further screening, facilitating a comprehensive approach to patient care.

Support: No support.

ABSTRACT #007

EPAP ENHANCED ORAL APPLIANCE THERAPY SUCCESSFULLY TREATED PATIENTS WITH SEVERE OBSTRUCTIVE SLEEP APNEA (OSA)

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Introduction: Oral Appliances (OA) are a primary therapy option for mild to moderate OSA patients and for severe OSA patients who are continuous positive airway pressure (CPAP) intolerant. However, there is a paucity of published data for efficacy of OA in severe OSA. The OA advance the mandible and tongue position to enlarge the upper airway volume and reduce pharyngeal collapsibility. A novel oral appliance, O2Vent Optima incorporates both the mandibular advancement and an air channel that allows airflow through the device to circumvent nasopharyngeal obstruction. The ExVent is an accessory to the mandibular advancement device and provides oral Expiratory Positive Airway Pressure (EPAP). Oral EPAP accessory is designed to provide upper airway support via similar mechanisms of action as nasal EPAP devices in commercial distribution, e.g., passive dilatation of the airway, which reduces flow limitation. Previous studies have established efficacy of the air channel and EPAP of the combination therapy in the treatment of mild to moderate OSA.

The study purpose was to assess the efficacy of the EPAP enhanced novel OA in the treatment of severe OSA patients who were either CPAP intolerant or preferred other

therapies.

Methods: A prospective, open-label study conducted at multiple sites included 17 patients with severe OSA (AHI>30/hr.). Average age: 54.6±5.8 years; mean BMI: 32.6±4.3; 70% were men. A diagnostic in-lab PSG study was initially performed to confirm a diagnosis of mild to moderate OSA. Patients who were CPAP intolerant or preferred OA were approached for study participation and informed consented was obtained. The enrolled patients were evaluated, custom fitted with the EPAP enhanced novel OA and followed by the sleep dentists. Anterior adjustments of the of the OA was clinically guided and optimized, highest resistance EPAP valves (7 cmH2O) were utilized. The participants were required to use the combination therapy >80% of the nights for >12-week period; compliance was assessed by periodic phone calls. Primary Efficacy Measure: Change in AHI between baseline vs. EPAP enhanced OA. Secondary Efficacy Measures: Treatment success (percentage of patients with a ≥50% decrease in AHI from baseline); improvement in lowest oxygenation saturation (SpO2 nadir).

Results: Treatment with the EPAP enhanced OA reduced AHI from 41.4±11.23/hr. to 12.1±2.45/hr. ($p< 0.005$), average 71% reduction in AHI. The lowest oxygen saturation (SpO2 nadir) during sleep increased from 81.8±6.2% to 89.4±1.2% ($p< 0.005$). Treatment success rate was 86%.

Conclusions: Oral Appliance therapy offers an alternative treatment solution for patients with severe obstructive sleep apnea who are intolerant or refuse CPAP therapy; however, the data is limited. Our study demonstrated successful treatment of patients with severe obstructive sleep apnea with the novel EPAP enhanced Oral Appliance.

Support: Supported by a grant from the Centre for Sleep and Chronobiology, Toronto, Canada.

ABSTRACT #008

OROPHARYNGEAL CANCER AND TOLERANCE TO MANDIBULAR ADVANCEMENT ORAL DEVICE: AN INTERIM REPORT

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Introduction: It is about 2/3 of the individuals with oropharyngeal cancer (OPC) who present snoring and poor sleep quality complaints following radiotherapy. Use of CPAP is associated with major discomfort due to air dryness and oral-facial sensitivity (Faiz SA et al, 2014; Dal Fabbro C et al, 2022). Our objectives are to: 1) Estimate sleep breathing complaints and sleep quality in an OPC population; 2) Initiate a research protocol assessing tolerance to mandibular advancement device (MAD) in adult individuals with OPC after radiotherapy.

Methods: Individuals (n=63) with OPC under radiotherapy treatment from our clinics were invited to complete WEB-based questionnaires to assess sleep breathing and sleep quality (snoring awareness, Stop-Bang, Epworth, Insomnia Severity Index (ISI)). Participants identified with snoring or OSA risk were invited to participate to a 3 night's sleep trial with clinical follow-ups using a MAD (D-SAD, Panthera Dental) in neutral or advance position to assess tolerance. (ClinicalTrials.gov 22.204)

Results: Snoring awareness was reported by 30.2% of the OPC sample; moderate to severe OSA related risk on Stop-Bang by 34.9% and 17.5%, respectively (total of 52.4%). Sleepiness Epworth score ≥10 present by 62%. Moderate to severe ISI score by 21.5% and 6.2%, respectively (total of 27.7%). Yet, 6 participants were evaluated for the MAD tolerance trial. Among them, 3 were excluded at screening due to i) high severity of AHI and occupational risk (truck driver well controlled by CPAP), ii) refused the device due to size before using it, iii) scheduled for a dental implant surgery postponing participation. Yet, 3 were enrolled to date (Nov 2024); they all reported acceptable tolerance to the MAD and improvement of their sleep quality; less awakening and nocturia. In a qualitative assessment of MAD advantage/disagreement, one cited that return to the sleep partner bedroom was the main positive outcome.

Conclusions: Poor sleep quality and breathing issues were present in 1/3 to 1/2 of OPC individuals. So far, MAD seem to be well tolerated by OPC individuals who also report improvement in quality of life. These preliminary results encourage us to move forward with the recruitment process.

Support: Panthera Dental, Quebec, Canada; Canadian Institutes of Health Research-Network Canadian Oral Health Research; Fonds Edouard Dubord, Faculty of Dental Medicine, Universite de Montreal

ABSTRACT #009

AWARENESS AND ATTITUDE OF SLEEP PHYSICIANS ON THE ROLE OF DENTISTS AND ORTHODONTISTS IN THE MANAGEMENT OF OBSTRUCTIVE SLEEP APNEA (OSA)

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Introduction: Referral rates of patients with Obstructive Sleep Apnea remain low despite the high prevalence. Physician knowledge is a key factor in making referrals for OSA evaluation. OSA is diagnosed by physicians, but dentists are involved in identifying underlying dentofacial components and assisting the physician in managing the disease. Dental management in adult OSA patients may include oral appliance therapy, maxillary expansion, and maxillomandibular advancement. OSA management in pediatric patients involve addressing hypertrophic tonsils/adenoids and dentofacial orthopedic management, such as maxillary expansion, maxillary protraction, and mandibular advancement. Collaborative efforts between sleep medicine physicians and dentists are increasing.

Methods: This study was approved by the IRB, University of the Pacific IRB2024-33. A total of 40 survey responses were included. California physicians practicing sleep medicine were sent Qualtrics Surveys to their emails between March-April 2024. Surveys were also distributed during the 17th Annual Education Symposium of the California Sleep Society on October 4-5, 2024. The survey questionnaire is composed of three sections. The first section includes demographic data. The second section evaluates knowledge of craniofacial factors that may cause or aggravate OSA and the role of dental professionals in the management of OSA. Total and Percentage Mean Scores (PMS) were calculated and participants were grouped into three categories: Good, Average, and Poor. The third section evaluates attitude towards the recognition of craniofacial features that may contribute to OSA and attitude towards referring to dental professionals.

Results: The demographic data indicate that most physicians surveyed were male, aged 25-44, with over five years of experience. A majority (67%) reported Sleep Medicine as their primary specialty, followed by Pulmonary Medicine (17%). Additionally, 20% of physicians saw between 21-40 patients per week, while 13% saw over 60 patients weekly. More than 90% indicated that less than 25% of their practice involved pediatric and adolescent patients. 51% reported referring more than 20 patients annually to dentists, primarily for Oral Appliance Therapy (37%), followed by consultation (21%), expansion (14%), temporomandibular disorders (8%), and teeth grinding (7%). High mean percentage scores (over 75%) were recorded across all survey sections assessing knowledge and professional attitude.

Conclusions: This survey study showed good Percentage Mean Scores (PMS) for all three sections evaluating the knowledge of craniofacial factors contributing to OSA and the role of dental professions, professional attitude towards the recognition of craniofacial features that contribute to OSA, and professional attitude towards properly referring patients to dental professionals. Based on this survey study, Sleep Medicine physicians between the ages of 25-44 years with >5 years of experience are likely to have good craniofacial knowledge and a positive attitude towards recognizing craniofacial features contributing to OSA and properly referring to dentists.

Support: No Support

CASE REPORT #010

MANAGEMENT OF COMORBID OBSTRUCTIVE SLEEP APNEA AND INSOMNIA, INTEGRATION OF MANDIBULAR ADVANCEMENT DEVICE AND BEHAVIORAL THERAPY: A CASE REPORT

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Introduction: Obstructive sleep apnea (OSA) and insomnia are two prevalent sleep disorders that often coexist, with estimates of 38% pooled prevalence. While each condition has distinct pathophysiological mechanisms, their comorbidity can significantly worsen sleep quality and exacerbate daytime fatigue, cognitive dysfunction, and overall health outcomes. One potential complication to treatment is that patients with OSA may present with insomnia symptoms and interventions for OSA, such as continuous positive airway pressure (CPAP), are often less effective in patients with coexisting insomnia. Fortunately, patients with comorbid OSA and insomnia may benefit from psychological interventions like cognitive behavioral therapy for insomnia (CBT-I). Studies have reported improvement in sleep when integrating CBT-I and CPAP, however to the best of our knowledge no one has reported in the integration with mandibular advancement device (MAD). This case report explores the management of a patient with comorbid OSA and insomnia, treated with a combined approach MAD for OSA and brief cognitive behavioral therapy for insomnia (BBT-I). The case highlights the potential for integrated treatment strategies in improving both sleep quality and daytime functioning in this complex patient population.

Report of Case: 67-year-old male diagnosed with mild OSA (AHI 12.9 min SpO2 88%) was referred to the Orofacial pain clinic for management with MAD. He indicated snoring and increased daytime sleepiness (ESS 11) as associated symptoms. He indicated dissatisfaction with sleep for the last 25 years progressively worsening.

He indicated having cognitive difficulties when he is sleep is worst. Reportedly, he has 2-3 awakening per night lasting up to 3 hours. Patient was started treatment with MAD, and in the first follow-up he noted great improvement in his symptoms. However, as the follow-up progressed, he noted that even though his sleep was deeper he was still waking up multiple times and felt unrefreshed. At that time insomnia severity index was performed (ISI 16) and BBT-I was introduced. Brief behavioral therapy consists of several sessions where patients are taught skills of sleep hygiene, stimulus control, and sleep restriction. BBTI was created by taking the necessary and sufficient components of CBT-I and condensing them into a brief protocol (generally 2-4 sessions) which can be delivered by trained medical providers, including dentists. Currently 2 months into BBT-I and with the continued titration of the MAD patient has noted a significant improvement in his sleep, sleeping well throughout the night and feeling energetic during the day.

Discussion: Often patients with OSA present with insomnia-like symptoms. Psychological interventions targeting sleep (e.g., CBT-T or BBTI) have demonstrated impressive efficacy for improving sleep and are recommended as a first-line treatment for primary insomnia by the American Academy of Sleep Medicine. Yet, this case study supports that they may also be helpful in patients who have other sleep disorders (i.e., OSA) with comorbid insomnia symptoms, if both sleep disorders are treated simultaneously. The combinations of a MAD with BBTI may present a promising avenue for improving sleep in patients with comorbid OSA and insomnia.

Support: None

ABSTRACT #011

THERAPEUTIC EFFICACY, EXPRESSED BY DECREASE IN APNEA/HYPOPNEA INDEX AND SLEEP APNEA SPECIFIC HYPOXIC BURDEN (SASHB), OF PRECISION MANDIBULAR ADVANCEMENT DEVICE (MAD) AND CONTINUOUS POSITIVE AIRWAY PRESSURE (CPAP) THERAPY, EVALUATED IN THE SAME PATIENT COHORT

Dieltjens Marijke, Op de Beeck Sara, Engelen Sanne, Goossens Renilde, Verbraecken Johan, Charkendeh Shouresh, Braem Marc, Azarbarzin Ali, Vanderveken Olivier

Introduction: Assessment of obstructive sleep apnea (OSA) severity remains mainly confined to the apnea/hypopnea index (AHI), a count of respiratory events per hour of sleep. However, AHI does not account for the duration and severity of these events, and thus fails to fully capture the physiological burden caused by OSA. The sleep apnea specific hypoxic burden (SASHB) is proposed as a novel metric to assess OSA severity, defined as the total area under the respiratory event-related desaturation curve.

The aim of this clinical trial was to evaluate the therapeutic effect of a precision mandibular advancement device (MAD) therapy and to compare it with continuous positive airway pressure (CPAP) therapy in the same patient cohort, studying both AHI and SASHB. Additionally, the mean risk alleviation will be compared between both treatment modalities.

Methods: Patients (n=136) diagnosed with moderate to severe OSA (15/h<AHI<65/h, upper limit defined per protocol) with no history of CPAP or MAD were contacted and consented with the study. They started MAD therapy for three months (EVO, ProSomnus) and switched to CPAP treatment for three months (Prisma, Löwenstein) after a two-weeks wash-out. Polysomnography type 1 assessed the therapeutic effect of each treatment modality. SASHB was calculated from the polysomnographic data according to Azarbarzin et al. (2019). "High SASHB" was defined as SASHB ≥ 60.0%min/h, the threshold for increased risk of cardiovascular disease mortality in a population-based study. The mean risk alleviation, which is a combination of decrease in SASHB and adjusted adherence) was calculated. Data are presented as median (quartile1; quartile 3).

Results: 94 patients out of 132 completed all study visits with 72 patients being compliant to both precision MAD and CPAP therapy, showing a significant decrease in AHI from 24.7 (17.5; 32.4) at baseline to 7.7 (4.9; 11.3) events/hour with MAD ($p<0.005$) and to 3.5 (1.4; 5.1) events/hour with CPAP. In these 72 patients, the SASHB decreased significantly from 38.9 (28.8; 72.9) %min/h to 13.0 (6.9; 23.3) %min/h with MAD ($p<0.01$) and to 41 (1.8; 7.3) %min/h with CPAP ($p<0.01$ compared to baseline and $p<0.01$ compared to precision MAD). The absolute decrease in SASHB was 90.1 ± 19.5 %min/h for CPAP and 55.4 ± 18.9 %min/h for precision MAD therapy as compared to baseline.

Twenty patients (28%) suffered from OSA with a high risk for cardiovascular disease mortality with a "high SASHB" at baseline. In this group the SASHB was decreased below the threshold of 60 %min/h by precision MAD therapy and CPAP therapy in 85% (17 out of 20) and in 100% (20 out of 20) of patients respectively.

In an intention-to-treat analysis, taken into account the adherence failures, the mean risk alleviation was 54% (decrease in SASHB of 64 % and an adjusted adherence of 84 %), while it was only 40% in CPAP (decrease in SASHB of 88 % and an adjusted adherence of 46 %).

Conclusion: In this study, both precision MAD and CPAP therapy had similar effect on AHI; however, MAD had a better mean risk alleviation than CPAP.

Support: The MAD devices (ProSomnus EVO) used in this study were provided free of charge by ProSomnus Sleep Technologies, Pleasanton, CA, USA.

ABSTRACT #012

THREE-DIMENSIONAL MEAN DISEASE ALLEVIATION (3D-MDA) OF MANDIBULAR ADVANCEMENT DEVICE THERAPY BASED ON SNORING RESOLUTION, THERAPY ADHERENCE AND EFFICACY

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Introduction: Mandibular Advancement Device (MAD) therapy is a non-invasive treatment option for patients diagnosed with obstructive sleep apnea. The removable nature of MAD puts the responsibility on the patient to appropriately adhere to the device therapy. The overall clinical effectiveness can be expressed as the mean disease alleviation (MDA), which is a combination of efficacy in terms of OSA severity reduction and objective adherence. However, the shortcoming of this MDA metric is that it fails to capture symptom changes with treatment. Therefore, recently, the three-dimensional mean disease alleviation (3D-MDA) was proposed as alternative paradigm, integrating symptom response (Kaffenberger TM et al. Sleep Med. 2024).

Methods: Patients diagnosed with moderate to severe OSA fulfilling the inclusion criteria (body mass index (BMI)<35 kg/m², 15 events/hour≤obstructive apnea/hypopnea index (oAHI)<65 events/hour of sleep, central AHI<30% of total AHI, no history of CPAP or MAD) were contacted to start MAD therapy for three months (ProSomnus EVO Sleep and Snore Device, ProSomnus Sleep Technologies) as a first-line treatment option with measurement of objective adherence using an embedded active thermomicrosensor (Theramon, MC Technology GmbH), followed by polysomnographic evaluation as part of the 'First Line Obstructive Sleep Apnea Therapy' (FLOSAT) study. The 3D-MDA, which integrates the symptom response, therapy adherence and efficacy, was calculated using the Visual Analogue Scale (VAS) for snoring as the survey instrument of interest to follow-up the symptom of snoring.

Results: 101 patients completed the 3 month follow-up with MAD. The majority of patients was male (86%) with a mean age of 51±12 years and a BMI of 28.3±3.4 kg/m². The median AHI was 24.5 (17.8; 32.7) events/hour with 71% suffering from moderate OSA (15 ≤ AHI < 30 events/hour) and 29% suffering from severe OSA (30 ≤ AHI < 65 events/hour). Ninety-four patients (93%) were considered 'continuing user', defined as patients who still used the MAD after 3 months of therapy and had a PSG with MAD. In these 94 continuing users, the AHI decreased significantly by 67% from 24.5 (17.3; 32.7) to 8.1 (5.3; 12.6). The success rates were 76%, 70% and 65% for ΔAHI≥50% or AHI_{MAD}<10/h, $Sher_{20}$ and $Sher_{15}$. The median objective nightly adherence was 6.9 (5.4; 7.4) hours/night with 88% of patients fulfilling the definition of compliant $users_{4hours}$ and 80% of patients defined as compliant $users_{5hours}$. The overall clinical effectiveness in these continuing users was defined by an adjusted compliance of 95% and an efficacy of 55%, leading to a mean disease alleviation of 52%. In 76 continuing users, we were able to calculate the 3D-MAD (VAS) score. In these patients, the treatment efficacy was 60%, combined with an adjusted adherence of 92% and symptom response was 63%, yielding a 3D-MDA (VAS) of 37%.

Conclusion: This is the first study calculating the 3D-MDA (VAS) in patients with moderate to severe OSA treated with MAD as first-line treatment. Overall, the high adherence is counterbalanced by a moderate efficacy and symptom response, yielding a 3D-MDA (VAS) of 37%.

Support: The MAD devices (ProSomnus EVO) used in this study were provided free of charge by ProSomnus Sleep Technologies, Pleasanton, CA, USA.

ABSTRACT #013

FIVE-YEAR, PROSPECTIVE, MULTICENTER, REAL-WORLD STUDY TO ASSESS INITIAL DELIVERY, MANAGEMENT AND LONG-TERM EFFECTIVENESS OF A CAD/CAM, 3-D PRINTED ORAL APPLIANCE IN THE TREATMENT OF OBSTRUCTIVE SLEEP APNEA: INTERIM ANALYSIS UPDATE

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Introduction: Oral appliance therapy (OAT) continues to be a mainstay of therapeutic options in the treatment of obstructive sleep apnea (OSA). The provision of OAT requires a multidisciplinary approach to care involving a qualified sleep dental provider and a prescribing sleep specialist. This trial supports this methodology in a real-world, observational, longitudinal study of the Panthera D-SAD. The patients' therapeutic journey will be followed by providing data from first-time fit and delivery to ongoing adherence. Long-term adherence is essential for any OSA therapy to contribute to overall health and well-being. This study will fulfill French

reimbursement requirements. Ethics committee approval was obtained.

Methods: OAT naïve individuals with moderate OSA (AHI 15-30) or those with severe OSA (AHI > 30) who decline CPAP and meet all other criteria will be included. Sites will follow the standard of care in France to provide OAT. The Panthera D-SAD is a CAD/CAM, 3D printed biocompatible nylon appliance allowing for a patient-matched design. Fifteen centers in France will enroll 217 participants via consecutive sampling. A Somnologist will assess participants for entry criteria, and a prescription for OAT obtained. A dental evaluation for suitability is conducted (V0). Initial OAT fitting occurs at Visit 1. Evaluation time points are (V2) three to six months (medical/sleep/dental), yearly follow-up to four years (dental visit/phone calls), and five years (medical/dental). Secondary endpoints include side effects, oxygenation metrics, quality of life, self-reported adherence, and subjective symptoms.

Results: Enrollment is complete (n=257). Baseline demographics n=239 (mean/SD): Age 50.7 (12.8), BMI 26.6 (4.7), F 49%, AHI 22.7 (9.0), ODI 17.0 (11.4), lowest SpO_2 84.6% (6.8), ESS >10 42.4% (n=198). No changes to the OAT at delivery were required in 84.3%, with 82.3% of participants indicating that the device was comfortable and that only minimal adjustments were required. Within two post-delivery visits, 88.3% of participants were fully titrated. Change from baseline in sleep respiratory variables (n=179) to sleep testing (3-6 Mos): AHI reduction ≥ 50% (60.3%). Additionally, 87.8% of moderate and 83.4% of severe transitioned to a lower AHI classification, with AHI <15 (80.9%), <10 (58.5%), <5 (20.8%). ODI decreased to 9.7 (8.4). Daily usage of ≥4 hours per night was reported by 96.2% of participants at three months and 94.8% at six months. During the routine annual call, 94.7% confirmed wearing the device all night. The average number of nights per week with device usage was 6.6 (1.2) at 3 months, 6.4 (1.4) at 6 months, and 6.2 (1.7) at one year, demonstrating sustained adherence over time. Satisfaction with treatment was 82.8% at three months and improved at one year (91.9%). At three months, ESS >10 24.5% (n=139).

Conclusions: These data represent insight into an ongoing, real-world observational study. Participants had improvement in their OSA and high satisfaction levels regarding wearing the device. The continued robust self-reported adherence confirms sustained therapy over time. Limitations include variances from site to site. However, in an observational study, these are expected findings. The last participants enrolled have not finalized titration. Additional data will be forthcoming.

Support: Panthera Dental Inc., Quebec Canada

ABSTRACT #014

EFFECTIVENESS OF MANDIBULAR REPOSITIONING SPLINT IN PREVENTING DENTAL SIDE EFFECTS OF ORAL APPLIANCE THERAPY FOR OBSTRUCTIVE SLEEP APNEA: A 2-YEAR FOLLOW-UP ANALYSIS

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Introduction: Mandibular advancement oral appliances (OA) are an effective treatment for obstructive sleep apnea (OSA). However, long-term OA use has been associated with significant changes in occlusion, prompting the use of mandibular repositioning splints (MRS) in the morning after overnight OA use, to mitigate side effects. This study aims to evaluate the effectiveness of morning MRS therapy in minimizing occlusal changes in OSA patients compared to those treated with OA alone.

Methods: The study sample consisted of 31 OSA patients (M/F: 21/10, age range: 39-73 years) who were randomly assigned to two groups: the MRS group (n=15), which received a mandibular repositioning splint to wear for at least one hour each morning following OA removal, and the control group (n=16), which received only the OA. Digital dental models were obtained at baseline and after two years. The baseline and follow-up models were oriented in space and superimposed using reference landmarks on the palatal rugae and mucogingival junction of the maxilla and mandible, respectively, using Geomagic Control X software. Next, using 3D Slicer, additional landmarks were placed on the anterior teeth and first molars to analyze the angular and linear movements of each tooth along the X, Y, and Z axes. Tooth displacements were compared between the MRS and control groups using independent t-test or Mann-Whitney U-test (P=0.05). Intra-examiner reliability for model registration and tooth movement measurements was evaluated using intraclass correlation coefficients (ICCs).

Results: The ICCs ranged from 0.90 to 0.98, indicating excellent reliability. Statistically significant tooth displacements in the anteroposterior and total 3D dimensions were observed for all upper and lower anterior teeth and the lower first molars (P<0.01). Upper canines also showed significant right-left displacement towards the midline (P<0.05). No significant differences were found between the MRS and control groups for the posterior movement of maxillary incisors (0.25 mm vs 0.22 mm) and canines (0.17 mm vs 0.21 mm) or the anterior movement of mandibular incisors (0.38 mm vs 0.41 mm), canines (0.34 mm vs 0.32 mm), and first

molars (0.38 mm vs 0.40 mm) (P>0.05). Angular measurements showed a statistically significant anterior tipping (pitch) of mandibular teeth (P<0.05). However, no significant differences were observed between the MRS and control groups for the tipping of incisors (1.85° vs 1.62°), canines (1.45° vs 1.26°), and first molars (1.31° vs 1.24°) (P>0.05).

Conclusions: The mandibular repositioning splint was not effective in reducing dental side effects after two years of oral appliance use. Longer-term studies on MRS use and adherence data are needed to confirm our findings.

Support: Funded by American Sleep Medicine Foundation and American Academy of Dental Sleep Medicine.

ABSTRACT #015

MANDIBULAR ADVANCEMENT WITH TEMPORO-MANDIBULAR JOINT CONTROL TO TREAT OSA PATIENTS: A PILOT STUDY ON A RANDOMIZED PORTUGUESE SAMPLE.

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Introduction: Continuous positive air pressure (CPAP) is the gold standard treatment for obstructive sleep apnoea (OSA), but research shows that it has greater efficacy but less compliance than mandibular advancement devices (MAD). On the other hand, mandibular advancement devices may have less efficacy but more compliance. Although there are the same external factors that can determine the efficacy and effectiveness of MAD, such as sleep hygiene, patent airway, positional therapy, and external factors such as amount of advancement, vertical dimension, nasal or mouth breathing, arch perimeter, tongue position and hyoid position, general oral health conditions.

Methods: A randomised sample of 29 individuals was selected with a mean age of 45 years, both sexes, BMI > 25 Kgm2. A complete clinical examination was performed by an otorhinolaryngologist, an internist and a sleep specialist, and patients underwent PSG type II, the results of which were AHI > 5.6/h and AHI < 41.9/h; ODI > 2/h and <36.8/h with a severe snoring index. Subjective assessment was performed using the Epwoth Sleep Scale. And an intra-oral assessment of oral health, TMJ and muscle palpation was performed by a dentist qualified in dental sleep medicine. All subjects were subjected to a novel MAD design therapy, which respects and replicates the individual mandibular movement seen on film. Mandibular advancement was performed with a George gauge, taking into account 50% of the maximum mandibular range of motion.

Results: After MAD delivery, 5 subjects received Covid-19 and did not complete the evaluation process. The other 25 individuals underwent a type II PSG and the authors evaluated the results: all 25 individuals significantly reduced or eliminated the snoring index; in 4 individuals the AHI decreased to < 5/h; in 10 individuals the AHI decreased at least 50% from the baseline value; all 25 individuals showed a decrease in positional AHI (taking into account the supine position).

Conclusions: MAD therapy with less advancement and temporomandibular joint design control could be an alternative therapy for OSA patients who refuse CPAP, with high adherence and reduced risk factors for joint dysfunction and secondary intra-oral effects.

Support: This Pilot Study was supported by Orthoapnea giving free MAD for all patients.

ABSTRACT #016

INDIVIDUALIZED OPTIMIZATION OF MANDIBULAR ADVANCEMENT DEVICES IN OBSTRUCTIVE SLEEP APNEA: A CLINICAL OUTCOME ANALYSIS

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Introduction: The mandibular advancement device (MAD) is an established OSA treatment, typically titrated subjectively based on patient symptoms. Despite the importance of optimal mandibular position in treatment efficacy, a standardized method of titration does not exist. Most outcome studies employ a 'subjective titration protocol', which relies on the patient's self-reported symptoms such as snoring or daytime sleepiness. However, subjective improvement may lead to premature titration termination. This study evaluates whether objective titration via polygraphy can improve treatment outcomes.

Methods: This study is a sub-analysis of the First Line Obstructive Sleep Apnea Therapy' (FLOSAT) study, a prospective cohort study in patients with moderate to severe OSA (body mass index (BMI)<35 kg/m², 15 events/hour≤obstructive apnea/hypopnea index (oAHI)<65 events/hour of sleep, central AHI<30% of total AHI, no history of CPAP or MAD).
All patients started MAD therapy for three months (ProSomnus MAD EVO Device, ProSomnus Sleep Technologies) as a first-line treatment option. The MAD was fitted in the maximum comfortable protrusion minus 3 millimeters. Titration was completed by the patients, guided based on subjective relief of cardinal symptoms. The efficacy of the therapy in terms of reduction in OSA severity was evaluated by polysomnography (PSG). Response was defined as AHI with MAD < 10 events/hour. In non-responders (AHI with MAD > 10 events/hour), additional titration under polygraphic guidance (MediByte V8.0 Sleep Analysis Software, BRAEBON) was performed. Differences in respiratory parameters (AHI, oxygen desaturation index (ODI) and sleep apnea specific hypoxic burden (SASHB)) between responders and non-responders were evaluated.

Results: 86 patients completed the study of which 73 patients (male: 82%; age: 51±12 years; BMI: 28.2±3.2 kg/m²) could be considered responder based on subjective titration solely, while 13 patients (male: 100%; age: 55±11 years; BMI: 28.0±4.4 kg/m²) needed additional titration based on AHI>10/h on PSG.
In the responder group, AHI, ODI and SASHB improved significantly under MAD therapy: AHI from 23.9 (17.3; 31.3)/h to 6.7 (4.7; 10.2)/h, ODI from 18.7 (13.6; 26.5)/h to 8.8 (5.6; 12.5)/h and SASHB from 37.8 (27.1; 58.0) min/h to 9.8 (6.1; 19.5)%min/h. In the non-responders who needed additional titration, the respiratory parameters AHI, ODI and SASHB improved following optimization. AHI reduced from 29.8 (21.6; 40.6)/h at baseline to 15.9 (13.9; 19.6)/h after subjective titration to 12.8(8.4; 20.9)/h after PG-guided titration, while ODI reduced from 26.3 (16.2; 32.0)/h at baseline to 15.4 (10.7; 17.8)/h after subjective titration to 9.6 (7.3; 14.2)/h after PG-guided titration. SASHB reduced from 53.4 (39.1; 76.0) min/h at baseline to 23.8(17.8; 27.5)%min/h after subjective titration.
AHI, ODI, and SASHB were significantly higher at baseline ($p<0.05$) and after subjective titration ($p<0.05$) in the non-responders vs responders, but became comparable after optimization.

Conclusion: Our findings indicate that subjective titration may not be sufficient for guiding MAD therapy. Further objective optimization can result in improved MAD treatment outcomes.

Support: The study received support from ProSomnus Sleep Technologies, providing the precision MAD free of charge.

ABSTRACT #017

IMPROVEMENT IN NOCTURIA WITH MANDIBULAR ADVANCEMENT DEVICE AND CHANGES APNEA HYPOPNEA INDEX: PRELIMINARY FINDINGS.

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Introduction: Nocturia refers to waking up at least two times per night for voiding and occurs in at least ten percent of the population. Although nocturia has been associated with urological disease and diabetes, studies also support a relationship with obstructive sleep apnea (OSA). To the best of our knowledge, no studies have investigated the effect of a mandibular advancement device (MAD) on nocturia, especially its association with apnea hypopnea index (AHI). This study is part of a larger ongoing project examining if MAD are associated with reduction in nocturia and improvement in AHI in patients managed for OSA. Here, we present preliminary findings based on the limited data available as of February 2025. Further analysis will be conducted as additional data are collected.

Methods: Participants were recruited among patients referred to a university-based orofacial pain clinic diagnosed with OSA for the management with MAD. Patient were recruited if they meet the inclusion and exclusion criteria. All participants completed baseline questionnaires and underwent a baseline home sleep study (Alice One Night®) evaluated by the same sleep physician. They all completed daily questionnaires regarding their nighttime urination until they were fitted with a Somnodent Classic appliance at 50% protrusion. From delivery until follow up they completed daily questionnaires regarding they nighttime urination as well as appliance usage and fluid intake. Titration was completed once they were classified as responders in terms of nocturia (average of <2 urination at night per daily diary) or until maximum titration was achieved. At this time, second home sleep study was performed and evaluated by same sleep physician. Responders in terms of AHI was defined as reduction of 50% from baseline.

Results: Up to the current date, 6 patients have been successfully recruited, which is 16.67% of the target sample size of 36. Recruitment is ongoing. This abstract includes 5 patients (2 males and 3 females). Average age of the sample was42.8±8.16 and baseline AHI was 17.2 ±11.3. All patients had resolution of their nocturia (with nighttime urination of <2 per daily questionnaires) at their first follow up. The average change in nocturia was (1.07±.04) and the reduction was statistically significant ($t(4) = 5.91$, $p = 0.004$). Sleep study was performed at 50%

titration and 3 of 5 patients had 50% improvement in AHI. Pearson correlation between changes in AHI and changes in nocturia was performed which revealed a ,marginally significant but strong correlation between the two ($r = .872$, $p = .054$).

Conclusions: In this preliminary analysis, a statistically significant reduction in nocturia was observed following treatment, with all patients reporting resolution of nocturia at their first follow-up. Additionally, 60% was defined as responders in terms of nocturia. The Pearson correlation indicated a strong relationship between changes in nocturia and AHI (although this was marginally significant, likely due to the small current sample size). These findings suggest a potential link between improvement in AHI and reduction in nocturia, warranting further investigation.

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