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SLEEP MEDICINE and the promises of EHR INTEROPERABILITY

NIGHTMARES versus NIGHT TERRORS

WIRELESS SLEEP DATA ACQUISITION

CASE STUDY

Oral Appliance: An Effective Alternative to PAP Therapy for Obstructive Sleep Apnea

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INTRODUCTION

Undiagnosed and untreated sleep apnea is a serious and growing health problem. The adult population in the United States has a prevalence of obstructive sleep apnea (OSA) of 12%.[1] This prevalence is rising at an estimated 14% growth rate between 2022-2027 due to factors including the obesity crisis.[1] 80% of individuals with suspected OSA are undiagnosed.[3]

Adults with undiagnosed and untreated OSA have poorer survival rates than those without OSA.[3] People with mild to moderate OSA have a 50% greater mortality risk and those with severe have three times the mortality risk than those without OSA.[3]

Adherence to therapy is important to achieve long-term health gains. Those who are diagnosed and treating their OSA with PAP therapy are reportedly <40% compliant with therapy. In contrast to the fact that 76% of patients report wearing their oral appliance after one year and 62% of patients report wearing their oral appliance after four years.[2]

Continuous Positive Airway Pressure (CPAP) recalls are driving physicians to learn more about CPAP alternatives due to the lack of availability of CPAP machines. This event has led to more patients using oral appliances to treat their OSA. Physicians are seeing the results of the effectiveness of oral appliance therapy in their patients. The following case study demonstrates the process from screening to diagnosis and treatment and the effectiveness of oral appliance therapy for a patient over the past three years.

BACKGROUND

Chief Complaint

A 50-year-old male presented for consultation and evaluation of his airway reporting unrestful sleep, snoring, and his wife told him that she witnesses him choking, gasping and gagging. He is a pilot for a commercial airline and wanted to make sure he had restful sleep and was protecting his overall health and job performance and safety of his passengers.

Health History:

- Age: 50 years old
- Sex: Male
- BMI: 33.7
- Neck Size: 17.5
- BP: 128/87
- Occupation: Commercial Pilot
- Medications: Crestor
- Allergies: None
- Surgeries: Hx of tonsillectomy as a child and deviated septum surgery in 2004/2005
- Family Hx: Parents with hyperlipidemia
- Epworth Sleepiness Score: 14

DENTAL EXAMINATION

- Patient maintains regular six-month exam and cleaning recall. Healthy gingival and hard tissue.
- Mallampati Class IV **(Figure 1)**, Pharyngeal Grade 0 **(Figure 2)**
- Temporal Mandibular Joint (TMJ): Within Normal Limits
- Overjet: -3mm (Overjet is when the upper front teeth protrude outward) **(Figure 3)**
- Overbite: 25% (Overbite occurs when your top front teeth extend beyond your bottom front teeth) **(Figure 3)**
- Maximum Protrusion: 6mm
- Range of Motion: 9mm
- Deflection to the left on protrusion
- Stable for oral appliance therapy if indicated

TREATMENT METHODS

The patient completed a diagnostic Type III home sleep study. The study was read and interpreted by a board-certified sleep physician. The patient was diagnosed with severe OSA. The patient declined CPAP therapy per the physician's recommendations and opted for oral appliance therapy. His physician provided an order for oral appliance therapy and treatment was initiated.

Digital scans were performed using a jig to set the initial positioning of the appliance at an 8mm vertical opening and to move the jaw to an end to end protrusive relationship which was equivalent to 3mm of protrusive movement for the mandible. End to end is where the upper and lower incisors are touching edge to edge by protruding the mandible.

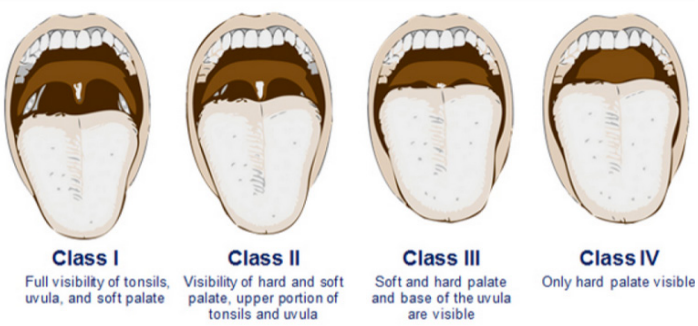

FIGURE 1. Mallampati Classification.

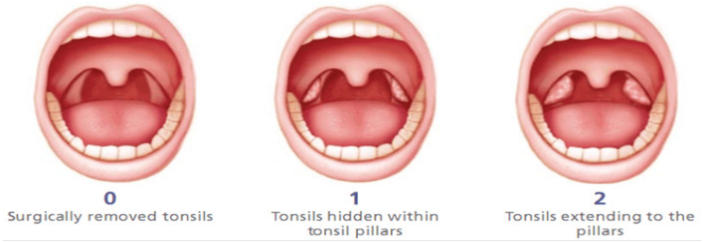

FIGURE 2. Brodsky Pharyngeal Grading.

A SomnoDent Herbst Advance Elite™ appliance by SomnoMed and morning repositioner were fabricated according to the specifications provided. The device was delivered to the patient during a sleep dental clinic visit. Training and instructions were provided to the patient on titration in order to achieve a mandibular protrusive position. The therapeutic goal is to titrate to the position that would yield maximum medical effectiveness and that could be tolerated long-term by the patient. Sleep hygiene, morning exercises, and appliance care were discussed at delivery and all follow-ups. Following eight weeks of titration, the final protrusive position was identified based on patient comfort and the resolution of subjective symptoms. An efficacy HST study was completed with the device. At 4.5 mm on the left and 5.0 mm on the right adjustment on the device (The device was adjusted unevenly due to the initial finding of deflection to the left on protrusion. This allows the mandible to move forward naturally and without pain according to this patient's physiology.) The total protrusion of the device was set at 7mm which was 78% of his range of motion.

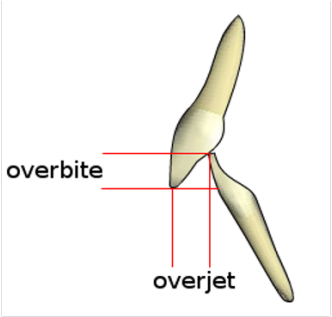

FIGURE 3. Overbite and Overjet.

The patient was seen in follow-up at 6 months, 1, and 2 years to evaluate compliance, oral health, and effectiveness of the appliance and continues to maintain a yearly follow-up recall schedule and regular dental exams and cleanings.

DISCUSSION

The patient was diagnosed with severe OSA, macroglossia and snoring. Oral appliance therapy is effectively treating this patient and has significantly reduced his SEVERE OSA to MILD OSA **(Table 1, Figures 4 and 5)**. While his oxygen saturation levels remain the same, his highest pulse and snore index has greatly decreased and his sleep efficiency has measurably increased.

The patient's Epworth Sleepiness Score has decreased from 14 prior to treatment to 0 at the six-month follow-up. He reports no snoring, his wife no longer witnesses gasping, choking, or gagging, and he feels

Table 1. Summary of Pre and Post Treatment Sleep Study Results

	Diagnostic Sleep Study	Efficacy Study (Device at 4.5L and 5.0R)
BMI	33.7	31.9
Duration of Study	7:59	6:57
Overall AHI	41.1	6.5
Supine AHI	103.2	20.8
AHIc (Central Index)	3	0
Mean SpO2%	89.3	89.1
Nadir SpO2%	81	80
Mean Pulse	69.3	76.4
Highest Pulse	184	103
Snore Index	31.4	9.1
Sleep Efficiency	81	98.8
Epworth Sleepiness Score	14	0

more rested. He has lost 10 pounds since the start of treatment without any changes in diet or exercise. He continues to wear his appliance nightly three years later with no changes in his medical history or dental side effects. He reports that he is very happy and grateful for this treatment and has told many friends about it.

CONCLUSION

Oral appliance therapy is an effective treatment for OSA and should be a treatment consideration for all mild to moderate OSA patients and any CPAP intolerant patients. Patients are more adherent with oral appliance therapy and continue to wear their appliances long-term thus improving overall health outcomes.[2] Patients with severe OSA should be offered the oral appliance treatment option during these times of CPAP recalls and delays in being able to obtain a CPAP machine for treatment. Oral appliance treatment for these patients is better than going months with an unprotected airway that ultimately increases their risk of comorbidities, heart, attack, stroke and mortality.[3] Proper diagnosis, patient and appliance selection, follow-up, and efficacy studies are the keys to successful treatment of OSA with an oral appliance.

Recommendations/Implementation

All medical providers should be evaluating a patient's sleep health and should screen for possible sleep-related breathing disorders. This evaluation starts with reviewing a comprehensive medical history and asking sleep screening questions such as the Epworth or STOP-BANG questionnaires. When patients demonstrate reasonable subjective and objective conditions suggesting a possible sleep-related breathing disorder, providers need to facilitate diagnostic sleep studies and should be able to discuss treatment options and provide referrals for treatment based on the diagnosis.

Ultimately, it is up to all providers to help educate and screen patients for this common and grossly undertreated condition to prevent comorbidities and death. Comprehensive medical histories, patient evaluation, and medical-dental integration are keys to reducing the prevalence of undiagnosed and untreated sleep apnea. Together, providers can make a positive impact on patients' overall health and quality of life while improving the statistics and costs related to sleep disorders including automobile accidents, poor work performance, comorbidities, and death.■

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References:

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