



Evaluating Efficacy of Oral Appliance Therapy During Drug-Induced Sleep Endoscopy



Michael Bauschard, MD¹; Ryan Nord, MD¹

¹Virginia Commonwealth University – Department of Otolaryngology - Head and Neck Surgery

Introduction

Oral appliance therapy (OAT) has shown to be an effective treatment of obstructive sleep apnea for many patients, with a multi-disciplinary approach often utilized.¹ However, determining which patients should be offered this treatment is the subject of much research, with various selection criteria being suggested.^{1, 2}

Currently, there is no published literature on endoscopic findings of airway collapse with a mandibular advancement appliance in place, or whether endoscopic findings during drug-induced sleep endoscopy (DISE) may be able to predict the success of oral appliance therapy.

The efficacy of OAT is inferior to CPAP; however, the effectiveness as measured by sleepiness, quality of life, endothelial function and blood pressure is similar likely due to higher acceptance and subjective adherence.³

Methods

We are recruiting patients presenting to our multi-disciplinary clinic that are found to be candidates for OAT and DISE. Patients must have AHI <65 with less than 25% central apneas. NO contraindications to sleep surgery. We first create George bite gauges in clinic to use during DISE

These gauges function similarly to OAT and can set a fixed position of the mandibular teeth relative to the maxillary teeth in order to advance the mandible.

These impressions are used during DISE to assess what effect, if any, varying degrees of mandibular protrusion have on relieving airway obstruction. We plan on comparing these endoscopic findings with long-term data on effect on AHI from actual use of OAT.

Results

Two patients were evaluated with the above technique. Our first patient was found on DISE to have cessation of snoring and resolution of hypopharyngeal collapse with a protrusive bite in place. Our second patient was found to have resolution of hypopharyngeal collapse with 5 millimeters of mandibular protrusion, while interestingly, their hypopharyngeal collapse returned with 9 millimeters (maximum protrusive range of the patient) of mandibular protrusion taken by the George gauge.

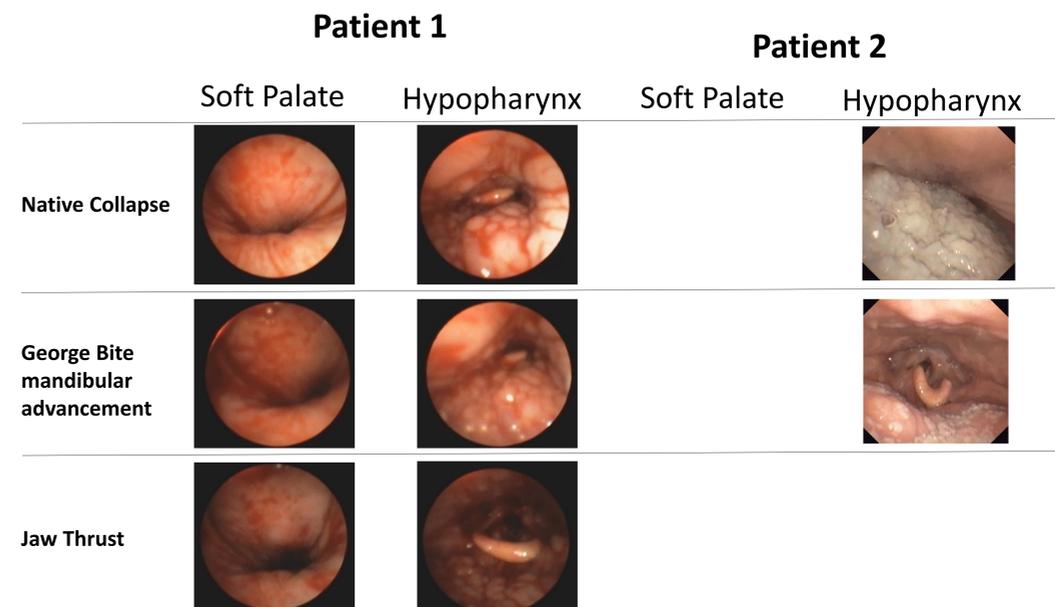
Conclusion

Utilizing protrusive bites at different degrees, it is feasible to select the advancement level which leads to optimal airway opening. This technique may minimize the degree of mandible protrusion and contribute to both the efficacy of and compliance with OA therapy.

Table 1

Age	Sex	AHI	DISE Findings	
			No intervention	George bite advancement
32	F	10.2	Velum: partial collapse Oropharynx: no collapse Tongue Base: partial collapse Epiglottis: independent collapse	Velum: partial collapse Oropharynx: no collapse Tongue Base: partial collapse (slightly improved) Epiglottis: no collapse
74	M	17.0	Velum: complete anterior posterior collapse Oropharynx: complete lateral collapse Tongue Base: complete circumferential collapse Epiglottis: no independent collapse	Velum: slight partial anterior posterior collapse Oropharynx: slight partial lateral collapse Tongue Base: no collapse Epiglottis: no independent collapse

Table 1: Results of first two patients enrolled in study with findings on Drug-induced Sleep Endoscopy (DISE) examining native airway versus airway treated with George bite mandibular protrusion.



Contact

Michael Bauschard, MD
 Virginia Commonwealth University – Department of Otolaryngology
 1200 East Broad Street
 12th Floor, South Wing, Suite 313, Box 980146
 Richmond, VA 23298-0146
 Michael.bauschard@vcuhealth.org
 Phone: 804.828.2785

References

- Milano F, Mondini S, Billi MC, Gobbi R, Gracco A, Sorrenti G. The impact of a multidisciplinary approach on response rate of mandibular advancing device therapy in patients with obstructive sleep apnoea syndrome. *Acta Otorhinolaryngol Ital.* 2013 Oct;33(5):337-42. PubMed PMID: 24227900.
- Petit FX, Pépin JL, Bettega G, Sadek H, Raphaël B, Lévy P *Am J Respir Crit Care Med.* 2002 Aug 1; 166(3):274-8. Oropharyngeal collapse predicts treatment response with oral appliance therapy in obstructive sleep apnea. *Ng AT, Qian J, Cistulli PA Sleep.* 2006 May; 29(5):666-71.
- Doff MH, Hoekema A, Wijkstra PJ, van der Hoeven JH, Huddleston Slater JJ, de Bont LG, Stegenga B. Oral appliance versus continuous positive airway pressure in obstructive sleep apnea syndrome: a 2-year follow-up. *Sleep.* 2013 Sep 1;36(9):1289-96. doi: 10.5665/sleep.2948. PubMed PMID: 23997361

Abstract

Objectives: Insomnia is seen in some patients with obstructive sleep apnea (OSA). Psychophysiological insomnia (Psy-I) is a subgroup of insomnia, for which specialized treatment is often required. The aim of this study was to characterize the features and prevalence of obstructive sleep apnea insomnia overlap (OSAIO).

Materials and Methods: This was a chart review of patients who underwent overnight polysomnography (PSG). All patients completed questionnaires with the Epworth Sleepiness Scale (ESS), and a symptom checklist detailing symptoms of insomnia and Psy-I. Patients with OSA (apnea-hypopnea index, AHI ≥ 5 events/hour) on the PSG were included.

Results: A total of 296 patients were included. In this OSA population, 80% reported at least 1 major symptom of insomnia: 57% reported sleep onset insomnia, 68% sleep maintenance insomnia, and 48% had early morning awakenings. Those with OSA and 2 (33%) or 3 (33%) major symptoms of insomnia were considered to have OSAIO. There were no differences in age, BMI, or sex or racial distributions, or OSA severity between those with and without OSAIO. Patients with OSAIO had higher ESS scores (median (interquartile range)) than those without (14 (10-18) vs. 12 (6-17); $P=0.015$). Among the patients with OSAIO, 85% reported at least 1 symptom of Psy-I.

Conclusions: Insomnia is extremely prevalent in our population of patients with OSA, accompanied by daytime sleepiness. Clinicians treating patients with OSA should be aware of OSAIO and understand how to identify the phenotype. Further study is needed to determine the interactions between symptoms and OSA treatments in these patients.

Background

- Insomnia and obstructive sleep apnea (OSA) commonly co-occur together.
- It has been suggested that insomnia is due to a hyper-arousal state that causes excessive alertness [1].
- Both OSA and insomnia contribute to the burden and cost of healthcare.[2]
- Studies have suggested that insomnia might reduce CPAP compliance in patients with OSA [3].
- By identifying a specific phenotype, OSA–insomnia overlap, this may help in suggesting a successful long-term disease management of these patients [1].

Objectives

- To determine the prevalence of obstructive sleep apnea with insomnia overlap and characterize a phenotype of co-existing OSA / insomnia sleep disorder.
- Secondary objectives were to determine associations between OSA and psychophysiological insomnia symptoms in adults.

Methods

- Prior to obtaining a overnight PSG, we conducted a chart review, ESS score and insomnia questionnaire / checklist.
- Major insomnia symptoms
 - Trouble falling asleep at night
 - Trouble staying asleep
 - Waking too early
- Psychophysiological insomnia:
 - Fear of being unable to sleep
 - Fear of being unable to fall back asleep after awakening at night
 - Laying in bed worrying when trying to sleep
 - Racing thoughts when trying to sleep
 - Increased muscle tension when trying to sleep
- Those with OSA (apnea-hypopnea index, AHI ≥ 5 events/hour) on the PSG were included in the analyses.

Results

Demographic characteristics of the participants.

Total participants: 296

Age (years):

Gender: 49.3% male; 50.6% female.

Ethnicity: % Caucasian, % Hispanic, % other

OSA (AHI ≥ 5): 160 (82.5%)

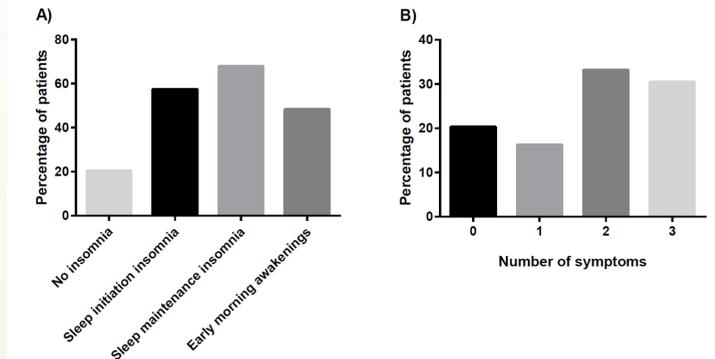
Moderate to severe OSA (AHI ≥ 15): 116 (59.8%)

ADHD screen positive (≥ 4 abnormal responses): 37 (19.1%)

Association overlap of OSA and Insomnia

	ADHD+	OSA(5)+	P-value	OSA(15)+	P-value
All (n=194)	37	160	n.s.	116	n.s.
Male (n=120)	17	105	n.s.	80	n.s.
Female (n=74)	20	55	n.s.	36	n.s.
Caucasian (n=105)	19	86	n.s.	61	n.s.
Hispanic (n=85)	16	72	n.s.	53	n.s.
Obese (n=151)	33	131	n.s.	100	n.s.
Non-obese (n=41)	4	27	n.s.	14	n.s.
Age <50 (n=66)	19	50	n.s.	39	n.s.
Age 50-64 (n=69)	12	63	n.s.	46	n.s.
Age ≥ 65 (n=59)	6	47	n.s.	31	n.s.

All major insomnia symptoms were represented in OSA patients (A) and patients were much more likely to report 2-3 insomnia symptoms than 0-1 symptoms (B).



Conclusion

- 80% patients reported at least one major symptom of insomnia associated with OSA.
- 57% reported sleep onset insomnia, 68% sleep maintenance insomnia and 48% had early morning awakenings.
- Insomnia is extremely prevalent in our population of patients with OSA, accompanied by daytime sleepiness. Clinicians treating patients with OSA should be aware of OSAIO and understand how to identify the phenotype. Further study is needed to determine the interactions between symptoms and OSA treatments in these patients.

References

1. Luyster F, Buysse D, et. al. / JCSM 2010 vol.6 No.2 Comorbid Insomnia and Obstructive Sleep Apnea: Challenges for Clinical Practice and Research.
2. Duarte R, Flavio J, et. al. / Sleep May 2019 Predicting Obstructive Sleep Apnea in Patients with Insomnia: A Comparative Study with Four Screening Instruments.
3. Bahr K, Camara R, et. al. / Front Neuro 9:804 2019 Current Treatment of Comorbid Insomnia and Obstructive Sleep Apnea With CBTi and PAP-Therapy: A Systematic Review.

Prevalence of Anxiety disorder in patients with Obstructive Sleep Apnea and relationship to disease severity

Wahida Akberzie¹, Sean Hesselbacher^{1,2}, Ishan Aiyer³, Salim R. Surani³, Zoya S. Surani³

¹Eastern Virginia Medical School, Norfolk, VA; ²Hampton VA Medical Center, Hampton, VA; ³Texas A&M University, Corpus Christi, TX

Abstract

Objectives: Mood disorders are common in obstructive sleep apnea (OSA), though the interactions are not well-understood. The objective of this study was to evaluate the relationship of anxiety and depression with OSA.

Materials and Methods: This study was a chart review of patients who presented to the sleep center and underwent polysomnography (PSG). Records were included if the sleep study showed OSA (Apnea-Hypopnea Index (AHI) ≥ 5 events/hour). All patients completed an Epworth Sleepiness Scale (ESS) and Hospital Anxiety and Depression Scale (HADS). A score of 8 or higher on the respective portion of the HADS was abnormal.

Results: A total of 45 records were included, with 28 scoring positive for anxiety and 29 positive for depression. Patients with anxiety had lower AHI (median (interquartile ratio, IQR)) than those without (21.4 (9.6-41.3) vs. 50.5 (25.1-94.3); $p=0.0076$). The SpO₂ nadir (80 (74-84)% vs. 65 (57-76)%; $p=0.0007$) and time with SpO₂ $<90\%$ (11 (6-12) minutes vs. 36 (13-68) minutes; $p=0.0002$) were less abnormal in patients with anxiety. The anxiety score on the HADS weakly correlated with AHI ($r = -0.29$). Patients with depression were not significantly different than those without depression in AHI, SpO₂ nadir, and time with SpO₂ $<90\%$.

Conclusions: Symptoms of anxiety and depression are both prevalent in patients with OSA. There is an inverse relationship between OSA severity and the presence of anxiety, suggesting that comorbid anxiety may prompt sleep evaluation in less severe disease. Depression symptoms did not demonstrate a similar relationship with OSA severity.

Background

- Some studies have found that patients with OSA had more depressive symptoms than those without OSA, but that depressive symptoms were associated with poor sleep quality rather than OSA severity.¹
- The correlation between anxiety/depression and obstructive sleep apnea is not well understood
- A meta-analysis consisting of 73 articles showed a prevalence of depressive and anxious symptoms in OSA patients 35% and 32%, respectively.²

Objectives

- The main objective of this study was to evaluate the relationship of anxiety and depression with OSA.
- This includes assessing the correlation of depression and anxiety with OSA severity.

Methods

- This study was a chart review of patients who presented to The Torr Sleep Center in Corpus Christi, TX and underwent polysomnography (PSG).
- Records were included if the sleep study showed OSA (Apnea-Hypopnea Index (AHI) ≥ 5 events/hour). All patients completed an Epworth Sleepiness Scale (ESS) and HADS.
- HADS results were compared with AHI data for significant associations using Mann-Whitney test and Kruskal-Wallis test statistical analysis.

Results

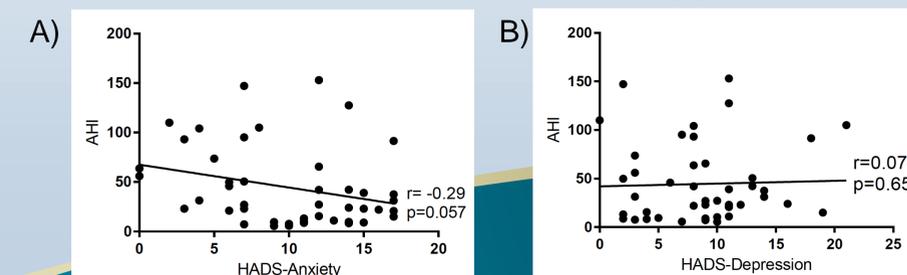
Total participants: 45
Abnormal HADS-A: 28 (62%)
Abnormal HADS-D: 29 (64%)
Abnormal HADS-A or HADS-D: 37 (82%)

Table 1. Association between OSA severity and Anxiety

	No Anxiety (HADS-A <8)	Anxiety (HADS-A ≥ 8)	P-value
Number	17	28	
Age (years), median (IQR)	47 (39-52)	43 (31-49)	0.52
Male, n (%)	7 (41%)	9 (32%)	0.75
Race, n (%)			
Hispanic	6 (35%)	9 (33%)	0.53
Caucasian	6 (35%)	6 (22%)	
African American	5 (29%)	12 (43%)	
BMI (kg/m ²), median (IQR)	42.8 (39.6-59.1)	41.2 (35.7-46.4)	0.11
ESS score, median (IQR)	14 (7-18)	10 (7-15)	0.49
AHI (events/hour), median (IQR)	50.5 (25.1-94.3)	21.4 (9.6-41.3)	0.0076
SpO ₂ nadir (%), median (IQR)	65 (57-76)	80 (74-84)	0.0007
Minutes with SpO ₂ $<90\%$, median (IQR)	36 (13-68)	11 (6-12)	0.0002

*IQR = interquartile ratio; BMI = body mass index; AHI = apnea-hypopnea index; SpO₂ = peripheral oxygen saturation
**Race was not reported by 1 participant

Figure 1. Apnea-Hypopnea Index is weakly correlated with the Anxiety score (A) but not Depression score (B)



Conclusion

- Symptoms of anxiety and depression are both prevalent in patients with OSA – 82% reported symptoms.
- This underscores the importance of screening OSA patients for Major Depressive Disorder and General Anxiety Disorder, and vice versa.
- There was an inverse relationship between OSA severity and anxiety symptoms, suggesting that comorbid anxiety may prompt sleep evaluation in less severe disease.
- While depressive symptoms were prevalent in patients with OSA, there was no association with OSA severity.
- Future studies with a larger population size with higher statistical power could help apply the data to a broader population.

References

- Lee SH, Lee YJ, Kim S, Choi JW, Jeong DU. Depressive symptoms are associated with poor sleep quality rather than apnea-hypopnea index or hypoxia during sleep in patients with obstructive sleep apnea. *Sleep Breath*. 2017; 21(4):997-1003.
- Garbarino S, Bardwell W, Guglielmi O, Chiorri C, Bonanni E, Magnavita N. Association of Anxiety and Depression Obstructive Sleep Apnea Patients: A Systemic Review and Meta-Analysis. *Behavioral Sleep Medicine*. 2018; DOI: [10.1080/15402002.2018.1545649](https://doi.org/10.1080/15402002.2018.1545649)

Conflicts of Interest Disclosure: I do not have any relationships with any entities producing, marketing, re-selling, or distributing health care goods or services consumed by, or used on, patients.

CASE REPORT: Atypical Presentation of OSA in an Adult with Retinal Nerve Fiber Layer Thinning.

Joshua M. Sill, MD, FACP, FCCP Phillip A. Nye, MD

Eastern Virginia Medical School, Norfolk, VA; Sentara Norfolk General Hospital, Norfolk, VA

ABSTRACT

Introduction: Retinal nerve fiber layer thickness (RNFL) is evaluated for thinning in conditions such as macular degeneration, glaucoma and secondary retinopathy. RNFL thinning in the absence of other ocular signs may also suggest periods of hypoxia as seen in obstructive sleep apnea (OSA). Undiagnosed OSA can lead to cardiovascular disease, diabetes, stroke and death.

Case Presentation: We report the case of an 80-year-old, non-obese woman who presented to her ophthalmologist for routine eye exam and was diagnosed with RNFL thinning. She denied snoring, day-time sleepiness, or other sleep complaints. She was referred to a sleep specialist because of this abnormal finding on eye exam. A home apnea test revealed severe OSA, with an apnea hypopnea index of 63/hr. and an oxygen saturation nadir of 75%. She was started on continuous positive airway pressure therapy.

Discussion: In severe OSA, patients typically present with excessive day time sleepiness, nonrestorative sleep and insomnia. OSA is more common in men and associated with obesity. Inherited ventilatory responses may also affect the respiratory drive and predispose patients to obstructive and central sleep apnea. Many factors contribute to OSA, resulting in commonly seen symptoms. This patient reported none of the classic symptoms associated with an AHI \geq 30.

Conclusions: Ophthalmologists evaluate RNFL thickness to help diagnose glaucoma and retinopathy related to vascular disease. Chronic ischemia secondary to the intermittent hypoxia seen in OSA will also cause RNFL thinning. These patients are rarely referred for a sleep evaluation. This case demonstrates the benefits of screening for OSA in patients that present with RNFL thinning.

INTRODUCTION

Ophthalmologist use scanning laser polarimetry imaging and optical coherence tomography (OCT) to diagnose numerous disorders. Both techniques have also been shown to have a high sensitivity and specificity in the detection of early retinal nerve fiber layer (RNFL) thinning³. OCT is an imaging technique that produces a cross sectional display of the RNFL. Reduction in RNFL thickness has been seen in patients with moderate to severe OSA. We report the case of an 80-year-old, non-obese woman who presented to her ophthalmologist for routine eye exam and was diagnosed with RNFL thinning. After an evaluation and sleep study, she was found to have severe OSA.

Conflicts of Interest Disclosure: I do not have any relationships with any entities producing, marketing, re-selling, or distributing health care goods or services consumed by, or used on, patients.

Case study

A 80 year-old white female was referred for a sleep medicine consult by her ophthalmologist for RNFL thinning. Her medical history included:

- 1.COPD (HCC), Unspecified chronic bronchitis type
- 2.hypertension
- 3.hypercholesterolemia.

Her history was unremarkable for excessive daytime sleepiness. She denied any sleep disorder complaints, including snoring or witnessed apneas. Her physical exam was normal, she had a Mallampati III, airway, BMI 22.9 kg/m² ESS score of 3 and her neck circumference was less than 16 inches. Her vital signs were stable.

A home apnea test revealed:

- AHI (REI) of 63
- ODI 39.6
- SaO2 nadir of 75%.

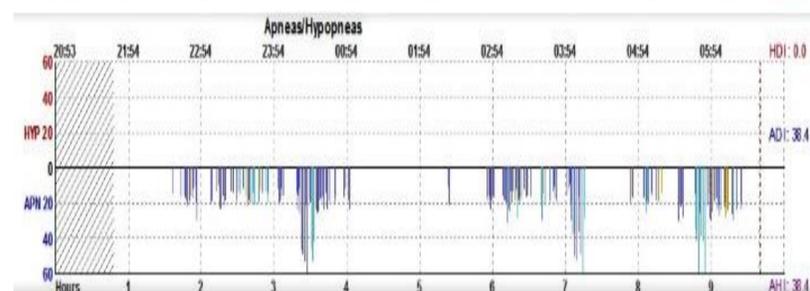
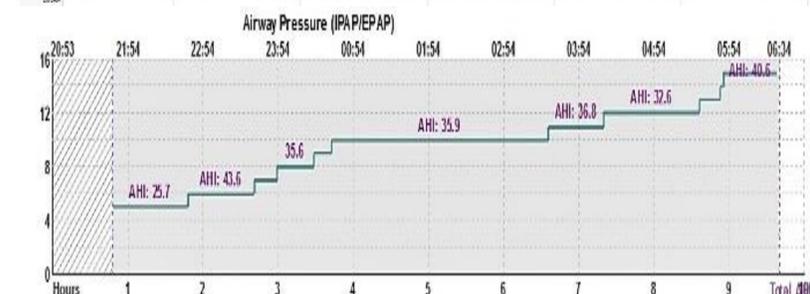
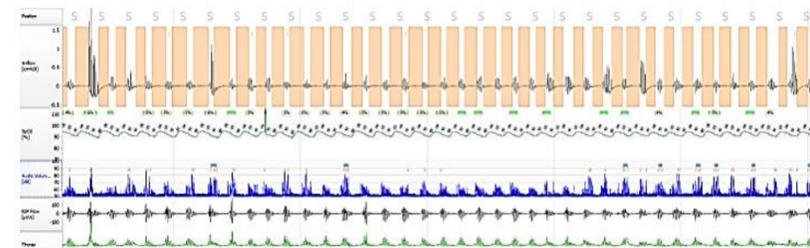
She was started on continuous positive airway pressure (CPAP) therapy, auto-CPAP of 5-20 cwp. Three months later she underwent a CPAP titration study. She reported 8-9 hours of restful sleep the night prior to her polysomnogram. Her PAP Titration results (Figure):

- TST 293 minutes
- 142 obstructive events
- 29 mixed apneas
- 17 central apneas
- AHI 38
- AHI in REM sleep 42
- SaO2 nadir 83%
- At the maximal pressure of 15 cwp:
 - 6 central and 13 obstructive events
 - Residual AHI of 40.6 events/hour
 - Minimum SpO2 of 87%

DISCUSSION

Patients with severe OSA typically present with excessive day time sleepiness, non-restorative sleep, and insomnia. The patient in this case reported none of these symptoms associated with OSA. Undiagnosed OSA can lead to cardiovascular disease, diabetes, stroke cardiac arrhythmia and increased mortality.

Previous studies have described OCT imaging with areas of RNFL thinning that may be unique to OSA⁴. OCT is a noninvasive tool used to assess the retinal nerve fiber thickness by mapping and averaging the measurements of each quadrant. Four quadrants are measured; superior, inferior, nasal and temporal for each eye. Casas et. al., described RNFL thinning in the nasal region that was only seen in the OSA study population.



OSA can result in derangement of the perfusion pressure to the optic nerve. These conditions can involve BP changes, increased viscosity and increased resistance in the small vessels perfusing the optic nerve, resulting in ischemia to the optic nerve head⁵. On eye exam, visual field deficits will only become evident after 40% or more retinal ganglion cell damage. The eye is a considerably powerful tool for recognizing early chronic disease because the retina nerve is very sensitive to the ischemic insult.

Conclusions

Ophthalmologists evaluate RNFL thickness to assess and rule out many common ocular disorders. Chronic ischemia secondary to the intermittent hypoxia seen in OSA will also cause RNFL thinning. This may be a starting point for many patients with undiagnosed sleep apnea who present with a abnormal eye exam. This case is an excellent example of a good referral system working to screen OSA in a patient that might not have sought evaluation. RNFL thickness might be considered as an early biomarker for diagnosis of OSA.

References

1. M. Mentek et al. / Diseases of the retina and the optic nerve associated with obstructive sleep apnea. Sleep Medicine Reviews 38 (2018) 113e130
2. R.Parikh et al. / Optic Nerve Head and Retinal Nerve Fiber Layer Imaging in Glaucoma Diagnosis. Journal of Current Glaucoma Practice, May-August 2009;3(2):8-19
3. SH Kargi et.al / Retinal nerve fiber layer measurements are reduced in patients with obstructive sleep apnea syndrome. Eye (lond) 2005 May;19(5):575-9.
4. Casas et.al / Retinal and optic nerve evaluation by optical coherence tomography in adults with obstructive sleep apnea-hypopnea syndrome (OSAHS). Graefes Arch Clin Exp Ophthalmol. 20 Jun;251(6):1625-34.
5. Zengen MO et.al / Retinal nerve fiber layer thickness changes in obstructive sleep apnea syndrome: one year follow-up results. International J Ophthalmology 2014 Aug 18;7(4):704-8

Epworth Sleepiness Scale as Reliable Predictor of Sleep-Disordered Breathing

Choi A¹, Hesselbacher S^{1,2}, Aiyer I³, Surani Z³, Surani S³

Eastern Virginia Medical School, Norfolk, VA¹; Hampton VA Medical Center, Hampton, VA²; Texas A&M University, Corpus Christi, TX³

Introduction

An estimated 13% of men and 6% of women in the United States are affected by sleep-disordered breathing (SDB). One of the screening tools for evaluation of SDB involves Epworth Sleepiness Scale (ESS). A significant portion of the patients with SDB have lower than expected ESS scores, especially in women.

Objectives

1. The aim of this study was to evaluate the association between the ESS score and presence and severity of SDB
2. Secondary objectives were to determine the associations between ESS score and SDB with respect to:
 - Gender
 - Age
 - BMI
 - Neck circumference

Methods

A retrospective chart review of patients referred to the Torr sleep center (Corpus Christi, TX) was done.

All patients completed questionnaires, including the ESS and demographic and clinical information, and underwent overnight attended polysomnography.

- SDB: respiratory disturbance index (RDI) ≥ 5 events per hour
- An ESS score >10 considered abnormal (i.e., excessive sleepiness)

Results

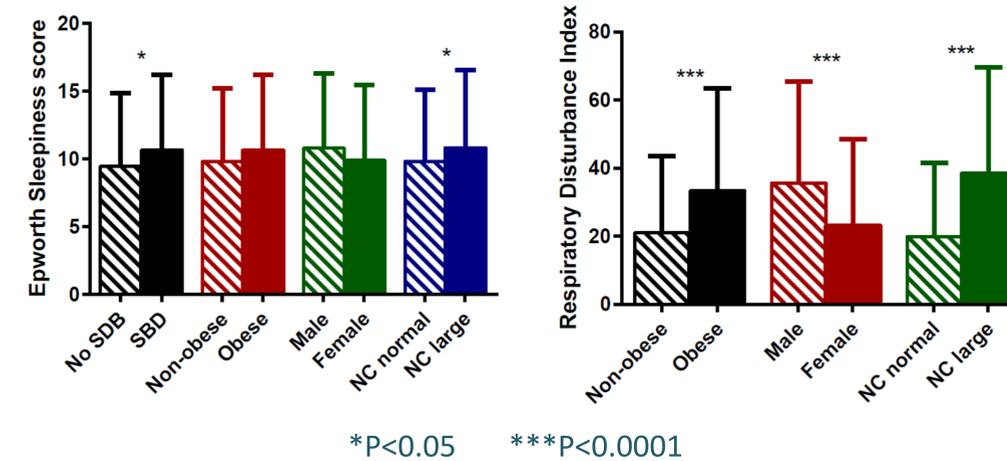
Total participants: 634

- Complete PSG data was recorded in 206 of these patients
- The ESS score was weakly, but significantly correlated with AHI in all patients (Spearman $r = 0.20$, $p < 0.0001$), patients with SDB ($r = 0.22$, $p < 0.0001$), males ($r = 0.23$, $p < 0.0001$), obese patients ($r = 0.20$, $p < 0.0001$)

Demographic and clinical characteristics of the patients

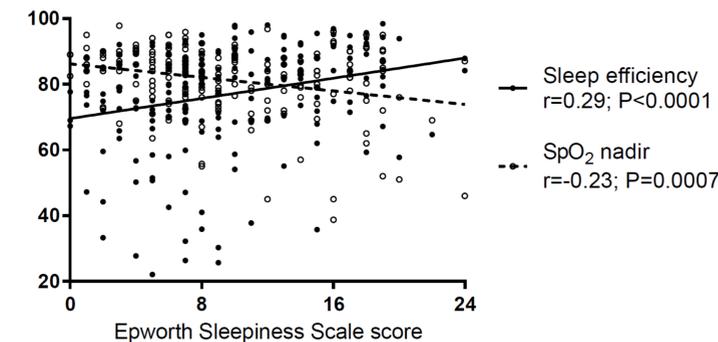
	No SDB (RDI <5)	SDB+ (RDI ≥ 5)	P-value
All, n (%)	127 (20%)	507 (80%)	
Male, n (%)	60 (47%)	299 (59%)	0.02
Age (years), median (IQR)	53 (40-63)	54 (45-65)	0.13
BMI (kg/m ²), median (IQR)	32.0 (27.4-36.0)	34.8 (30.5-40.7)	<0.0001
Neck Circumference (cm), median (IQR)	15.5 (14.0-17.5)	17.0 (15.5-18.0)	<0.0001
ESS score, median (IQR)	8 (5-14)	10 (6-14)	0.03

Comparisons of ESS scores and RDI by subgroup



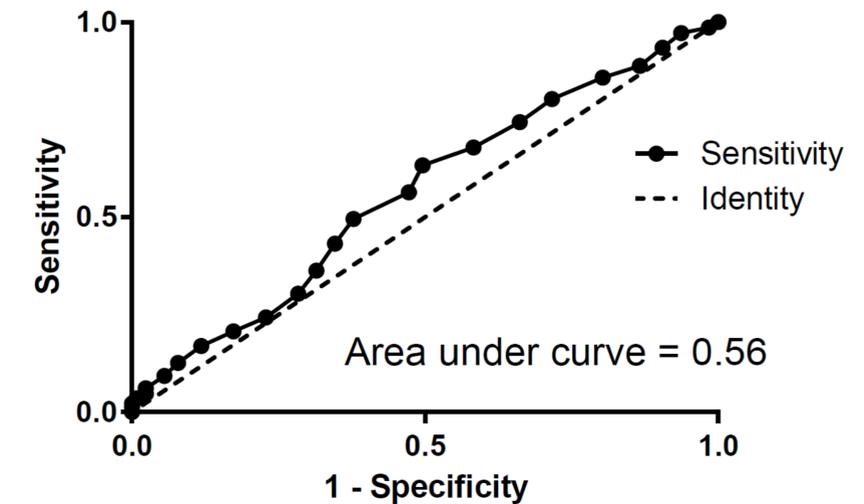
- When considering the upper limit of normal ESS score as 10, the sensitivity was 56% (95% confidence interval, CI 52-61%) and specificity was 53% (CI 44-62%) in all patients

Correlations of ESS with sleep study results



- ESS was not significantly correlated with arousal index or percentage of REM sleep

Receiver-operator characteristics of the ESS in the diagnosis of sleep-disordered breathing



Conclusions

- ESS score poorly predicted SDB in the sleep lab population
- A normal ESS score was seen more often with greater age, female gender, and lower BMI
- Use of the ESS in these subsets of patients may yield higher than expected false negative results
- ESS alone may not be a reliable screening tool for OSA
- Further work is necessary to elucidate the causes for these discrepancies



Drug-Induced Sleep Endoscopy: A Single Institution Study

Nima Vahidi, MD^{1*}; Pavan Krishnan, B.S.¹; Evan Reiter, MD¹; Ryan Nord, MD¹;

¹Department of Otolaryngology (Head and Neck Surgery), VCU School of Medicine, Richmond, VA; * **Presenter**

Objective

- Obstructive sleep apnea (OSA) is a form of sleep-disordered breathing characterized by the collapse and subsequent obstruction of the upper airway during sleep.
- Drug Induced Sleep Endoscopy (DISE) is a surgical evaluation technique that allows for the examination of the upper airway under a pharmacologically induced sleep state.
- Our study aims to provide further information as to the utility and safety profile of DISE in the comprehensive analysis of patients with OSA.

Methods

- Our study examines all individuals that underwent a DISE between July 2016 and April 2019 at a tertiary academic medical center.
- Exclusion criteria included patients under the age of 18 or over 88 years of age.
- We reviewed demographic information, comorbidities, operative reports, and sleep studies for 150 patients.

Figures/Tables



Figure 1. Intrinsic epiglottic collapse



Figure 2. Complete concentric collapse of the velum

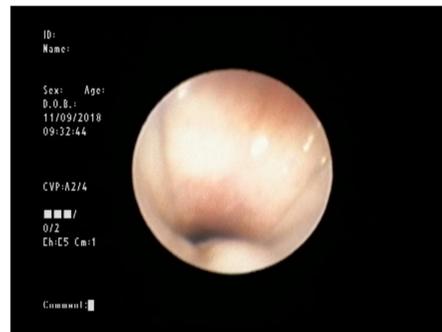


Figure 3. Stable lateral palatal walls

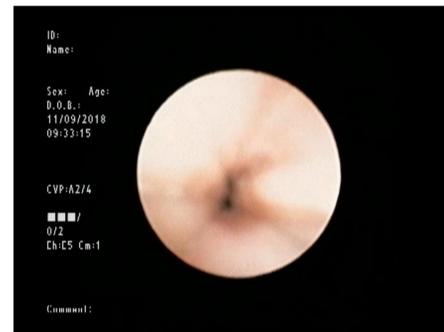


Figure 4. Oropharyngeal collapse giving appearance of complete concentric collapse at the distal velum

	Velum	Oropharynx	Tongue Base	Epiglottis
Any Collapse	97%	76%	80%	43%
Total Collapse	68%	49%	30%	33%
Partial Collapse	22%	25%	50%	10%
Concentric Collapse	7%	2%	-	-
No Collapse	3%	24%	20%	57%

Table 1: Patient demographics and outcomes

Results

- Within the vast majority of our patients DISE demonstrated that most patients have multilevel collapse.
- The average age of our patient population was found to be 56.3, the average BMI was 30.7, and the average pre-treatment AHI was found to be 36.7.
- We found that the velum (97%) and tongue base (80%) were the most common sites of collapse, but the oropharynx and epiglottis were also a factor in many patients.
- We also found that multilevel collapse is associated with worsening severity of sleep apnea. We found DISE to be a safe procedure with no unplanned intubations.

Conclusion

- This study provides additionally information to support the use of DISE in the evaluation of patients with OSA.
- Within our patient cohort we found the majority demonstrated multilevel airway collapse which supports previously published data.
- Additionally we found DISE to be a safe procedure with very low complication profile

Connect with VCU ENT Residency





Multidisciplinary Sleep Apnea Clinic at VCU Health: A First Year Retrospective



Ryan Nord, MD¹; Nima Vahidi, MD^{1*}; Reginald Osardu, B.S.¹; Samuel Taylor, MS, MD²; Robert Strauss, DDS, MD³; Harmeet Chiang, BDS, MS, DDS⁴

¹Department of Otolaryngology (Head and Neck Surgery), VCU School of Medicine, Richmond, VA; ²Department of Neurology, VCU School of Medicine, Richmond, VA; ³Department of Oral and Maxillofacial Surgery, VCU School of Dentistry, Richmond, VA; ⁴Department of General Practice, VCU School of Dentistry, Richmond, VA; * **Presenter**

Objective

- The Multidisciplinary Sleep Apnea Clinic (MDSC) at VCU started in 2018
- This MDSC represents a true multidisciplinary clinic where each patient is evaluated simultaneously on ENT, Sleep Medicine, OMFS and Dental Sleep.
- The objective of this presentation is to review the clinical results during the first 12 months of operation.

Methods

- IRB approval (IRB: HM20016349) was obtained by VCU Health
- We conducted a retrospective review of all patients evaluated between February 2018 and January 2019 in the MDSC.
- All patients presenting to the clinic had a diagnosis of OSA and history of CPAP failures.
- The primary endpoint was either 50% reduction in their AHI and achieving a level less than 20 or becoming CPAP compliant.

Figures/Tables

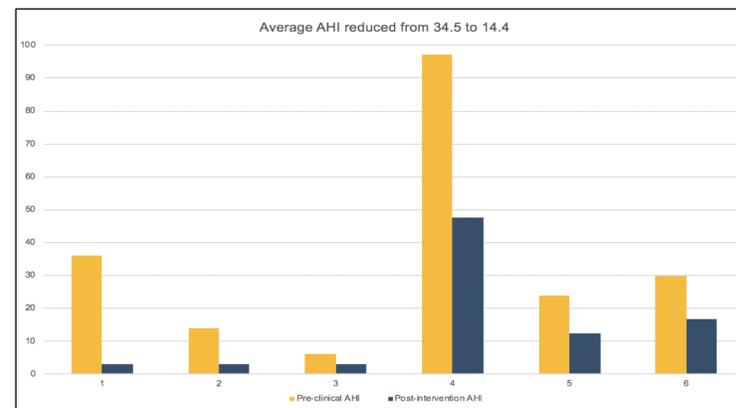


Figure 1: AHI results (Pre-clinical and Post-Interventional)

Patient	BMI	Sex	Previous Interventions	Pre-Intervention AHI	Post-Intervention AHI	Intervention Recommended	Outcome
1	29	F	- Dental Appliance - BiPAP	36	3.1	Inspire	HNS compliant
2	29.9	M	- CPAP	5.1		MAD	
3	26	F	- Dental Appliance - CPAP	9		MAD	
4	25	F	- CPAP - Septoplasty	13.9	3.1	MAD	OAT compliant
5	22.7	F	- CPAP	37.9		Inspire	
6	28.7	F	- CPAP	6.3	3.1	MAD	OAT compliant
7	29.3	M	- DISE - Sinus surgery	35		Hyoid suspension	
8	46	M	- CPAP	107.8		DISE Septoplasty ITR	BiPAP compliant
9	35	M	Unknown	Unknown		DISE Adenoidectomy ITR	CPAP compliant
10	34.2	M	- CPAP - UPPP	97	47.6	MMA Hyoid suspension	
11	51.6	M	- CPAP - UPPP	17		Hyoid suspension Tongue base suspension	
12	42	M	- UPPP	100.2		MMA Tonsillectomy Uvullectomy	
13	32.5	M	- Epiglottectomy - Lingual tonsillectomy - Uvullectomy	36	12.5	MAD	
14	37.1	M	- CPAP	85		CPAP	CPAP compliant
15	36.6	M	- UPPP - CPAP	19.2		DISE Septoplasty ITR MAD	Improved CPAP Tolerance

*OAT (oral appliance therapy). HNS (hypoglossal nerve stimulation). MAD (mandibular advancement device). DISE (drug induced sleep endoscopy)

Table 1: Patient demographics and outcomes

Results

- 19 patients were evaluated in MDSC between February 2018 and January 2019.
- All patients were CPAP non-compliant, 50% had prior sleep apnea surgery and 16% had previously used oral appliance therapy.
- Clinic recommendations included:
 - Oral appliance (50%)
 - Upper airway surgery/stimulation (50%)
 - Sleep endoscopy (32%)
 - CPAP modifications (11%)
 - Maxillo-mandibular advancement (11%)
- Out of the 19 patients, 5 (26%) either withdrew or were lost to follow-up. Of the remaining 14 patients, 7 achieved the primary endpoint of surgical success of CPAP compliance, 2 patients underwent an intervention with improvement but did not meet criteria for success and 5 patients are awaiting updated sleep studies to determine success and next steps. (Table 1)
- 6 patients had post-interventions sleep studies showing a reduction in AHI from 34.5 to 14.4 on average (Figure 1)

Conclusion

- The MDSC at VCU Health is one of only a handful of true multidisciplinary clinics in the United States.
- Although a significant number of patients were either lost to follow-up or are currently awaiting outcome data, available data shows this approach to be highly effective in those who are otherwise treatment failures.

Connect with VCU ENT Residency



Nima Vahidi, MD, Otolaryngology Resident
VCU Department of Otolaryngology – Head & Neck Surgery
1200 East Broad Street, West Hospital, Richmond, VA, 23298