


Identifying Signs and Symptoms of Obstructive Sleep Apnea in a Men's Health Clinic: The Utility of Home Sleep Apnea Testing During COVID-19

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Abstract

The objective of the study was to identify symptoms of men presenting for an outpatient urology visit that prompted referral for a Home Sleep Apnea Test (HSAT) to assess for obstructive sleep apnea (OSA) by a single provider. To assess the proportion of patients referred for the HSAT who underwent the test and, out of these patients, the proportion of men diagnosed with sleep apnea, we performed a retrospective chart review of men 18–99 years old seen by a single provider in the Department of Urology referred for an HSAT to evaluate for presenting symptoms. Patients with a prior diagnosis of OSA were excluded. Eighteen patients were identified (mean age at time of referral 51 + SD 13 years). Half of patients reported erectile dysfunction/concerns, 56% reported nocturia, 44% had been diagnosed with testosterone deficiency, and 39% reported low libido. Nearly all (89%) of patients snored, all reported fatigue, 56% were over the age of 50, 44% had a BMI >35, and 78% had hypertension. Twelve patients completed the HSAT, all of whom were diagnosed with OSA for which continuous positive airway pressure (CPAP) therapy was initiated. Men presenting with genitourinary concerns to an outpatient urology clinic may also have OSA. About half of included patients reported genitourinary concerns. Hundred percent of patients who completed their sleep study were diagnosed with OSA. Genitourinary concerns, in addition to signs and symptoms commonly associated with OSA, should prompt consideration of sleep apnea evaluation.

Keywords

behavioral issues, erectile dysfunction, hypertension, obesity, obstructive sleep apnea, physiological and endocrine disorders, sexuality

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Introduction

The relationship between obstructive sleep apnea (OSA) and genitourinary conditions has been increasingly identified in the literature. Conditions such as nocturia, erectile dysfunction (ED), testosterone deficiency, and male and female sexual dysfunction have been linked to OSA (Chung et al., 2016; Liu et al., 2015). Nocturia is 84.8% sensitive for OSA and is present in over 75% of OSA patients (Romero et al., 2010). Additionally, Kalejaiye et al. (2017) identified ED in 55% of patients with OSA. Traditionally, the STOP-Bang questionnaire has been used to screen for those at low, intermediate, or high risk

of having sleep apnea. This questionnaire asks if the patient snores loudly, often feels tired during the daytime, has been observed not breathing, choking, or gasping

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during sleep, if the person is being treated for high blood pressure, has a body mass index (BMI) >35 kg/m², is older than 50 years, has a neck size ≥ 40 cm, and whether patient is male (Chung et al., 2008). Despite the associations between ED, nocturia, low testosterone, and polycythemia with OSA, these symptoms are not represented in the widely used STOP-Bang screening tool.

In addition to the well-described associations between OSA and genitourinary symptoms, existing literature suggests that those treated for OSA notice improvement in these symptoms. For example, sildenafil and continuous positive airway pressure (CPAP) therapy each independently improve ED, but have a synergistic effect when used as combined therapy (Husnu et al., 2015; Li et al., 2019; Pascual et al., 2018; Perimenis et al., 2007). CPAP has been reported to increase quality of life, sexual satisfaction, nocturia symptoms, and other genitourinary metrics (İrer et al., 2018). Among patients who receive testosterone replacement therapy, higher levels of OSA have been identified as compared to patient cohorts who are not on this treatment (Cole et al., 2018; Payne et al., 2020). This further indicates that OSA may be increased in this study population, increasing the importance of provider ability to identify the signs and symptoms of OSA.

Many patients presenting for outpatient genitourinary evaluation are candidates for the HSAT, rather than the in-lab sleep study. To qualify for the HSAT at our institution, patients must meet the following qualifications: healthy adult over the age of 18; excessive daytime sleepiness; at least two of the following (snoring, hypertension, witnessed sleep apnea); and none of the following (opioid use or significant cardiopulmonary or neuromuscular disease, stroke, waking hypoventilation and/or risk for sleep-related hypoventilation, severe insomnia, and/or other primary sleep disorders) that might prevent a successful test. Once the referral is placed for the HSAT evaluation, the medical director reviews the order, an appointment is scheduled at the sleep clinic, the patient receives a portable device and instructions, and the device is taken home for the night and returned the next morning. A board-certified sleep medicine physician interprets the study, and the patient returns to the sleep clinic in 1–2 weeks to discuss results and recommendations. A positive HSAT results in a prescription for an auto-CPAP machine and a negative HSAT may require a subsequent in-lab sleep study. This is of particular interest in the COVID-19 pandemic. As hospitals limited inpatient stays, there was a sudden inability of individuals to undergo sleep apnea testing. Diagnosing and treating OSA is imperative for optimizing genitourinary function, as well as overall health. HSAT is a viable tool for diagnosis, requiring fewer resources compared to the in-lab study, particularly important during a pandemic.

This study aimed to identify symptoms of men presenting for an outpatient urology visit that prompted referral for the HSAT by a single provider. We also assessed a proportion of patients referred for the HSAT who ended up undergoing the test and, out of these patients, the proportion of men diagnosed with OSA. Our final aim was to evaluate, via retrospective review of the electronic medical record, if patients noted any improvement in their sleep and/or genitourinary condition(s) with OSA treatment.

Methods

Retrospective chart review was conducted at a Midwest tertiary medical center. All patients were seen by a single provider in the Department of Urology and appropriate candidates for the at-home study were referred. Male patients aged 18–99 were included. Patients were excluded if they had a prior diagnosis of sleep apnea. Patient age, gender, and BMI were collected. Presenting genitourinary symptoms (nocturia, low testosterone, low libido, erectile dysfunction) and other OSA symptoms (polycythemia, snoring, fatigue, hypertension) were also recorded. Finally, completion and results of the HSAT and changes in symptoms reported after CPAP initiation were noted. Categorical variables are reported as proportions and continuous variables as means with standard deviations. All analyses were descriptive; therefore no statistical tests were necessary. This study underwent IRB review and was deemed exempt. The requirement for informed consent was waived because by the IRB because of the retrospective nature of the study, and it was found to be unrealistic to contact all patients in the study.

Results

Eighteen patients were identified as having been referred for the HSAT by a single urologist between January 2019 and July 2020. Mean age at time of HSAT referral was $51 \pm$ SD 13 years. Nine patients (50%) reported erectile dysfunction/concerns, 11 (56%) reported nocturia, eight (44%) had been diagnosed with testosterone deficiency, and seven (39%) reported low libido (Table 1).

With respect to the STOP-Bang screening questions, 16 (89%) of patients snored, 18 (100%) reported fatigue, 10 (56%) were over the age of 50, eight (44%) had a BMI >35 kg/m², and 14 (78%) had hypertension. Only one patient (6%) reported anyone having observed him stop breathing, choking, or gasping during sleep. Twelve patients (67%) had hematocrit (Hct) levels available for review at time of office visit with the urology provider (mean Hct 45.3%; SD \pm 6.6%) with three (17%) of levels $>52\%$ (threshold for polycythemia).

Table 1. Proportions and Means of Demographic, Genitourinary, and Outcomes Measures.

Variable	N	Mean/%
Age (mean)	18	51 years
Nocturia	10	56%
Low testosterone	8	44%
Low libido	7	39%
Erectile dysfunction	9	50%
Hematocrit (mean)	12	45%
Snoring	16	89%
Fatigue	18	100%
Observed apnea	1	6%
Hypertension	14	78%
Body mass index >35	8	44%
Age >50 years old	10	56%
Male gender	18	100%
Underwent study	12	67%

Note: The N indicates number of patients out of 18 included in the table; % indicates the percentage of the N out of the total, or the mean value if indicated by the row title. Approximately half of patients presented with nocturia, low testosterone, or ED. Additionally, 100% of the patients reported being tired, while only 6% of patients had an observed apnea event.

Twelve patients (66%) completed the HSAT, all of whom were diagnosed with OSA for which CPAP therapy was initiated. Four of the 12 (33%) reported subsequent improvements in either their sleep and/or genitourinary concerns, six have not followed up since CPAP initiation, and two were unable to tolerate CPAP therapy and were offered referral to an otolaryngologist for discussion of hypoglossal nerve stimulation as an alternative therapy. Those who had not completed the HSAT at time of retrospective review were either not scheduled or were cancelled and not rescheduled due to SARS-COV-2 restrictions.

Discussion

OSA is commonly diagnosed in men presenting to the urologist with genitourinary concerns. Our data suggest that purely using STOP-Bang may not adequately capture all patients and considering widely prevalent conditions such as nocturia, ED, testosterone level, and polycythemia may be necessary when working with patients seeking care for genitourinary conditions. Moreover, we found that 100% of patients referred for and who underwent HSAT were diagnosed with OSA and were able to begin treatment. Based on available information in the electronic charts, when assessing for OSA risk based on STOP-Bang criteria, one (5.6%), 13 (72.2%), and four (22.2%) were low, moderate, and high risk, respectively. Neck circumference was not regularly measured or mentioned in the patient notes, and not all STOP-Bang

criteria were documented for every patient, so our data likely underestimate the degree of OSA risk based on this questionnaire.

A novel aspect of this work is the focus on at-home sleep studies. Published work has focused on in-lab sleep evaluations or have not differentiated between the two (Arslan et al., 2019). Increasing awareness of at-home sleep studies may aid in willingness from patients to proceed with further evaluation who would, otherwise, not be interested in completing the in-lab study. Additionally, by limiting patients undergoing in-lab studies, the HSAT device is particularly useful during pandemics like the current SARS-COV-2 when resources are and patient-provider interactions are limited.

Our study suggests that urologists have a unique opportunity to emphasize the associations between the presenting and bothersome genitourinary concerns and possibly undiagnosed and untreated OSA. STOP-Bang criteria and other commonly presenting genitourinary conditions indicative of sleep apnea can help urologists identify those at increased risk for OSA so they may make appropriate referrals for the at-home versus in-lab sleep studies based on patient comorbidities. Traditionally, referral for OSA evaluation has been a role conducted by the primary care provider (PCP), but due to the clear overlap of OSA symptoms and common genitourinary conditions, it is reasonable for the urologist to make these referrals. Those interested in doing so should first reach out to local sleep specialists to inquire as to whether the HSAT is available, and if so, to understand qualifications for the at-home versus in-lab sleep studies as these may differ based on available technology and insurance payors. It is important for the urologist to understand the workflow involved to get patients scheduled for OSA evaluation and appropriately followed up to review the results and initiate treatment when necessary, so that the urologist is not responsible for prescribing sleep apnea therapy.

CPAP therapy has been reported to improve nocturia symptoms, and, in one study, the prevalence of clinically relevant nocturia (≥ 2 voids per night) dropped from 73.0% to 51.5% following at least 1 year of CPAP therapy (Margel et al., 2006; Vrooman et al., 2020). CPAP, alone, results in improved international prostate symptom score, overactive bladder symptoms score, and overall quality of life, also noting that the severity of genitourinary conditions was associated with severity of OSA (İrer et al., 2018). Genitourinary conditions are overrepresented in urology and symptoms can be improved by starting CPAP therapy. Thus, it is vital the health-care workers have OSA in their diagnostic considerations when applicable.

In order for the urologist to provide comprehensive and effective care to patients, one must understand that

multimodal treatment has been identified to be more effective than treating the sleep apnea or genitourinary concern alone. For example, when CPAP was paired with a phosphodiesterase type 5 inhibitor, there was a significant increase in the international index of erectile function score, successful attempted intercourse rate, and total number of erectile events (İrer et al., 2018). These results are supported by a systematic review by Campos-Juanatey et al. (2017), which reported that, in the OSA population, phosphodiesterase type 5 inhibitors were effective in treating ED and that surgical treatment of OSA improved erectile function and sexual satisfaction. With the proven benefits of multimodal therapy, and with CPAP alone, it is a disservice to patients with urologic conditions for healthcare providers to not consider the possibility of OSA.

The traditional tool utilized by healthcare professionals to identify patients at risk for sleep apnea is the STOP-Bang questionnaire, which assesses snoring, feeling tired, observed apnea, high blood pressure, elevated BMI, older age, increased neck circumference, and gender. This questionnaire, while helpful, can be problematic in screening for those at risk for OSA due to several reasons. First, if the patient sleeps by himself and/or does not have a partner, he may not know if he snores loudly or stops breathing, chokes, and/or gasps while sleeping. It can be difficult to implement in a busy clinic setting when patients do not know their neck size, which would warrant the clinic staff have access to a measuring tape to measure the person's neck circumference. Gruss et al. (2016) proposed a virtual neck circumference as a screening tool before conducting the STOP-Bang questionnaire, but this technology is not uniformly available. The questionnaire also asks if the patient is being treated for hypertension, though this assumes that the patient is followed by a PCP who would have made that diagnosis and does not account for those patients not regularly followed by a PCP. Although age >50 increases the risk of OSA in the general population, nocturia is associated with OSA 41.1% of the time in those younger than 50 (Moriyama et al., 2008).

Due to the high prevalence of genitourinary symptoms in those diagnosed with OSA, we believe these conditions should prompt further sleep apnea evaluation. It should also be noted that some patients were not able to tolerate CPAP therapy. These patients should be encouraged to discuss alternative masks from a durable medical equipment supplier or directed to a specialist to discuss role for oral appliance and/or hypoglossal nerve stimulation (HGNS; Maresch, 2018). A 2012 study by Tegelberg et al. identified that among 134 patients, the use of oral appliance decreased nocturia symptoms. Additionally, the use of oral appliance has been reported to improve ED symptoms (Zhang et al., 2014, 2016). It

is not known whether genitourinary symptoms improve following treatment of OSA with HGNS.

Our study is not without limitations. Our study was retrospective, and we assessed improvement in genitourinary concerns with open-ended questions to our patients rather than with pre- and post-intervention (initiative of CPAP) validated questionnaires. Our study is also limited to the experience of one provider. It could be argued that the physician may be individually good at identifying patients at high risk for OSA. The decision to proceed with the HSAT was based on shared decision-making between the urologist and patients, and patients unwilling to undergo further sleep apnea evaluation were not referred for the study. The efficacy and improvements to overall health is well documented in the literature. This work aims to educate providers that HSAT is a helpful tool within the urologist's armamentarium in the diagnosis of OSA associated with common genitourinary conditions.

Conclusion

Men presenting with genitourinary concerns to an outpatient urology clinic may have OSA. Half of our patients referred for at-home sleep studies reported nocturia, low libido, ED, and/or were diagnosed with testosterone deficiency. Twelve of the 18 patients completed the sleep apnea evaluation, of whom 100% were diagnosed with OSA. Signs and symptoms commonly associated with OSA (STOP-Bang criteria), in addition to those commonly reported by men presenting to a urology clinic, should be considered when deciding on need for sleep apnea evaluation. HSAT is a viable option to diagnose OSA, particularly during the SAR-COV-2 pandemic, decreasing individual exposure and overall density of individuals being seen at the hospital.

Institution

The University of Iowa Carver College of Medicine.

Author's note

All authors have seen and approved the manuscript.

Declaration of Conflicting Interests

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