Exploring the Connection Between Obstructive Sleep Apnea and Subarachnoid Hemorrhage: A Case Study

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Abstract

A middle-aged female with a medical history of obstructive sleep apnea (OSA), subarachnoid hemorrhage (SAH), and gestational diabetes presented to the clinic requesting an updated sleep study and Continuous Positive Airway Pressure (CPAP) therapy. She also expressed concerns about persistent symptoms of "neuro-fatigue" and weight gain. Her previous sleep study indicated an apnea-hypopnea index (AHI) score of 10 events per hour.

This case was managed in an outpatient family medicine setting, which posed some treatment challenges in the context and scope of a family medicine clinic. The patient was referred to a CPAP titration clinic, and laboratory tests were ordered to check for prediabetes. Additionally, referrals to a neurologist and for a magnetic resonance imaging (MRI) scan were recommended.

This case highlights the potential connection between obstructive sleep apnea and subarachnoid hemorrhage, underscoring the need for physicians to consider these conditions' possible relationship when treating patients.

1. Introduction

There is relevant literature discussing the relationship between OSA and SAH. One major topic discusses the incidence of SAH in patients with sleep disorders being 8.3 per 100,000 per year. However, this incidence is significantly higher in patients with a history of OSA, at 14.5 per 100,000 per year [4].

In this case study, we examine a patient with a history of both obstructive sleep apnea (OSA) and subarachnoid hemorrhage (SAH), conditions traditionally considered unrelated in existing literature. This report aims to explore the potential link between these two medical diagnoses.

Subarachnoid hemorrhage often described in literature the sudden onset of the worst headache of a patient's life, typically resulting from head trauma, a brain aneurysm (such as a berry aneurysm), or a bleeding disorder. In the United States, the annual prevalence of SAH is approximately 14 per 100,000 individuals [1]. Immediate diagnosis usually involves a computed tomography scan, while a lumbar puncture showing yellow fluid or MRI is indicative of SAH that occurred in the preceding weeks.

Treatment often requires surgical intervention to place a clamp on the affected blood vessel. Obstructive sleep apnea is characterized by the blockage of airflow through the upper airways during sleep, often due to enlarged tonsils, the anatomical shape of the oral cavity, or increased neck circumference commonly seen in obese patients. OSA prevalence is higher in men under 50 but equalizes between genders after age 50 [2]. Symptoms include daytime sleepiness, mood changes, depression, and insomnia. Diagnosis is confirmed through a polysomnogram, which provides an apnea-hypopnea index score [3].

Treatments include CPAP therapy, weight loss, and surgery.

By examining this patient's case, we discuss the possible connection between obstructive sleep apnea and subarachnoid hemorrhage, emphasizing the importance for physicians to consider these conditions' potential connections when managing patients.

As with many medical conditions, it is vital to consider underlying risk factors associated with a condition's development. A case control study by Geer et al. discusses its results as to whether OSA influences cranial hemorrhage due to underlying complications such as hypertension and heart disease, or if OSA is independently a risk factor [5].

2. Case Report

A middle-aged female patient with a history of obstructive sleep apnea presented requesting an updated sleep study and a CPAP machine. She was previously diagnosed with OSA and had an apnea-hypopnea index of 10 events per hour. Her past medical history includes a spontaneous subarachnoid hemorrhage in 2021, which occurred while exercising. According to the patient's report, her previous neurologist could not determine the cause of the hemorrhage based on her initial MRI, and she has no history of clotting disorders.

Since the SAH, she has experienced persistent symptoms including brain fog, neuro-fatigue, facial drooping, speech issues, and general body weakness. She has not seen a neurologist or undergone a repeat MRI since the incident. Additionally, she reported fatigue and weight gain and is concerned about developing diabetes due to her history of gestational diabetes during her second pregnancy and recent weight gain of 20 pounds.

Physical examination was unremarkable except for her fatigued appearance and slow speech. Vital signs were within normal limits except for her blood pressure, which was elevated at 130/83 mmHg. Patient had BMI of 34. The treatment plan for this patient includes the following:

1. Obstructive Sleep Apnea: The patient was previously diagnosed with OSA, with an AHI of 10 events per hour. To better manage her symptoms, she was referred to a CPAP titration clinic.
2. Non-Traumatic Subarachnoid Hemorrhage (SAH): The patient experienced a spontaneous SAH in 2021, despite having no history of clotting disorders. Given her persistent symptoms of "neuro-fatigue," she was referred to a neurologist for further evaluation and a repeat MRI. A referral to a brain rehabilitation clinic was also considered.
3. Prediabetes: The patient had a history of gestational diabetes and is experiencing fatigue and weight gain, raising concerns about reoccurrence of prediabetes. Preventative measures included ordering the following labs: CBC, CMP, A1c, vitamin D, and lipid panel. Follow-up with the patient was recommended. At the moment, the lab values are unattainable.

3. Discussion

As physicians, it is crucial to understand the Apnea-Hypopnea Index (AHI) ranges and their clinical implications. Table 1 illustrates these ranges:

- Less than 5 AHI events per hour is considered normal.
- 5-15 events per hour is classified as mild OSA.
- 15-30 events per hour is considered moderate OSA.
- Over 30 events per hour is classified as severe OSA.

Table 1: *Apnea Hypopnea Index*

Apnea Severity	Apnea-Hypopnea Index (AHI)
Normal	<5
Mild	5 ≤AHI <15
Moderate	15 ≤AHI <30
Severe	≥30

Recent research has explored the relationship between obstructive sleep apnea and subarachnoid hemorrhage. According to a study by Sebastian Zaremba, the incidence of SAH in patients with sleep disorders is 8.3 per 100,000 per year. However, this incidence is significantly higher in patients with a history of OSA, at 14.5 per 100,000 per year, compared to other sleep disorders [4]. The study suggests that screening for sleep apnea should be considered in patients with intracranial aneurysms, as OSA may be an unrecognized risk factor for SAH.

OSA is associated with several risk factors, including obesity, increased neck circumference, and alcohol consumption, among others. Similarly, the development of subarachnoid hemorrhage can be influenced by medical conditions like hypertension and smoking. Notably, some risk factors, like smoking, contribute to both OSA and SAH, suggesting a potential correlation between these conditions. It is crucial to assess each patient's individual risk profile, particularly in cases where multiple risk factors overlap to assess one's likelihood of developing these conditions and if there is potential correlation between the conditions, with the risk factors being a common denominator.

However, a case-control study by Geer et al. found that OSA itself is a risk factor for both intracranial hemorrhage and ischemic strokes, independent of other factors like hypertension [5]. This suggests that OSA may contribute to cerebrovascular disease through mechanisms beyond traditional risk factors. Possible explanations include intermittent hypoxia and the resulting oxidative stress, endothelial dysfunction, and systemic inflammation, all of which can increase the likelihood of vascular injury and thrombosis. These findings highlight the importance of recognizing OSA as more than just a respiratory condition, but rather a systemic disease with significant neurological and cardiovascular implications.

These findings highlight the importance of comprehensive patient care, considering the potential interconnections between different medical conditions. As practicing physicians, it is essential to adopt a holistic approach when diagnosing and treating patients, keeping in mind the broader spectrum of possible health issues.

4. Conclusion

While subarachnoid hemorrhage and obstructive sleep apnea may seem like unrelated medical conditions, it is crucial for physicians to recognize the potential connection between them (either correlation or causation) because of the clinical implications. Understanding how OSA can influence the risk of subarachnoid hemorrhage and other cerebrovascular events underscores the importance of comprehensive patient assessment. By considering the connections between these conditions, healthcare providers can better manage and mitigate the risks, ultimately improving patient outcomes. It is also equally important to recognize that obstructive sleep apnea may be an independent risk factor for the development of intracranial hemorrhage.
Considering how serious the consequences of intracranial hemorrhages are, further studies may be warranted to analyze the role of OSA and its connection with intracranial hemorrhage**.**

Abbreviations

OSA: Obstructive Sleep Apnea
SAH: Subarachnoid Hemorrhage
CPAP: Continuous Positive Airway Pressure
AHI: Apnea Hypopnea Index
MRI: Magnetic Resonance Imaging

Declarations

Ethics approval and consent to participate

Not Applicable

Consent for publication

Informed consent for this case report could not be obtained as the patient was lost to follow-up, and all efforts to re-establish contact were unsuccessful. Details have been removed to ensure anonymity. The editors and reviewers have seen the complete information available and are satisfied that the arguments contained herein are valid and well supported.

Data Availability:

Not Applicable

Conflicts of Interest

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