

CASE REPORT

Overzealous Compliance with CPAP in Obstructive Sleep Apnea

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ABSTRACT

A young male doctor presented with complaints of excessive daytime sleepiness and loud snoring, which had even led to a near-fatal driving accident. A level I polysomnography was done, which showed severe obstructive sleep apnea (OSA) hypopnea syndrome, and the patient was advised continuous positive airway pressure (CPAP) therapy. On follow-up, the patient's compliance with his positive airway pressure (PAP) therapy was nearly 12 hours per day, including during the daytime in the awake state. A detailed evaluation of the patient helped in gaining insight into the etiology of the same.

Keywords: Case report, Continuous positive airway pressure, Compliance, Obstructive sleep apnea.

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INTRODUCTION

Obstructive sleep apnea (OSA) is a disorder characterized by apnea, desaturation, and disturbed sleep, due to repeated episodes of upper airway collapse causing. Continuous positive airway pressure (CPAP) therapy provides pressure that splints the airway open and prevents its collapse. Compliance with CPAP has been shown to significantly improve the symptoms of OSA. Co-relation of cardiovascular comorbidities like hypertension and heart failure (HF) with OSA has been proven beyond doubt in the literature. Symptoms of HF may mimic those of OSA – disturbed sleep due to orthopnea and paroxysmal nocturnal dyspnea, nocturia and daytime tiredness. Continuous positive airway pressure has been used as an effective therapy in acute settings of HF. Even in the long term, patients with HF may benefit from CPAP due to a reduction in RV preload and an increasing in RV afterload, thus reducing pulmonary edema and improving the symptoms of HF.

CASE DESCRIPTION

A 35-year-old general physician presented with the complaints of fatigue, insomnia at night with daytime sleepiness and loud snoring. The patient said that he was only able to sleep for around three hours at night and required frequent intermittent naps throughout the day, even during active work. The family of the patient complained of loud snoring, which was persistent and even heard in the next room. All these complaints has been present for the last nine months. The patient also had a history of a near-fatal accident while driving a motor vehicle on the road due to falling asleep while driving. He had gained 20 kg of weight during the COVID-19 lockdown. He was a newly diagnosed case of hypertension, for which he was on three antihypertensive drugs and diabetes, with a HbA1c of 13%, and his sugars remained uncontrolled despite three oral hypoglycemic agents. He had an echocardiogram done, reported being normal from a peripheral center. On evaluation, the patient was obese with a body mass index of more than 30, and his STOP BANG score was 6 out of 8 (high risk of OSA). His Epworth sleepiness score (ESS) was 19 out of 24 (ESS

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of 16 or greater is associated with severe daytime sleepiness). On oral examination, even with a complete mouth opening, even his soft palate was not visible (Mallampati class IV).

He was subjected to a level I polysomnography (Fig. 1), which revealed an apnea hypopnea index (AHI) of 66. On the titration study, at 12 cm H₂O CPAP pressure, all his obstructive apneas were corrected, and AHI was reduced to 3.5 in REM sleep. He started on CPAP therapy with a nasal mask. On regular follow-up, the patient was compliant with his CPAP therapy, and his symptoms improved significantly. He felt less fatigued and more energetic during the daytime. His hypertension and diabetes control also improved.

However, the review of his compliance data documentation showed usage of 12 hours or more (Fig. 2). On enquiry, he revealed that he used it during the daytime also. This was not for daytime naps, but in the awake state during his work schedule, apart from nocturnal usage during sleep. The patient said that his daytime

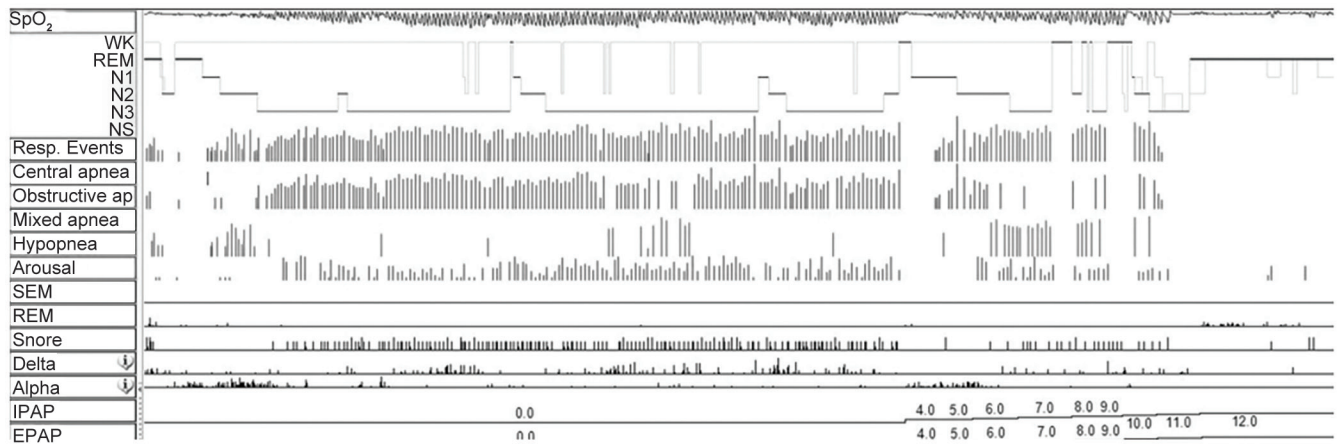


Fig. 1: Hypnogram showing severe OSA corrected by CPAP

EPAP, expiratory PAP; IPAP, inspiratory positive airway pressure; REM, rapid-eye movements; Resp, respiratory; SEM, slow-eye movements; SpO₂, saturation of oxygen

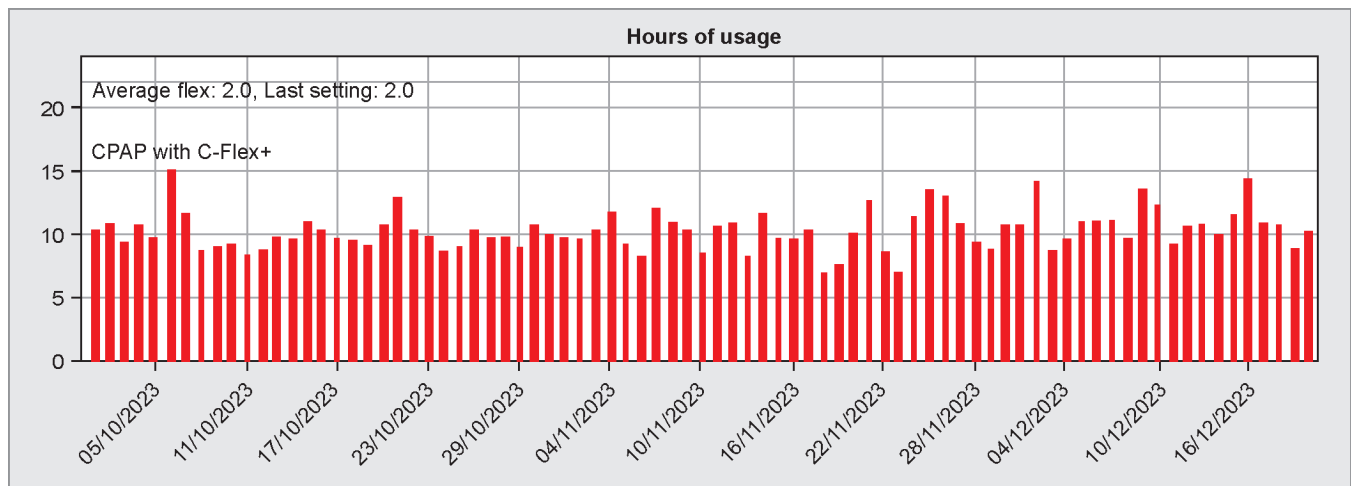


Fig. 2: Compliance data of >10 hours per day of CPAP

fatigue, alertness and exertional dyspnea are controlled if he intermittently uses CPAP during office hours also.

An echocardiogram was repeated in our hospital, which revealed all four cardiac chambers were dilated, left ventricular ejection fraction was 55% and there was grade II diastolic dysfunction. His NT Pro BNP was 3000 pg/mL. This was suggestive of HF with preserved ejection fraction. A cardiologist's opinion was taken, and he was started on diuretic therapy. After one month of therapy, the patient was reviewed again. His CPAP use during the daytime had reduced, and he felt better even off the CPAP during working hours. He continued to use overnight CPAP and was on medical management for his HF.

DISCUSSION

Obstructive sleep apnea is a common yet underdiagnosed disorder, where in patient's present with complaints of inadequate/poor quality sleep, snoring and excessive daytime sleepiness. This can be a fatal condition wherein, because of inadequate night sleep, patients tend to fall asleep during the day, which can lead to road traffic accidents and poor work performance.¹

Continuous positive airway pressure therapy is the mainstay of treatment for moderate to severe OSA. Positive airway pressure (PAP) devices keep the upper airway patent by increasing the upper airway pressure above the 'critical' pressure by functioning as a pneumatic splint. Positive airway pressure therapy is indicated for all symptomatic patients, and in all cases if the AHI is between 5 and 15, PAP is indicated in the presence of symptoms, (i.e., excessive daytime sleepiness, impaired cognition, morning headaches) or in the presence of comorbidities like diabetes, hypertension, previous cerebrovascular accidents or coronary artery disease. The effectiveness of CPAP in treating OSA depends on the compliance with the therapy.²

Obstructive sleep apnea worsens of cardiovascular morbidity and mortality, which is proven beyond doubt. Heart failure is a common comorbidity associated with OSA.^{3,4} Obstructive sleep apnea and HF may function in symbiosis to exacerbate one another, with the sodium and fluid retention of HF leading to upper airway edema and OSA, and OSA causing sympathetic stimulation and leading to progression of HF.⁵ Daytime symptoms like unrefreshed sleep, easy fatigability, and sometimes excessive daytime time sleepiness may be seen in patients with HF, even in the absence of OSA.⁶

Continuous positive airway pressure use in HF has been shown to improve symptoms and reduce hospital visits.⁷ The 2022 American Heart Association guidelines recommend that, in patients with HF and OSA, CPAP may help to improve sleep quality and decrease daytime sleepiness.⁸ Positive airway pressure therapy reduces the systemic venous return and RV preload by increasing intrathoracic pressure.^{9,10} It also causes recruitment of the alveoli and prevents the alveoli from collapsing at the end of expiration, leading to improved gas exchange and oxygenation, thus reducing the hydrostatic forces that cause pulmonary edema, and maintaining airway patency.⁹ Continuous positive airway pressure has been recommended and used for acute HF in hospital settings. However, there are no guidelines or studies suggesting its use for home management.

Continuous positive airway pressure therapy is an effective treatment for both HF and OSA. Since these two conditions can co-exist, CPAP can act as a single effective treatment modality and improve patient symptoms and quality of life. Various studies have shown significant improvement in symptoms of HF and have also shown mortality benefits in patients with HF and OSA, with the use of CPAP.^{11,12}

As per the Medicare guidelines, CPAP compliance is defined as CPAP use for at least four hours a night for 70% of nights in a month.¹³ Compliant patients have significant improvement in their symptoms, better focus at work and improvement in quality of sleep at night.

There are no studies or no data stating overuse of CPAP and its benefits in OSA. In our case, the patient had an element of HF which remained undiagnosed earlier. When the patient started using CPAP, the reduction in preload and the improvement in after load lead to reduction of free fluid in the lungs and improvement in his symptoms. This made the patient continue to use CPAP even during the daytime to reduce his symptoms.

CONCLUSION

Continuous positive airway pressure is an effective treatment modality for both OSA and HF. Patients with HF are at a higher risk of developing OSA, and vice versa. Use of CPAP may mask the symptoms due to heart failure in patients with OSA. Bidirectional screening is essential for proper symptom control and effective therapy for both these conditions.

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REFERENCES

- Goyal M, Johnson J. Obstructive sleep apnea diagnosis and management. *Mo Med* 2017;114(2):120–124. PMID: 30228558.
- Epstein LJ, Kristo D, Strollo PJ, et al. Clinical guideline for the evaluation, management and long-term care of obstructive sleep apnea in adults. *J Clin Sleep Med* 2009;5(3):263–276. PMID: 19960649.
- Javaheri S, Barbe F, Campos-Rodriguez F, et al. Sleep apnea: Types, mechanisms, and clinical cardiovascular consequences. *J Am Coll Cardiol* 2017;69(7):841–858. DOI: 10.1016/j.jacc.2016.11.069.
- Bradley TD, Floras JS. Obstructive sleep apnoea and its cardiovascular consequences. *Lancet* 2009;373(9657):82–93. DOI: 10.1016/S0140-6736(08)61622-0.
- Lévy P, Naughton MT, Tamisier R, et al. Sleep apnoea and heart failure. *Eur Respir J* 2022;59(5):2101640. DOI: 10.1183/13993003.01640-2021.
- Arzt M, Young T, Finn L, et al. Sleepiness and sleep in patients with both systolic heart failure and obstructive sleep apnea. *Arch Intern Med* 2006;166(16):1716–1722. DOI: 10.1001/archinte.166.16.1716.
- Cistulli PA, Malhotra A, Cole KV, et al. Positive airway pressure therapy adherence and health care resource use in patients with obstructive sleep apnea and heart failure with preserved ejection fraction. *J Am Heart Assoc* 2023;12(14):e028733. DOI: 10.1161/JAHA.122.028733.
- Writing Committee Members, ACC/AHA Joint Committee Members. 2022 AHA/ACC/HFSA guideline for the management of heart failure. *J Card Fail* 2022;28(5):e1–e167. DOI: 10.1016/j.cardfail.2022.02.010.
- Kato T, Suda S, Kasai T. Positive airway pressure therapy for heart failure. *World J Cardiol* 2014;6(11):1175–1191. DOI: 10.4330/wjc.v6.i11.1175.
- Guarracino F, Ambrosino N. Non invasive ventilation in cardio-surgical patients. *Minerva Anestesiol* 2011;77(7):734–741. PMID: 21709660.
- Mansfield DR, Gollogly NC, Kaye DM, et al. Controlled trial of continuous positive airway pressure in obstructive sleep apnea and heart failure. *Am J Respir Crit Care Med* 2004;169(3):361–366. DOI: 10.1164/rccm.200306-752OC.
- Kasai T, Narui K, Dohi T, et al. Prognosis of patients with heart failure and obstructive sleep apnea treated with continuous positive airway pressure. *Chest* 2008;133(3):690–696. DOI: 10.1378/chest.07-1901.
- Michigan Medicine. Medicare and CPAP Compliance. University of Michigan Health. Available from: <https://www.uofmhealth.org/conditions-treatments/brain-neurological-conditions/medicare-and-cpap-compliance>.