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A false alarm of narcolepsy: obstructive sleep apnea masquerading as narcolepsy and depression

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Abstract

Purpose We report a case with symptoms and signs of obstructive sleep apnea (OSA), depression, and narcolepsy. Polysomnographic (PSG) and multiple sleep latency test (MSLT) findings, clinical characteristics, and diagnostic challenges in this case are discussed.

Methods A 23-year-old single male presented with excessive daytime sleepiness, low mood, lack of energy, and snoring for 3 years. In addition, he reported excessive weight gain, lack of interest in work, partial loss of muscle tone during excitations, and sleep attacks during work and driving. He had experienced three episodes of sleep paralysis. The patient underwent a sleep study including PSG and MSLT.

Results On baseline PSG, he had an apnea/hypopnea index (AHI) of 72.8/h. The MSLT showed a mean sleep latency of 3.8 min and two sleep-onset rapid eye movement periods (SOREMPs). On admission, he had an Epworth Sleepiness Scale (ESS) score of 21, and positive findings for depression in the clinical interview and psychometric scales. He was treated with continuous positive airway pressure without any medication. Follow-up PSG and MSLT were performed after 1 week, which showed an AHI of 0/h without SOREMPs. After 1 month, there was no sign of depression.

Conclusions This study reflects that OSA can present with cataplexy-like features and false positive MSLT results for narcolepsy, as well as depressive symptoms. The case highlights the complexity in which OSA can present to physicians, and emphasizes that clinicians should be aware that OSA can mimic narcolepsy and present with depressive symptoms.

Keywords Obstructive sleep apnea · Narcolepsy · Depression

Introduction

Obstructive sleep apnea (OSA) is a disease which is characterized by nocturnal symptoms of snoring, sleep apnea, headache after waking up, and diurnal symptoms of excessive sleepiness and a decrease in cognitive performance with a prevalence of 9–38% at an apnea-hypopnea index (AHI) ≥ 5 events/h [1]. Excessive daytime sleepiness, nocturnal sleep disruption, fatigue, poor concentration, and weight gain are common symptoms of OSA, narcolepsy, and depression. In comorbid cases, these symptoms overlap with OSA and depression, which may lead to the underdiagnoses of OSA [2]. On the other hand, the narcolepsy which has a prevalence of 0.03–0.16% may be overlooked in some cases with OSA [3]. The current study presents a case of OSA which mimicked narcolepsy and presented with depressive symptoms in initial evaluations and was treated with continuous positive airway pressure (CPAP) therapy alone without any medication.

Report of case

The patient was 23-year-old single male presented with excessive daytime sleepiness, low mood, constant fatigue, and persistent snoring for 3 years. He had also experienced excessive weight gain, falling behind peers, lack of interest in work, partial loss of muscle tone during excitations, and sleep attacks during work time and once during driving. The frequency of muscle weakness was 2–3 times per year triggered by

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anger, laughter by jokes and while watching scary movies which lasts for 5–8 min mostly involving knee joints. During episodes, the patient was unable to move his limbs in sitting position and needed squatting while standing. He had experienced three episodes of sleep paralysis and frequent episodes of unable to fall asleep after waking up at night and restlessness. For diagnosis and treatment, he visited our department on August 29, 2017.

On that day, the patient was voluntarily hospitalized, and working diagnosis of OSA was given keeping narcolepsy and depression as differential diagnoses for further evaluation. He had severe snoring at night and an Epworth Sleepiness Scale (ESS) score of 21 and a Pittsburgh Sleep Quality Index (PSQI) score of 4. He had low mood and a score of 18 on Hamilton Depression Rating Scale with 17 items (HAMD-17), a score of 9 on Hamilton Anxiety Rating Scale with 14 items (HAMA-14), as well as positive finding in major depressive disorder section of the MINI-International Neuropsychiatric Interview (MINI). His habitual nocturnal sleep schedule was from 23:00 to 07:00. On physical examination, vitals were within normal limits; height, weight, and body mass index were 178 cm, 100 kg, and 31.6 kg/m^2, respectively. Oropharyngeal examination allowed visualization of uvula but not the tonsils. Tonsils were not enlarged and hidden within the pillars. The Friedman tongue score was IIb. He had elevated aspartate aminotransferase—114 U/L, alanine aminotransferase—238 U/L, and uric acid—642 μmol/L, but other routine biochemical and electrocardiogram examinations found no other abnormalities. Ultrasound of the abdomen shows enlarged, fatty liver and right renal stone. The patient refused to undergo lumbar puncture sampling of cerebrospinal fluid to investigate hypocretin level.

A baseline polysomnography (PSG) study was done on August 31 followed by Multiple Sleep Latency Tests (MSLT). Reports of PSG and MSLT data of baseline are shown in Table 1. Graphical summaries of PSG done at different time intervals are delineated in (Fig. 1) polysomnographic summary of baseline, titration, and follow-up. On baseline PSG, he had AHI of 72.8/h throughout the night and periodic limb movement index (PLMI) of 44.6/h. The MSLT on the next day with five naps showed a mean sleep latency of 3.8 min and two sleep-onset rapid eye movement periods (SOREMPs). During CPAP titration, there was an increase in stage R sleep from 5.6 to 25.5% and a decrease in REM latency from 84 to 61.5%. The residual apnea with AHI of 14.4/h during CPAP titration disappeared at 13 cmH_2O pressure with fixed CPAP.

He was kept under observation for a week with CPAP device without any medication, and follow-up PSG and MSLT were performed. These results, compared with the baseline data, are shown in Table 1 and Fig. 1. After 1 week of therapy with CPAP device, his daytime symptoms like fatigue and lack of energy were markedly reduced; nocturnal symptoms disappeared completely. In addition, there were no SOREMPs on repeat MSLT at 1-week follow-up assessment.

Table 1 Sleep parameters and questionnaire scores of baseline, titration, and follow-up

	Baseline	Titration	Follow-up
PSG	2017/8/31	2017/9/1	2017/9/7
Total recording time (min)	578.4	602.0	560.7
Total sleep time (min)	487.0	438.5	476.5
Sleep efficiency (%)	84.2	72.8	84.9
Sleep latency (min)	16.5	13.0	30.5
REM latency (min)	84.0	61.5	286.5
Wake after sleep onset (min)	75.0	150.5	54.0
Arousal index (events/h)	56.4	34.3	5.7
Apnea/hypopnea index (events/h)	72.8	14.4	0
Minimum oxygen saturation (%)	51	60	91
Periodic Leg Movements index	44.6	17.8	4.8
Stage N1 sleep (%)	3.7	0	0.7
Stage N2 sleep (%)	60.8	65.1	55.7
Stage N3 sleep (%)	29.9	9.4	36.3
Stage R sleep (%)	5.6	25.5	7.2
MSLT	2017/9/1		2017/9/8
Mean sleep latency (min)	3.8		13.5
Sleep onset REM periods	2		0
Questionnaires	2017/9/2		2017/9/30
PSQI	4		1
ESS	21		3
HAMD	18		5
HAMA	9		6

PSG, polysomnography; *MSLT*, multiple sleep latency test; *PSQI*, Pittsburgh Sleep Quality Index; *ESS*, Epworth Sleepiness Scale; *HAMD*, Hamilton Depression Rating Scale; *HAMA*, Hamilton Anxiety Rating Scale

He was discharged from the hospital on September 9, 2017, and was followed up with only the CPAP device treatment. The results of follow-up scales done in the outpatient department on September 30, 2017, are shown in Table 1. After 1-month CPAP therapy, his depressive symptoms were significantly relieved.

Discussion

The patient described in this case report had several overlapping symptoms of OSA, narcolepsy, and depression. Excessive daytime sleepiness, nocturnal sleep disruption, fatigue, loss of energy, poor concentration, and weight gain can be seen in OSA, depression, narcolepsy, or comorbidity of any two [3–5].

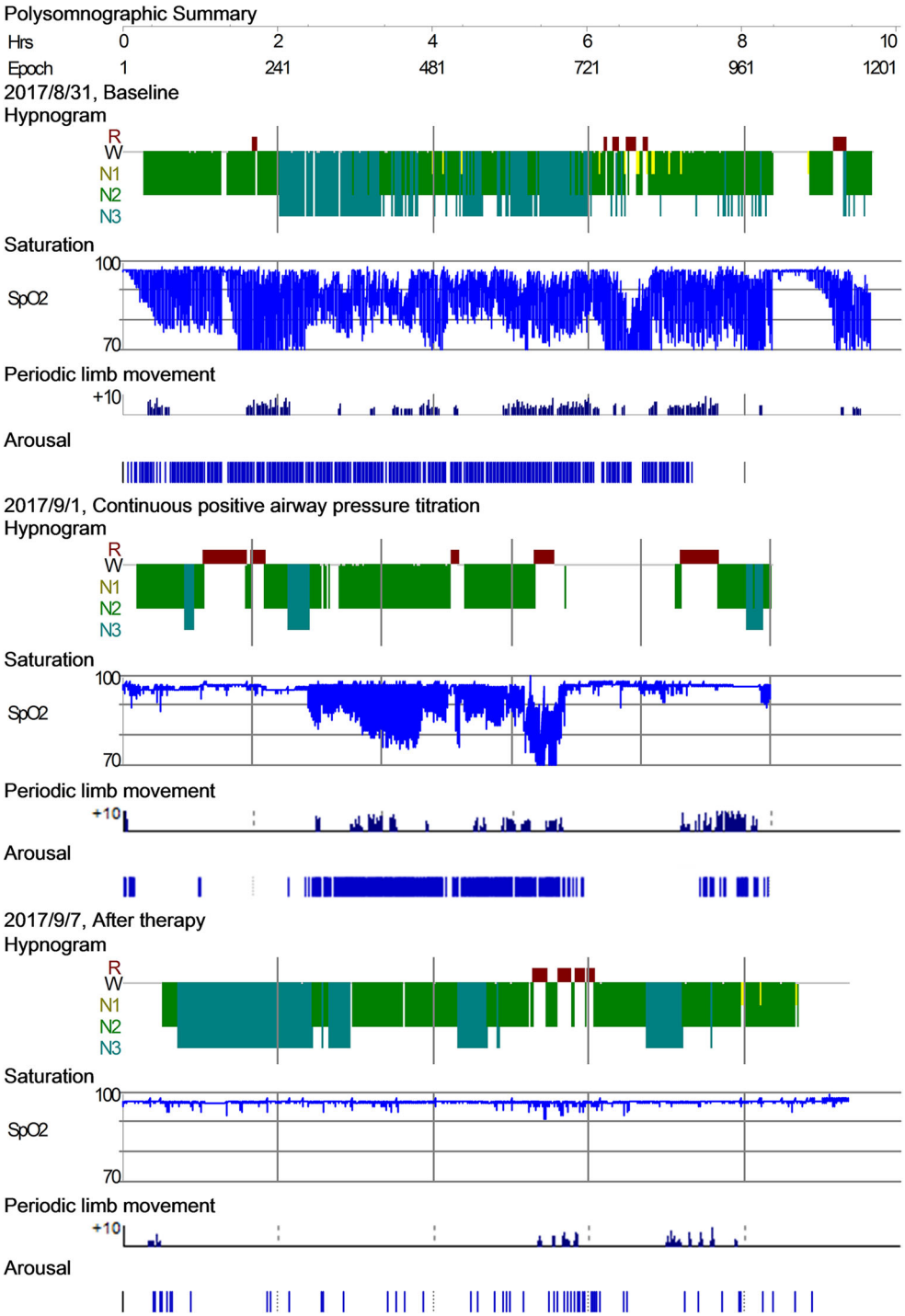

Fig. 1 Polysomnographic summary of baseline, titration, and follow-up

For further strengthening the diagnosis of OSA, he had persistent nocturnal snoring, constant fatigue, obesity (BMI 31), AHI of 72.8/h on baseline PSG [6], and elevated liver enzymes. However, the age of 23, partial loss of muscle tone, sleep paralysis, ESS of 21, mean sleep latency of 3.8 min, and two SOREMPs on baseline MSLT were suggestive of narcolepsy [7]; low mood, positive findings in major depressive disorder section of MINI, and HAMD-17 of 18 were suggestive of depression. Instead of treating all three diseases, a systemic approach was taken to rule out the differential diagnosis.

First, cataplexy is a brief (seconds, rarely more than minutes) bilateral loss of skeletal muscle tone, with preserved consciousness, elicited by strong positive emotions like humor or laughter and less commonly by anger, excitement, or surprise [8]. Cataplexy should be differentiated from

physiological reactions (cataplexy-like events). Non-narcoleptic patients might also feel the weakness of lower limbs— "rubber knees" or roll onto the floor when laughing hard. In true cataplexy, the partial loss of muscle tone occurs more than a few times in a lifetime. Interestingly, cataplexy-like events are significantly correlated with daytime sleepiness and depression [8]. In addition, in narcolepsy, the sleep paralysis is frequent and bothersome. In our patient, the presence of cataplexy-like events and three episodes of sleep paralysis were misleading symptoms for narcolepsy.

Second, SOREMPs are common elements of narcolepsy and OSA [9]. A study conducted previously found that SOREMPs occurrence in patients with OSA was 21% and narcolepsy was 24% [9]. In view of this, patients with SOREMPs should be assessed for altered sleep transition from stage non-N2/N3 to stage R [10, 11]. A previous study found that around 92.0% of patients with narcolepsy type 1 and 69.4% patient with narcolepsy type 2 presented with the altered transition from stage non-N2/N3 to stage R sleep in MSLT, while this number is only 39.3% in patients with other problems presenting with multiple SOREMPs [10]. Another study also confirms this observation [11]. In our case, there was no phenomenon of altered transition from stage non-N2/N3 to stage R sleep. What is more, during hospital admission, hilarious audio-visual aid was used to elicit the cataplexy, but the test was negative. A REM rebound or increase in REM sleep in initial CPAP exposure is associated with better CPAP compliance and improved subjective quality of sleep [12]. Also, the residual sleep apnea disappeared with fixed CPAP therapy. The patient was thus treated for OSA only with CPAP therapy. After a week of CPAP therapy, the patient had adequate sleep and proper sleep hygiene, and then a repeat MSLT was performed.

Third, as Ejaz et al. reviewed, CPAP therapy was beneficial not only for OSA but also for psychological symptoms of depression [4]. Taking into account that the depressive symptoms may be results of OSA due to sleep fragmentation and hypoxia, we decided to keep the patient on close monitoring, to follow up and screen further for the presence of depressive symptoms after CPAP therapy. After 1 month of nocturnal treatment with CPAP, the symptoms of depression were also resolved.

This study reflects that OSA can present with cataplexy-like events and false positive MSLT results for narcolepsy, as well as high scores in scales and positive finding in the clinical interview for depression. On the one hand, it should be noted that neither short mean sleep latency nor SOREMPs are specific to narcolepsy [7]. If MSLT is done in untreated OSA, it can give false positive results for narcolepsy. The common cause of sleepiness like OSA should be fully treated before conducting further MSLT for suspected comorbid narcolepsy. If daytime symptoms persist after CPAP therapy, an MSLT is indicated. Further, cataplexy should be differentiated from cataplexy-like events. On the other hand, most OSA is neglected in psychiatric cases. When a clinician encounters a patient with depression as one of the main manifestations, the possibility of sleep disorders, such as OSA, should be kept in mind.

In conclusion, excessive daytime sleepiness and SOREMPs can be seen in various disorders. An individualized approach should be carried out for a proper diagnosis and better management. The case highlights the complexity in which OSA can present to physicians. Our case emphasizes that clinicians should be aware that OSA can mimic narcolepsy and present with depressive symptoms.

Compliance with ethical standards

Conflict of interest The authors declare that they have no conflict of interest.

Ethical approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed consent Additional informed consent was obtained from the patient for any identifying information is included in this article.

Abbreviations *AHI*, apnea/hypopnea index; *CPAP*, continuous positive airway pressure; *ESS*, Epworth Sleepiness Scale; *HAMA*, Hamilton Anxiety Rating Scale; *HAMD*, Hamilton Depression Rating Scale; *MINI*, MINI-International Neuropsychiatric Interview; *MSLT*, Multiple Sleep Latency Test; *OSA*, obstructive sleep apnea; *PLMI*, periodic limb movement index; *PSG*, polysomnography; *PSQI*, Pittsburgh Sleep Quality Index; *SOREMP*, sleep-onset rapid eye movement period

References

1. Senaratna CV, Perret JL, Lodge CJ, Lowe AJ, Campbell BE, Matheson MC, Hamilton GS, Dharmage SC (2017) Prevalence of obstructive sleep apnea in the general population: a systematic review. Sleep Med Rev 34:70–81. https://doi.org/10.1016/j.smrv.2016.07.002
2. Schroder CM, O'Hara R (2005) Depression and obstructive sleep apnea (OSA). Ann General Psychiatry 4(13):13. https://doi.org/10.1186/1744-859X-4-13
3. Sansa G, Iranzo A, Santamaria J (2010) Obstructive sleep apnea in narcolepsy. Sleep Med 11(1):93–95. https://doi.org/10.1016/j.sleep.2009.02.009
4. Ejaz SM, Khawaja IS, Bhatia S, Hurwitz TD (2011) Obstructive sleep apnea and depression: a review. Innov Clin Neurosci 8(8):17–25
5. Lee MJ, Lee SY, Yuan SS, Yang CJ, Yang KC, Lee TL, Sun CC, Shyu YC, Wang LJ (2017) Comorbidity of narcolepsy and depressive disorders: a nationwide population-based study in Taiwan. Sleep Med 39:95–100. https://doi.org/10.1016/j.sleep.2017.07.022

6. Lurie A (2011) Obstructive sleep apnea in adults: epidemiology, clinical presentation, and treatment options. Adv Cardiol 46:1–42. https://doi.org/10.1159/000327660
7. Khan Z, Trotti LM (2015) Central disorders of hypersomnolence: focus on the narcolepsies and idiopathic hypersomnia. Chest 148(1):262–273. https://doi.org/10.1378/chest.14-1304
8. Chen W, Mignot E (2007) CHAPTER 6 - narcolepsy and hypersomnia of central origin: diagnosis, differential pearls, and management. In: Barkoukis TJ, Avidan AY (eds) Review of sleep medicine (Second Edition). Butterworth-Heinemann, Philadelphia, pp 75–94. https://doi.org/10.1016/B978-075067563-5.10006-9
9. Kim CY, Ong A, Chung SA, Shapiro CM (2012) SOREMs in sleep clinic patients: association with sleepiness, alertness and fatigue. Sleep Hypn 14(1):20–28
10. Liu Y, Zhang J, Lam V, Ho CK, Zhou J, Li SX, Lam SP, Yu MW, Tang X, Wing YK (2015) Altered sleep stage transitions of REM sleep: a novel and stable biomarker of narcolepsy. J Clin Sleep Med 11(8):885–894. https://doi.org/10.5664/jcsm.4940
11. Drakatos P, Suri A, Higgins SE, Ebrahim IO, Muza RT, Kosky CA, Williams AJ, Leschziner GD (2013) Sleep stage sequence analysis of sleep onset REM periods in the hypersomnias. J Neurol Neurosurg Psychiatry 84(2):223–227. https://doi.org/10.1136/jnnp-2012-303578
12. Koo BB, Wiggins R, Molina C (2012) REM rebound and CPAP compliance. Sleep Med 13(7):864–868. https://doi.org/10.1016/j.sleep.2012.03.019