

Overnight pulse oximetry for obstructive sleep apnea screening among patients with snoring in primary care setting: Clinical case report

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ABSTRACT

This clinical case report illustrated a typical patient presented with snoring in the primary care. He was screened positive for obstructive sleep apnea (OSA) by overnight pulse oximetry and then referred to respiratory specialist care. With early confirmation and treatment of OSA, symptoms and comorbidity associated with OSA can be improved and risk for cardiovascular complication can be prevented. Among 264 cohort patients presented primarily with snoring in one primary care clinic of Hong Kong, 175 patients (66.2%) were screened to have OSA. About 56.0% (98/175), 26.2% (46/175), and 17.8% (31/175) were classified as mild, moderate, and severe OSA, respectively. In view of high prevalence of OSA among snorers, and OSA-related exacerbation in comorbid conditions and increased risk of cardiovascular complication, there is a need to stimulate OSA screening among snoring patients in primary care.

Keywords: Obstructive sleep apnea, overnight pulse oximetry, snoring

Introduction

Snoring is an important characteristic feature of obstructive sleep apnea (OSA). Untreated OSA will lead to cardiovascular, metabolic and neurocognitive morbidities, and increased risk of motor vehicle accidents. Overnight pulse oximetry alone is often used and also a good screening tool in the primary care setting. This clinical case and case series reported screening of OSA among snorers in primary care.

Case History

Mr. S is a 56-year-old school workman. He is a non-smoker and social drinker. He has hypertension and hyperlipidemia for more than 10 years. He had been on amlodipine 5 mg daily and lisinopril 5 mg daily for hypertension and diet for lipid control.

Mr. S did home blood pressure (BP) monitoring and reported that home BP was suboptimal sometimes, with systolic BP around 140–150 mmHg, while diastolic BP around 90 mmHg. His wife witnessed that Mr. S had severe snoring all along. He had fragmented sleep usually from 11 pm to 6 am. He complained of excessive daytime sleepiness and dozed off at work or on travel. There was no morning headache and no history of road traffic accident reported.

On physical examination, the body mass index was 30.1 kg/m². BP was 147/81 mmHg and pulse 78/min regular in rhythm. Neck circumference was 18.2 inches (46.2 cm). There was no obvious craniofacial abnormality, no pallor, no ankle edema, no micronathia, and no adenotonsil hypertrophy. Heart sound was dual, no heart murmur, no carotid bruit, and chest examination was unremarkable. Epworth Sleepiness Scale (ESS) score was 23 (total score is 24, with higher score indicating higher sleepiness), which indicated Mr. S suffering excessive daytime sleepiness.

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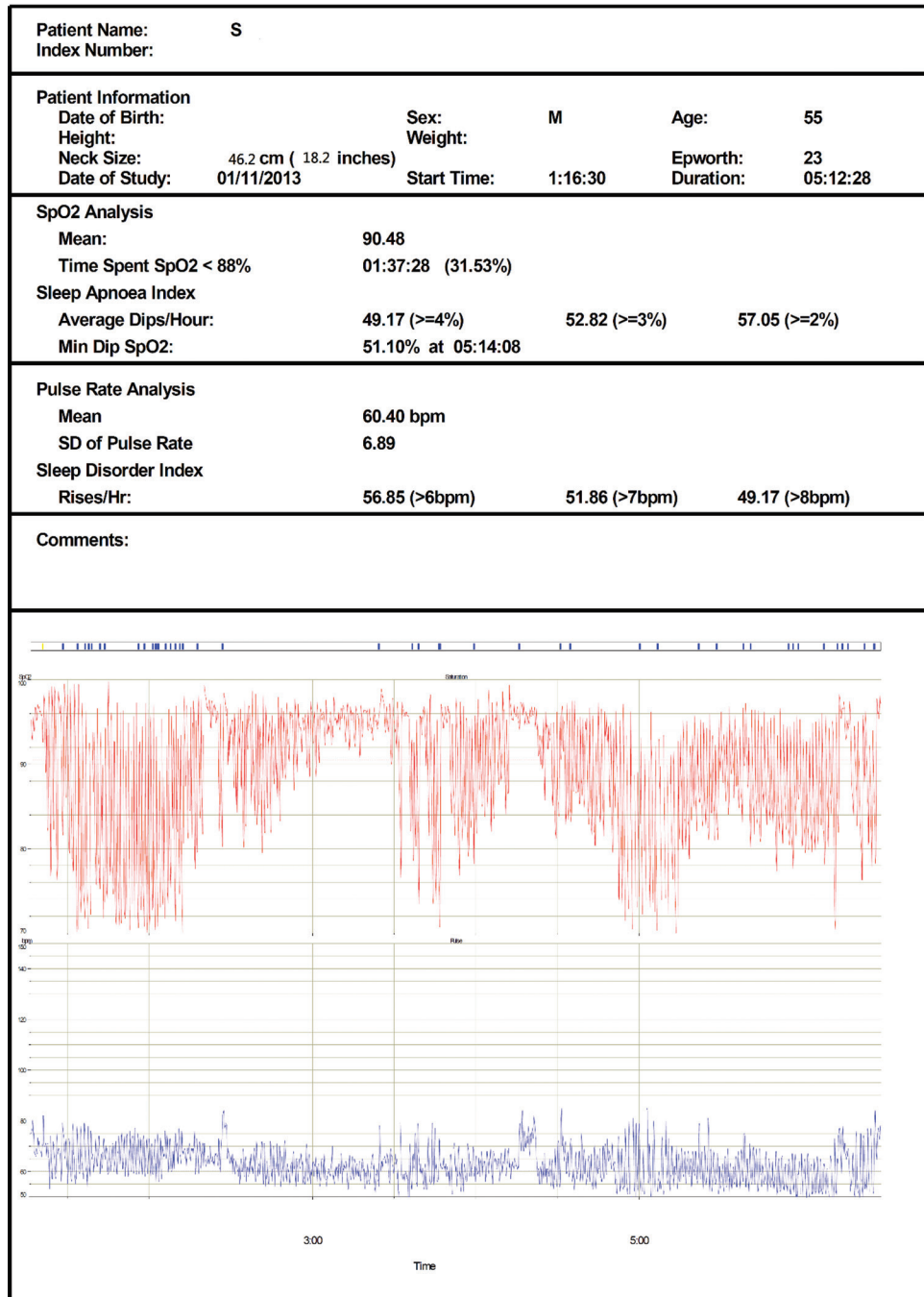
Overnight pulse oximetry for OSA screening was arranged. Oxygen desaturation index (ODI) of $\geq 4\%$ was 49.2 events/h [Graph 1]. Clinical impression was severe OSA. Mr. S was referred to respiratory unit for further management. Polysomnography was arranged, which revealed that Apnea–Hypopnea Index was 50.7 events/h, arousal index was 42.9/h, and total time with snoring was 8.1% of sleep time. Continuous pneumatic airway pressure (CPAP) with autotitration was indicated and initiated. Mr. S was compliant and tolerated to application of CPAP. His sleep symptoms improved significantly, and ESS decreased to score 8.

On subsequent follow-up, clinic BP of Mr. S was stable, that is, 130/75 mmHg and pulse 64/min. His home BP monitoring had also optimized, the systolic BP was around 110–120 mmHg, and diastolic BP was around 70–80 mmHg.

Discussion

Portable overnight pulse oximeter measured and stored oxygen saturation (SaO_2) value and pulse rate continuously. Computer-generated report includes SaO_2 analysis, pulse

Pulsox Analysis Report - Summary Page (Sleep Study)



Graph 1: Summary page of overnight pulse oximetry

rate analysis, ODI (number of oxygen desaturation events per hour of measurement time), and pulse disorder index (pulse rises events per hour of measurement time). Oxygen desaturation was defined as a decrease of $\geq 4\%$ from baseline SaO_2 .^[1] Subjects who had sleep disordered breath events associated with five or more oxygen desaturation events of the peripheral artery of 4% or greater per hour ($\text{ODI}_4 \geq 5$ events/h) were defined as screening positive. For screening positive patients, the severity of OSA was also determined by cut-off as mild ($\text{ODI}_4 = 5-14$ events/h), moderate ($\text{ODI}_4 = 15-30$ events/h), and severe ($\text{ODI}_4 > 30$ events/h).

In all, 264 patients with primary symptom of snoring were arranged for OSA screening. Patient characteristics and screening outcome are summarized in Table 1. The patients had a mean age of 52 years, 62.1% were male, and 9.1% were ex- or current smokers. About 53.0% of patients had hypertension, 28.8% had hyperlipidemia, and 54.2% were obese. A total of 175 patients (66.2%) were screening positive to have OSA. Among them, 56.0% (98/175), 26.2% (46/175), and 17.8% (31/175) were classified as mild, moderate, and severe OSA, respectively.

The case of Mr. S illustrates a typical patient presenting with snoring in the primary care. He screened positive for OSA, and then urgent referral to specialist care is justified and indicated. With early confirmation and treatment of OSA, symptoms

and comorbidity associated with OSA were improved and risk for cardiovascular complication was prevented. Among cohort patients presented with snoring in one primary care clinic of Hong Kong, 66.2% were screened to have OSA.

Snoring is common in the general population, with a prevalence of 25% in females and 45% in males.^[2,3] By the age of 60 years, snoring adversely affects 60% of men and 40% of women.^[4] The probability of OSA is 3.2 times higher in snorers than in nonsnorers.^[5] Of the patients with OSA, 70%–95% are habitual snorers.^[4,6] Epidemiological studies have concluded that untreated OSA is a large public health burden in terms of cardiovascular morbidity and mortality.^[7] Screening for OSA needs to take place in any adult who reports OSA symptoms, including snoring, witnessed apnea, nocturnal grasping/choking, unexplained daytime sleepiness, large neck size, sleep fragmentation, and unrefreshing sleep.^[8] Oximetry alone is often used as the first screening tool for OSA due to the universal availability of cheap recording pulse oximeters.^[9] A study conducted in primary care of Hong Kong concludes that overnight pulse oximetry is a good screening tool for OSA screening.^[10] About 40% of patients with hypertension (HT) were diagnosed comorbid with OSA, and with level as high as 71% with drug-resistant hypertensives.^[11,12] A meta-analysis of patients' treatment-resistant HT and OSA calculated that CPAP treatment resulted in an average BP reduction of $-6.7/5.9$ mm Hg.^[13] Continuous positive airway pressure (CPAP) functions as a pneumatic splint to maintain upper airway patency through all phases of sleep breathing. CPAP has been established as the treatment of OSA with the firmest evidence base. American Academy of Sleep Medicine recommended CPAP as the standard treatment of moderate to severe OSA and self-reported sleepiness, while it is the optional treatment for mild OSA, improving quality of life or as an adjunctive therapy to lower BP in hypertensive patients with OSA.^[8]

In view of high prevalence of OSA among snorers, and OSA-related exacerbation in comorbid conditions and increased risk of cardiovascular complication, there is a need to stimulate OSA screening among snoring patients in primary care.

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Conflicts of interest

There are no conflicts of interest.

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Table 1: Summary of patient characteristics

	Frequency	Percentage	Mean	SD
Study population	264	-	-	-
Male	164	62.1	-	-
Female	100	37.9	-	-
Age	-	-	52.0	13.0
Smoker/Ex-smoker	24	9.1	-	-
Associated Comorbidities	-	-	-	-
Hypertension	140	53.0	-	-
Diabetes mellitus	44	16.7	-	-
Impaired fasting glucose	16	6.1	-	-
Hyperlipidaemia	76	28.8	-	-
Chronic kidney disease	23	8.7	-	-
Ischaemic heart disease	4	1.5	-	-
Stroke	1	0.4	-	-
Atrial fibrillation	1	0.4	-	-
Allergic rhinitis	15	5.7	-	-
Obesity (BMI ≥ 25 kg/m ²)	143	54.2	-	-
BMI, kg/m ²	-	-	26.9	4.8
Neck circumference, cm	-	-	37.6	2.9
Systolic BP, mmHg	-	-	130.2	16.9
Diastolic BP, mmHg	-	-	76.9	11.6
Epworth Sleepiness Scale (ESS)	-	-	10.5	5.7
ODI ₄ , events/h	-	-	13.7	16.6
≥ 5	175	66.2	-	-
5-14	98	37.1	-	-
15-30	46	17.4	-	-
> 30	31	11.7	-	-

SD: Standard deviation; BMI: Body mass index; ESS: Epworth Sleepiness Scale; ODI: Oxygen desaturation index

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