

HOSTED BY



ELSEVIER

Available online at [www.sciencedirect.com](http://www.sciencedirect.com)

ScienceDirect

[www.elsevier.com/locate/ssci](http://www.elsevier.com/locate/ssci)

## Letter to the Editor<sup>☆</sup>

# Misleading sleep-diagnostic results in a patient with variable nasal airflow obstruction



## 1. Introduction

A 23 year old man was referred to our sleep clinic with a history of loud snoring, witnessed apnoeas and waking with a dry and sore throat. He experienced daytime somnolence, scoring 18/24 on the Epworth Sleepiness Scale and reported significant impairment in concentration and memory. He was mildly overweight (body mass index 28.2 kg/m<sup>2</sup>, neck circumference 39.5 cm) and had a resting oxygen saturation of 100%. In addition he was awaiting adenoidectomy and tonsillectomy due to an enlarged tonsil on the right side and enlarged adenoids, and described “attacks” of sudden-onset bilateral nasal obstruction which varied in duration. A diagnosis to confirm or exclude obstructive sleep apnoea was required in order for surgery to proceed.

## 2. Sleep study

A Type III home sleep study was performed using Embletta Portable Diagnostic System (Stowood Scientific Instruments, Oxford UK) and Somnologica software (Embla, Broomfield, USA) for analysis, due to the comparability in diagnosing adult patients with a high probability of moderate to severe obstructive sleep apnoea [1]. We measured body position, pulse oximetry (SpO<sub>2</sub>), thoraco-abdominal movement using inductive respiratory plethysmography (RP) and airflow using nasal pressure (NP); oral thermistor trace was unavailable for this study due to sensor failure, but the study went ahead with the alternative sensor method [2] in order not to delay diagnosis and surgery.

## 3. Results

The patient reported an unremarkable night's sleep, with all sensors securely in place on waking. Body position data showed a restful night, with the whole of the recording

period spent in the supine position. Initial results indicated severe obstructive sleep apnoea with an apnoea/hypopnoea index (AHI) of 38 events per hour, the majority of which were obstructive.

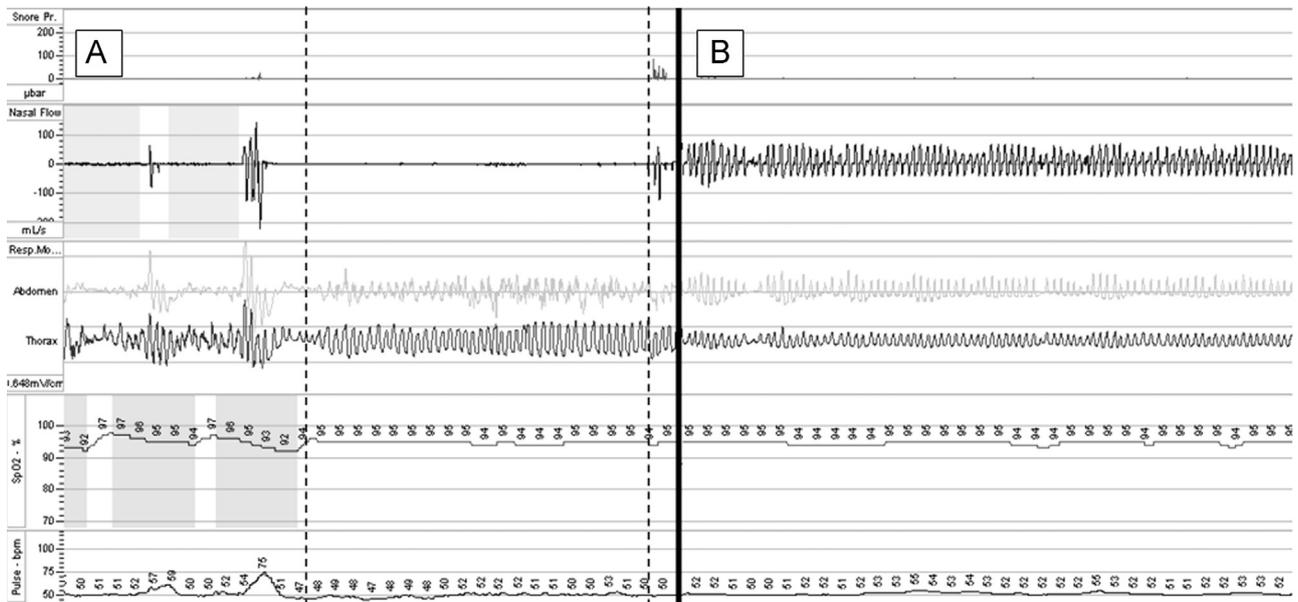
It was noted on analysis that the software had identified unusual prolonged events from the NP trace that did not correspond with any interruption to the regular thoraco-abdominal movement pattern, with no changes in SpO<sub>2</sub>. On closer examination these events were found to be the result of sudden and total cessation of nasal airflow. Although some of these events were correctly marked as artefact, most lasting less than 120 s had been falsely identified as obstructive apnoea events. Normal NP traces were apparent both before and after each event. Following manual scoring by an experienced physiologist these events were eliminated from the final report; AHI was revised from 38 to 28 events per hour, thereby changing the category from severe to moderate Fig. 1.

## 4. Discussion

The NP trace showed that this patient was experiencing periods of complete nasal obstruction during the study, which appeared to correspond with the history during waking hours. Although mouth breathing has been demonstrated as occurring between 1 and 3% of recording time, usually causing a reduction in signal amplitude [3] this patient's nasal obstruction episodes led the software to score numerous false positive events. Apart from the revision of the severity of OSA, there were no consequences for this patient as sleep-disordered breathing was identified, he was subsequently successfully treated with continuous positive airway pressure therapy, and his surgery went ahead as planned. However, the potential for false-positive results in the case of a less severe or a simple snoring patient is clear.

Although it is known that NP signal may show a degree of decreased amplitude during mouth breathing, [2,3] the onset

<sup>☆</sup>Peer review under responsibility of Brazilian Association of Sleep.



**Fig. 1 – Two 5-min sections from Somnologica software showing a period of complete nasal obstruction (marked by broken lines) preceded by genuine apnoea (A). Note normal RP and SpO<sub>2</sub> during this period. A section of normal trace is shown from later in the study for comparison (B).**

of sudden and complete nasal obstruction during sleep is unique in our experience. This individual case underlines the importance of recording airflow at the mouth in addition to NP during sleep, especially in patients with suspected nasal pathology. In addition we are reminded that the practice of relying solely on automatic detection software without some form of manual verification should be avoided.

#### REFERENCES

- [1] El Shayeb M, Topfer LA, Stafinski T, Pawluk L, Menon D. Diagnostic accuracy of level 3 portable sleep tests versus level 1 polysomnography for sleep-disordered breathing: a systematic review and meta-analysis. *CMAJ* 2014;186(1): E25–51.
- [2] Berry RB, Budhiraja R, Gottlieb DJ, Gozal D, Iber C, Kapur VK, et al. Rules for scoring respiratory events in sleep: update of the 2007 AASM manual for the scoring of sleep and associated

events. *Deliberations of the sleep apnea definitions task force of the american academy of sleep medicine. J Clin Sleep Med* 2012;8(5):597–619.

- [3] Ballester E, Badia JR, Hernández L, Farré R, Navajas D, Montserrat JM. Nasal prongs in the detection of sleep-related disordered breathing in the sleep apnoea/hypopnoea syndrome. *Eur Respir J* 1998;11(4):880–3.

K.J. Spurling\*, J.L. Perks, H.K. Makker  
Respiratory Physiology Department, North Middlesex University  
Hospital, London, UK  
E-mail address: kspurling@nhs.net (K.J. Spurling)

6 March 2015  
17 April 2015  
5 May 2015

\*Corresponding author at: Respiratory Physiology Department North Middlesex University Hospital NHS Trust Sterling Way, London N18 1QX, UK. Tel.: +020 8887 2802.