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SLEEP MEDICINE PEARLS

A Turbulent Night

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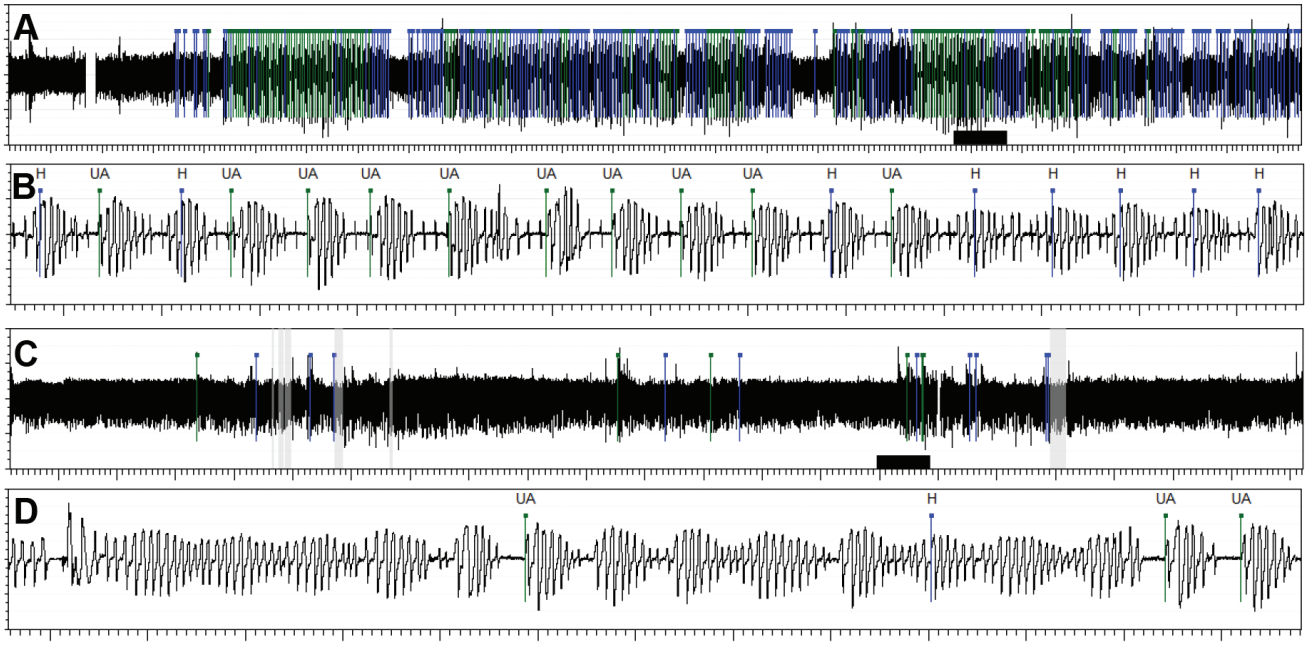
A 53-year-old man with hypertension and a body mass index of 34 kg/m^2 received a diagnosis of moderate obstructive sleep apnea 2 years prior. He was treated at an outside center with bilevel 20/7 cm H_2O (uncertain reason for the high differential). He presented for a second opinion due to treatment-evoked central apneas, aerophagia, and ongoing fatigue. Symptoms improved with reduction of pressures to 10/7 cm H_2O, and the machine-detected apnea-hypopnea index (AHI) was reduced from > 30 events to < 1 event/h. On a follow-up visit, the data card was extracted using SleepyHead software (SleepyHead is copyright 2011–2016 Mark Watkins (Jedimark); available via GNU License), a viewer that allows review of the raw waveforms and machine-detected events. A single outlier night was observed, with an AHI of 78 events/h, with 3 weeks prior showing AHI values averaging < 1 event/h.

The full-night waveform shows the nearly continuous machine-detected events (**Figure 1A**), which resemble periodic breathing (**Figure 1B**), although they are not detected as central apneas by the machine. Other nights showed rare blocks of waxing and waning patterns, usually not triggering detection by the machine (**Figure 1C** and **Figure 1D**). Although uncommonly seen in this patient's raw data review, it could be a subtle clue of chemoreceptor dyscontrol even at sea level (though some waxing and waning patterns can also be seen in rapid eye movement sleep).

QUESTION: What are the possible explanations for abrupt worsening of sleep apnea despite wearing PAP?

Figure 1—Extracted raw data from the machine data card.



(A) Full night flow data on the in-flight night, with frequent detected events. **(B)** Zoom of a ~10-minute window (indicated by the solid bar in panel A), showing frequent respiratory events. **(C)** Full-night flow data, from a night at sea level, with scattered events detected. **(D)** Zoom of a ~10-minute window (indicated by the solid bar in panel C), showing some subtle waxing and waning patterns.

ANSWER: From the differential diagnosis possibilities, the most likely is that the patient was sleeping aboard a red-eye flight, the cabin pressure of which may have caused relative hypoxemia and thus respiratory instability.

DISCUSSION

Potential explanations for acute worsening of breathing on positive airway pressure (PAP) could include obstructive or central apnea etiologies. For example, alcohol, sedatives, and body position can alter airway collapsibility, whereas opiates could enhance central apnea probability, and fluid status and mask leak might contribute to both. None of these conditions were present in this case. Non-sinus cardiac arrhythmia might also have contributed (not measured; though there were no symptoms and no cardiac history in this case). One notable difference on the night of excessive sleep-disordered breathing evident on the machine data was that the patient was sleeping on a red-eye flight. Machine data immediately returned to preflight patterns the following night. The patient was asymptomatic and unaware that breathing patterns were so abnormal during his sleep on that flight.

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Cabin pressures in typical commercial long-haul flights are ~8,000 feet altitude, and correspond to a sea-level oxygen partial pressure of ~15%.[1] In susceptible patients with sleep apnea, in-flight PAP therapy may result in hypoxia-primed chemoreflex instability.[2] The clinical effect of isolated nights of instability for those who fly occasionally remains unknown. There are no specific recommendations for PAP users in recent reviews of air travel safety in patients with pulmonary or other disorders.[1,3] Future work may shed light on whether preflight testing (hypoxic challenge on PAP), or in-flight adjunctive therapies, or transient switching to non-PAP alternatives, could be offered for vulnerable patients or frequent long-haul travelers.

CITATION

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