

CASE REPORTS

Night-time Bradyarrhythmia in a Patient with Mild Obstructive Sleep Apnea Syndrome is Reversed With CPAP Treatment

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Abstract: Nocturnal cardiac arrhythmia is a common clinical feature of obstructive sleep apnea syndrome. Pathologically relevant rhythm disturbances such as atrioventricular block or ventricular tachycardia are known to occur mainly in patients with a high apnea-hypopnea index and marked oxygen desaturation. We report on a patient with mild obstructive sleep apnea syndrome who nevertheless showed intermittent second-degree atrioventricular block during stages of rapid eye movement sleep-associated hypopneas. Cardiac arrhythmia was reversed with the initiation of nasal continuous positive airway pressure treatment. Based

on this case report and taking into account known facts from the literature, the finding of intermittent second-degree atrioventricular block in our patient with mild obstructive sleep apnea syndrome supports careful evaluation of electrocardiogram recording acquired during polysomnography in all patients with suspected obstructive sleep apnea syndrome.

Keywords: Arrhythmia, sleep apnea, CPAP

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Nocturnal cardiac arrhythmia, especially apnea-associated bradycardia with or without alternating tachycardia, has been frequently reported in patients with obstructive sleep apnea syndrome (OSAS).¹⁻⁶ The occurrence of pathologically relevant rhythm disturbances—such as second- or third-degree atrioventricular block (AV block), ventricular tachycardia, or complex ventricular ectopy—is supposed to be a feature of severe OSAS. Thus, a significant correlation between OSAS severity and the severity of rhythm disturbances was documented by Harbison et al.⁷ Furthermore, Guilleminault reported that bradycardic arrhythmias exclusively occurred during apneas with oxygen saturation below 72%.¹ Finally, Becker et al found bradycardic arrhythmias only in patients with an apnea-hypopnea index (AHI) of 60 or more per hour.⁸

Here we wish to report on a patient with mild OSAS who nevertheless presented with pathologically relevant nocturnal bradyarrhythmia and therefore does not fit in known patterns.

CASE REPORT

A 63-year-old male retired postal worker was admitted to our sleep laboratory because of a long-standing history of nocturnal snoring and mild daytime sleepiness. History taking was remark-

able for POEMS syndrome (polyneuropathy, organomegaly, endocrinopathy, monoclonal gammopathy, and skin changes) diagnosed 5 years before, arterial hypertension, and hypercholesterolemia. Neurologic examination revealed muscle wasting, weakness, and hypoesthesia in the distal legs. The ankle tendon reflexes were absent, and the knee tendon reflexes were diminished on both sides. The remainder of the patient's neurologic status was normal. Electrocardiogram recording was normal.

During the first night of standard overnight polysomnography⁹ the time in bed was 6 hours and 37 minutes, the sleep efficiency was 82%, and the sleep stages were distributed normally (Figure 1a). Polysomnography documented an AHI of 7.0 per hour of sleep and a snoring index of 128 per hour. The CT₉₀ (ie, the percentage of nighttime below 90% saturation) was 2%, and the minimal oxygen saturation was 86%. Obstructive hypopneas and oxygen desaturations mainly occurred during rapid eye movement (REM) sleep. Interestingly, we found intermittent second-degree AV-block during the stages of REM sleep-associated hypopneas (Figure 2). As is demonstrated in Figure 1, these rhythm disturbances were depicted as frequent drops in heart rate.

On the second night, nasal continuous airway pressure (CPAP) was started. Again, the patient slept well (time in bed, 6 hours 35 minutes; sleep efficiency, 80%) with a normal distribution of sleep stages (Figure 1a). The AHI was reduced to 0.8 per hour, and the snoring index to 5 per hour. The CT₉₀ was 1%, and the minimal oxygen saturation was 89%. No intermittent second-degree AV block was recorded during this night.

DISCUSSION

In patients with OSAS, the occurrence of pathologically relevant nocturnal arrhythmias is known to be linked to the severity of the disease.^{1,7,8} Therefore, the finding of an intermittent second-degree AV-block in our patient who had an AHI of only 7.0

Disclosure Statement

Drs. Dzierwas, Imai, Dittrich, Humpert, Hopmann, Boentert, and Young have indicated no financial conflicts of interest.

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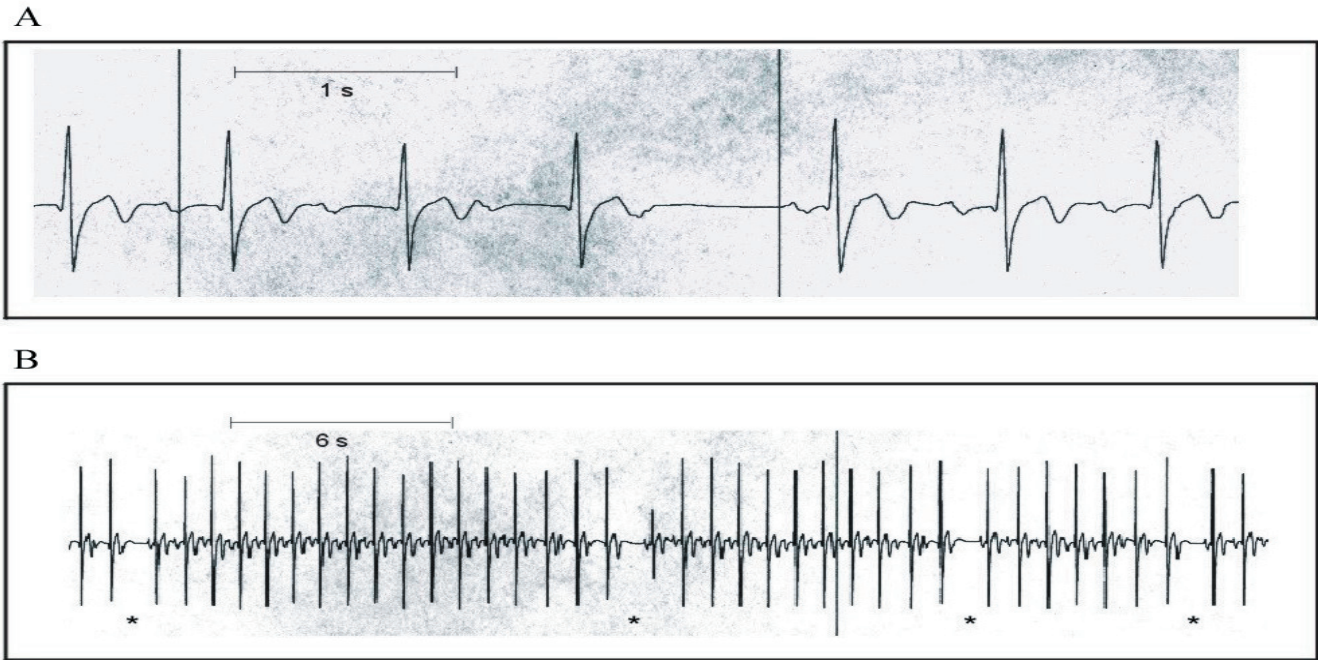


Figure 1—Electrocardiogram recordings during the first night of polysomnography showing second-degree atrioventricular block (A = high time resolution, B = low time resolution).

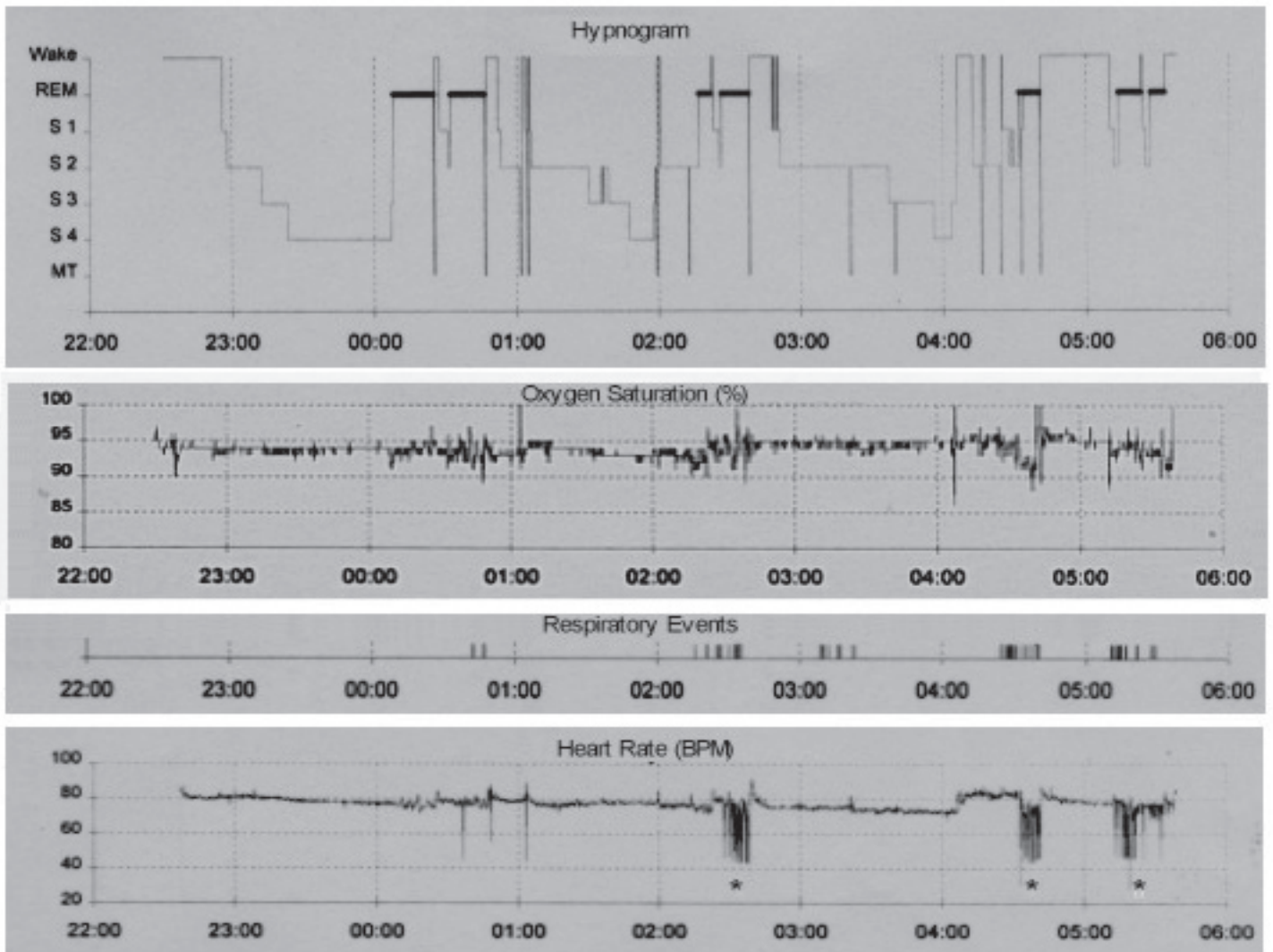


Figure 2a—Hypnogram, oxygen saturation, respiratory events (obstructive hypopneas), and heart rate during the first night without treatment. Recurring episodes of intermittent second-degree atrioventricular block are marked with *.

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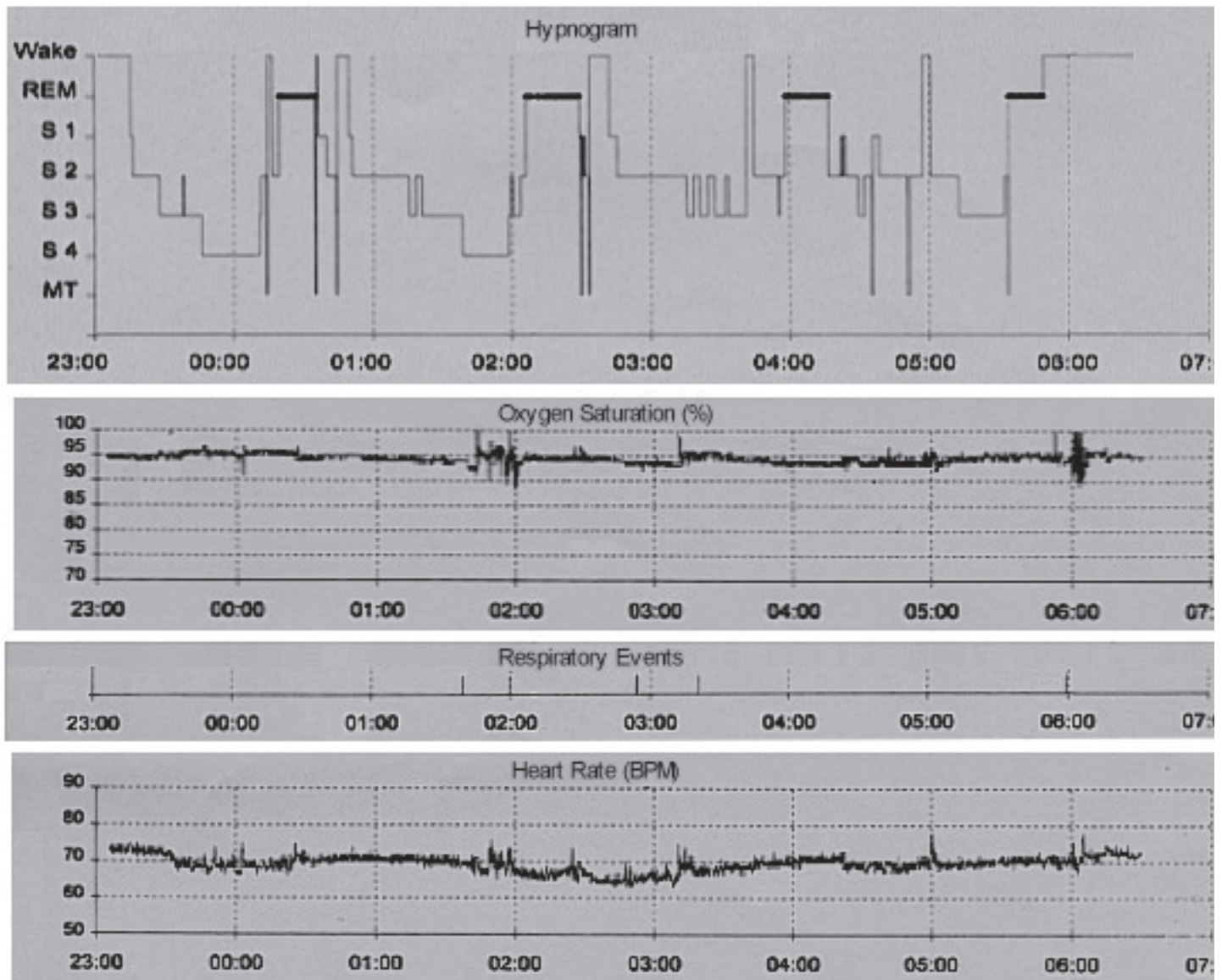


Figure 2b—Hypnogram, oxygen saturation, respiratory events (obstructive hypopneas), and heart rate after initiation of treatment with nasal continuous positive airway pressure. There were no episodes of second-degree atrioventricular block recorded.

per hour is remarkable.

However, one has to take into account that our patient suffered from POEMS syndrome, which is known to be associated with different cardiac complications and may even lead to congestive heart failure.¹⁰ Hence, the observed nocturnal arrhythmia may be partly due to an underlying cardiomyopathy, which was aggravated by obstructive apneas.

Pathophysiologically, apnea-associated hypoxemia is supposed to cause vagal stimulation, leading to bradycardia, which can be prevented by vagal blockade with atropine.¹¹ Furthermore, a substantial increase in the number of bradycardic arrhythmias during REM sleep has been reported.^{12,13} Although apneas are generally longer and desaturation is therefore more pronounced during this sleep stage, in the study of Becker and coworkers, REM sleep proved to be an independent factor contributing to heart block, after adjusting for desaturation and apnea duration. Interestingly, both mechanisms may be also relevant in our patient because second degree AV-block nearly exclusively occurred during clusters of obstructive hypopneas that were found in REM sleep.

In line with our observation, few studies have shown that nCPAP effectively treats night-time arrhythmia. Thus, Becker and

coworkers reported that the number of arrhythmias was reduced from 1575 to 165 episodes per night in 17 patients.⁸ Confirming these findings, 2 other studies have demonstrated reversal of heart block in 13 of 15 patients and in 7 of 8 patients, respectively, after initiation of therapy with nasal CPAP.^{7,14}

Taken together, the finding of intermittent second-degree AV-block in our patient with mild OSAS only supports careful evaluation of electrocardiogram recording acquired during polysomnography in all patients with suspected OSAS. Treatment with nasal CPAP effectively prevents arrhythmias in 80% to 90% of patients.

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