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CASE REPORT

Severe obstructive sleep apnea: first screening with an implanted pacemaker

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Key Clinical Message

Sleep apnea syndrome (SAS) is a chronic condition associated with cardiovascular disease. In some pacemakers, an advanced algorithm using transthoracic impedance may be used to identify SAS. This algorithm may be also a useful tool for a long-term monitoring helping physicians to optimize therapy, reducing risk factors, and improving therapeutic compliance.

Keywords

Arrhythmias, cardiovascular disease, pacemakers, sleep apnea syndrome.

Background

Sleep apnea syndrome (SAS) is a common chronic disease independently associated with an increased risk of sudden and any cause death [1–3]. The diagnosis may be difficult because many patients are often asymptomatic, since symptoms are not easily identified and consequently around 80% of sufferers remains undiagnosed [4]. Untreated sleep apnea may cause a very important additional medical costs [5, 6]. Therefore, systematic screening to identify this patient population would be desirable. Today some implantable devices provide a transthoracic impedance sensor with an advanced algorithm (sleep apnea monitoring SAM) for identifying patients with severe SAS in routine follow-up. Our case report shows the capacity of SAM algorithm to screen, diagnose, and follow patients with SAS.

Case Report

A 83 years old woman with drug refractory hypertension, excessive daytime sleepiness, paroxysmal atrial fibrillation, and sinus bradycardia associated with syncope episode, underwent to pacemaker implantation. Body mass index patient was 29.30 kg/m^2 (overweight). Patient was unknown for SAS. Dual chamber pacemaker implantation (Sorin Reply 200 DRTM with SAM) was performed on 22nd May 2015, and patient started routinely follow-up at our institution. At 3-month follow-up pathological RDI (respiratory disturbance index) evaluated by SAM algorithm was demonstrated in 86% of nights (Fig. 1). At the same time a polysomnography (PSG) was performed confirming the presence of severe obstructive SAS with apnea-hypopnoea index (AHI) 49/h, desaturation index (ODI) 51.2/h, average saturation ($Sa0_2$) 92.7%, and average heart rate (HR) 58.5 bpm. The patient started a continuous positive airway pressure (CPAP) training period for 2 weeks. During last CPAP night, she performed a second PSG to check the therapy effectiveness, with interesting results: AHI 1/h, ODI 8/h, and Sa02 94%. At the end of the period, pacemaker was checked: no pathological RDI was recorded during the treatment (Fig. 2) and atrio-ventricular blocks decreased significantly in the same period (Fig. 3). Moreover, a

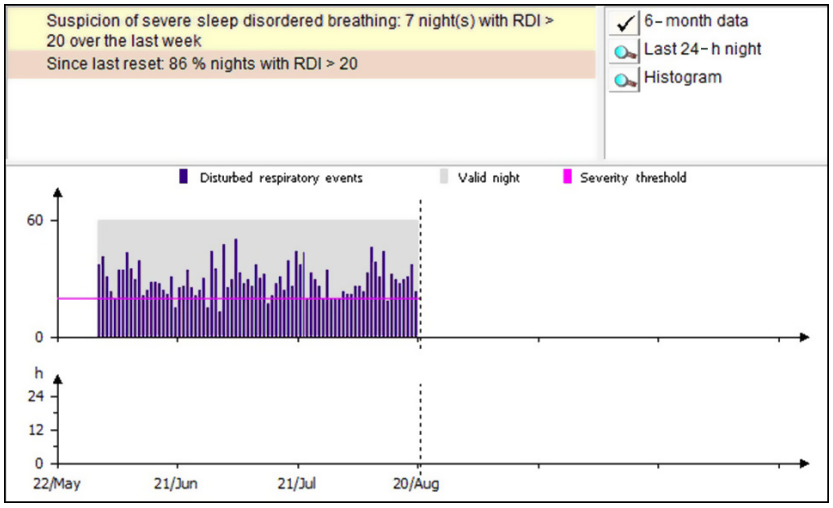

Figure 1. Respiratory Disturbance Index (RDI) evaluated at three-month follow-up: pathological RDI was demonstrated in 86% of nights. Disturbed respiratory events are shown as purple lines.

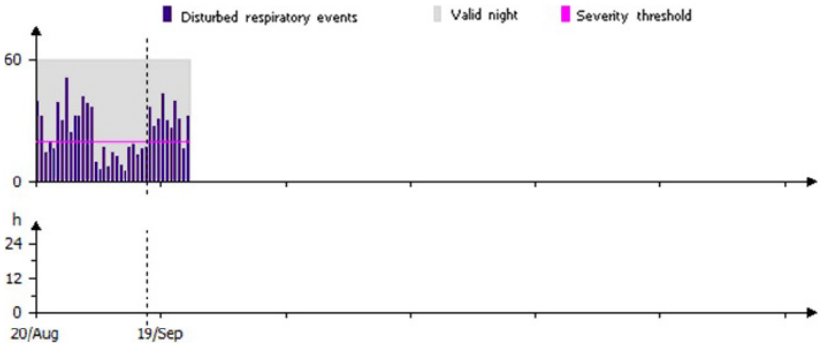

Figure 2. Continuous Positive Airway Pressure (CPAP) effect: no pathological Respiratory Disturbance Index (RDI) was recorded during the treatment. Disturbed respiratory events are shown as purple lines.

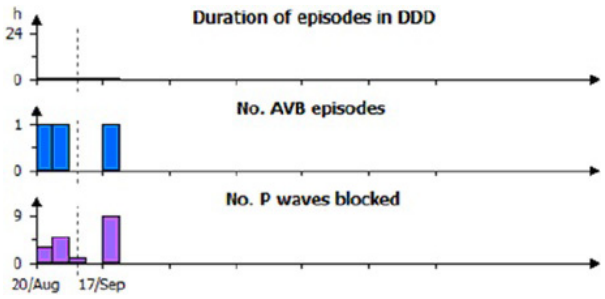

Figure 3. Continuous Positive Airway Pressure (CPAP) effect: atrioventricular blocks decreased significantly during treatment. Atrioventricular blocks are shown as blue columns.

24 h blood pressure (BP) monitoring showed a significant reduction during the CPAP training. At baseline, the mean BP value was 160/100 mmHg despite optimal medical therapy (amlodipine 10 mg, ramipril 10 mg, nebivolol 5 mg, and doxazosin 4 mg), while starting CPAP mean BP decreased to 140/70 mmHg during 24 h monitoring. Therefore, antihypertensive therapy was reduced. At same time patient showed clinical improvement with less daytime sleepiness, irritability, morning headache, and persistent fatigue.

Discussion

In our case report, SAM algorithm is a useful screening method to identify SAS in a patient with pacemaker. In addition to SAS diagnosis, this algorithm shows a good correlation with PSG, the gold standard method. Recently, Defaye et al. in the DREAM study demonstrated that a transthoracic impedance sensor with SAM algorithm could be used in patients with pacemaker to identify severe SAS with a sensitivity of 88.9% and a

specificity of 84.6% [7]. SAM algorithm may be also a useful tool for a long-term monitoring with repeated RDI measurements every night. These findings reinforce the diagnosis and may help physicians to optimize CPAP and medical therapy in order to reduce risk factors and improve therapeutic compliance. Also, arrhythmias are common findings in this patient population, and the presence and complexity of bradyarrhythmias and tachyarrhythmias may influence morbidity, mortality, and quality of life for patients with SAS [8]. Repetitive pharyngeal collapse during sleep leading to reduced or absent airflow and oxyhemoglobin desaturation may determine persistent inspiratory efforts against an occluded airway causing a variety of autonomic, humoral, hemodynamic, and neuroendocrine responses: these events may cause changes in cardiovascular function including arrhythmic events [8]. Not by chance, at pacemaker check we also documented an atrio-ventricular blocks decrease during CPAP training. Finally, an early SAS diagnosis could reduce many dangerous cardiovascular risk factors, and consequently may lead to an important decrease in medical costs [5, 6].

Authorship

MG, GM, AG, LF, BB, FG, MN, MM: All eight authors contributed equally to this case. In particular: MG and GM: perfomed the pacemaker implantation and equally contributed to write the manuscript. AG, LF, and MM: performed routinely patient's follow-up at our institution. MN: performed clinical follow-up leading to optimal medical therapy. BB and FG: performed polysomnography examinations.

Conflict of Interest

All authors have no conflict of interests.

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