



Review

Home Ventilation Therapy in Obstructive Sleep Apnea–Hypopnea Syndrome[☆]Nicolás González Mangado,^{*} María Fernanda Troncoso Acevedo, Teresa Gómez García

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ABSTRACT

Obstructive sleep apnea–hypopnea is a highly prevalent disease that is often underdiagnosed at present. It has a significant economic and social welfare impact, accounting for a large part of the resources assigned to home respiratory therapies. As part of the 2014 SEPAR Year of the Chronic Patient and Domiciliary Respiratory Care sponsored by the Spanish Society of Pulmonology and Thoracic Surgery, this article reviews the most recent publications on the indications and controversial issues in the treatment of sleep apnea, the latest evidence for indication of various positive pressure devices, and adjustment modes, ranging from the use of empirical formulae or mathematical estimations to modern auto-CPAP equipment, while not forgetting the gold standard of manual titration. Emphasis is placed on the need for monitoring required by patients to ensure treatment adherence and compliance. Finally, other therapies that are not the object of this article are briefly reviewed.

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Terapias ventilatorias domiciliarias en el síndrome de apnea-hipopnea del sueño

RESUMEN

El síndrome de apnea-hipopnea del sueño es una enfermedad muy prevalente, con tasas altas de infradiagnóstico en el momento actual, que conlleva un elevado impacto sanitario, económico y social, y consume gran parte de los recursos destinados a las terapias respiratorias domiciliarias. Con motivo del Año SEPAR 2014 del paciente crónico y las terapias respiratorias domiciliarias, patrocinado por la Sociedad Española de Neumología y Cirugía Torácica, en este artículo se revisa la literatura más reciente publicada sobre las indicaciones del tratamiento de la apnea del sueño y sus controversias, las últimas evidencias de las indicaciones de los distintos dispositivos de presión positiva, así como los modos de ajuste, desde el uso de fórmulas empíricas o estimaciones matemáticas, a los modernos equipos de auto-CPAP, pasando por la titulación manual como «gold standard». Además, se hace hincapié en la necesidad de seguimiento que los pacientes precisan para asegurar la adherencia y cumplimiento de la terapia. Por último, se comentan someramente otros tratamientos, que no son el objetivo del artículo.

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Palabras clave:

Apnea del sueño

Síndrome de apnea-hipopnea del sueño

Presión positiva continua en la vía aérea

Terapias ventilatorias

Introduction

Population aging, rising obesity figures, and the growing prevalence of chronic diseases make it necessary to place for greater

emphasis on home healthcare. Home respiratory therapy is a treatment option that can improve the quality of life of these patients and control healthcare costs while reducing the number of hospital admissions.

In Spain today, approximately 500 000 patients receive home therapies. According to figures published at the end of 2009,¹ 66% of home respiratory therapies are administered to patients with obstructive sleep apnea–hypopnea syndrome (OSAHS).

There are many reasons why OSAHS has gone from being a simple medical curiosity to become a public health issue over the course of the last 25 years. Firstly, at-risk groups are growing, due to

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population aging and widespread obesity; and secondly, advances in technology have contributed new diagnostic and therapeutic tools. However, there is no doubt that the most important change is the understanding that OSAHS, characterized by repeated episodes of partial or complete collapse of the upper airway during sleep, confers a negative survival prognosis by increasing, on the one hand, accident risk, and on the other, cardiovascular morbidity and mortality. Treatment options for patients with OSAHS vary depending on the spectrum of gravity of the disease, ranging from general measures, aimed at reducing upper airway collapse, to the surgical interventions or devices. CPAP, consisting of a turbine that delivers continuous positive pressure to the upper airway via a mask adapted to the patient, is clearly the treatment of choice in OSAHS. The scientific evidence is now indisputable,^{2–4} and this approach has been shown to be efficient and cost-effective.⁵ Moreover, CPAP treatment reduces the risk of road traffic accidents,⁶ appears to reduce high blood pressure in a large percentage of patients^{7–12} and reduces the cardiovascular^{13–15} and cerebrovascular^{14–16} consequences of the disease, as well as its mortality.^{14,17–19}

Historical Background

Although the first descriptions of sleep apnea go back to ancient times, awareness of OSAHS began to increase dramatically about 30 years ago. In 330 BC, King Pontus was described as an obese glutton who had difficulty remaining awake and had to be woken up with needles. Since then the literature has been full of anecdotal descriptions and medical curiosities, yet it was not until the second half of the 20th century that a precise definition was made of this disease that has affected humans for so long. In 1972, Christian Guilleminault first used the term “sleep apnea syndrome”, yet it was not until 1981 that Sullivan first used CPAP in the treatment of this entity.

Indications for Positive Pressure Therapy

The objectives of OSAHS treatment are assessed in the short term and in the long term. The aim in the short term is to control disease symptoms, primarily excessive daytime sleepiness, and in the long term to reduce the risks associated with this syndrome.

Various scientific societies have established indications for the prescription of CPAP. These are based on OSAHS severity, determined by the AHI (apnea–hypopnea index), and concomitant symptoms and comorbidities. Indeed, today’s clinicians unanimously accept this as the treatment of choice in patients with severe OSAHS with symptoms and associated comorbidities. However, the matter is less clear when the diagnosis is not so severe or there are no symptoms and/or associated comorbidities. As a general guideline, CPAP is indicated on the basis of abnormal AHI.^{3,16}

The considerable body of scientific evidence available to date suggests that the indications for CPAP on the basis of OSAHS severity, coexistence of symptoms or comorbidities, and in certain situations or particular groups should be reviewed.

With regard to OSAHS severity, measured by AHI, multiple studies show that an AHI greater than 15 is associated with increased cardiovascular risk, with or without associated symptoms, and that the risk is further aggravated in patients with an AHI greater than 30. A recent analysis of the Sleep Heart Health Study and the Wisconsin Sleep Cohort,^{19–21} the largest population cohorts in the United States, suggests that increased AHI may also be considered as an independent cardiovascular risk factor of sleepiness.

There is also proven evidence that patients with severe disease (AHI>30) improve on CPAP, although discrepancies in the efficacy of this technique in mild to moderate disease persist. Simon and Collop²² recently published a review of the latest advances in obstructive sleep apnea, singling out one study¹⁰ on the efficacy

of CPAP in patients with mild to moderate OSAHS that concluded that CPAP improves functional outcome (subjective sleepiness and state of mind) of sleepy patients, despite relatively low adherence. Furthermore, Epworth Sleepiness Scale results of over 10 points were not significantly altered.

With regard to comorbidities, the Spanish Sleep Group has published large multicenter, randomized, controlled studies analyzing the benefit of CPAP in the treatment of systemic hypertension. A study published by Durán-Cantolla et al.¹¹ found a statistically significant reduction in blood pressure figures in patients with systemic hypertension and obstructive sleep apnea treated with CPAP, although the expected 3 mmHg target (reduction of 2.1 mmHg for systolic and 1.3 mmHg for diastolic pressure) was not reached. Nevertheless, taking into account the prevalence of hypertension and the coexistence of comorbidities, even a minimal reduction of blood pressure with CPAP may be beneficial. Later, the HIPARCO study²³ in patients with moderate to severe OSAHS and hypertension refractory to pharmacological treatment showed that CPAP for 12 weeks reduced mean and diastolic blood pressure and improved nocturnal blood pressure patterns.

The prevalence of obstructive sleep apnea has increased worldwide due to the current obesity epidemic. Drager et al.²⁴ published a recent review supporting the idea that obstructive sleep apnea exacerbates the cardiometabolic risk in obesity and in metabolic syndrome. According to these authors, current evidence has shown that cardiovascular risk markers, including sympathetic activation, systemic inflammation and endothelial dysfunction, increase significantly in obese patients with OSAHS compared to those without OSAHS. This shows that OSAHS is not simply a phenomenon secondary to obesity. Results from animal models and OSAHS patients show that intermittent hypoxia worsens obesity-related metabolic dysfunction, increasing insulin resistance and non-alcoholic fatty liver. A recent study²⁵ indicated that effective treatment of OSAHS with CPAP over 3 months significantly reduced several metabolic syndrome components, including blood pressure, triglyceride levels and visceral fat, prompting the authors to conclude that diagnosis and treatment of this disease may reduce the cardiovascular risk of obese patients.

With regard to symptoms, CPAP is clearly the first line of treatment in patients with symptomatic obstructive sleep apnea. However, the indication of CPAP in patients with few or no symptoms is still in dispute. Barbé et al.¹² performed a multicenter, randomized, controlled study to determine the effect of CPAP on the incidence of hypertension and cardiovascular events in 723 non-sleepy patients with moderate and severe OSAHS (AHI>20). They concluded that in non-sleepy OSAHS patients CPAP treatment did not provide a statistically significant reduction in the incidence of hypertension or cardiovascular events compared to standard lifestyle and dietary measures. It should also be pointed out that the study was limited insofar as the sample size could not be accurately calculated due to the lack of previous similar studies. The protective effect of CPAP may also have been overestimated, and significant differences in the association between the treatment and the outcome could possibly have been obtained with a larger sample size and a longer follow-up period. In this respect, when the long-term effect (1 year) of CPAP was analyzed in non-symptomatic hypertensive patients with sleep apnea,²⁶ CPAP was associated with a small reduction in blood pressure, although this effect was clear only in patients with a treatment compliance of more than 5.6 h/night.

OSAHS studies in certain special populations (women and elderly subjects) deserve special attention.

Many aspects of OSAHS in women remain controversial due on the one hand to lack of data on prevalence,²⁷ and on the other to ignorance of the consequences and impact of treatment in this population.^{28,29} Most studies on the cardiovascular risk of OSAHS and how it improves with CPAP were performed in men. Possible

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