Med Clin (Barc). 2017;xxx(xx):xxx–xxx

MEDICINA CLINICA

www.elsevier.es/medicinaclinica

Brief report

Obstructive sleep apnea-hypopnea syndrome in patients with severe chronic respiratory insufficiency☆

Ana Hernández Voth*, Javier Sayas Catalán, Pedro Benavides Mañas, Alicia de Pablo Gafas, Trinidad Díaz Cambriles, Victoria Villena Garrido

Servicio de Neumología, Hospital Universitario 12 de Octubre, Madrid, Spain

ARTICLE INFO

Article history:
Received 7 October 2016
Accepted 29 December 2016
Available online xxx

Keywords:
Sleep apnea
Hypoxemia
Lung transplantation

ABSTRACT

Introduction and objective: Although sleep disordered breathing is common in patients with a severe chronic respiratory insufficiency (SCRI), there is few information on its prevalence. Our aim was to describe the prevalence and characteristics of the obstructive sleep apnea-hypopnea syndrome (OSAHS) in these patients.
Material and methods: Prospective and observational study carried out on patients with a SCRI included in a waiting list for a lung transplantation and who had undergone a standard polysomnography.
Results: A total of 105 patients were examined, of which 85 met the study's inclusion criteria. The prevalence of the OSAHS was 24.7%, with 19% of cases being severe. The most common underlying respiratory condition was COPD (62%). The OSAHS was linked to the male gender ($P = .002$), weight ($P = .013$), BMI ($P = .034$) and neck circumference ($P = .01$). Although most patients experienced symptoms suggestive of an OSAHS, the average score obtained in the Epworth Sleepiness Scale was low.
Conclusions: We observed a high prevalence of OSAHS in patients with a SCRI but without clinical data suggestive of its diagnosis; hence, we believe that sleep studies should be carried out in these patients given the low pre-test clinical suspicion of the disease.

Síndrome de apnea-hipopnea durante el sueño en pacientes con insuficiencia respiratoria crónica grave

Palabras clave:
Apnea obstructiva
Hipoxemia
Trasplante pulmonar

RESUMEN

Introducción y objetivo: Aunque los trastornos respiratorios durante el sueño son frecuentes en pacientes con insuficiencia respiratoria crónica grave (IRCG), hay poca información sobre su prevalencia. Nuestro objetivo ha sido describir la prevalencia y características del síndrome de apnea-hipopnea del sueño (SAHS) en estos pacientes.
Material y métodos: Estudio prospectivo observacional de pacientes con IRCG incluidos en lista de espera de trasplante pulmonar a los que se les realizó una polisomnografía estándar.
Resultados: Ciento cinco pacientes fueron valorados. Ochenta y cinco cumplieron los criterios de inclusión. La prevalencia de SAHS fue del 24,7%, y un 19% de ellos eran graves. La enfermedad respiratoria más frecuente fue la EPOC (62%). El SAHS se relacionó con el sexo masculino (p = 0,002), el peso (p = 0,013), el IMC (p = 0,034) y la circunferencia cervical (p = 0,01). Aunque la mayoría de los pacientes presentaron algún síntoma indicativo de SAHS, la media de puntuación en la Escala de Somnolencia de Epworth fue baja.
Conclusiones: Hemos observado una alta prevalencia de SAHS en pacientes con IRCG, sin datos clínicos que puedan evidenciar su existencia, por lo que consideramos adecuado realizar estudios de sueño dada la baja sospecha clínica pretest.

☆ Please cite this article as: Hernández Voth A, Sayas Catalán J, Benavides Mañas P, de Pablo Gafas A, Díaz Cambriles T, Villena Garrido V. Síndrome de apnea-hipopnea durante el sueño en pacientes con insuficiencia respiratoria crónica grave. Med Clin (Barc). 2017. http://dx.doi.org/10.1016/j.medcli.2016.12.043

* Corresponding author.
E-mail address: anahvoth@gmail.com (A. Hernández Voth).

Introduction

Sleep-disordered breathing (SDB) is common in patients with severe chronic respiratory failure (SCRF). Their relationship is based on nocturnal gas exchange abnormalities that may precede the onset of daytime respiratory failure. However, few studies describe the prevalence of SDB in patients with SCRF.

In diseases involving SCRF, such as chronic obstructive pulmonary disease (COPD), cystic fibrosis (CF) and pulmonary hypertension (PH), some SDB, as the obstructive sleep apnoea hypopnea syndrome (OSAHS), can play some prognostic role.

The association between COPD and OSAHS, known as *overlap* syndrome, has been associated with the development of PH and heart rhythm disturbances, and its treatment with continuous positive airway pressure devices has a positive impact on survival.[1]

Episodes of hypoventilation often occur during sleep in patients with CF and, consequently, hypercapnia, which in turn is related to worsening respiratory failure and development of PH and heart failure. The association between poor prognosis and nocturnal hypoxemia is evident in cases of advanced lung disease.[2]

OSAHS contributes to the development of PH by nocturnal hypoxemia and hypercapnia, causing vasoconstriction of pulmonary arterioles. The pathophysiologic consequences of OSAHS, the negative effects of intermittent hypoxia, sleep fragmentation and changes in intrathoracic pressure ultimately result in daytime PH due to pulmonary and myocardial artery remodeling, or by indirect consequences of increased systemic blood pressure. The relationship of hypoxemia with the development of PH has been demonstrated in patients with advanced lung disease, and this, in turn, with a mortality increase. Several studies carried out with Swan-Ganz catheters for diagnosing PH have reported that approximately 10% of patients with OSAHS have PH, and that treatment of this SDB is associated with hemodynamic improvement.[3]

Given the scarcity of data relating the diseases that present with respiratory failure and OSAHS, our aim is to describe their prevalence and characteristics in patients with SCRF, included on a waiting list for lung transplant (LT).

Methods

Type of study

Prospective, observational, descriptive and analytical study of SDB in patients with SCRF.

Population

All patients included on the Lung Transplant Unit's waiting list in the 12 de Octubre University Hospital of Madrid, who have undergone a diagnostic polysomnography (PSG) before LT. Patients who had a previous diagnosis of OSAHS were excluded, and those who required non-invasive home mechanical ventilation or endotracheal intubation with invasive mechanical ventilation.

Study period

Since the start of the Lung Transplant Program at the unit in September 2008 until October 2013.

Sleep studies

They were performed using a standard PSG on the Multidisciplinary Sleep Unit of 12 de Octubre University Hospital of Madrid. An Alice 5® (Phillips) polysomnograph was used, with measurement of oronasal flow by thermistor and pressure cannula, bands for measuring thoracic and abdominal effort, pulse oximetry for continuous recording of oxyhaemoglobin saturation, microphone for detecting snoring, body position sensor, chin and lower limb electromyography, and electroencephalography with 2 occipital channels (O1/O2) and two central channels (C3/C4). Each PSG was manually reviewed by qualified personnel from the unit, based on guidelines from the Spanish Society of Pneumology and Thoracic Surgery.[4] The presence of apnoea-hypopnea index (AHI) greater than or equal to 10 episodes per hour of sleep was defined as OSAHS, considering it as severe if the AHI $\geq$ 30.

Measurements

The selection and monitoring of patients was performed in the Multidisciplinary Sleep and Lung Transplantation units of 12 de Octubre University Hospital. In addition to performing and analysing the PSG, the following data were recorded:

Anthropometric data: age, sex, weight, height, BMI (weight/height^2) and neck circumference.

Clinical data: underlying lung disease, need for home oxygen therapy, measurement of systolic and diastolic blood pressure. Symptoms suggestive of respiratory disorders were collected during sleep (snoring, pauses of witnessed apnoeas, daytime fatigue, morning headache, clouded consciousness and asphyxia) and Epworth Sleepiness Scale score, considering excessive sleepiness a score higher than 10.

PSG data: total sleep time and percentage of time in each sleep phase, REM and non-REM sleep latencies, AHI, *arousals* index, oxyhaemoglobin desaturation index and percentage of total sleep time with oxyhaemoglobin saturation below 90%.

Statistical analysis

Arithmetic means were calculated for numerical variables with standard deviations and medians with ranges for variables with normal and non-normal distribution, respectively. Data were analyzed using non-parametric statistical tests. The tests used were the McNemar test, the *U* of Mann–Whitney and Wilcoxon. The statistical program used was SPSS 17.0 (SPSS Inc., Chicago, IL, USA). A p value of <0.05 was considered statistically significant.

Results

During the study period, 105 patients with SCRF who were on the waiting list for LT were assessed. Of this group, 20 patients were excluded: 11 of them because a PSG could not be performed, as they received a donor before carrying out the sleep study, seven of them being treated with BPAP- type non-invasive mechanical ventilation at the time of entry into the waiting list, and 2 because their waiting list entry was preferential, with orotracheal intubation and invasive mechanical ventilation. Finally, a sample of 85 patients (Fig. 1) was studied.

The general characteristics of sleep architecture and respiratory episodes of the population are described in Table 1.

The most common lung diseases were COPD (n = 38; 45%), usual interstitial pneumonia (UIP) (n = 19; 23%), primary PH (n = 13; 15%), CF (n = 5; 6%) and other (lymphangioleiomyomatosis, non-CF bronchiectasis, histiocytosis, scleroderma, polymyositis and sarcoidosis, n = 9; 11%).

The most frequent symptoms indicative of OSAHS were snoring (n = 62; 73%), followed by daytime tiredness (n = 53; 62%), nocturia (n = 51; 60%), morning headaches (n = 39; 46%), morning clouded consciousness (n = 25; 29%), witnessed apnoea (n = 17; 20%) and asphyxia during sleep (n = 14; 17%). Although most of the population had at least one OSAHS compatible symptom, the mean score on the Epworth Sleepiness Scale was 6.96 $\pm$ 3.05.