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Original article

Diagnostic value of respiratory polygraphy in patients with low probability of obstructive sleep apnea syndrome☆

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ABSTRACT

Introduction and objective: Polysomnography (PSG) is the gold standard technic for the diagnosis of obstructive sleep apnea syndrome (OSAS). It is an expensive, complex and not always available technic, meaning that respiratory polygraphy (RP) has become usual. Although RP is not validated in low probability patients, Spanish guidelines recommend conservative treatment in patients with negative RP. We intended to study the prevalence and severity of OSAS through PSG in a sample of patients with low probability and negative RP.
Material and methods: Retrospective, observational, descriptive and analytic study of low probability OSAS patients with negative RP in whom a PSG was performed. Anthropometric, clinical and sleep data were collected.
Results: Eighty-two patients were included. After PSG, a greater number of hypopneas (137.8 ± 70.1 vs. 51.2 ± 38.4 [$p < 0.05$]) and apnea hypopnea index (27.8 ± 15.6 vs. 11.7 ± 7.1 [$p < 0.05$]) was observed, as well as an increment in OSAS prevalence of 17%, which was 35% in severe OSAS. In mild OSAS, there was a decrement of 41%.
Conclusion: According with the results of this study, RP significantly underestimates the prevalence and severity of OSAS in low probability patients. While it is necessary to adequately stratify the OSAS probability in order to correctly indicate diagnosis tests, we recommend performing a PSG in low probability patients with negative RP.

Valor diagnóstico de la poligrafía respiratoria en pacientes con baja probabilidad de síndrome de apneas e hipopneas durante el sueño

Palabras clave:
Poligrafía
Polisomnografía
Baja probabilidad
Síndrome de apneas obstructivas de sueño

RESUMEN

Introducción y objetivo: La polisomnografía (PSG) es el método estándar para el diagnóstico del síndrome de apneas e hipopneas del sueño (SAHS). Es una técnica cara, compleja y de poca disponibilidad, por lo que la poligrafía respiratoria (PR) es de uso habitual. La PR no está validada en casos de baja probabilidad; sin embargo, la normativa vigente contempla el tratamiento conservador en caso de PR negativa. Nos hemos propuesto estudiar la prevalencia y gravedad del SAHS mediante PSG, en una muestra de pacientes con baja probabilidad y PR negativa.
Material y métodos: Estudio retrospectivo, observacional, descriptivo y analítico de pacientes con baja probabilidad de SAHS y PR negativa a los que se les realizó posteriormente una PSG. Se registraron datos antropométricos, clínicos y características del sueño.

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Resultados: Ochenta y dos pacientes fueron incluidos. En el registro de la PSG se observó un incremento de hipopneas (137,8 ± 70,1 frente a 51,2 ± 38,4 [p < 0.05]) y del índice de apneas e hipopneas (27,8 ± 15,6 frente a 11,7 ± 7,1 [p < 0,05]), así como un aumento del 17% en la prevalencia de SAHS, de un 35% de casos graves y una disminución de un 41% de los casos leves.
Conclusión: De acuerdo con los resultados de este estudio, la PR subestima de forma estadísticamente significativa la prevalencia y gravedad del SAHS en pacientes con baja probabilidad. Es necesario un adecuado proceso de estratificación de riesgo para la correcta indicación de pruebas diagnósticas, y recomendable realizar una PSG cuando se ha realizado una PR con resultado negativo en estos pacientes.

Introduction

According to the evidence derived from solid cohort studies, an increase in cardiovascular morbidity and mortality in patients with obstructive sleep apnea syndrome (OSAS) has been demonstrated, especially in those with an apnea-hypopnea index (AHI) greater than or equal to 30, but the risk is already observed with an AHI greater than 15.[1] These data show that the definition of OSAS should be based primarily on obtaining an abnormal AHI.[2]

Conventional polysomnography (PSG) is the reference method for the diagnosis of patients with suspected OSAS.[3] This study is conducted in a sleep laboratory, under technical surveillance and a night record of at least 3 h of continuous sleep; it is an expensive and complex technique which not all the centers have, that is why portable devices for respiratory polygraphy (RP) have been developed. However, unlike the PSG, the RP does not consider electroencephalography, electromyography or electrooculography, so the *arousals* caused by airflow limitations cannot be demonstrated.

After several validation studies, it was concluded that RPs can be used as an alternative to PSG in patients with moderate or high probability of obstructive sleep apnea.[4]

According to the guidelines of the Spanish Society of Respiratory Diseases (SEPAR) for the diagnosis and treatment of OSAS,[1] the clinical probability of the disorder is classified as:

- Low: patients with snoring and observed apneas, without drowsiness or cardiovascular comorbidity.
- Moderate: patients with snoring and observed apneas and/or score on the Epworth Sleepiness Scale[5] of 12–15 and/or body mass index (BMI) ≥ 30 without cardiovascular comorbidity.
- High: patients with snoring and observed apneas, score on the Epworth Sleepiness Scale > 15, BMI > 30 and/or cardiovascular comorbidity.

RP confirms the suspicion of OSAS in patients with moderate or high probability. In contrast, its use in cases of low probability of obstructive sleep apnea is not validated, although it is a part of routine clinical practice.[1] According to Spanish legislation, if there is clinical suspicion of OSAS and RP is negative, a PSG has to be performed to definitively rule out the diagnosis; however, according to the algorithm of action in suspected OSAS in this same legislation, a patient with a low probability that has undergone a RP that is negative, should be treated with conservative measures, sleep hygiene and weight control diets.

When in doubt as to diagnosis and treatment of OSAS in a patient with clinical suspicion but low probability, we intend to study the prevalence and severity of OSAS diagnosed by PSG, in a sample of patients with low probability and RP negative, to assess the reliability of ambulatory sleep studies in this population.

Methods

Type of study

Retrospective, observational, descriptive and analytical study on the comparison between the results of RP and PSG performed in patients with clinical suspicion of OSAS and low probability.

Population

All patients evaluated by a hospital department on sleep-related breathing disorders with suspected OSAS and low pretest probability, which underwent a portable ambulatory RP and subsequently a hospital PSG. Patients whose PSG had been performed as titration for *continuous positive airway pressure* (CPAP) devices or *bilevel positive airway pressure* (BiPAP) devices were excluded.

Study period

Since the start of the operation of the Sleep-related breathing disorders (SRBD) unit in September 2008 until May 2014.

Sleep studies

All studies were performed in the sleep laboratory of the SRBD unit of the Infanta Sofia University Hospital in Madrid. Embletta® PDS and Gold® (ResMed), Nox T3® (NoxMedical) and SOMNOScreen® (SANRO) polygraphs were used for the RPs, all measure oronasal flow by thermistor and pressure cannula, bands for measuring thoracic and abdominal effort, pulse oximetry for continuous recording of oxyhemoglobin saturation, microphone to detect snoring and body position sensor. A Comet-PLUS XL® polysomnography was used for PSG with TWin® PSG Software (GRASS Technologies), with oronasal flow measurement by thermistor and pressure cannula, bands for measuring thoracic and abdominal movements, pulse oximetry for continuous recording of oxyhemoglobin saturation, microphone for detecting snoring, body position sensor, chin and lower limb electromyography, electrooculography and electroencephalography with 2 occipital channels (O1/O2) and 2 central channels (C3/C4). Each PSG was manually reviewed by qualified Unit personnel, based on guidelines from SEPAR[1] and the *American Academy of Sleep Medicine*.[6] The presence of an AHI ≥ 10 has been considered diagnosis of OSAS. With respect to the classification by severity, it was established as follows: mild (AHI < 15), moderate (AHI 15–29.9) and severe (AHI > 30).

Measurements

A retrospective review of sleep studies (RP and PSG) conducted in the SRBD unit was carried out from the Unit's own databases, collecting the following data:

Anthropometric data: age, sex, weight, height, body mass index (weight/height^2) and cervical perimeter.