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Research Article

SLEEP DISTURBANCE IN PATIENTS WITH BRONCHOPULMONARY PATHOLOGY

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ABSTRACT

Conducting night cardiorespiratory monitoring in patients with chronic obstructive pulmonary disease allows us to identify 4 clinical and pathogenetic variants of breathing during the night hours. The course of chronic obstructive pulmonary disease without obstructive sleep apnea syndrome in older patients with a long history of the disease, severe obstructive disorders and pulmonary hypertension can lead to nocturnal hypoxemia and poor quality of night sleep.. Patients with chronic obstructive pulmonary disease with obstructive sleep apnea syndrome and persistent nocturnal hypoxemia against the background of effective sipap therapy need additional low-flow oxygenotherapy during the night hours. Patients with severe chronic obstructive pulmonary disease without obstructive sleep apnea need low-flow oxygen therapy at night.

KEYWORDS

Chronic obstructive pulmonary disease, sleep apnea, CPAP therapy.

INTRODUCTION

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Chronic obstructive pulmonary disease (COPD) is one of the leading causes of morbidity and mortality worldwide. A number of studies have reported that the prevalence of COPD in the adult population is 5–9% (1,2). COPD is a common cause of doctor visits, hospital admissions, and intensive care units. It is the only disease whose death rate continues to increase. Mortality from COPD ranks 4th among all causes of death in the general population, which is about 4% in the structure of total mortality [1].

In modern society, COPD, along with arterial hypertension, coronary heart disease and diabetes mellitus, constitute the leading group of chronic diseases: they account for more than 30% of all other forms of human pathology (4,6).

The World Health Organization (WHO) classifies COPD as a group of diseases with a high level of social burden, as it is widespread in both developed and developing countries. The forecast compiled by WHO experts until 2020 indicates that COPD will not only become one of the most common forms of human pathology, but will also become one of the leading causes of death [2].

Recently, the role of obstructive sleep apnea (OSA) in the pathogenesis of respiratory failure has been widely discussed. OSAS is characterized by the development of pauses in breathing during sleep lasting more than 10 seconds with a frequency of more than 10 per hour. (3.5). According to the literature, hypoxemia, hypercapnia, and acidosis developing during sleep apnea contribute to the occurrence of pulmonary hypertension, cardiac arrhythmias, and right ventricular failure (5,7).

Undoubtedly, the combination of different levels and mechanisms of airway obstruction in one patient leads to a worsening of the course of the disease. However, the clinical and diagnostic characteristics of the chiasm syndrome have not been sufficiently studied: the features of the clinical picture, indicators of acid-base balance and respiratory function, as well as indications for and modes of ventilation of CPAP therapy in combination with low-flow oxygen therapy (3,5,7).

In this regard, the development of algorithms for diagnosing the disease, comorbid conditions when planning drug therapy in patients with COPD is of particular importance.

MATERIAL AND RESEARCH METHODS

67 patients with chronic obstructive pulmonary disease of moderate severity and severe course in the remission phase of the disease were examined. In all patients, the diagnosis was confirmed by spirometry data (FEV] < 80%, FEV] / FVC < 70%, the absence of significant positive dynamics after the use of a bronchodilator - an increase in FEV1 < 12%). A total of 67 people were examined: 54 men (80.6%), 13 women (19.4%). The mean age was 57.93 ± 9.73 years.

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Patients underwent a comprehensive examination, an additional anthropometric study and a questionnaire, which included two questionnaires - a questionnaire for detecting daytime sleepiness and sleep disorders (Epfort's Sleepiness Scale modified by Levin). It was also carried out using the analyzer of acid-base balance RADIOMETER ABL 50. 8. study of the gas composition of capillary blood. Evaluation of indicators of the function of external respiration was carried out on the diagnostic system "Valenta". The following indicators were determined: a) forced vital capacity (VC), b) forced expiratory volume in 1 second (FEV1).

All patients underwent nocturnal cardiorespiratory monitoring (Flaga polysomnographic complex, Iceland) and pulse oximetry.

Statistical processing of the obtained results was carried out using commonly used methods of parametric and non-parametric statistics.

RESEARCH RESULTS

Night cardiorespiratory monitoring was carried out using the Flaga polysomnographic complex, Iceland. At the same time, the following indicators were evaluated: apnea/hypopnea index, desaturation index, average and minimum oxygen saturation at night according to pulse oximetry data.

As a result, all patients were divided into 2 groups:

Group I - patients with obstructive sleep disorders of varying severity 32 - human. The severity was assessed by the apnea/hypopnea index. Of them:

- in 15 patients (46.9%) severe obstructive sleep apnea syndrome (apnea/hypopnea index >40 per hour);
- 9 people (28.1%) had moderate obstructive sleep apnea syndrome (apnea/hypopnea index 20-40 per hour);
- 8 people (25%) mild obstructive sleep apnea syndrome (apnea/hypopnea index 10 - 20 per hour);
- Group II - control group - patients without obstructive sleep apnea/hypopnea syndrome - 35 people. The apnea/hypopnea index in this group was less than 10 per hour.

Among the patients of the 1st group there were 6 women (18.75%) and 26 men (81.25%), the 2nd - 7 women (20%) and 28 men (80%). Males predominated in both groups.

The main differences in anthropometric data and the results of cardiorespiratory monitoring of patients in the main and control groups are presented in Table 1.

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Table 1

Characteristics of the study groups of patients with chronic obstructive pulmonary disease

Characteristics	Main group	Control group	Reliability of differences
Number of persons	p = 32	p = 35	
Age, years	55,1±8,1	60,5+10,5	p < 0,05
BMI, kg/m ^{2}	34,9±5,9	26,9±5,5	p < 0,05
IAG, sob. an hour	39,5±25,1	3,9±3,5	p = 0,001
ID, sob. an hour	54,5+29,1	7,6+10,7	p = 0,001
Medium B a 0_2, %	90,0±6,1	93,0±2,4	p = 0,001
Minimum Ba Og, %	69,8+11,2	84,0±5,1	p = 0,001

The average age of patients with obstructive sleep apnea was 55.1 ± 8.1 years. The mean age of patients in the control group was significantly older and amounted to 60.5±10.5 years (p < 0.01).

Patients of the two groups also had differences in body mass index. In the 1st group, BMI was significantly higher and amounted to 34.9±5.9, in the 2nd group - 26.9±5.5 (Table 1) paid attention:

- significant differences in the values of the apnea/hypopnea indices of the main and control groups (39.5±25.1 and 3.9+3.5, respectively) - the main criterion for distinguishing the formation of groups of patients (p = 0.001);
- significant differences in the desaturation index in the main and control groups (54.5±29.1 and 7.6±10.7, respectively), which naturally confirms the diagnosis of obstructive sleep apnea syndrome in patients of the main group (p = 0.001);
- significant differences in the values of the average oxygen saturation at night (90.0±6.1% in the main group and 93.0±2.4% in the control group), which is explained by frequent episodes of desaturation in patients with obstructive sleep apnea syndrome;
- significantly lower minimum oxygen saturation among patients of the main group (69.8±11.2% in patients of the main group and 84.0±5.1% in patients of the control group), which is associated with a sharp drop in oxygen saturation during episodes of apnea or hypopnea.

It was noted that the desaturation index in the main and control groups exceeded the apnea/hypopnea

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index, although episodes of desaturation, according to the literature, are closely associated with episodes of apnea and hypopnea ( ). This increase in the desaturation index is most likely associated with the presence of chronic obstructive pulmonary disease in these patients.

All patients of the main group underwent selection of therapy with non-invasive ventilation of the lungs at night (CPAP therapy) under the control of night cardiorespiratory monitoring with an assessment of the following indicators: apnea/hypopnea index (AHI), desaturation index, average and minimum oxygen saturation. The pressure level in CPAP was selected individually until AHI <10 events an hour. Thus, in all patients of the main group, CPAP therapy effectively cured the obstructive sleep apnea syndrome. However, according to pulse oximetry data, in 8 patients (25% of cases), the average level of oxygen saturation at night remained below 88%, despite successful treatment of OSAS.

Based on the above, patients of the main group were divided into 2 subgroups:

Subgroup 1 - patients with chronic obstructive pulmonary disease with obstructive sleep apnea syndrome, in whom CPAP therapy led to a decrease in AHI below 10 per hour. At the same time, the average oxygen saturation at night was above 88%.

Subgroup 2 - patients with chronic obstructive pulmonary disease and obstructive sleep apnea syndrome, who, on the background of CPAP therapy, had AHI < 10 per hour, but to achieve an average oxygen saturation at night of more than 88%, additional low-flow oxygen therapy was required.

According to the results of cardiorespiratory monitoring, patients in the control group had an apnea/hypopnea index below 10 per hour, that is, they had no data for obstructive sleep apnea syndrome. However, when evaluating the pulse oximetry data, it was found that in 9 patients (25.7%) the average oxygen saturation at night was less than 88%. Such patients were selected for low-flow oxygen therapy at night under the control of cardiorespiratory monitoring. The 02 feed rate was selected individually and amounted to 1-3 liters per minute, the efficiency criterion was an increase in the average Ea 02 > 90%.

Based on these data, the control group - patients with chronic obstructive pulmonary disease without obstructive sleep apnea syndrome was divided into 2 subgroups:

Subgroup 1 - patients with chronic obstructive pulmonary disease and nocturnal hypoxemia receiving low-flow oxygen therapy.

Subgroup 2 - patients with chronic obstructive pulmonary disease without obstructive sleep apnea syndrome and without nocturnal hypoxemia.

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Subgroup 3. Based on the data obtained, 4 clinical and pathogenetic variants of respiratory failure at night in COPD patients were identified:

1. Patients with chronic obstructive pulmonary disease in combination with obstructive sleep apnea syndrome receiving CPAP therapy without nocturnal hypoxemia.

2. Patients with chronic obstructive pulmonary disease in combination with obstructive sleep apnea syndrome receiving CPAP therapy in combination with low-flow oxygen therapy.

3. Patients with chronic obstructive pulmonary disease with nocturnal hypoxemia receiving low-flow oxygen therapy.

4. Patients with COPD without obstructive sleep apnea and no nocturnal hypoxemia.

CONCLUSION

In conclusion, it should be noted that conducting night cardiorespiratory monitoring in patients with chronic obstructive pulmonary disease with an assessment, first of all, of the apnea / hypopnea index and the values of the average and minimum saturation, in addition to the traditional methods of examining patients with COPD (assessment of the degree of dyspnea, cough and - indicators of spirometry) carried out during the daytime, during wakefulness, significantly complements our understanding of respiratory dysfunction and allows us to determine the indications for respiratory therapy in patients with chronic obstructive pulmonary disease.

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