

Features Of Sleep Apnea Syndrome In Patients With Chronic Obstructive Pulmonary Disease

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Abstract. *Clinical-instrumental examination and polysomnographic examination were performed in 56 patients with chronic cerebral ischemia on the background of venous cerebral dysfunction with concomitant pathology - chronic obstructive pulmonary disease. 21 (37.5%) of the examined patients had clinical manifestations of obstructive sleep apnea / hypopnea syndrome: mild - in 3, moderate - in 11, severe - in 7. A significant correlation was shown between body mass index, the number of episodes of apnea and the level of saturation of blood hemoglobin with oxygen, symptoms of venous cerebral dysfunction. Correlation with the index of forced expiratory volume for 1 second was not revealed. It should be assumed that in the pathogenesis of obstructive apnea / hypopnea syndrome in chronic obstructive pulmonary disease, the degree of obesity and venous cerebral dysfunction are more important than the severity of lower airway obstruction.*

Key words: *obstructive sleep apnea / hypopnea syndrome, polysomnography, venous cerebral dysfunction.*

1. INTRODUCTION

Venous cerebral dyscirculation (VCD) often occurs with congestion in the superior vena cava system, right ventricular failure, circulatory disorders in the pulmonary circulation. Moreover, in this category of patients, along with hemodynamic factors in the development of this pathology, individual neuro-reflex mechanisms and primary pathological conditions are of great importance, leading to the development of discirculation in the venous system of the brain.

In patients with VCD against the background of chronic obstructive pulmonary disease (COPD), obstructive sleep apnea syndrome (OSAS) significantly aggravates the course of the underlying disease, increases hypoxemia, promotes the development of secondary erythrocytosis, pulmonary hypertension and the formation of chronic cor pulmonale with right ventricular failure [3, 9, 10].

The prevalence of OSAS among the entire population over 30 years old is 5–7%. These indicators are comparable to the prevalence of bronchial asthma. About 1–2% of this group of people suffer from severe forms of the syndrome. Among people over 60 years of age, the frequency of OSAS increases noticeably and is about 30% in men and about 20% in women. In people over 65 years of age, the incidence of this syndrome can reach 60% [1].

The combination of COPD and OSAS - overlap syndrome - is a state of mutual burdening. The prevalence of overlapping syndrome among people with COPD is estimated at 2%, and among patients with OSAS - at 10%. In this regard, patients with COPD with suspected OSAS should undergo polysomnography and, if necessary, prescribe appropriate treatment. In this regard, patients with COPD with suspected OSAS should undergo polysomnography and, if necessary, prescribe appropriate treatment.

Polysomnography is a synchronous registration of an electroencephalogram, electrooculogram (movement of the eyeballs), chin electromyogram, air flow at the level of the mouth and nose, respiratory movements of the abdomen and chest, oxygen saturation of hemoglobin in blood, electrocardiogram and motor activity of the legs [6]. This is the main method for studying obstructive sleep apnea syndrome.

There is no effective drug therapy for OSAS. Surgical interventions (uvulopalatopharyngoplasty, septoplasty) are difficult for patients and do not guarantee a cure. Mechanical devices (intraoral applicators, devices for lower jaw reduction) are considered as a possible alternative to treatment with the use of special breathing equipment [6].

The method of choice in the treatment of this syndrome for more than 30 years has been the creation of continuous positive pressure in the upper airways, which prevents their obstruction and maintains sufficient patency - CPAP therapy (Continuous Positive Airway Pressure) [8]. It is prescribed if the severity of OSAS has reached moderate or severe levels. This method of treatment consists in the use of a special breathing equipment that creates a constant flow of air under pressure, which, entering through the mask, prevents the soft tissues of the upper respiratory tract from collapsing and prevents apnea and hypopnea.

The aim of this study was to analyze the frequency and severity of OSAS in patients with venous cerebral insufficiency against the background of chronic obstructive pulmonary disease and the level of oxygen saturation of hemoglobin in the blood at the time of an attack of sleep apnea.

2. MATERIAL AND METHODS

We examined 56 patients with COPD between 40 and 75 years old (30 men and 26 women). The average age of men was 56.5 years, women - 57.5 years. Criteria for inclusion in the study: age over 40 years, the presence of post-dilatation parameters of the function of external respiration and clinical manifestations of respiratory disorders during sleep (snoring, daytime sleepiness, respiratory arrest during sleep). According to the GOLD criteria (2010), middle stage COPD was diagnosed in 39 cases, severe - in 33 cases. In accordance with the GOLD criteria (2011), category B was determined in 18 patients (all cases of moderate airflow restriction), category C - in 15 patients (12 - moderate, 3 - severe airflow restriction), category D - in 5 patients (all cases of severe airflow restriction). Concomitant cardiovascular diseases (ischemic heart disease and arterial hypertension) were present in 39 patients (69.6%). Signs of venous cerebral dyscirculation (VCD) were in 61.4% of the subjects. The overwhelming majority of the surveyed had an increased body weight: the body mass index (BMI) was less than 25 kg/m² in only 7 people (12.5%), in 11 people (19.6%) - from 25 to 29 kg/m² (I class of obesity), in 23 people (41.1%) - from 30 to 40 kg/m² (II class of obesity) and in 18 people (32.1%) - more than 40 kg/m² (III class of obesity).

Polysomnographic examination was carried out at the Research Institute of Endocrinology on Embla S7000 equipment from Medcare, version 4.0 (copyright belongs to Medcare Flaga, USA). The selection of CPAP therapy was carried out using the S8 AutoSet Spirit II system from ResMed (Australia). Statistical processing of the data obtained was carried out using nonparametric and parametric criteria.

3. RESEARCH RESULTS

OSAS was confirmed in 21 patients (37.5%), in 11 cases only the syndrome of nocturnal snoring was recorded without stopping breathing and a drop in the level of hemoglobin oxygen saturation. Among patients with only snoring without apnea, middle stage COPD was detected in 8, severe - in 3 cases; category B - in 8, category C - in 2, category D - in 1 patient. The average forced expiratory volume in 1 second here was $51.3 \pm 8.2\%$ of the required value, concomitant cardiovascular diseases were present in 6 people, BMI averaged $26.1 \pm 2.9 \text{ kg/m}^2$.

Table 1.

The degree of OSAS depending on the presence of VCD in patients, obesity. Moderate COPD was recorded in 11 patients (including 7 men): the average number of respiratory disorders per night was 140.4 ± 25.1 , of which obstructive

		A group of patients with OSAS , n=21								A group of patients without OSAS, n=35	
		mild		medium		severe		Total		35	
		n=3	%	n=1	%	n=7	%	n=2	%		
COPD	moderate	3	14,3%	4	19,0%	0	0,0%	7	33,3%	25	71,4%
	severe	0	0,0%	7	33,3%	7	33,3%	16	76,2%	3	8,6%
VCD		2	66,7%	8	72,7%	7	100,0%	17	81,0%	9	25,7%
Obesity	1 class	2	66,7%	2	18,2%	0	0,0%	4	19,0%	3	8,6%
	2 class	1	33,3%	5	45,5%	3	42,9%	9	42,9%	5	14,3%
	3 class	0	0,0%	4	36,4%	4	57,1%	8	38,1%	2	5,7%

apnea - 46.2 ± 6.7 , obstructive hypopnea - 91.4 ± 9.8 , central apnea - 2.8 ± 0.5 . The average duration of obstructive apnea was 41.5 ± 6.3 s, the average minimum saturation of blood hemoglobin with oxygen was $80.2 \pm 9.8\%$, and the average saturation was $91.4 \pm 8.6\%$. COPD of the middle stage was detected in 4, severe - in 7 patients; category B - in 3, category C - in 5, category D - in 3 patients. The average forced expiratory volume in the 1st was $43.2 \pm 9.2\%$ of the required value. Concomitant cardiovascular diseases were present in 7 people. Cerebral venous encephalopathy symptoms were observed in this group in 72.7% of cases. The average BMI was 33.4 ± 4.1 kg / m² (class I obesity - in 5 people, class II obesity - in 4, class III obesity - in 2 people).

OSAS of severe degree was recorded in 7 people (including 5 men): the average number of respiratory disorders per night was 415.0 ± 31.5 , of which obstructive apnea - 270.6 ± 24.5 , obstructive hypopnea - $134, 0 \pm 13.7$, central apnea - 10.4 ± 1.8 . The average duration of obstructive apnea was 58.9 ± 8.9 , the average minimum saturation of blood hemoglobin with oxygen was $66.9 \pm 5.6\%$, the average saturation was $87.0 \pm 10.4\%$ (the minimum saturation level was 50%) ... COPD of severe degree was determined in all patients of this group; category B was not registered, category C was determined - in 3, category D - in 4 patients. The average forced expiratory volume in the 1st s was $39.2 \pm 6.9\%$ of the required value. All patients had concomitant cardiovascular diseases. In this group, all patients had venous encephalopathy. The average BMI was 41.84 ± 6.2 kg/m², and all patients were obese (class II - in 7 people) (Table 1).

Considering the severity of OSAS and concomitant pathology, CPAP therapy was recommended to 9 patients (42.85%), consultation with an ENT doctor - 11 patients and weight loss - 15 patients. CPAP therapy was selected in 9 cases, 11 people refused it due to the high cost of treatment. During therapy, 6 patients showed a decrease in the apnea / hypopnea index to 5 per hour, which corresponded to the norm. In 1 patient, this index decreased to 9 per hour, which corresponded to the mild severity of OSAS (selection of two-level PAP therapy is recommended).

It was found that signs of cerebral venous dysgenia and obesity were significantly more frequent in the group of patients with moderate and severe OSAS compared with the group of patients where SAOS was not detected.

There was no significant difference in the average values of forced expiratory volume for 1 second with different severity of OSAS and a significant correlation between this indicator and the frequency of apnea. However, similar comparisons with BMI values showed a significant direct correlation with the severity of OSAS, as well as a significant correlation between BMI and the amount of apnea ($r = 0.7$) and the level of hemoglobin oxygen saturation ($r = -0.6$). Apparently, in the occurrence of OSAS, the degree of obesity is pathogenetically more important than the degree of obstruction of the lower airways. The high incidence of OSAS in overweight patients with COPD is probably a feature of the so-called obesity COPD phenotype.

4. CONCLUSION

Based on the foregoing, it can be concluded that OSAS is one of the important mechanisms that aggravate the course of COPD, especially in overweight individuals, and requires mandatory correction of the patency of the upper airways using CPAP therapy. People with

OSAS are also characterized by the formation of venous cerebral dysgenia, which significantly aggravates the course of the underlying disease, increases hypoxemia. To avoid neurological symptoms in patients with COPD, in particular in patients with SAOS, it is necessary to prescribe a course of venotonic drugs.

5. REFERENCES

- [1] Buzunov R.V., Eroshina V.A., Legeida I.V. Snoring and Obstructive Sleep Apnea Syndrome: A Study Guide for Physicians. M., 2007.
- [2] Buzunov R.V. Treatment of obstructive sleep apnea with positive airway pressure: a textbook for physicians / ed. V.S. Gasilin. M., 2004.
- [3] Buzunov R.V. Obstructive sleep apnea syndrome // Attending physician. 2010. No. 11..
- [4] Kalinkin A.L. Diagnosis of obstructive sleep apnea / hypopnea syndrome by cardiorespiratory monitoring // Functional Diagnostics. 2004. No. 3. P. 54–62.
- [5] Kalinkin A.L. Sinus node arrest as a result of sleep apnea as a probable cause of sudden death during sleep // Functional diagnostics. 2005. No. 2. P. 73–77.
- [6] Palman A.D. Obstructive Sleep Apnea Syndrome in Internal Medicine Clinic. M., 2007.78 p.
- [7] Pulmonology: national guidelines / ed. A.G. Chuchalin. M. : GEOTAR-Media, 2009.960 p.
- [8] Somnology and sleep medicine: selected lectures / ed. ME AND. Levin, M.G. Poluektova. M. : Medforum, 2013.432 p.
- [9] Shumatov V.B., Nevzorova V.A. Clinical pathophysiology of systemic manifestations of chronic obstructive pulmonary disease. Vladivostok: Medicine DV, 2012.232 p.
- [10] Weitzenblum E., Chaouat A. Sleep and chronic obstructive pulmonary disease // Sleep. Med. Rev. 2004. Vol. 8. P. 281-294.