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

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SLEEPAPNEASYNDROMEINPATIENTSWITHCHRONICCEREBRALVENOUSINSUFFICIENCYONTHEBACKGROUNDOFCHRONICOBSTRUCTIVEPULMONARYDISEASE

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Sleep Apnea Syndrome in Patients with Chronic Cerebral Venous Insufficiency on the Background of Chronic Obstructive Pulmonary Disease

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Abstract- A clinical instrumental examination and polysomnographic examination were performed in 94 patients with chronic cerebral ischemia against the background of cerebral venous dysfunction with concomitant pathology - chronic obstructive pulmonary disease. 21 (22.3%) patients from the survey had clinical manifestations of obstructive sleep apnea/hypopnea sleep: mild - 3, moderate - 11, severe - 7. A significant correlation was shown between body mass index, the number of apnea episodes and the level of hemoglobin saturation with oxygen, symptoms of cerebral venous dysfunction. No correlation was found between forced expiratory volume indicator and for the 1st second. It should be assumed that in the pathogenesis of obstructive sleep apnea/hypopnea syndrome in chronic obstructive pulmonary disease, the degree of obesity and cerebralvenous dysfunction are more important, and not the severity of obstruction of the lower respiratory tract.

Keywords: obstructive sleep apnea/hypopnea syndrome, polysomnography, cerebral venous dysfunction.

I. Introduction

Cerebral venousdiscirculation (CVD) often occur with congestion in the system of the superior vena cava, right ventricular failure, impaired blood circulation 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 leading to the development of dyscirculation in the venous system of the brain matter.

In patients with CVD on the background of chronic obstructive pulmonary disease (COPD), obstructive sleep apnea/hypopnea syndrome (OSA/HS) significantly aggravates the course of the underlying disease, increases hypoxemia, promotes the development of secondary erythrocytosis, pulmonary hypertension and the formation of chronic pulmonary heart with right ventricular failure [3, 9, 10].

The prevalence of OSA/HS among the entire population over 30 years is 5–7%. These figures are comparable with the prevalence of bronchial asthma. About 1–2% of this group of people suffer from severe forms of the syndrome. Among people older than 60 years, the frequency of OSA/HS increases significantly and is about 30% for men and about 20% for women. In persons older than 65 years, the incidence of this syndrome can reach 60% [1].

Combinations of COPD and OSA/HS - overlap syndrome - is a state of mutual aggravation. The prevalence of chiasm syndrome among persons with COPD is estimated at 2%, and among patients with OSA/HS - at 10%. In this regard, patients with COPD with suspected OSA/HS should always have polysomnography and, if necessary, prescribe appropriate treatment. In this regard, patients with COPD with suspected OSA/HS should always have polysomnography and, if necessary, prescribe appropriate treatment.

Polysomnography is a synchronous recording of electroencephalogram, electrooculogram (eyeball movement), submental electromyogram, airflow at the level of the mouth and nose, respiratory movements of the abdomen and chest, oxygen saturation of hemoglobin, electrocardiogram and leg activity [6]. This is the main method of investigating obstructive sleep apnea.

There is no effective drug treatment for OSA/HS. Patients hard tolerate surgical interventions (uvulo-palato-pharyngoplasty, septoplasty) and do not guarantee cure. Mechanical devices (intraoral applicators, devices for reposition of the lower jaw) are considered as a possible alternative to treatment using special breathing apparatus [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 respiratory tract, which prevents their obstruction and maintains sufficient permeability - CPAP-therapy (Continuous Positive Airway Pressure) [8]. It is prescribed if the severity of OSA/HS has reached moderate or severe levels. This method of treatment consists in the use of a special breathing apparatus, which creates a constant stream of air under pressure, which, acting through a mask, prevents the soft tissues of the upper respiratory tract from falling and prevents apnea and hypopnea.

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The purpose of this study was to analyze the frequency and severity of OSA/HS in patients with cerebral venous insufficiency on the background of chronic obstructive pulmonary disease and the level of hemoglobin saturation with blood oxygen at the time of an apnea.

II. Material and Methods

94 patients with COPD aged 40 to 75 years (68 men and 26 women) were examined. The average age of men was 56.5, women - 57.5 years. Criteria for inclusion in the study: age over 40 years, the presence of post-deduction parameters of respiratory function and clinical manifestations of breathing disorders during sleep (snoring, daytime sleepiness, respiratory arrest during sleep). According to the criteria of Global Initiative for Chronic Obstructive Lung Disease (GOLD) (2010), middle stage COPD was diagnosed in 52, severe - in 42 cases. In accordance with the GOLD (2011) criteria, category B was determined in 18 patients (all cases of moderate degree of restriction of airflow), category C in 62 patients (34 - moderate, 28 - severe degree of restriction of airflow), category D - in 14 patients (all cases of severe airflow restrictions). Concomitant cardiovascular diseases (ischemic heart disease and arterial hypertension) were present in 69 patients (73.4%). Signs of cerebral venousdiscirculation (CVD) were in 61.4% of the subjects. The overwhelming majority of those examined had increased body weight: only 15 people (15.96%) had less than 25 kg/m^2 in body mass index (25 to 29 kg/m^2 in 21 people (22.34%)) (I the degree of obesity), in 29 people (30.85%) - from 30 to 40 kg/m^2 (II degree of obesity) and in 7 people (7.45%) - more than 40 kg/m^2 (III degree of obesity).

A polysomnographic survey was conducted at the MedcareEmbla S7000 Research Institute of Endocrinology, version 4.0 (copyright belong to MedcareFlaga, USA). CPAP - therapy was selected using the ResMed (Australia) S8 AutoSet Spirit II system. Statistical processing of the data obtained using nonparametric and parametric criteria.

III. Results

OSA/HS was confirmed in 21 patients (22.34%), in 31 cases only night snoring syndrome was recorded without stopping breathing and the oxygen saturation level of hemoglobin in the blood decreased. Among patients with only snoring without apnea, COPD of the middle stage was determined in 21, severe - in 10 cases; category B in 5, category C in 17, category D in 9 patients. The average indicator of forced expiratory volume in 1 second here was 51.3 ± 8.2% of the due, 6 people had concomitant cardiovascular diseases, the BMI was on average 26.1±2.9 kg / m2 (normal weight was registered in 15, I degree obesity - in 14, II degree obesity - in 2 people).

The mild OSA/HS was recorded in 3 people. The average number of respiratory disorders per night was 50.1±12.1, of which obstructive sleep apnea - 11.7 ± 2.4. The average duration of obstructive apnea was 26.4 ± 4.1 s, the average minimal oxygen saturation of hemoglobin with blood was 84.1 ± 10.3%, and the average saturation was 97.4±9.6%. COPD of the middle stage was determined in all patients of this group, category B - in one, category C - in two. The average indicator of the forced expiratory volume for the first was 42.4±7.1% of the due. Concomitant cardiovascular diseases were present in 2 people. 33.3% of the subjects had symptoms of venous dysgemia of the brain. The average BMI was 32.8±3.8 kg/m^2 (II degree obesity - in 2 patients) (Table 1).

Table 1: The degree of SOAGS depending on the presence in patients with IDC, obesity

OSA/HS n=21		Mild Degree		Moderate Degree		Severe Degree		Total		Surveyed without OSA/HS	
		n=3	%	n=11	%	n=7	%	n=21	%	73	%
COPD	Moderate Severity	3	14.3	4	19.0	0	0.0	7	33.3	67	91.8
	Severe Degree	0	0.0	7	33.3	7	100.0	16	76.2	6	8.2
CVD		1	33.3	8	72.7	7	100.0	16	76.2	26	35.6
Obesity	1st Degree	1	33.3	5	45.4	0	0.0	6	28.6	54	74.0
	2nd Degree	2	66.7	4	36.4	7	100.0	13	61.9	16	21.9
	3rd Degree	0	0.0	2	18.2	0	0.0	2	9.5	5	6.8

OSA/HS of moderate degree was recorded in 11 patients (including seven men): the average number of respiratory disorders per night was 140.4±25.1, of which obstructive apnea was 46.2±6.7, obstructive hypopnea was 91.4±9.8, and central apnea was 2.8±0.5. The average duration of obstructive apnea was 41.5±6.3 s, the average minimal oxygen saturation of hemoglobin with blood was 80.2±9.8%, and the

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average saturation was 91.4±8.6%. COPD of the middle stage was determined in 4, severe - in 7 patients; category B - in 3, category C - in 5, category D - in 3 patients. The average indicator of forced expiratory volume with for the 1st second was 43.2±9.2% of the due. Concomitant cardiovascular diseases were present in 7 people. Symptoms of cerebral venous encephalopathy were observed in this group in 72.7% of cases. The average BMI was 33.4 ± 4.1 kg/m^2 (obesity grade I - 5, obesity grade II - 4, obesity grade III - 2 people).

OSA/HS severe 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 was 270.6±24.5, obstructive hypopnea was 134.0±13.7, central apnea was 10.4±1.8. The average duration of obstructive apnea was 58.9±8.9 s, the average minimum saturation of blood hemoglobin with oxygen was 66.9±5.6%, the average saturation was 87.0±10.4% (the minimum level of saturation was 50%). Severe COPD was determined in all patients of this group; category B is not registered, category C was determined in 3, category D in 4 patients. The average indicator of forced expiratory volume for the 1st with was 39.2±6.9% of the due. Concomitant cardiovascular diseases were present in all patients. In this group, all patients had venous encephalopathy. The average BMI was 41.84±6.2 kg/m^2, and all patients were obese (II degree - in 7 people) (Table 1).

Taking into account the severity of OSA/HS and comorbid pathology, CPAP-therapy was recommended to 9 patients (42.85%), an ENT doctor's consultation - to 11 patients and a weight loss - to 15 patients. CPAP therapy was selected in 9 cases; 11 people refused it due to the high cost of treatment. During therapy, in 6 patients a decrease in the apnea/hypopnea index to 5 per hour was observed, which corresponded to the norm. In 1 patient, this index decreased to 9 per hour, which corresponded to the mild severity of OSA/HS (recommended selection of two-level PAP therapy).

It was found that the signs of cerebral venousdysgemia and obesity were significantly more common in the group of patients with OSA/HS of moderate severity and severe compared with the group of patients where SAIA was not detected.

No significant difference was found in the mean indices of the forced expiratory volume for the 1stwith a varying severity of OSA/HS and a reliable correlation connection of this indicator with the frequency of apnea. However, with similar comparisons with BMI values, there was a significant direct correlation with the severity of OSA/HS, as well as a significant correlation between BMI and the amount of apnea (r=0.7) and the oxygen saturation level of hemoglobin (r = –0.6). Apparently, in the occurrence of OSA/HS, the degree of obesity is more important pathogenetically than the degree of obstruction of the lower respiratory tract. The high incidence of OSA/HS in patients with increased body weight in COPD is probably a feature of the so-called obesity COPD phenotype.

IV. Conclusion

Based on the foregoing, it can be concluded that OSA/HS is one of the important mechanisms that make heavier the course of COPD, especially in individuals with increased body mass, and requires mandatory correction of the upper airway patency using CPAP-therapy. For persons with OSA/HS, the formation of cerebral venousdysgemia is also characteristic, which significantly aggravates the course of the underlying disease and increases hypoxemia. For the non-removal of neurological symptoms in patients with COPD, in particular in patients with OSA/HS, course of venotonic drugs should be prescribed.

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