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BRIEF REVIEW

Obstructive Sleep Apnea (OSA) in patients with Chronic Obstructive Pulmonary Disease (COPD)

Apnée Obstructive du Sommeil (AOS) chez les patients atteints de la Broncho-Pulmonaire Chronique Obstructive (BPCO)

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ABSTRACT

Introduction. The term "overlap syndrome" is used to indicate the coexistence of OSA and any chronic respiratory diseases such as idiopathic pulmonary fibrosis or cystic fibrosis, but the use of this term is usually limited to the relationship between OSA and COPD. The incidence of OVS ranged from 2.9% to 65.9% in patients with COPD and the prevalence of OSA in COPD patients is higher than in non-COPD group (23% versus 10%). There was a significant correlation between AHI and snoring during sleep, nocturia and Epworth score. OVS patients had a decrease in blood oxygen saturation at night compared to COPD patients without OSA or OSA alone. The risk of respiratory failure increase with higher CO2 and pulmonary hypertension although the bronchial obstruction is mild or moderate level. ***Observation.*** The objective evidence of disturbed sleep in COPD patients have been proven by studies on EEG: reduced sleep effectiveness, onset for difficult sleep, the total sleep time is reduced, the period of awakening is frequent and prolonged. Patients with overlapping syndrome, when compared with patients with obstructive respiratory disease only, had a higher Epworth score, lower total sleep time, and sleep efficiency. There were no significant differences in sleep disturbances in subjects with the highest and lowest FEV1 levels. OVS patients are at risk of developing pulmonary hypertension although the obstruction is not so serious. Age, gender, BMI and the presence of co-morbidities such as hypertension may be superior beside the traditional symptoms of OSA. ***Conclusion.*** The coexistence of COPD and OSA (overlap syndrome-OVS) is common condition with high number of patients. The clinical signs such as snoring, nocturia and daytime sleepiness (assessed by the Epworth score) and PSG are required signs and very useful to detect OSA in COPD patients.

KEYWORDS: Overlap syndrom (OVS); Obstructive sleep apnea (OSA); COPD; Apnea - hypopnea index (AHI).

RÉSUMÉ

Introduction. Le terme «syndrome de chevauchement» est utilisé pour indiquer la coexistence de l'AOS et de toute maladie respiratoire chronique comme la fibrose pulmonaire idiopathique ou la fibrose kystique, mais l'utilisation de ce terme est généralement limitée à la relation entre l'AOS et la BPCO. L'incidence de l'OVS variait de 2,9% à 65,9% chez les patients atteints de BPCO et la prévalence de l'AOS chez les patients BPCO est plus élevée que dans le groupe non BPCO (23% contre 10%). Il y avait une corrélation significative entre l'IAH et le ronflement pendant le sommeil, la nycturie et le score d'Epworth. Les patients OVS avaient une diminution de la saturation en oxygène du sang la nuit par rapport aux patients BPCO sans AOS ou AOS seuls. Le risque d'insuffisance respiratoire augmente avec l'augmentation du CO2 et de l'hypertension pulmonaire bien que l'obstruction bronchique soit modérée ou modérée. ***Observation.*** Les preuves objectives d'un sommeil perturbé chez les patients atteints de BPCO ont été prouvées par des études sur l'EEG: efficacité réduite du sommeil, début de sommeil difficile, durée totale du sommeil réduite, période de réveil fréquente et prolongée. Les patients atteints d'un syndrome qui se chevauchent, comparativement aux patients atteints d'une maladie respiratoire obstructive uniquement, avaient un score d'Epworth plus élevé, un temps de sommeil total et une efficacité du sommeil plus faibles. Il n'y avait pas de différences significatives dans les troubles du sommeil chez les sujets présentant les niveaux de VEMS les plus élevés et les plus bas. Les patients OVS sont à risque de développer une hypertension pulmonaire bien que l'obstruction ne soit pas si grave. L'âge, le sexe, l'IMC et la présence de comorbidités telles que l'hypertension peuvent être supérieurs aux symptômes traditionnels de l'AOS. ***Conclusion.*** La coexistence de la BPCO et de l'AOS (syndrome de chevauchement-OVS) est une condition courante avec un nombre élevé de patients. Les signes cliniques tels que le ronflement, la nycturie et la somnolence diurne (évalués par le score d'Epworth) et le PSG sont des signes obligatoires et très utiles pour détecter l'AOS chez les patients atteints de BPCO.

MOTS CLÉS: Syndrome de chevauchement (OVS); Apnée obstructive du sommeil (AOS); BPCO; Indice d'apnée-hypopnée (IAH).

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INTRODUCTION

Overlap syndrome (OVS) was first introduced by David C. Flenley in 1985 to describe the coexistence of obstructive sleep apnea syndrome (OSA) in patients with chronic obstructive pulmonary disease (COPD). According to him, the term "overlap syndrome" can also apply to the coexistence of OSA and any chronic respiratory diseases such as idiopathic pulmonary fibrosis or cystic fibrosis, but the use of this term is usually limited to the relationship between OSA and COPD [24],[27].

More than three quarters of patients with COPD report nocturnal discomfort symptoms. Sleep complaints increas with more severe illness [1],[8]. However, because the respiratory symtoms are prominent problem, so both patients and clinicians often ignore or disregard. Many studies show that about 0.5-1% of the population has OVS. The incidence of COPD in OSA patients according to Bradley (1985) [3] is 14% and Chaouat A (1995) is 11% [5]. A study of Pavel Turcania (2014) noted that the OSA rate among COPD patients who hospitalized for acute exacerbations was 51.4% [14]. And if patient has a sustainly increase in CO2, the OVS rate is up to 82% (Cristina Miralles 2013). OVS patients had a decrease in blood oxygen saturation at night compared to COPD patients without OSA or OSA alone. The risk of respiratory failure increase with higher CO2 and pulmonary hypertension although the bronchial obstruction is mildle or moderable level.

OBSERVATION

COPD affects about 10% of adults and OSA is also reported to have a similarly high incidence [17]. According to S Duong-Quy et al (2018): OSA has apnea - hypopnea index (AHI) > 5 found in 8.5% and AHI > 15 (5.2% of cases) [22]. A recent review by Shawon et al concluded that the incidence of OVS ranged from 2.9% to 65.9% in patients with COPD [19]. S Duong Quy (2013) reported that the prevalence of OSA in COPD patients is higher than in non-COPD group (23% versus 10%). There was a significant correlation between AHI and snoring during sleep, nocturia and Epworth score ($r = 0.614$, $p < 0.05$, $r = 0.672$, $p < 0.05$, $r = 0.526$, $p < 0.01$) [23]. OVS is observed in a relatively high number of patients because both of COPD and OSA are common conditions.

Quality of sleep

Many patients with COPD complain about poor sleep quality. The objective evidence of disturbed sleep in COPD patients have been proven by studies on EEG: reduced sleep effectiveness, onset for difficult sleep, the total sleep time is reduced, the period of awakening is frequent and prolonged. The cause of poor sleep quality is due to many factors, including nocturnal cough, nocturnal dyspnea, medication use and the influence of age on sleep. In fact, previous studies have included patients with severe COPD with marked hypoxia during the day. On the other hand, The Sleep Heart Health Study (SHHS) studied 1,138 participants with mild COPD, indicating that in the absence of sleep apnea, sleep only has minimal disturbance. There were no significant differences in sleep disturbances in subjects with the highest and lowest FEV1 levels. Therefore, COPD does not affect sleep quality. Sanders and colleagues observed that patients with overlapping syndrome, when compared with patients with obstructive respiratory disease only, had a higher Epworth score, lower total sleep time, and sleep efficiency. lower and higher stimulus index [15],[26].

There were no significant differences in sleep disturbances in subjects with the highest and lowest FEV1 levels [11], [15], [18]. Sanders et al observed that patients with OVS, when compared with patients with COPD only, had a higher Epworth score, a lower of total sleep time and sleep efficiency [16].

Pulmonary hypertension

OVS patients are at risk of developing pulmonary hypertension although the obstruction is not so serious [5]. OVS patients may develop pulmonary hypertension even if they do not have significant bronchial obstruction. Pulmonary hypertension is often observed in severe bronchial obstruction (FEV1 <50% of the predicted value, usually <1,000 ml) resulting in significant hypoxia [4],[6]. This problem can be explained by the contractual impact of diseases on pulmonary gas exchange and hemodynamics.

In patients with COPD, pulmonary hypertension is usually observed when daytime PaO2 is below 55 to 60 mm Hg. It should be noted that if the daytime PaO2 of these patients is about 65 mm Hg, the average PaO2 during sleep is definitely lower because of the repetition of apnea - hypnosis.

Other symptoms

A recent report by Ustun et al indicates that beside the traditional symptoms of OSA including snoring and excessive daytime sleepiness then age, gender, BMI and the presence of co-morbidities such as hypertension may be superior [25].

DISCUSSION

According to Sanders, the coexistence of COPD and OSA is by accident, not through pathophysiology between the two conditions. OVS is observed in a relatively high number of patients, because COPD and OSA are common pathologies [16].

COPD has many clinical phenotypes. With emphysema is dominant and low BMI, can lead to lower rate of OSA. In addition, the excessive pneumonia is reducing the development of OSA by reducing pressure on the upper airway closure during sleep [2]. Emphysema levels and air trapping images on chest computer tomography have been shown to be negatively correlated with AHI in a group of patients with severe COPD [10]

On the other hand, the predominant chronic bronchitis phenotype can lead to a higher likelihood of developing OSA for a variety of reasons [9]. This type of COPD tends to have a higher BMI and a higher incidence of chronic heart disease, and some of these patients have a tendency to hypoxemia and hyper CO2. Peripheral congestion in the chronic heart disease leading to OSA due to the fluid movement that occurs while sleeping in the supine position. Its result is upper airway obstruction due to airway stenosis. Upper respiratory tract inflammation from smoking can also be a contributing factor to the development of OSA. In addition, the upper airway factors of COPD that can lead to OSA include musculoskeletal disease and the effect of inhaled corticosteroid therapy on upper air muscles and function.

In fact, the majority of patients with COPD have both of emphysema and chronic bronchitis, so the probability of OSA may represent the balance of protective and motivating factors in each patient. Some drugs used in COPD such as theophylline have beneficial effects in OSA as well as improve sleep-related gas exchange. Decreased nocturnal blood oxygen saturation is considered to be the most common consequence of disturbed sleep in COPD. Three mechanisms contribute to the reduction of nocturnal blood oxygen saturation in COPD are alveolar hyperventilation, hypoventilation - perfusion and decreased volume of expiratory gas storage (ERV).

OVS patients are at a higher risk for nocturnal oxygen saturation than patients with COPD alone. Its result is respiratory failure and hypercapnia [21],[41]. Potential hypoxia in these patients causes the release of systemic inflammatory mediators including C-reactive protein (CRP), interleukin-6 (IL-6), nuclear factor - kappa beta. (NF-), tumor necrosis factor (TNF-α) and interleukin-8 (IL-8). This intermittent hypoxia also causes oxidative stress, leading to the release of oxygen-free radicals (ROS), mainly from leukocytes. Furthermore the release of mediators causes systemic inflammation leading to endothelial dysfunction and an increased risk of atherosclerosis. The pronounced decrease of oxygen saturation in patients with OVS is an important factor in the development of pulmonary hypertension. C-reactive protein (CRP) has also been identified as commonly elevated in COPD and OSA although obese OSA patients are also an important confounding factor.

Both of COPD and OSA are involved in a series of overlapping physiological disorders including hypoxia and inflammation, which contribute to cardiovascular diseases and other co-morbidities. Therefore, it is highly likely that overlapping syndrome will be at a higher risk of co-morbidity than for each individual pathology. Prolonged hypoxia in many patients with OVS also leads to the formation of molecules that are involved in the mechanisms of cardiovascular diseases, particularly through activation of the mediated transcription pathway by the sensory factor.

A recent report demonstrated that OVS patients had higher sympathetic activity and lower parasympathetic activity when measured by adjusting the sympathetic and parasympathetic heart rates when compared. For those with OSA or COPD alone, it also provides an additional mechanism for cardiovascular diseases. Moreover, the stiffness of the arterial wall in patients with overlapping syndrome is also higher than in patients with OSA alone [20],[27-35].

Other studies have shown that nocturnal desaturations in COPD with OSA are lower than those without OSA with the same level of bronchial obstruction. This characteristic worsens heart diseases as well as cardiovascular complications. Oxygen desaturations that are common in COPD with poor REM sleep are considered to be the cause of pulmonary hypertension. For that reason, the quality of sleep is significantly improved by low-dose oxygen therapy with nasal goggles [12][36-40]. The report of Marin et al demonstrated that OVS patients treated with long-term CPAP, with an average follow-up of 9.4 years, had the same survival rate as patients with COPD only. OVS patients who were not treated with CPAP had a higher mortality rate (relative risk, 1.79; 95% confidence interval, 1.16 - 2.77) and were more likely to get worse leading to hospitalization (relative risk, 1.70; 95% confidence interval, 1.21-2.38) compared to the group with only the COPD [7],[13],[42].

CONCLUSION

The fairly common signs of OSA in the general population such as obesity, morning headache, daytime fatigue are not correlated with the AHI for COPD. So PSG is required for COPD patients with signs of suspected OVS. Regarding clinical signs, the OVS patients have high rate of symptoms such as snoring, nocturia and daytime sleepiness (assessed by the Epworth score) and are correlated with AHI. These are very useful signs to detect OSA in COPD patients.

CONFLIT OF INTEREST

Non.

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