CARDIOLOGIE TUNISIENNE

ARTICLE ORIGINAL

Correlation between the severity of Obstructive Sleep Apnea Syndrome and coronary lesions' extent

Corrélation entre la sévérité du syndrome d'apnée obstructive du sommeil et l'étendue des lésions coronaires

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Résumé

Introduction: Le syndrome de l'apnée obstructive du sommeil (SAOS) est une maladie fréquente mais insuffisamment diagnostiquée. Il joue un rôle majeur dans la progression de l'athérosclérose et peut être considéré comme un facteur de risque cardiovasculaire.
Objectif: Evaluer la corrélation entre la gravité du SAOS et l'étendue des lésions coronariennes.
Méthodes: Nous avons mené une étude prospective comprenant 60 patients (âge moyen = 59 ± 10, Sexe ratio = 1,5) qui ont été admis pour un syndrome coronarien aigu sur une période de 3 mois. Tous les patients avaient coronarographie. La gravité des lésions coronaires était déterminée par le nombre de vaisseaux sténosés ainsi que par un score coronarien. Tous les patients avaient également une polygraphie déterminant l'indice d'apnée de l'hypopnée (IAH) pour chacun d'eux.
Résultats: La prévalence du SAOS était de 61,7%. L'IAH moyen était de 15,32 +/- 15,46 par heure. L'IAH était comparable chez les patients une atteinte monotronculaire, bitronculaire et tritronculaire (13,3 vs 17 vs 14,75, p = NS). Il n'y avait pas de corrélation significative entre l'IAH et le score coronarien (r = -0,046, p = NS)
Conclusion: Le SAOS est fréquent chez les patients admis pour syndrome coronarien aigu, suggérant que son dépistage systématique devrait être effectué dans cette population. La gravité du SAOS ne semble pas être liée à la gravité de la maladie coronarienne. Cependant, d'autres études sont nécessaires pour valider nos résultats.

Mots-clés
Syndrome coronarien aigu, Syndrome d'apnée obstructive du sommeil, coronarographie, polygraphie, score coronaire , Indice d'apnée hypopnée.

Summary

Introduction: Obstructive Sleep Apnea Syndrome (OSA) is a frequent yet under-diagnosed disease. It plays a major role in the progression of atherosclerosis and can be considered as a cardiovascular risk factor.
Objective: To assess the correlation between the severity of OSA and the extent of coronary lesions.
Methods: We conducted a prospective study including 60 patients (mean age= 59±10; sex ratio= 1.5) who have been admitted for an acute coronary syndrome over a period of 3 months. All patients had a coronary angiography. The severity of coronary lesions was determined by the number of stenosed vessels as well as a coronary score. All patients also had a polygraphy determining the Apnea Hypopnea index (AHI) for each one of them.
Results: The prevalence of OSA was 61.7%. The mean HAI was 15.32 +/- 15.46 per hour. The average AHI was quite similar comparing patients having one, two, or three vessels coronary disease. (13.3 vs. 17 vs. 14.75, p = NS). There was no significant correlation between AHI and the coronary score (r = -0.046, p = NS)
Conclusion: OSAS is common in patients with a coronary heart disease, suggesting that its systematic screening should be carried out in this population. The severity of OSAS does not appear to be related to the severity of coronary artery disease. However, further studies are needed to validate our results.

Keywords
Acute coronary syndrome, obstructive sleep apnea, coronarography, polygraphy, coronary score, Apnea Hypopnea Index.

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INTRODUCTION

Obstructive Sleep Apnea Syndrome (OSAS) is a frequent but often under diagnosed disease. It is a serious public health problem because of its prevalence and its association with several other conditions. It affects at least 5% of the general population (1)
Coronary disease is considered one of the major causes of mortality in the world. Many studies suggest a strong association between OSA and ischemic heart disease [2,3].
According to several studies, OSAS is considered as an independent predictor of prognosis in coronary patients. Continuous Positive Airway Pressure (CPAP) has been shown to have a beneficial effect on coronary prognosis and mortality in patient with OSAS [4].
The aim of our study is to assess the relationship between the severity of OSAS and the extent of coronary lesions.

METHODS

We conducted a prospective longitudinal study including 60 patients with acute coronary syndrome. Patients were admitted at the Cardiology Department of Abderrahmen Mami Hospital (Tunisia) over a period of three months. Patients with a history of OSAS and a prior revascularization were excluded. Data was carried out on the basis of a medical questionnaire and a physical examination. We have obtained the informed consent of all our patients. All patients underwent an echocardiography and parameters were measured according to the recommendations of the American Society of Echocardiography [5]. We measured left ventricular diastolic and systolic diameters (LV DD, LV SD). The ejection fraction of the left ventricle (LV EF) was calculated by the Simpson method.
All patients underwent a coronarography by radial approach. The severity of the coronary disease was evaluated by the degree of stenosis: a significant stenosis was diagnosed in the left main and proximal left descending artery when it was superior to 50% and in the other coronary segments when it was superior to 70%. Coronary involvement was classified according to the number of main vessels interested. Stenosis of the left main artery was considered as a two vessel disease. The extent of the coronary disease was classified according to a modified Friesinger score (6).
Polygraphy was carried out after the third day of hospitalization and within a period not exceeding one month after admission. The polygraph of ventilation is an EMBLETTA or Cidelec polygraph. The system identifies five signals: nasobuccal airflow measured by the flow sensor by a nasal bezela thoracic and abdominal respiratory movement signals, nocturnal desaturations detected by oximetry, heart rate, body position.
OSAS is defined according to the American Academy of Sleep Medicine: Apnea-Hyopnea index (AHI)>5 (7). An apnea is defined by a complete interruption of the respiratory flow more than 10 seconds and a hypopnea is defined by a reduction> 50% of the nasal pressure signal, or a decrease between 30 and 50% of the nasal pressure signal associated with> 3% desaturation, or micro-arousal> 10 seconds on the electroencephalogram. AHI was used as an indicator of the severity of OSAS. Our population was subdivided into 3 groups: mild OSAS with AHI between 5 to 15 per hour, moderate OSAS:AHI between 15 to 30 per hour and severe OSAS with AHI greater than or equal to 30 per hour.

Statistical analysis: Firstly, data collected from our participants were checked and classified. Then it was subsequently coded and entered on the statistical analysis software EXCEL in its 2007 version. Clinical, electrocardiographic, echocardiographic, coronary and polygraphic data were collected and treated in a descriptive way, with analysis of the different studied variables and calculation of simple frequencies and relative frequencies (percentages) for qualitative variables; averages and standard deviations for quantitative variables. Concerning the comparative study, the various clinical parameters were studied according to the severity of the OSAS and the significant differences were identified (a difference is considered significant if $p < 0.05$). Finally, the analytical study allowed us to examine the correlations by calculating the Pearson linear correlation coefficient. The dispersion diagram with trend curve was adopted to illustrate these correlations.

RESULTS

Population: The mean age of our population was 59 ± 10 years (38-79 years). Sixty percent of patients were male with a sex ratio of 1.5. Table 1 summarizes the main characteristics of our patients. The prevalence of OSAS was 60 %. Twenty percent of patients had severe OSAS, 20% had moderate OSAS and 20% had a mild OSAS. Patients had one vessel disease in 42.3 %, two vessel disease in 31.6% and three vessel disease in 26.3%. The mean coronary score was 9 +/- 5.6 (3 to 18)

Comparative study: In our study we didn't find significant differences between patients with OSAS (Group 1) and those without OSAS (Group 2) in term of demographic characteristics, distribution of cardiovascular risk factors and echocardiographic data (Table 2). In both groups, the number of one, two and three vessel disease was comparable as well as the mean coronary score (Table3). The mean AHI was 23.97/h in patients with

angiographically normal coronary arteries, 13.3 ± 13.7 in patients with one vessel disease, 17 ± 17.2 in patients with two vessel disease and 14.75 ± 16.45 in patients with three vessel disease. There was no significant difference regarding the mean AHI in patients with one vessel, two vessel and three vessel disease (Figure1). The correlation was not significant between AHI and the coronary score (r = -0.046, p = 0.762) (Figure2).

Table 1: Patient characteristics

Patients (n)	60
Age (years)	59 ± 10
Sex ratio	1,5
Cardiovascular risk factors	
Hypertension	37 (61.7%)
Diabetes	35 (58.3%)
Hypercholesterolemia	24 (40%)
Smoking	31 (51.7%)
Body Mass Index	28.29 ± 4.02
Acute coronary syndrom with ST elevation	43 (71.7%)
Acute coronary syndrom without ST elevation	15 (25%)
LV EF	54.08 ± 15.8%.
LV DD	50 ± 8.6 mm
LV SD	36 ± 13 mm
Coronary Angiography	
• One vessel disease	24 (42.1%)
• Two vessel disease	18 (31.6%)
• Three vessel disease	15 (26.3%)
Mean coronary score	9 ± 5.6
AHI	
• < 5	24 (40%)
• 5-15	12 (20%)
• 15-30	12 (20%)
• >30	12 (20%)
Mean AHI	15.32 ± 15.46
Antiplatelet drugs	100%
ACE/ARBangiotensin-converting-enzyme inhibitor/angiotensin II receptor blockers	40 (66.7%)
Statins	55 (91.7%)
Beta Blockers	43 (71.1%)

Table 2 : Comparison of demographic data and cardio-vascular risk factors in patients with and without OSAS.

	Patients with OSAS (Group 1) (n=36)	Patients without OSAS (Group 2) (n=24)	p
Age	61.28	57.42	0.151
Men	55.56%(20)	66.7%(16)	0.278
Hypertension	66.67%(24)	54.16%(13)	0.24
Obesity	27.78%(10)	29.17%(7)	0.553
Hypercholesterolemia	41.67%(15)	37.5%(9)	0.48
Smoking	44.44%(16)	62.5%(15)	0.134
Diabetes	52.78%(19)	66.67%(16)	0.212

Table 3: Comparison of different angiographic parameters in patients with and without OSAS.

	Patients with OSAS (Group 1) (n=36)	Patients without OSAS (Group 2) (n=24)	p
One vessel disease	14(38.89%)	10(41.67%)	0.800
Two vessel disease	12(33.34%)	6(25%)	0.800
Three vessel disease	8(22.22%)	7(29.17%)	0.800
Main vessel	6(16.67%)	4(16.67%)	0.643
Mean coronary score	7.16 ± 4.72	7.96 ± 5.88	0.567

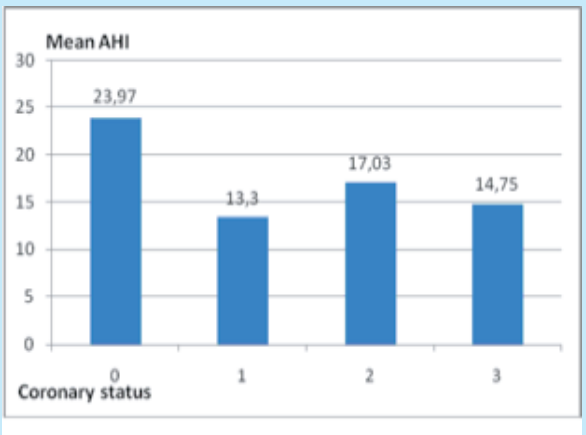

Figure 1: Comparison of mean AHI according of the number coronary vessels stenosed.

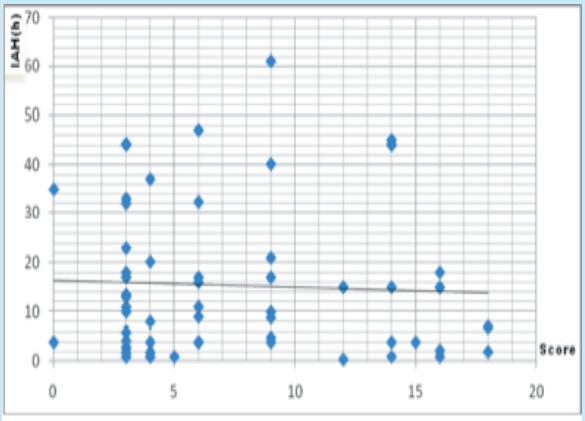

Figure 2 : Correlation of AHI with the coronary score

DISCUSSION

Over past years, there has been a great interest in studying the association between OSAS and cardiovascular diseases [8-9]. It is reflected in the growing number of publications dealing with this subject. OSAS is characterized by repeated obstruction of the upper airways occurring during sleep leading to intermittent hypoxia and then to oxidative stress which seems to be the major factor explaining cardio-vascular morbidity and mortality associated with OSAS [10-11]. As a result of these repeated respiratory events, mechanisms of adaptation of the cardiovascular system have been demonstrated. The main ones are sympathetic hyperactivation, endothelial dysfunction and vascular inflammation. These mechanisms lead to functional and cardiac structural changes predisposing to the progression of atherosclerosis and coronary artery disease. In our study, OSAS was diagnosed in 60% of patients and it was severe in 20% of cases. According to several studies the prevalence of OSAS in ischemic heart disease varies from 43 % to 79 % (42-45, 48-50). We didn't find any correlation between the severity of coronary artery disease and AHI. The AHI was comparable in patients with one, two or three vessel disease. There was no relation between coronary score and AHI. Few studies evaluated the correlation between the severity of coronary lesions assessed by coronarography and the severity of OSAS. In the study of Javadi HR et al. [12] which included 406 patients who had coronary angiography , the probability of having OSAS was higher in patients with two or three vessel disease (60%) than patients with one vessel disease (39%) (p=0.005). Young et al. [13] found more severe coronary lesions in patients with OSAS versus patients without OSAS (80% versus 12%, p <0.05).

In the study of Yumino et al. [14] which included 89 patients who had primary angioplasty for myocardial infarction, 57% of patients had OSAS. Patients with OSAS had a higher restenosis rate compared to those without OSAS (36.5% versus 15.4%, p=0.026).

Kent Brian et al. [15] compared the volume of coronary artery atherosclerosis plaques using coronary angiography in 29 apneic patients. The volume of plaques was higher in patients with AHI > 15.5/ hour compared to those with AHI <15.5 / hour (2.6±0.7 mm^2 versus 0.8±0.2 mm^2, p=0.017).

Other studies evaluated the correlation between OSAS and coronary artery disease using coronary artery calcification score by a helical scan. Weinreich et al. [16] had included 1604 patients with coronary disease in a cross-sectional study. They found a positive and significant correlation between AHI and coronary artery calcification score evaluated by helical scan in men under 65 years (logarithmic increase = 0.25, 95%CI, p=0.051) and women of all ages (logarithmic increase = 0.23 95% CI, p = 0.02).

Kepez et al. [17] had included 97 apneic. Four groups were identified based on AHI. They found that the coronary artery calcification score increased significantly with the severity of OSAS (p=0.046).

Study limitation: The small size of our population was due to the limited accessibility to polygraphy. We didn't test other recent coronary scores. Monitoring the evolution of coronary artery disease after CPAP would have been of great interest

CONCLUSION

In summary, our study shows that OSAS is frequent in patients with coronary artery disease. Few studies have investigated the correlation between the severity of coronary lesions and the severity of OSAS. We found no significant correlation between these two variables. Screening OSAS in coronary patients is a great issue because of the high frequency and the pejorative prognosis of their association.

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