Obstructive Sleep Apnea Syndrome: A Descriptive Review at King Hussein Medical Center

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ABSTRACT

Objectives: To describe the different causes, laboratory diagnosis, and treatment of Obstructive Sleep Apnea Syndrome.

Methods: A total of 100 medical files for patients diagnosed by polysomnography with Obstructive Sleep Apnea Syndrome during the period between January 2007 and November 2011 were reviewed. Demographic data and result of polysomnography were described according to their age, gender, and Body Mass Index. Patients with a definite diagnosis of Obstructive Sleep Apnea Syndrome by polysomnography underwent a titration test to evaluate the comfortable continuous positive airway pressure for Obstructive Sleep Apnea Syndrome. Simple descriptive statistics were used to describe the study variables.

Results: About 82% of the overall study group have Obstructive Sleep Apnea Syndrome. The study group was 64 males and 36 females. Obstructive Sleep Apnea Syndrome was present in 82.8% of the male group and 80.6% of the female. In the age group ≤ 50 year, 76.9% of male patients and 57% of female patients had Obstructive Sleep Apnea Syndrome. In the age group above 50 years, 92% of males and 86.2% of female patients were diagnosed to have Obstructive Sleep Apnea Syndrome. About 86.6% of patients with body mass index more than 30 had Obstructive Sleep Apnea Syndrome, 30 patients underwent titration test in this study; 76.7% of patients had successful treatment with continuous positive airway pressure.

Conclusions: Obstructive Sleep Apnea Syndrome is more common in men than women in patients less than 50 years, but it seems that obstructive sleep apnea is seen equally in both gender after the age of 50 years. Aging and obesity are the most important risk factors for the development of the syndrome. Based on our results, management with continuous positive airway pressure titration was successful in most of the patients.

Key words: Continuous positive airway pressure, Obstructive Sleep Apnea Syndrome, Obesity, polysomnography.


Introduction

Sleep disordered breathing consists of three distinct clinical syndromes, namely, Obstructive Sleep Apnea Syndrome (OSAS), Central Sleep Apnea including Cheyne – Stokes breathing syndrome and sleep hypoventilation syndrome. OSAS consists of decreased air flow due repetitive

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Manuscript received January 18, 2012. Accepted August 2, 2012
complete or partial obstruction of the upper airway associated with progressive respiratory effort to overcome the obstruction. OSAS has been recognized over the past few decades as an important cause of morbidity and mortality. Published studies have attributed OSAS to the development of systemic hypertension, cardiovascular disease, abnormalities in glucose metabolism, stroke and road traffic accidents. OSAS is a disease of increasing prevalence, worldwide a lot of cohort studies give us an estimate of OSAS prevalence in countries such as United States, Spain, Korea and India. The prevalence of OSAS is approximately 3 to 7% for adult men and 2 to 5% of adult women in the general population.

OSAS has variable clinical representation. A lot of questionnaires have been developed worldwide to identify patients at risk for OSAS. Like the Epworth sleepiness scale, Berlin questionnaire and Arabic version of Berlin questionnaire. The most representative symptoms of OSAS include loud snoring, unrefreshed sleep, nocturnal apnea and daytime sleepiness. Up to date the majority of patients with OSAS remain undiagnosed. Knowledge of the risk factors for OSAS is therefore very important to properly direct diagnostic attention at those with the highest risk. These risk factors include aging, gender, obesity, craniofacial anatomy, familial and genetic predisposition and smoking. The gold standard test to diagnose OSAS is Over Night polysomnography (PSG) done at a sleep laboratory. The first line of treatment for most patients with OSAS is Continuous Positive Airway Pressure (CPAP). This study is performed to describe the different causes, laboratory diagnosis, and treatment of Obstructive Sleep Apnea Syndrome.

Methods

Patients involved in this study were selected based on available medical files of sleep studies in the sleep laboratory. A total of 100 medical files for patients diagnosed by polysomnography with OSAS during the period between January 2007 and November 2011 were reviewed. All patients were divided into groups according to their age, gender and Body Mass Index (BMI). The BMI was measured in this study manually, using the equation: BMI = body weight (kg) / height (cm)^2. Patients with BMI more than 25 are considered over weight and more than 30 are obese. The patients underwent PSG after clinical evaluation by a pulmonologist in the Chest Clinic at King Hussein Medical Center (KHMC). PSG includes a lot of measurements including Electro-encephalogram (EEG), electrocardiogram (ECG), chin and leg electro-myogram, right and left electro-oculogram, body position, finger pulse oximetry, measurement of airflow and measurements of chest and abdominal respiratory movement. All overnight PSG were done in sleep laboratory at KHMC, a qualified nurse is responsible for the study performance. The medical records of sleep study are manually scored by a trained technician using standard criteria. These records include: heart rate, O_2 saturation, respiratory effort, airflow, EEG, snoring and total sleep time. An apnea was identified if airflow was absent or nearly absent for more than 10 seconds and a hypopnea if air flow or thoraco-abdominal movements reduced by more than 30% below the base line values occurred in more than 10 seconds. The Respiratory Disturbance Index (RDI) was defined as the number of apneas or hypopneas with a 4% decrease in oxygen saturation per hour slept. The treatment for OSAS is continuous positive airway pressure (CPAP) and it is given to the patient as treatment after PSG is repeated while the patient is using CPAP. At our center, titration test with CPAP was done for patients with severe OSAS (RDI>30), other patients with mild and moderate OSAS underwent only life style modification and close clinical follow-up and were scheduled for a repeat of sleep study within a year. Titration test was either performed in the same night (Split night study) i.e. combines diagnostic PSG and therapeutic titration in one night or in a separate night, depending if the patient has OSAS confirmed by sleep study early in the night and had enough time left for the titration test.
Table I: The number of patients who underwent polysomnography in each year

<table>
<thead>
<tr>
<th>Year</th>
<th>Number of patient</th>
</tr>
</thead>
<tbody>
<tr>
<td>2007</td>
<td>190</td>
</tr>
<tr>
<td>2008</td>
<td>266</td>
</tr>
<tr>
<td>2009</td>
<td>196</td>
</tr>
<tr>
<td>2010</td>
<td>285</td>
</tr>
<tr>
<td>2011</td>
<td>377</td>
</tr>
<tr>
<td>Total</td>
<td>1314</td>
</tr>
</tbody>
</table>

Table II: The number of patients involved in the study in each year

<table>
<thead>
<tr>
<th>Year</th>
<th>Number of patient</th>
</tr>
</thead>
<tbody>
<tr>
<td>2007</td>
<td>19</td>
</tr>
<tr>
<td>2008</td>
<td>13</td>
</tr>
<tr>
<td>2009</td>
<td>20</td>
</tr>
<tr>
<td>2010</td>
<td>26</td>
</tr>
<tr>
<td>2011</td>
<td>22</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
</tr>
</tbody>
</table>

Table III: The frequency of OSAS among males according to the age group

<table>
<thead>
<tr>
<th>Age group</th>
<th>No. of patients</th>
<th>% to total group</th>
<th>Number of Patients with OSAS</th>
<th>% of patients with OSAS</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤ 50</td>
<td>39</td>
<td>60.9</td>
<td>30</td>
<td>76.9</td>
</tr>
<tr>
<td>&gt;50</td>
<td>25</td>
<td>39.1</td>
<td>23</td>
<td>92</td>
</tr>
</tbody>
</table>

Table IV: The frequency of OSAS among females according to the age group

<table>
<thead>
<tr>
<th>Age group</th>
<th>Number of patients</th>
<th>% to total group</th>
<th>Number of Patients with OSAS</th>
<th>% of patients with OSAS</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤ 50</td>
<td>7</td>
<td>19.4</td>
<td>4</td>
<td>57</td>
</tr>
<tr>
<td>&gt;50</td>
<td>29</td>
<td>80.6</td>
<td>25</td>
<td>86.2</td>
</tr>
</tbody>
</table>

Table V: The frequency of OSAS according to BMI

<table>
<thead>
<tr>
<th>BMI</th>
<th>Number of patients</th>
<th>Number of Patients with OSAS</th>
<th>% of patients with OSAS</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 25</td>
<td>1</td>
<td>0</td>
<td>&lt; 1</td>
</tr>
<tr>
<td>≥ 25 - &lt; 30</td>
<td>14</td>
<td>9</td>
<td>64.3</td>
</tr>
<tr>
<td>≥ 30</td>
<td>83</td>
<td>71</td>
<td>86.6</td>
</tr>
<tr>
<td>No records</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>

Fig. 1: Comparison between male and female results according to the age group

Simple descriptive statistics were used to describe the study variables (frequency, mean, and percentage).

Results

Table I shows the number of patients who underwent PSG for each year, Table II presents the number of patients involved in the study for each year. The age range of the study group between 19 to 76 year and the mean was 51.9 years. 82% of the overall study group have OSAS. Sixty-four were males and thirty-six were females. About 83% of the male group and 80.6% of the female group proved to have OSAS. In the age group ≤ 50 years; 76.9% of male patients had OSAS. 92% of males and 86.2% of female patients were diagnosed to have OSAS in the age group more than 50 years. Table III demonstrated the distribution of the male sample according to the age group and Table IV illustrated the female sample according to the age group. Only 7 female patients were suspected clinically to have OSAS in the age group less than 50 years out of the total female group (7/36). The total number of patients who underwent PSG after the age of 50 years of both sexes were 54 patients, representing 54% of the total sample and OSAS.
was diagnosed in 88.9% of this group. Chart I shows a comparison between male and female results according to the age groups. BMI was recorded in 98 patients. Clinical OSAS was suspected only in one patient with BMI less than 25 and PSG result was negative for this patient.

Table V shows the distribution of patients according to BMI. About 86.6% of obese patients (body mass index more than 30) had OSAS. Titration test was performed in 30 patients. Only 18 patients had a titration test as split night test and 12 patients had the test in a separate night. The post titration RDI improved to less than five per hour in 23 out 30 patients (76.7%). In six patients, the RDI improved partially between 5-15 per hour and in one patient the RDI decreased from 101 per hour to 26 per hour.

**Discussion**

OSAS is clinically suspected when a patient has a clinical picture suggestive of OSAS which can be variable from patient to patient. Worldwide a great majority of patients with OSAS (70-80%) remain undiagnosed i.e. not reaching a chest clinic for further evaluation according to previously published studies. A lot of questionnaires to identify patients at risk for OSAS are in use now. General practitioners, internists and other doctors should use these questionnaires as a screening test to refer patients to pulmonologist for further evaluation. In Jordan, OSAS is still underestimated and the screening questionnaires are not widely used. According to our study group, in every 5 patients clinically suspected to have OSAS by a pulmonologist PSG was negative in one patient. In this study the overall male to female ratio was 1.8:1. World wide the male to female ratio range from 2-3:1. Previous epidemiological studies have confirmed higher prevalence of OSAS in males but report a lower male to female ratio. In patients below 50 years, the clinical diagnosis of OSAS has a higher preference for males. Strohl et al., reported a ratio of 5-8:1. In this study, the ratio was 5.6:1 for this group. In our sample, among patients aged above 50 years the male to female ratio was 1:1.1, so after the age of 50 years the gender difference is negligible. This is seen in Tishler et al., where the influence of gender on disease incidence in the Cleveland Family Study diminished with increasing age with men and women being at equal risk for disease after the age of 50 years. Bixler et al. found that the disease prevalence is higher in post- versus pre-menopausal women. In the subgroup of patients aged more than 65 years, i.e. elderly patients, OSAS was definite diagnosis by PSG in all patients with clinical diagnosis of OSAS.

Worldwide the results of early studies showed that there is no simple positive correlation of OSAS with age. Thereafter, the results are conflicting. Bixler et al. reported that the prevalence of OSA in men increased in a monotonous manner from 20-59 years but decreased thereafter. More recent studies like in Tishler et al. found a higher prevalence of OSAS with increasing age, while in Yong et al. found that OSAS prevalence increases steadily with age and reaches a plateau after the age of 60 years.

Worldwide, obesity is considered the most important risk factor for the development of OSAS. Published studies, as in Strohl et al., showed that obesity is a common clinical finding and is present in more than 60% of the patients referred for a diagnostic sleep evaluation. In this study, obesity was present in 83% of patients who underwent PSG and the ratio of patients with a definite diagnosis of OSAS by PSG in obese to overweight patients was 7:1:1. Recent studies found that more than half of the prevalence of OSA is attributable to obesity. In this study, 64% of patients with definite diagnosis of OSAS were obese. The success rate of CPAP in treating patients with OSAS in our sample was 76.7%. In 20% of patients CPAP had partial success in treating patients with OSAS, while in 3.3% CPAP failed, however our sample for the titration test was too small for statistical analysis. Worldwide CPAP is the first line of treatment for most patients with OSAS and it has been studied in a lot of studies.

This study was a simple descriptive review limiting the result of the study. Further analytical prospective studies and or surveys at the national level involving a larger number of patients are
needed. Community-based studies rather than Hospital-based studies would also be helpful.

**Conclusion**

The clinical diagnosis of OSAS is not enough for diagnosis without doing PSG. The prevalence of OSAS increases with aging. OSAS is more common in men than women in patients less than 50 years but it seems that obstructive sleep apnea is seen equally in both gender after the age of 50 years. Obesity is still one of the most important risk factors for the development of OSAS. Based on our result CPAP was successful in most of the patients as a treatment for OSAS.

**References**


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