Otorhinolaryngologic Manifestations in Obstructive Sleep Apnea

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Abstract

Introduction: In this study, we aimed to evaluate the patients with obstructive sleep apnea syndrome (OSAS) for otorhinolaryngological manifestations.

Methods: A total of 347 patients who were diagnosed to have OSAS by polysomnography between April 2010 - September 2015 were included in the study. Data of patients, which were collected from patient registry records on hospital computer automation system, were analyzed, retrospectively.

Results: A total of 117 otorhinolaryngological manifestations diagnosed in all of the OSAS patients. According to the polysomnographic findings, 26 of these patients had simple snoring while 30 had mild OSAS, 20 had moderate OSAS and 41 had severe OSAS. When the OSAS group (mild-moderate-severe) (n=91) was examined, 68 patients had nasal septum deviation, 28 had inferior concha hypertrophy, 23 had tongue base hypertrophy, 20 had tonsillar hypertrophy and 33 had elongated soft palate. When the simple snoring group was examined, 20 patients had nasal septum deviation, 8 had inferior concha hypertrophy, 5 had tongue base hypertrophy, 3 had tonsillar hypertrophy and 4 had elongated soft palate. When both groups were compared, it was seen that the only significant difference was that the OSAS group had higher values in terms of elongated soft palate (p˂ 0.05). When OSAS group was examined, nasal septum deviation and concha hypertrophy were the most commonly coexisting conditions among all otorhinolaryngologic diagnosis (12.09%). Similarly, in OSAS group, nasal septum deviation, tongue base hypertrophy and elongated soft palate were the most commonly coexisting diagnosis (8.79%). There was only 1 patient having all the otorhinolaryngologic diagnosis (1.1%).

Conclusion: Obstructive sleep apnea syndrome cause severe morbidity and mortality. Otorhinolaryngological pathologies have an important role in the physiopathology of OSAS and early diagnosis has a great importance in reducing mortality and morbidity.

Keywords: Obstructive sleep apnea syndrome, otorhinolaryngology, nasal septum deviation, otorhinolaryngologic examination.

Introduction

Sleep, which is essential for spiritual and physical health, is a readily reversible state of reduced responsiveness to external stimulation. While sleep is essential in improving memory and learning and repairing and renewing organ tissues physiologically, some issues arising during sleep can be threatening for human health (1).

Obstructive sleep apnea syndrome (OSAS) is a disease having a wide range of symptoms and signs from simple snoring to severe cardiac and pulmonary complications (2,3). Snoring occurring as a result of the vibration of the soft palate is an early and the most common symptom of OSAS.

The term “Apnea” means cessation of breathing in Greek. Airflow disturbance over 10 seconds during sleep are defined as apnea. At least 50% reduction in thoracoabdominal movement and breathing lasting for more than 10 seconds is defined as hypopnea. All the apnea and hypopnea events occurring all throughout the night are calculated to define the number of events per hour and this is called the “Apnea-Hypopnea Index” (AHI). The AHI values are categorized as follows: 0-4: normal (simple snoring), 5-15: mild, 16-29: moderate and 30 or more: severe sleep apnea (5,6). OSAS can be central or obstructive. In central type, sleep apnea is very rare and occurs when the brain fails to transmit right signals to the muscles that control breathing. Obstructive sleep apnea (OSAS) is a syndrome characterized with repetitive episodes of upper airway obstruction which is associated with a reduction in blood oxygen saturation (5,6). It effects 2-4% of adult males and 1-2% of females. The classic symptoms of OSAS are snoring, witnessed apnea and excessive daytime sleepiness (hypersomnolence). OSAS is associated
Moreover, polysomnographic data recorded were the duration of apnea, the lowest \(\text{SO}_2\), desaturation percentage and desaturation index values.

**Results**

Otorhinolaryngological manifestations were available in 117 of the 347 patients included in the study. According to the polysomnography findings, 26 of these patients had simple snoring while 30 had mild OSAS, 20 had moderate OSAS and 41 had severe OSAS. The average ages and genders of the patients are given in Table 1. In the simple snoring group, there were 14 males and 12 females, with an average age of 48.08 ±11.56. In the mild OSAS group, there were 20 males and 10 females, with an average age of 45.43±9.74. In the moderate OSAS group, there were 18 males and 2 females and the average age was 49.95±14.69. In the severe OSAS group, the numbers of male and female patients were 29 and 12 respectively and the average age was 49.66±11.43. When all the groups were taken into consideration, there were 91 (77.8%) males and 26 females (22.2%). The groups did not show any statistically significant difference in terms of gender and age.

When the OSAS group (mild-moderate-severe) \((n=91)\) was examined, 68 patients had nasal septum deviation, 28 had inferior concha hypertrophy, 23 had tongue base hypertrophy, 20 had tonsillar hypertrophy and 33 had elongated soft palate. When the simple snoring group was examined, 20 patients had nasal septum deviation, 8 had inferior concha hypertrophy, 5 had tongue base hypertrophy, 3 had tonsillar hypertrophy and 4 had elongated soft palate (Table 2). When both groups were compared, it was seen that the only significant difference was that the OSAS group had higher values in terms of elongated soft palate \((p<0.05)\). When those in OSAS group were compared, there was significant difference in terms of otorhinolaryngological diagnosis \((p>0.05)\). When OSAS group was examined, nasal septum deviation and concha hypertrophy were the most commonly coexisting conditions among all otorhinolaryngological diagnosis \((12.09\%)\). Similarly,
in OSAS group, nasal septum deviation, tongue base hypertrophy and elongated soft palate were the most commonly coexisting diagnosis (8.79%). There was only 1 patient having all the otorhinolaryngologic diagnosis (1.1%).

In OSAS group, only the moderate and severe OSAS groups showed a significant difference in terms of tonsillar hypertrophy (p<0.05). The remaining OSAS groups did not have a significant difference in terms of otorhinolaryngological manifestations (Table 3). Moreover, none of the otorhinolaryngologic manifestations correlated with having a simple snoring and severity of OSAS (p=0.05).

**Table 2.** Otorhinolaryngologic diagnosis in both simple snoring and OSAS patients.

<table>
<thead>
<tr>
<th></th>
<th>Simple snoring group</th>
<th>OSAS group (mild-moderate-severe)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nasal septum deviation (%)</td>
<td>76.9</td>
<td>67.03</td>
<td>0.82</td>
</tr>
<tr>
<td>Concha hypertrophy (%)</td>
<td>30.80</td>
<td>30.77</td>
<td>1.00</td>
</tr>
<tr>
<td>Tongue base hypertrophy (%)</td>
<td>19.2</td>
<td>25.27</td>
<td>0.52</td>
</tr>
<tr>
<td>Tonsillar hypertrophy (%)</td>
<td>11.5</td>
<td>21.98</td>
<td>0.24</td>
</tr>
<tr>
<td>Elongated soft palate (%)</td>
<td>15.4</td>
<td>36.26</td>
<td>0.04</td>
</tr>
</tbody>
</table>

The polysomnographic findings of the OSAS group are given in Table 4. In the mild, moderate and severe OSAS patients, all the polysomnographic findings (AHI, duration of apnea, the lowest SO2, desaturation percentage and desaturation index) evaluated in our study showed a significant difference. When the mild and the moderate OSAS groups were compared, there was a significant difference in terms of AHI, duration of apnea and desaturation index values (p<0.001; p<0.05; p<0.001, respectively). When the mild and the severe OSAS groups were compared, there was a significant difference in terms of AHI, duration of apnea, the lowest SO2 and desaturation index values (p<0.001; p<0.001; p<0.001, respectively). When the moderate and the severe OSAS groups were compared, there was a significant difference in terms of AHI, duration of apnea, the lowest SO2, desaturation percentage and desaturation index values (p<0.001; p<0.05; p<0.001; p<0.05; p<0.05, respectively).

**Discussion**

A clear upper airway during sleep depends on the balance between the collapsing effect of the negative pressure occurring as a result of the airflow inside the pharyngeal lumen and the forces keeping the upper airway open. OSAS occurs as a result of the narrowing of the airway once the said balance is altered in favor of the pharyngeal collapse forces. Consequently, the blood oxygen level goes down and this is detected by the brain. Then, the brain tells to wake up to restore the airway (11,12). As a result of a decrease in the depth of sleep, short changeovers to a more superficial stage or wakefulness which is called “arousal” start to restore breathing. This may repeat all through the night. The type, number and duration of respiratory failures determines the type and severity of the disease (11,13).

Snoring, which is both a social and a medical problem, is the colloquial term used for obstructive sleep breathing. Snoring is an early and the most common symptom of OSAS and occurs in 70-95% of the OSAS patients (14,15). Snoring is a noisy sound occurring as

**Table 3.** The distribution of otorhinolaryngologic diagnosis in OSAS patients.

<table>
<thead>
<tr>
<th></th>
<th>Mild OSAS</th>
<th>Moderate OSAS</th>
<th>Severe OSAS</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nasal septum deviation (%)</td>
<td>76.7</td>
<td>75.0</td>
<td>73.2</td>
<td>&gt;0.05</td>
</tr>
<tr>
<td>Concha hypertrophy (%)</td>
<td>36.7</td>
<td>25.0</td>
<td>29.3</td>
<td>&gt;0.05</td>
</tr>
<tr>
<td>Tongue base hypertrophy (%)</td>
<td>33.3</td>
<td>30.0</td>
<td>17.1</td>
<td>&gt;0.05</td>
</tr>
<tr>
<td>Tonsillar hypertrophy (%)</td>
<td>23.3</td>
<td>40.0</td>
<td>12.2</td>
<td>&gt;0.05</td>
</tr>
<tr>
<td>Elongated soft palate (%)</td>
<td>30.0</td>
<td>40.0</td>
<td>39.0</td>
<td>&gt;0.05</td>
</tr>
</tbody>
</table>

**Table 4.** Polysomnographic outcomes in OSAS patients.

<table>
<thead>
<tr>
<th></th>
<th>Mild OSAS</th>
<th>Moderate OSAS</th>
<th>Severe OSAS</th>
<th>p'</th>
</tr>
</thead>
<tbody>
<tr>
<td>AHI</td>
<td>9.81±2.81</td>
<td>21.00±3.74</td>
<td>55.27±19.47</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Duration of apnea (sec)</td>
<td>21.07±6.62</td>
<td>24.14±4.83</td>
<td>35.21±15.20</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Minimum SO2 (%)</td>
<td>80.56±16.43</td>
<td>79.10±14.50</td>
<td>70.00±12.05</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Desaturation percentage (%)</td>
<td>24.24±25.62</td>
<td>12.68±10.80</td>
<td>33.45±28.96</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>Desaturation index</td>
<td>9.39±11.10</td>
<td>21.69±12.59</td>
<td>40.06±25.31</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

AHI: Apnea-Hypopnea Index
a result of the vibration of the soft tissue in the upper airway during partial interruption of inspiration during sleep (14,15). It is a rather frequent symptom in all the societies. In OSAS patients, habitual snoring can be observed (at least 5 nights a week) and irregular snoring is typical due to repetitive apneas (16). Studies undertaken have found that 80.2% of the patients reporting snoring every night had an AHI >5 (17). Apnea is a condition where airflow is ceased more than 10 seconds despite a continued respiratory effort while hypopnea is defined ≥ 50% airflow reduction causing %4 ≥ oxyhemoglobin desaturation. AHI is the total number of apnea and hypopnea occurring in one hour. In OSAS patient, the threshold value defined for AHI ranges between 5-20 in various studies. However, patients with an AHI>20 have been shown to have increased mortality risk. According to AHI, OSAS is divided into subgroups as (5<AH<15) mild OSAS, (16<AH<30) moderate OSAS, and (AH>30) severe OSAS (18). In our study, among those applying to hospital for snoring, 117 patients had polysomnographic findings and 91 (77,78%) of these patients had an AHI of >5 and only 26 of them had simple snoring. Moreover, the average AHI was 32.75±24.72 in the OSAS group composed of 91 patients while 30 had mild, 20 had moderate and 41 had severe OSAS. These results are parallel to the results reported in the literature.

Age, gender and obesity are significant risk factors in OSAS. Changes in body fat distribution, tissue elasticity and ventilation control disposition to OSAS (19). OSAS has been reported to be observed the most frequently at the ages of 40-65 with a reduced prevalence after 65 years old (20). In our hospital, the average age of the patients was 48.33±11.77. The average ages of the mild, moderate and severe OSAS groups were found to be 45.43±9.74, 49.95±14.69 and 46.68±11.59 respectively. Moreover, based on the apnea hypopnea index, these was no statistically significant difference between the groups in terms of average age (p=0.923).

Male gender is another important risk factor for OSAS. Accumulation of fat around the neck due to androgenic fat distribution in males increases the risk of OSAS. Epidemiological studies have shown the male/female ratio which was as high as 10/1-7/1 back in eighties has come down to 3/1 (19,21). In our study, 74% of the OSAS cases were male while 26% were female. Based on AHI, the groups had no significant difference in terms of gender distribution (p=0.055).

It is known that the pathogenesis of OSAS includes local anatomical factors as well as neurological factors. It can even be said collapsed pharyngeal airway is the fundamental factor in OSAS. In majority of the case, this narrowing and/or obstruction occur at the tongue base and/or soft palate. An obstruction or narrowing occurs when the tongue shifts towards the pharyngeal wall and elongated soft palate which prevents the inhaled air travel through the pharynx (22,23). In our study, in terms of elongated soft palate, there was a significant difference between the simple snoring group and OSAS patients and elongated soft palate was encountered significantly higher in OSAS patients (p=0.04). This supports that the fact that the most common one of the anatomic factors causing OSAS is an obstruction in the pharyngeal airway.

In OSAS patients, when the sleep physiopathology is examined in terms of respiratory local anatomic anomaly, it is seen that the upper airway dilator muscles, especially the genioglossus muscle tone decreases, muscles relax and the upper airway space is narrowed during REM (Rapid Eye Movements) (22). It is also known that the number and frequency of apnea seizures and the blood oxygen desaturation are increased during REM sleep (24-26). Due to repeated apnea episodes in severe cases, blood oxygen saturation is lowered more than 50%. As a result of this, bradycardia and tachycardia occur consecutively in each apnea cycle (25). Moreover, reduced blow oxygen causes an increase in carbon dioxide level (21). All these effects are observed more during REM sleep as the hypotonia or atonia of the muscles (especially the genioglossus muscle) is increased during this phase of sleep by repetitive episodes (24,27).

In our study, the polysomnographic data showed a significant difference from mild OSAS to severe OSAS group as expected. Only the desaturation percentage was found to be lower in the moderate OSAS group compared to the mild OSAS group. Its reason was to have a patient population with restricted number of patients.

As a result, the social, neuropsychological and cardiovascular consequences of obstructive sleep apnea syndrome cause severe morbidity and mortality. Otorhinolaryngological pathologies have an important role in the physiopathology of OSAS and early diagnosis has a great importance in reducing mortality and morbidity.
References


