

## Obstructive Sleep Apnea Syndrome- A Life Threatening Sleep Disorder: Proper Diagnosis and Treatment is Essential

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### Abstract

*Obstructive Sleep Apnea Syndrome is a life threatening sleep disorder which can occur as consequences of some body conditions. On the other hand it causes many systemic diseases as well as accidental injury. There is no prevalence study in Bangladesh but its prevalence is higher in western countries. Proper diagnosis and treatment is essential. Surgical treatment of this disease gives permanent cure. Maxillofacial surgeon has a vital role in treating this disease. ENT surgeon as well as prosthodontist can help the OSAS patient as well.*

**Key words:** OSAS- Obstructive Sleep Apnea Syndrome, AHI-Apnea- hypopnea Index, REM- Rapid Eye Movement, EEG- Electro Encephalogram, EMG- Electro myoeogram, EOG- Electro Oculogram, CPAP- Continuous Positive Airway pressure, MRA- Mandibular Repositioning Appliance, MMA- Maxillo Mandibular Advancement

Obstructive sleep apnea is a breathing disorder which is caused by the obstruction of upper airway. It is characterized by repetitive pauses in breathing during sleep. This pause in the breath is called apnea which typically lasts for 20-40 seconds, resulting in reduction in blood oxygen saturation. It is believed that 1 in 5 American adults (20%) have mild OSA<sup>1</sup>. In 2006, a population-based survey in north India had estimated the prevalence of OSAS at 3.6 per cent (males and females being 4.9 and 2.1% respectively)<sup>2</sup>. In Bangladesh no such study was carried out.

Most cases of OSAS are caused by i) structural features which give rise to narrowed airway, ii) increased soft tissue around the airway, iii) decreased muscle tone, iv) old age and v) brain injury.

The pathophysiology of OSAS is such that during Rapid Eye Movement (REM), sleep in particular, muscle tone of the throat and neck, as well as the vast majority of all skeletal muscles are almost completely attenuated, allowing the tongue and soft palate/oropharynx to relax and in the case of sleep apnea, to impede the flow of air to a degree ranging from light snoring to complete collapse. In the cases where airflow is reduced to a degree where blood oxygen level falls or the physical exertion to breathe is great, neurological mechanism triggers and a sudden interruption of sleep occurs which is called a neurological arousal. These arousals rarely result in complete awakening but have a

significant negative effect on the restorative quality of sleep. Severity of OSA can be measured by Apnea-hypopnea index. The apnea-hypopnea index (AHI) is an index of sleep apnea severity that combines apneas and hypopneas. The apneas (pauses in breathing) must last for at least 10 seconds and are associated with a decrease in blood oxygenation. Combining these give an overall sleep apnea severity score that evaluates both number of sleep disruptions and degree of oxygen desaturation (low blood level). The AHI is calculated by dividing the number of events by the number of hours of sleep. (AHI values are typically categorized as 5-15/hr = mild; 15-30/hr = moderate; and > 30/h = severe.)<sup>3</sup>

During apneic episodes, arterial blood oxygen saturation decreases, and sympathetic activity and blood pressure increases. Each apneic episode is ended with an arousal from sleep, resulting in marked fragmentation of sleep in affected individuals. Excessive daytime sleepiness is a major consequence of OSA. OSA has also been linked to significant conditions such as hypertension<sup>4,5,6</sup>, ischaemic heart disease and stroke<sup>7</sup>, premature death<sup>8</sup>, and impairment of cognitive functions<sup>9</sup> which may contribute to motor vehicle and workplace related accidents (comparable to functioning while intoxicated)<sup>10,11</sup>. A study of The University of British Columbia demonstrated that a person with OSA is twice as likely to be involved in a motor vehicle accident<sup>12</sup>. For untreated individuals, it has been established that there is a 37% higher 5-year morbidity and mortality rate<sup>13</sup>. Moreover, it was also estimated in 2008 that the average additional annual health care cost of an untreated sleep apnea patient is US \$1,336 contributing an estimated total of \$3.4 billion/year additional medical costs in the U.S.<sup>14</sup>. In Australia, the financial burden of OSA (including healthcare costs, lost productivity, road accidents and work-related accidents) is in the range of AU \$2-8 billion per year<sup>15</sup>.

Diagnosis of OSAS is based on a combination of patient

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history and lab test specially polysomnography, which is the gold standard for the diagnosis of OSAS. Polysomnography is a multiparameter test which monitors brain (EEG), muscle activity or skeletal muscle activation(EMG), eye movements (EOG), and heart rhythm (ECG) during sleep. But this procedure is inconvenient to the patient as well as it requires sophisticated specialist facilities, technical and scientific staff and sleep clinicians.

Although PSG helps identify individuals who have OSA and help the management, it does not identify the site of obstruction or predict surgical outcome. Polysomnography has been used in children for more than 30 years and is accepted as the most comprehensive and accurate method of determining the presence and severity of OSA in children. However, it is expensive, time- and labor-consuming, intrusive, and not readily available to children in many communities. Alternative or abbreviated testing is desirable.<sup>16</sup> Diagnosis of OSA with polysomnography is more cost effective and not readily available in all centres.<sup>17</sup> More over that polysomnographic studies are usually performed in a dedicated sleep laboratory with supervision by a sleep technician and the resulting data require time-consuming analysis. Thus, many attempts have been made to simplify the diagnostic process for patients suspected of having sleep-related breathing disorders.<sup>18</sup>

Imaging has also adjunctive role in the diagnosis and treatment planning of OSAS, among which cephalometry is one. But cephalometry due to its two dimensional representation are lacking of information about the airway volume and dimensions.<sup>19</sup> Also due to the difference in the posture during cephalometry sleep may create an underestimation.

Both CT Scans and MRIs are beginning to play a crucial role in the evaluation of patients before surgical treatment (Maxillo Mandibular Advancement, Uvulopalatopharyngoplasty, reduction of tongue base or genioid muscle surgery) as well as non surgical treatment..

The treatment of OSA is determined by patients medical history, the severity of the disorders and most importantly, the specific cause of the obstruction. Mild apnea can be treated by behavioral therapy, moderate or severe OSA requires more significant interventions. Nasal Continuous Positive Airway Pressure (CPAP) or Mandibular Repositioning Appliance (MRA). But neither CPAP nor MRA are cures for OSA. For these patients advancement surgery of both the maxilla and mandible (Maxillo Mandibular Advancement surgery-

MMA) is performed to eliminate or improve symptoms of the condition by increasing the size of the airway. MMA resulted in an 83% reduction in the group mean apnea-hypopnea index (AHI) when diagnosis and planning was based on cephalometric analysis<sup>20</sup>. This treatment option is based on a permanent alteration of the maxillary and mandibular anatomy including the attached soft tissue. Study of Conley showed that the MMA surgical option is more successful than MRA.<sup>21</sup> Maxillofacial surgeon plays the key role in MMA surgery which is a type of orthognathic surgery.

### Conclusion:

Treatment reduces the health consequences of OSA. Imaging is valuable in determining sites of potential airway obstruction to direct treatment of the specific causes of obstruction to improve CPAP tolerance and assist in dental and nasal treatment planning. Maxillofacial surgeon as well as the ENT surgeon can combinedly work together to solve the problem. Sleep apnea diagnosis and treatment is essential to fight to turn the deadly "Choke and Gasp" cycle into a good night's sleep for patients and their loved ones.

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