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Obstructive Sleep Apnoea



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Definition

Sleep apnoea is a disorder in which breathing is repeatedly interrupted during sleep. The word “apnoea” literally means “without breath”. An apnoea is defined as a complete cessation of breathing that lasts 10 seconds or greater.

There are two principal types of sleep apnoea, “obstructive sleep apnoea (OSA),” and “central sleep apnoea” (CSA). By far the most common is obstructive sleep apnoea, comprising 90 to 96% of apnoeas diagnosed on overnight sleep study (polysomnography). OSA results from repetitive collapse of the upper airway. Central sleep apnoea is due to decreased output from ventilatory control centres in the brain. Further discussion of CSA is beyond the scope of this fact sheet.

In clinical practice, the most frequently used measurement of OSA is the Apnoea Hypopnoea Index (AHI) derived from an overnight sleep study. It is the number of apnoeas (complete cessation of airflow) plus hypopnoeas, (50% reduction in airflow associated with oxygen desaturation and/ or arousal from sleep), divided by the number of hours of recorded sleep. An AHI of 5 or greater indicates the presence of OSA, and more than 30 indicates a severe degree of OSA.

Obstructive Sleep Apnoea occurs in an estimated 24% of middle-aged males and 9% of middle-aged females as defined by an AHI >5 on sleep study. If there are associated daytime symptoms, especially excessive

daytime sleepiness (EDS), then this Obstructive Sleep Apnoea Syndrome (OSAS) is estimated to affect 4% of middle-aged men and 2% of middle-aged women. Upper Airway Resistance Syndrome (UARS) is a separate

entity that is characterised by a decrease in upper airway flow that precipitates nocturnal arousals and daytime sleepiness, in the setting of a normal AHI.

Daytime sleepiness is a characteristic feature of OSA and can be assessed using the Epworth Sleepiness Scale (ESS). There are 8 questions in the scale, which ask a patient how likely they are to doze off in certain situations. A score greater than 10 out of a possible 24, indicates subjective daytime sleepiness.

Obstructive Sleep Apnoea occurs as a result of collapse of the upper airway. The upper airway between the back of the nose and the top of the larynx is supported only by muscle tone. With sleep onset, this muscle tone is reduced and the airway narrows. The airspeed through this narrowed upper airway increases and results in vibration of the upper airway, with snoring. The airway may become so narrow that it collapses, usually on inspiration, resulting in an apnoea or hypopnoea. Since air can no longer enter the lungs, the oxygen level in the blood falls, and carbon dioxide levels rise. These changes are sensed by receptors in the carotid artery in the neck and also in the brain, and stimulate increased respiratory effort via the abdominal and chest wall muscles. These efforts are futile against the occluded upper airway. The fall in oxygen levels, the rise in carbon dioxide levels and increased respiratory effort may precipitate an arousal from sleep. Muscle tone then returns to the upper airway which allows breathing to recommence. Surges of sympathetic nerve activity occur during the period of apnoea which may contribute to the cardiovascular consequences of OSA.

The duration of this obstruction may last up to a minute and occasionally longer, and may occur hundreds of times during the night. The repeated fragmentation results in poor sleep quality and excessive daytime sleepiness.

Symptoms and Complications of OSA

Repeated fragmentation of sleep from OSA results in poor quality of sleep, and symptoms of sleep deprivation. Apart from daytime sleepiness, which does not necessarily relate to the severity of the OSA, there are a wide range of health concerns. Cognitive function can be significantly impaired resulting in difficulty concentrating, depression, learning and memory difficulties, personality changes, and hyperactivity in children. Morning headaches, decreased libido and impotence in men can result from OSA, which can also increase driving risk and impair work performance. Licensing authorities have strict guidelines on how sleepiness and driving risk should be addressed.

OSA has been linked to several cardiovascular complications. OSA is an independent risk factor for the development of hypertension and insulin resistance, and is associated with heart attack, cardiac arrhythmia, and stroke.

Bed partners are also significantly affected, with their own sleep being disrupted, even as they sleep, resulting in symptoms of sleep deprivation.

Risk Factors for OSA

There are a number of recognised risk factors for OSA. These include:

- Male gender
- Increasing age
- Body Mass Index > 30
- Neck circumference > 42 cm
- Enlarged tonsils
- Alcohol
- Smoking
- Post-menopause
- Sleeping tablets

Investigation of OSA

In view of the high prevalence of OSA, and the potentially serious consequences of untreated OSA, investigation is essential in order to determine the most effective treatment. Investigation should be considered if the patient presents with persistent snoring, and at least one other associated symptom. Most commonly this will be excessive daytime sleepiness, but may include any of the symptoms mentioned above.

Investigations can be divided into four categories:

- 1 Level 1.** Full monitored overnight polysomnography. Undertaken in a specialist unit with overnight observation. Involving both respiratory, limb and EEG leads.

- 2 Level 2.** Full overnight polysomnography, without overnight observation. This might be in a specialist unit, or at home. Measurements as for level 1.
- 3 Level 3.** Monitoring of respiratory parameters and oximetry with pulse rate, and usually undertaken in the home.
- 4 Level 4.** Pulse oximetry, measuring oxygen desaturation and pulse rate only. Usually undertaken in the home.

Whilst Level 1 studies have always been considered to be the 'gold standard' investigation for sleep disorders, the expense and availability of this study, and the high prevalence of the condition make it impractical in many cases. Consequently, level 3 and 4 studies are increasingly being used in the community but also need specialist interpretation.

Ideally every patient who has had a sleep study should be seen by a Sleep Physician, but review should be considered mandatory in the following circumstances:

- Where there is uncertainty about the results of any sleep test or where the results of a test are not consistent with the patient's symptoms
- Severe cardiopulmonary conditions including Obesity Hypoventilation Syndrome
- The presence of two or more sleep disorders.
- Forensic investigations

Treatments of OSA

There are of four broad categories of effective treatments for OSA.

- 1 **Lifestyle. Lifestyle changes can be very effective in mitigating the symptoms of sleep apnoea.**
 - Weight loss is most important in all those who are overweight. However approximately 25% of those suffering from OSA are not overweight but may exhibit some craniofacial characteristics such as micro- or retrognathia.
 - Alcohol in the evening should be reduced to <2 units. Both alcohol and sleeping tablets relax the pharyngeal muscles allowing the pharyngeal walls to collapse more easily.
 - Smoking results in irritation and swelling of the pharyngeal space, increasing the likelihood of snoring and OSA.
 - Snoring and OSA is almost always worse when lying on the back. Sewing a pocket into the back of the pyjamas to hold a tennis ball or golf ball will ensure that lying on the back is impossible.
- 2 **Continuous Positive Air Pressure (CPAP).**

This is the “gold standard” treatment for OSA. Delivered via a nasal or oronasal mask, pressurised air is used to splint open the floppy upper airway. It is a cumbersome, but extremely effective therapy. As many as 70% of patients can tolerate therapy long term. CPAP can improve quality of life, cognitive function, reduce driving risk, hypertension and cardiovascular risk, particularly in symptomatic patients with severe disease.

- 3 **Mandibular Advancement Splints (MAS).**

This works by holding the mandible forward. Since the tongue is attached to the mandible, the tongue is held forward preventing it from falling backwards and causing obstruction.

There are a number of devices which are generally effective for snoring, mild and even moderate OSA. They are most effective in patients with mild OSA which is worst in the supine position (lying on back) in non-obese patients. Patients who may be suitable for treatment with a MAS should be referred to a dentist who has an interest in this area. It is very important that the device is properly manufactured and customized for each patient. A number of cheaper appliances are available for purchase over the counter or from the internet. These cannot be recommended.

- 4 **Surgery.** Whilst this used to be a very popular treatment for OSA, its use now is rather more limited.

Uvulopalatopharyngoplasty (UPPP) may improve snoring but is unlikely to cure OSA, particularly more severe disease. Tonsillectomy is most effective when the patient has large tonsils. Nasal surgery can be used to relieve obstruction. More extensive procedures are available for selected cases where craniofacial abnormalities are impinging on the upper airway.

DISCLAIMER - INFORMATION PROVIDED IN THIS FACT SHEET IS GENERAL IN CONTENT AND SHOULD NOT BE SEEN AS A SUBSTITUTE FOR PROFESSIONAL MEDICAL ADVICE.

Further reading:

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