

## Sleep apnoea

### Introduction

Sleep apnoea is a common condition in which intermittent pauses in breathing during sleep are followed by brief arousals or awakenings which then enable return of breathing. The current roles of primary care providers are screening and case recognition of patients with suspected obstructive sleep apnoea syndrome (OSAS), and screening of high risk co-morbidity patient groups for OSAS, with appropriate referral to secondary care.

Obstructive sleep apnoea (OSA) involves intermittent complete collapse of the pharyngeal airway, and affects up to 4% of middle-aged men and 2% of middle-aged women in the UK.<sup>1,2</sup>

OSA may be asymptomatic or present with a range of non-specific symptoms (Table 1). Only about 1 in 4 people with OSA have been diagnosed and only about half of patients diagnosed have been able to access treatment. Untreated OSAS is estimated to cost the NHS £432 million a year.<sup>2,3</sup> NICE guidance and specialist professional bodies support treatment of symptomatic patients based on gradation of severity (Table 2).<sup>1,3</sup>

Obstructive sleep apnoea syndrome (OSAS) is defined by the association of OSA with symptoms of excessive sleepiness, or impaired alertness with loss of

concentration or memory, due to sleep fragmentation (Table 2). Excessive sleepiness can be independently associated with obesity, diabetes mellitus, depression or sedative drug therapies which may be co-morbid factors in patients with OSA.

Central sleep apnoea (CSA) is less common and comprises intermittent cessation of breathing despite a patent airway, as noted for example in cardiac failure with Cheyne-Stokes respiration.

### Consequences of sleep apnoea

Sleep apnoea is a major cause of potentially fatal road accidents, lost work productivity, breakdown of personal relationships and impaired quality of life. Patients with OSAS have been shown to be up to 7 times more likely to have a road accident, and to have a worse simulated driving performance than drivers in excess of the blood alcohol limit.<sup>4,5,6</sup> An 83% reduction in road traffic accidents has been reported in OSAS patients on CPAP treatment.<sup>1</sup> OSAS frequently disrupts personal relationships with effects of sleep loss suffered by both patients and partners. Patients may suffer loss of interest in social and family activities and become impotent. Patients and partners may become irritable or feel too tired for sex, leading to misunderstandings and strain. OSAS has been recognised as a community health problem, impairing the quality of life and well-being of not only the individual patient, but the entire family and society.<sup>6</sup>

Co-morbidities commonly associated with OSA include hypertension, heart failure, obesity, diabetes mellitus and stroke, often in combination, comprising a cardio-metabolic syndrome.

Metabolic syndrome with insulin resistance may develop in OSA due to the effect of intermittent hypoxia, and may occur independently of obesity, with prevalence 9 times more in subjects with OSA than obese controls.<sup>7-9</sup> This may help explain the increased cardiovascular morbidity and mortality associated with sleep apnoea, and the reduction in mortality seen in uncontrolled treatment studies. There is a significant potential for reduced morbidity and mortality if OSAS is treated, via a number of theoretical but unproven mechanisms (Table 4).<sup>2</sup>

### Diagnosis of sleep apnoea

Early clues to diagnosis of OSAS include excessive (inappropriate) sleepiness associated with snoring and/or witnessed pauses (apnoeas) or choking during sleep. The Epworth Sleepiness scale score is a simple self-administered assessment tool, but low scores do not exclude sleepiness due to patient misunderstanding or misreporting (Table 3).<sup>10</sup> Population surveys have found a strong correlation between snoring and daytime sleepiness. Reporting of apnoea by the bed partner has been more predictive of sleep apnoea than snoring alone. Less common problems include nocturnal urinary frequency as a marker of severe sleep apnoea, morning headaches and

**Table 1. Obstructive Sleep Apnoea - Clinical Presentation**

**Common (>60%)**

- Loud snoring
- Excessive daytime sleepiness
- Feelings of choking or shortness of breath at night
- Restless sleep
- Unrefreshing sleep
- Changes in personality
- Nocturia

**Less common (10-60%)**

- Morning headaches
- Enuresis
- Reduced libido
- Spouse worried by apnoeic pauses
- Nocturnal sweating
- Symptomatic oesophageal reflux

**Rare (>10%)**

- Recurrent arousals/ insomnia
- Nocturnal cough

**Table 2. Definitions**

**Obstructive Sleep Apnoea**  
(defined on sleep study)

**Apnoea:**

Absence of breathing for at least ten seconds.

**Hypopnoea:**

50% reduction in breathing amplitude with at least 3% oxygen desaturation, or 30% reduction in breathing amplitude with at least 4% oxygen desaturation.

**Apnoea-hypopnoea index – AHI:**

The hourly rate of apnoeas plus hypopnoeas:

- AHI < 5 Normal
- AHI 5-15 Mild OSAH
- AHI 16-30 Moderate OSAH
- AHI >30 Severe OSAH

**Obstructive Sleep Apnoea Syndrome**  
(defined on sleep study plus symptoms)

**> 5 obstructive events/hour**

(usually apnoea, hypopnoeas, or oxygen desaturations)

**AND:**

**excessive daytime sleepiness not better explained by other factors**

**USUALLY ASSOCIATED WITH SOME OF THE FOLLOWING:**

- choking or gasping in sleep
- recurrent awakenings
- unrefreshed sleep
- daytime fatigue
- impaired concentration

**Table 3. Epworth sleepiness scale score**

How likely are you to doze off or fall asleep in the following situations, in contrast to feeling just tired? This refers to your usual way of life in recent times. Even if you have not done some of these things recently try to work out how they would have affected you.

Use the following scale to choose the most appropriate number for each situation:

- 0 = no chance of dozing
- 1 = slight chance of dozing
- 2 = moderate chance of dozing
- 3 = high chance of dozing

Situation	Chance of dozing
Sitting and reading	
Watching TV	
Sitting inactive in a public place (e.g a theatre or a meeting)	
As a passenger in a car for an hour without a break	
Lying down to rest in the afternoon when circumstances permit	
Sitting and talking to someone	
Sitting quietly after a lunch without alcohol	
In a car, while stopped for a few minutes in traffic	
<b>TOTAL</b>	

A score of more than 10 indicates significant sleepiness.

**Table 4. Obstructive Sleep Apnoea and Co-morbidities**

- Resistant Hypertension
- Nocturnal Hypertension
- Stroke
- Coronary Artery Disease
- Recurrent AF
- Nocturnal bradycardias
- Type 2 Diabetes Mellitus

impotence. A structured history and assessment will identify patients with high probability for OSAS, and screening of patients with common co-morbidities will increase diagnosis.

Examination may reveal obesity in 70% of patients with OSAHS, with increased neck and waist circumference and BMI. Some patients may have nasal airway for obstruction (deviated nasal septum, rhinitis or polyps), or enlarged soft palate, tonsils or uvula.<sup>2</sup>

Confirmation of diagnosis, treatment, and monitoring of treatment response in OSAS should be carried out in a specialist sleep service by appropriately trained medical and support staff.<sup>3,11</sup>

Overnight oximetry and heart rate monitoring can be undertaken at home in conjunction with clinical assessment, but false positive results (due to other causes of nocturnal hypoxaemia) and false negative results (usually in younger and thinner patients) are common and expert interpretation is required. A typical pattern with 4% oxygen desaturation index (ODI) of more than 10 per hour, with synchronous oscillations in heart rate, is consistent with sleep apnoea. The potential for false negatives

means that a normal result does not exclude OSA and further assessment is required, if symptoms remain unexplained.

Multi-channel portable monitoring (respiratory polysomnography) is provided as in a home or inpatient setting by specialist sleep services and respiratory specialists, and sometimes via ENT or other specialist services. Portable monitoring may use, in addition to oximetry and heart rate, nasal airflow, snoring, movement and position sensors, and chest and abdominal sensors to measure respiration, producing an apnoea-hypopnoea index (AHI) which allows differentiation of obstructive from central sleep apnoea (CSA).

Full polysomnography with EEG sleep staging and video is carried out by specialist sleep services in a tertiary regional setting, and may rarely be required in complex cases of OSA which may overlap with possible co-morbidities including cardiac failure, COPD, obesity hypoventilation syndrome, and more commonly in other causes of excessive sleepiness including upper airways resistance, periodic limb movement and narcolepsy.

### Treatment of sleep apnoea

General measures for treatment of OSAS include lifestyle advice comprising weight control, elevation of the bed head and avoidance of supine posture, alcohol and sedatives, as well as treatment of nasal congestion, although no evidence of benefit was found in a Cochrane review.<sup>12</sup> Good sleep hygiene is advised with 8 hours in a quiet dark bedroom, and avoidance of daytime naps.<sup>2</sup>

Driving should be avoided if excessively sleepy. Motor vehicle drivers with OSA who have 'excessive or unavoidable sleepiness in inappropriate situations' (OSA syndrome) must inform DVLA (via form SL-1) and motor insurers of their diagnosis and may be allowed to drive if symptoms are controlled on treatment, with confirmation by medical opinion. Sleep apnoea confirmed by a sleep study, but without excessive sleepiness is not a notifiable condition.

### Continuous positive airways pressure

(CPAP) treatment involves delivery of pressurised air from an electric compressor to the nose or mouth via a mask or nasal cushion interface. CPAP is a clinically proven and cost-effective treatment for moderate to severe sleep apnoea syndrome and corrects excessive daytime sleepiness in most patients (Table 2). Additional benefits of CPAP treatment in sleep apnoea include clearer thinking and concentration, improved snoring and pauses in sleep, better daytime function, and improved psychological wellbeing.<sup>1,2,11-14</sup> CPAP treatment can reduce blood pres-

**Table 5. Indications for Continuous Positive Airways Pressure (CPAP) in OSAS**

**Symptomatic Severe OSA** (AHI > 30)

**Symptomatic Moderate OSA** (AHI >15)

**Mild OSA** (AHI 5-15)

- if:* symptoms affect quality of life and ability to go about daily activities,  
*and:* lifestyle advice and any other relevant treatment options have been unsuccessful,  
*or:* are considered inappropriate.

sure and may reduce cardiac risk by 20% and risk of stroke by 40% over a 5-10 year period.<sup>2</sup> Quality of Life benefits include an average lifetime gain of 5.4 to 8 QALYs, at a cost below £5000 per QALY gained, a 24% increase in Health Status and very favourable cost utility ratio.<sup>1</sup>

NICE guidance recommends CPAP as a treatment option for adults with symptomatic moderate (AHI >15) and severe (AHI >30) OSAHS. CPAP is recommended for adults with mild OSAHS (AHI 5-15) if they have symptoms that affect their quality of life and ability to go about their daily activities and lifestyle advice and any other relevant treatment options have been unsuccessful or are considered inappropriate (Table 5).

CPAP titration allows optimum pressure adjustment either overnight in hospital or preferably during a one or two week home trial, which allows better assessment of improvement in sleepiness and quality of life, as well as compliance. Pressure titration may be carried out manually, by calculated algorithm based on neck circumference and OSA severity, or by auto-titrating CPAP equipment (APAP). Patients should aim to use CPAP for as much of the night as possible and preferably for 6 hours. Continuing use of CPAP at 5 years is about 70%, and predicted by its use at 3 months, snoring history, AHI  $\geq$  30, and Epworth sleepiness scale score of 10 or more.<sup>14</sup>

CPAP complications and problems may lead to poor CPAP adherence or compliance, and include mask leak or discomfort, nasal congestion, dryness and rhinorrhoea. Heated CPAP humidification and/or use of a nasal steroid may be helpful for nasal problems.<sup>15</sup> ENT assessment is advised in patients with symptomatic nasal obstruction as correction of obstruction due to a deviated nasal septum or polyps may be a useful adjunct to CPAP therapy. Claustrophobia or difficulty in exhalation may require education and possible adjustment of CPAP pressure or equipment. Education is more effective than change of interfaces.<sup>16</sup> Epistaxis is a less common problem and a few cases of pneumocephalus have been reported.

Oral appliance therapy (OAT), using mandibular advancement devices (dental splints worn in the mouth overnight), may

**Table 6. Benefits of CPAP in Sleep Apnoea Syndrome (OSAS)**

- Resolution of sleepiness
- Clearer thinking and concentration
- Abolition of snoring and apnoeas during sleep
- Better daytime function
- Improved psychological wellbeing
- Better Quality of Life

be a first line option for snoring in patients with or without mild OSA, or in patients expressing a preference for it.<sup>18</sup> OAT is a second-line therapy for patients with OSAS who fail to benefit from or discontinue CPAP therapy.<sup>2,17</sup>

Surgical management includes nasopharyngeal surgery in combination with lifestyle measures. Naso-pharyngeal surgery may be considered as an adjunct to CPAP or in cases of CPAP failure.<sup>3</sup> Bariatric surgery to aid weight loss is effective in reducing OSA, and has the added advantage of reducing the severity of comorbidities.<sup>18</sup> There is, however, a high incidence of persistent sleep apnoea, snoring, and discontinuation of CPAP after one year, related to initial OSA severity.<sup>19</sup>

### Follow up

Shared care of patient follow up, patient advice on lifestyle management and management of cardio-metabolic and other co-

morbidity is appropriate. An annual specialist clinical review and machine service check by experienced sleep service staff is advised, with interim support as required.<sup>3</sup> Specialist medical advice should be available promptly if the cause of problems such as persistent or recurrent sleepiness is not immediately clear.<sup>3</sup> Failure to continue CPAP use simply due to poor support negates the value of the effort already expended. Advice is often required for patients who require hospitalisation for surgical procedures or other reasons, as many medical and nursing staff in other specialties are unfamiliar with OSAHS and its treatment.<sup>3</sup>

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