

Snoring: referral, investigation and treatment

Snoring is a common problem and the incidence increases with age. The significance of snoring as a symptom of sleep disordered breathing must not be overlooked in assessing this complaint. This article aims to highlight some of the important aspects in the investigation and management of a snoring patient.

It is estimated that approximately 20% of all adults are habitual snorers rising to over 50% in those over the age of 60 years (Lugaresi et al, 1980). The significance of snoring as a symptom has only really been highlighted relatively recently as it may be a sign of obstructive sleep apnoea (OSA).

Snoring is a symptom of a spectrum of disorders that are collectively grouped into the category 'sleep disordered breathing' (Figure 1) (Littlefield and Mair, 1999). This spectrum of conditions ranges from those who have simple snoring as a result of minimal or transient airway obstruction (simple snoring) to those patients with a much greater degree of airway obstruction causing OSA.

The aim of this article is to allow the clinician to make an informed choice as to which group of patients require referral and which can be managed conservatively. It also describes the assessment and treatment of patients, with simple snoring, both conservatively and surgically.

Assessment

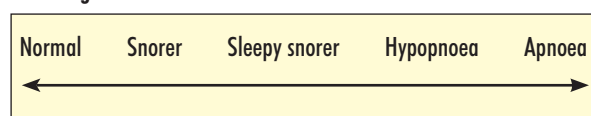
If all patients complaining of snoring problems were referred to an otolaryngologist or respiratory physician then the service would be deluged. It is therefore necessary to try and categorize patients into those that may be simple snorers, those suffering with excessive daytime somnolence and those with potential OSA. It is those that fall into the latter two groups that require investigation, as these are the patients in whom OSA must be distinguished from sleepy snorers, as the management is entirely different.

The snoring groups

Simple snorers

These patients normally give a history of increasing snoring over time without a history of excessive tiredness.

Figure 1. Scale demonstrating the various stages of sleep-disordered breathing.



Tiredness can be assessed using the Epworth sleepiness scale (Johns, 1991) (see below). These patients can normally be managed with conservative treatment regimens in the first instance before referral to an otolaryngologist or respiratory physician.

Obstructive sleep apnoea

It is vitally important to diagnose this group of patients, as these are the patients whose health depends on adequate treatment.

Patients with excessive tiredness and snoring

This group is difficult to manage as these patients include those with OSA and as such require referral and appropriate management.

The Epworth sleepiness scale assesses the patient's likelihood to fall asleep in certain situations. The questionnaire comprises eight different situations such as the likelihood of falling asleep when 'lying down to rest in the afternoon when circumstances permit'. The respondent answers using a scale 0–3 (3 being very likely). Thus the minimum score is 0 the maximum is 24. Results suggest a normal range of 0–10, anyone with a score greater than 10 is regarded as having excessive tiredness and appropriate for referral. There is a correlation between increasing score and likelihood of OSA (Johns, 1993).

Investigations

The most important goal in assessing patients with snoring problems is to rule out OSA. Patients with OSA have an increased risk of cardiovascular arrhythmias and haemodynamic changes during sleep. This has been shown to increase the mortality in patients in whom conservative management (weight loss) is the only treatment modality offered (Partinen et al, 1988).

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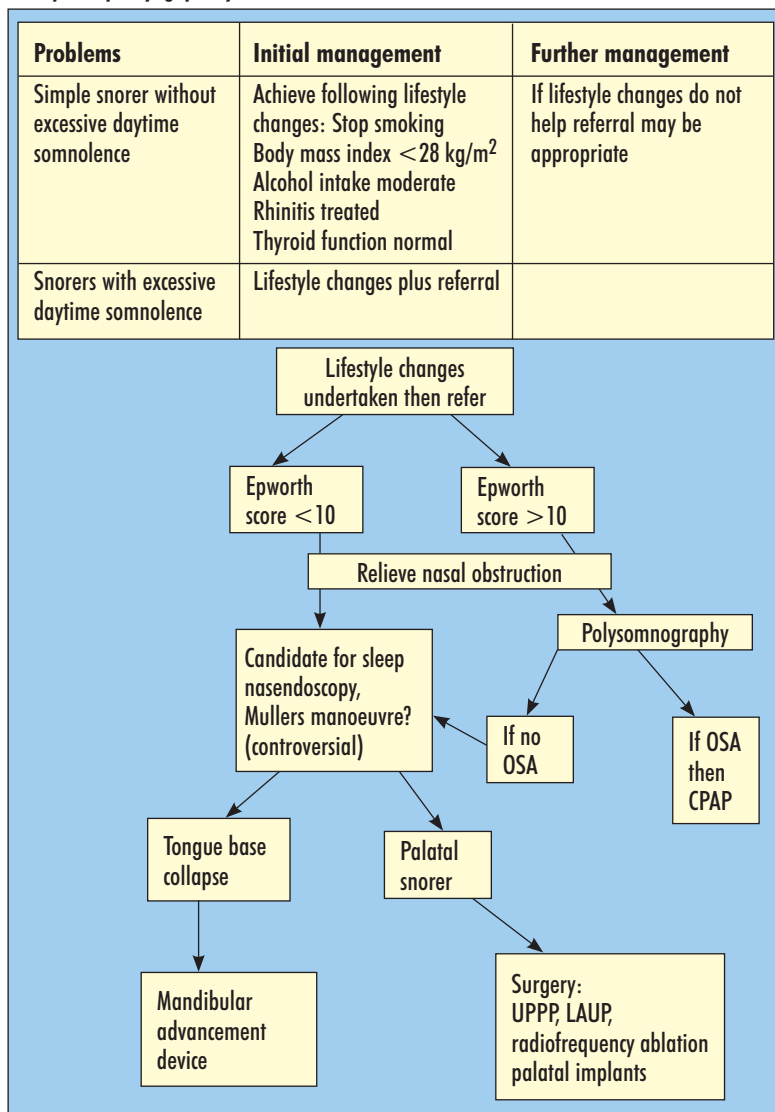
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Polysomnography

This investigation is undertaken to exclude OSA in those whose main complaint is excessive tiredness and snoring. Polysomnography is a complex investigation undertaken in the hospital environment within a dedicated sound-proofed sleep study room. The use of a dedicated room in a hospital cannot be underestimated as patients in a ward environment are unlikely to sleep as well as they would at home and less so if there is background hospital noise. The investigation normally comprises strain gauges on the abdomen and chest (to record chest/abdominal movement), tape recording facility, pulse oximetry, infrared camera recording and a nasal thermistor to detect airflow. The thermistor is important as it allows differentiation between central and OSA. If respiratory effort is present despite a lack of airflow then the apnoea is obstructive, conversely if airflow and respiratory effort do not take place then there is central apnoea and referral

Figure 2. Management of patients. CPAP = continuous positive airway pressure; LAUP = laser-assisted uvulopalastoplasty; OSA = obstructive sleep apnoea; UPPP = uvulopalatopharyngoplasty.



to a neurologist may be appropriate. Overnight pulse oximetry can be used at home and can identify those who desaturate. Oligosomnography is similar to polysomnography but uses fewer parameters.

Apnoeas are identified as episodes of cessation of breathing lasting longer than 10 seconds: hypopnoeas are identified as incomplete episodes of cessation of breathing characterized by a >50% reduction in oronasal airflow, also lasting longer than 10 seconds (Freidrickson and Krueger, 1994; Hoffstein et al, 1994).

OSA is defined as a minimum number of apnoea and hypopnoeas per hour and it is widely accepted that 10 apnoea or hypopnoeas is indicative of OSA (Sher et al, 1996).

Snoring scale score

This score can be used to assess severity of snoring. Three questions are asked of the bed partner and there are four responses to choose from. The score takes into account loudness, frequency and periodicity of the snoring. Numerical scores are assigned to the responses and the score is the sum of the three questions. Scores greater than four and demonstrating collapse of the airway with Muller manoeuvre or sleep nasendoscopy are considered for surgery (Lim and Curry, 1999).

Sleep nasendoscopy

Some clinicians use this rather controversial technique as a tool to locate the source of the snoring in the pharynx. The patient is sedated to a depth that produces snoring. A respiratory stimulant is often given to overcome the respiratory depressant effect of the sedative. It is undertaken in an operating theatre environment and an assessment is made as to the level of the obstruction – palatal, tongue base collapse or multi segmental. Work by Jones et al (2006) highlighted the apparent difference in the acoustic characteristics of snoring from natural sleep and snoring induced by medically induced sleep.

Muller manoeuvre

This technique can be used, like sleep nasendoscopy, to assess the level at which snoring is being generated. The technique can be undertaken in the outpatient setting, by visualizing the upper airway using a flexible nasendoscope. This is passed through the nose into the postnasal space. The patient attempts forced inspiratory effort with a closed mouth and nose. The degree of collapse is assessed at the velopharyngeal sphincter. The nasendoscope is then advanced into the hypopharyngeal area to assess the degree of collapse. This method may be able to demonstrate the suitability of patients for uvulopalatopharyngoplasty (UPPP) (Sher et al, 1985).

Management

Conservative (general)

Conservative management is essential before any surgical intervention (Figure 2). It is also undertaken in patients

diagnosed with tongue base collapse or those in whom OSA has been diagnosed. Assessment of alcohol consumption, weight, smoking, nasal obstruction and thyroid function are all useful tools in managing a simple snorer.

Body mass index

The normal healthy upper limit is regarded as 25 kg/m². Obesity is implied in those with a body mass index (BMI) >30 kg/m². Obesity is known to be a cause of snoring and therefore encouraging weight loss in those with a BMI > 25 kg/m² is often effective in treating snoring patients. Surgical treatment is generally not offered to snorers with a BMI >27–28 kg/m² as it is less effective (Rollheim et al, 1999).

Alcohol and smoking

In a randomized trial alcohol consumption before sleeping was found to provoke snoring in people who do not normally snore (Scrima et al, 1989); it has also been shown to potentiate snoring in people complaining of snoring (Robinson et al, 1985; Mitler et al, 1988). It is therefore imperative to encourage reduction in alcohol consumption. Smoking increases the likelihood of snoring. Smoking irritates the lining of the nose and pharynx leading to inflammation, which exacerbates any propensity to snoring. In two studies of 2187 and 457 patients a linear relationship was demonstrated between the number of cigarettes smoked and the degree of snoring (Bloom et al, 1988; Kauffman et al, 1989).

Nasal obstruction

Nasal obstruction (e.g. rhinitis, polyps) results in changes in airflow velocity and resistance. A study of almost 5000 patients at the University of Wisconsin looked at the role of acute and chronic rhinitis as a risk factor for snoring (Young et al, 1997). It demonstrated that those that suffered with night-time symptoms of rhinitis were significantly more likely to report habitual snoring. A small prospective study on surgery to relieve nasal obstruction reported cessation of snoring in 50% of those who have nasal obstruction and snoring problems (Low, 1994). Retrospective studies of 96 and 126 patients have reported complete cessation of snoring following nasal surgery for obstruction of 31–50%. In addition snoring frequency was reduced in a further 40–57% (Ellis et al 1992; Elsherif and Hussein, 1998).

Sleeping position

Lying supine increases the chance of snoring because of the ease with which the palate or tongue base can lie against the posterior pharyngeal wall. Snorers are advised to raise the head of the bed and sleep on pillows.

Conservative (specific)

Mandibular advancement device

This device is used in patients whose snoring is thought to be as a result of tongue base collapse. The purpose of

this device is to advance the mandible so as to prevent the tongue collapsing back onto the posterior pharyngeal wall and occluding the airway. It is a simple device and can be purchased by the patient or fitted by a dentist or maxillofacial surgeon. Obviously those fitted by a specialist are tailored to the patient's requirements and so are likely to be more comfortable and effective. Two small studies have reported improvements in snoring in 14–50% of users (Borgersen et al, 2000; Schonhofer et al; 2000). Complications of these devices include temporomandibular joint pain and movement of teeth; it cannot be used in the edentulous.

Nasal bridges

Often the patient has used these as a first-line treatment for their snoring. Splints can be used to splint the alar cartilage (at the external nares) open should the cause of snoring be as a result of alar collapse (rarely the only cause).

Surgical management

There is controversy as to the effectiveness of surgery to treat snoring patients. OSA must be excluded. It is also imperative that lifestyle changes have occurred and most surgeons would not contemplate operating on a patient with a snoring problem should their BMI be greater than 28 kg/m². Snoring may be caused by tongue base collapse and this should be investigated before embarking on any surgery to the soft palate. Treatment of nasal obstruction must be undertaken before embarking on snoring surgery as one of the prerequisites of successful snoring surgery is a patent nasal airway.

Assessing the results of snoring surgery is difficult. Snoring is a subjective problem and it is not just the decibel level that causes the bed partner irritation (Hoffstein et al, 1994).

Reviewing the results of snoring surgery is also difficult, as there is little agreement as to what constitutes a successful operation. Some regard a reduction in snoring as a success, others require a 50% reduction in the bed-partners perception of snoring. The variability in reporting success makes it difficult to compare studies.

There are four main procedures undertaken for palatal snorers.

Uvulopalatopharyngoplasty

Fujita introduced UPPP to North America in 1981 with certain modifications from the original operation undertaken by Ikematsu in Japan (Fujita et al, 1981). The technique involves the patient undergoing a tonsillectomy followed by partial removal of the soft palate, uvula and pharyngeal arches. The mucosal edges are then appositioned and sutured together. The purpose of the operation is to reduce vibratory movement of the palate and increase airflow. Fujita originally introduced the operation as a treatment for OSA but later recommended the operation as the treatment of choice in simple snorers (Fujita, 1984).

Initial success of this operation has been quoted at between 76–100% (Fujita et al, 1985; Tytherleigh et al, 1999; Hicklin et al, 2000). All these studies were retrospective with relatively small numbers of patients except for Hicklin et al's study that looked at 271 patients. The long-term success (defined as a 50% reduction in snoring score postoperatively) in this study was reported as 45%. Other studies reported a reduction in success of the operation longer term to between 71–83% although these studies didn't require a 50% reduction in snoring for the operation to be regarded as successful (Koay et al, 1994; Tytherleigh et al, 1999).

The main problem associated with this operation is postoperative pain, most patients will require between 1–2 weeks off work and combination analgesia such as diclofenac and cocodamol. Longer-term complications include palatal dryness and nasal regurgitation.

Laser-assisted uvulopalatoplasty

This operation was described as an alternative to UPPP (Kamani, 1990). It was originally undertaken as an outpatient under local anaesthetic. It is normally performed under a general anaesthetic in the UK. This technique uses a CO₂ laser to make vertical through-and-through incisions on both sides of the uvula, combined with a significant shortening of the uvula. Like UPPP initial results are very encouraging, but over time the success of the procedure is reduced. In a retrospective study of 50 patients the short-term success at reducing snoring was 82% at 1 month, 68% at 6 months and 55% at between 18 and 24 months (Wareing and Mitchell, 1996; Wareing et al, 1998).

Results for this procedure are similar to that of UPPP (Clarke et al, 1998) but the morbidity associated with this procedure is reduced as a result of less nasal regurgitation and postoperative bleeding. Pain is comparable to that of UPPP (Maw and Marsan, 1997).

Radiofrequency ablation

This operation can be undertaken under either local or general anaesthetic. Placing a sheathed probe into the soft palate in multiple positions allows radiofrequency waves to generate heat in the soft palate and therefore scarring as a result of protein denaturation. The purpose of this is to increase the stiffness of the palate and reduce the vibratory component of palatal snoring. It is performed as a day case or even in the outpatient setting and

has minimal morbidity and little pain associated with it. Short-term results indicate the procedure to be effective but effectiveness decreases over the medium term (Trotter et al, 2002).

Palatal implants

The use of palatal implants is a newer technique and was introduced because of a concern over scar remodelling in the palate following radiofrequency surgery. These have been introduced with promising results (Ho et al, 2004). One of the concerns regarding implants is extrusion and palatal implants are no exception (Skjostad et al, 2006).

Conclusions

Snoring is a symptom that a large percentage of the general population is troubled by. In assessing these patients it is vital to differentiate those that are likely to be suffering with OSA and therefore need treatment to those that suffer excessive daytime somnolence without OSA and may therefore benefit from surgery. **BJHM**

Conflict of interest: none.

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KEY POINTS

- Snoring is a spectrum of which includes but is not diagnostic of sleep apnoea.
- Sleep studies are indicated in higher risk groups to rule out apnoea.
- Medical and supportive management is the mainstay of treatment.
- Surgery reserved for those with a body mass index less than 28 kg/m².
- Surgery is not always curative.

Educational resources

Royal Society of Medicine – Sleep medicine section (www.rsm.ac.uk/academ/fors_id.htm)

British Sleep Society (www.british-sleep-society.org.uk)

British Sleep Foundation (www.britishsleepfoundation.org.uk)

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