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Things to discuss...

**when considering
surgery for snoring
& sleep apnoea**



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Things to discuss... when considering surgery for snoring & sleep apnoea

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Things to discuss... when considering surgery for snoring & sleep apnoea

Introduction

This guide starts from the point where lifestyle¹ and self-help options have been tried and haven't proven successful. If you are reading this without having a broad understanding of snoring and obstructive sleep apnoea (OSA) treatments then we suggest you first look at the **Snorer.com** Snoring and Sleep Apnoea Overview Guide [here](#).

Snoring and obstructive sleep apnoea may be thought of as essentially the same problem but at different levels of severity. Snoring may be defined as "breathing during sleep with hoarse or harsh sounds", while obstructive sleep apnoea (OSA) is not just noisy, it is when the airway during sleep collapses, causing obstruction, and the obstruction causes the apnoea (cessation of breathing).

Although surgeries are rarely performed, surgical approaches have been largely confined to reduction of the soft palate and uvula (dangly bit in the mouth) and/or removal of nasal polyps ('lumps' inside your nasal airway) or septum straightening (correcting a crooked nose) and more recently advancing the upper and lower jaws which advances the soft palate and tongue, opening up the airway, known as an MMA.

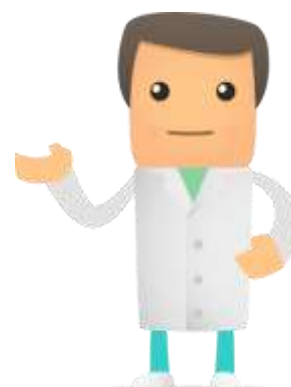
If you are considering surgery, your hospital doctor or specialist will discuss with the options with you. This will include the likelihood of success, goals of the treatment, risks and benefits of the procedure, possible side-effects, complications and alternative treatments.²

This guide does not pretend to explain everything in detail; it is intended to provide an accessible, evidence-based introduction, sufficient to help you engage in conversation with your medical professional.

There are lots of external references in this Guide. The reference information can be found in the References section of the Appendix at the end of the Guide.

Snorer.com uses the UK spelling of 'apnoea' rather than the more widely used US spelling 'apnea.'

<https://snorer.com/information-guides/>



ACRONYM ALERT!

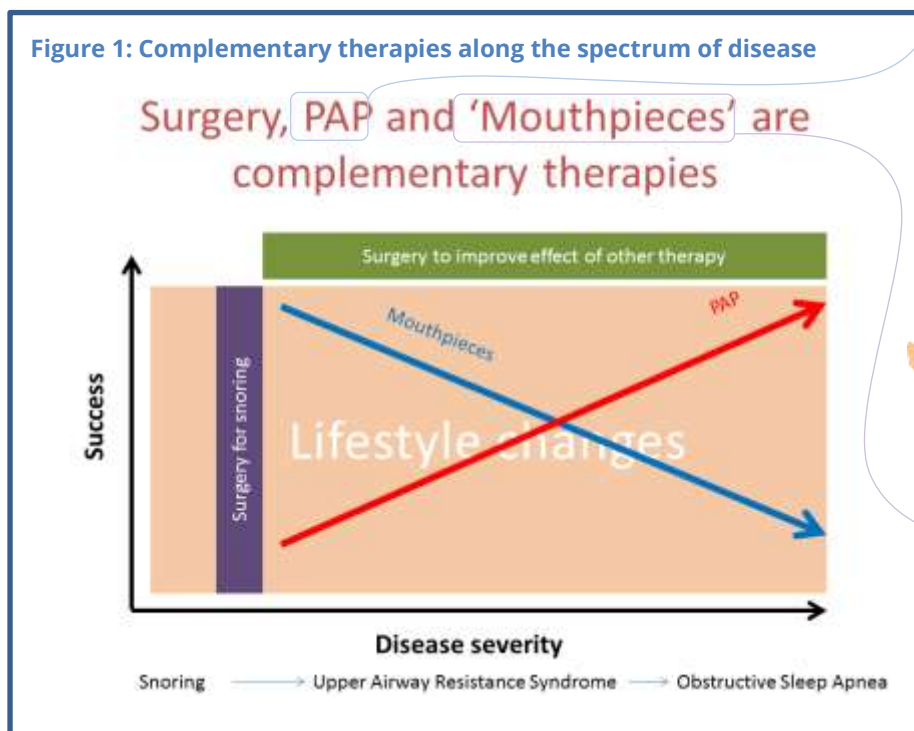
MMA = Maxilla (upper jaw) Mandible (lower jaw) Advancement

Further information can be found in the References section of the Appendix at the end of this Snorer.com Guide.



Things to discuss... when considering surgery for snoring & sleep apnoea

While this is of course general information, in the diagram below (Figure 1) you will see how the various therapies, lifestyle changes and surgery all interrelate. Where you are on the disease severity axis, along with any other conditions you may have, could indicate various options.



ACRONYM ALERT!

PAP = Positive Airway Pressure
(See our "How to choose... Positive Airway Pressure therapy" Guide.)



JARGON ALERT!

MRD (Mandibular Repositioning Device)
MAS (Mandibular Advancement Splint)
Mouthpiece, 'Gumshield', Oral Appliance, Device, Splint...
These are different names for the same thing: a device worn in your mouth, which holds your lower jaw forwards, to help you breathe better while asleep.

The myriad of variables is one reason why you must have an overnight sleep apnoea assessment (known as a 'Sleep Study') and a thorough ENT examination before considering any form of surgery.³ If there is a restriction in your throat, that if removed would help you use another treatment more effectively, then exceptionally, surgery may help.



ACRONYM ALERT!

ENT = Ear Nose and Throat

Further information can be found in the References section of the Appendix at the end of this Snorer.com Guide.

If you have a 'set back' or what is known as a retruded lower jaw (where your teeth are well behind those of the upper jaw) surgery to advance your lower jaw (which will also bring the tongue forwards and open the



JARGON ALERT!

Medical and dental professionals may describe this as a 'receding' mandible (lower jaw) or retrognathic.

Things to discuss... when considering surgery for snoring & sleep apnoea

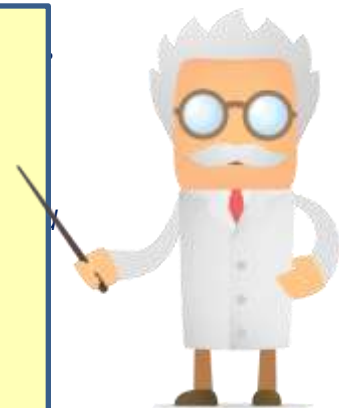
airway) may be indicated. Even those with normal 'bite' positions may benefit from the advancement of the upper and lower jaw.

The extract below is taken from the 2005 "Surgery for Obstructive Sleep Apnoea in Adults", Cochrane Database of Systematic Reviews.⁴

Further information can be found in the References section of the Appendix at the end of this Snorer.com Guide.

The Cochrane database has an excellent reputation, as they collate medical papers and review lots of patients with similar problems.

"Surgery for obstructive sleep apnoea/hypopnoea syndrome aims to relieve obstruction by increasing the size of the airway in the throat, bypassing the airway or removing a lesion. A limited number of trials assessing diverse surgical techniques were identified. There were inconsistent effects reported across the trials. The available evidence from these small studies does not currently support the widespread use of surgery in people with mild to moderate daytime sleepiness associated with sleep apnoea."



This means that, as a general rule, surgery is appropriate for snoring but not for sleep apnoea. However, in a select group of patients surgical intervention may be appropriate even in the mild or moderately severe sleep apnoeic person. In other words, Cochrane is unable to prove surgical results. However, since 2006, it has been appreciated that in cases of severe OSA, MMA is appropriate for those that cannot use CPAP.

Broadly speaking, surgery could be considered either to improve upper airway anatomy in such a way so that it facilitates PAP therapy or preferably to overcome the upper airway obstruction completely and negate the need for PAP therapy.

For example, if the individual had nasal polyps or really enlarged tonsils, then surgical intervention may result in a dramatic improvement in their symptoms. There are a number of patients who cannot tolerate PAP or mouthpieces and are not willing to accept PAP as a lifetime therapy.



ACRONYM ALERT!

MMA = Maxilla & Mandible Advancement (upper and lower jaw)



JARGON ALERT!

Nasal polyps are explained in more detail on page 11 of this Snorer.com Guide.



ACRONYM ALERT!

PAP = Positive Airway Pressure

Things to discuss... when considering surgery for snoring & sleep apnoea

This selective group, while admittedly small in numbers, may benefit from complex surgery.

Surgery for snoring and sleep apnoea

This **Snorer.com** Guide follows the logical flow of air into your body, through your nose, down your throat and past your **larynx**. Then it moves to surgery on the actual structure of your face – the bones.

In the same way that snoring and **OSA** are points along a line, the surgical approach changes and becomes progressively more serious from **ENT** to **Oro-maxillofacial** surgery, in correlation with the severity of the sleep problem.

History, examination, tests, diagnosis

You will no doubt have heard of the terms 'diagnosis' and 'treatment'. To determine what is happening (diagnosis) and how to help you best (treatment), the surgeon will review your medical history and ask you to undergo various thorough examinations and assessments.

As there are many causes of snoring - no one solution is appropriate. Only after an accurate diagnosis can the right treatment for you be determined.

Before you decide on surgery, talk it over with your GP or specialist Consultant and your partner. Surgical options for OSA are not usually recommended, as sleep apnoea responds better to positive airway pressure therapy (PAP) and can usually be managed through non-surgical means.

In a highly select group of patients however, surgery may be appropriate if treatment with PAP or mouthpieces [oral appliances] has failed.⁵



JARGON ALERT!

The larynx is also known as your 'voicebox'.



ACRONYM ALERT!

OSA = Obstructive Sleep Apnoea
ENT = Ear Nose and Throat



JARGON ALERT!

Oro-maxillofacial surgery is surgery on the bones of the face.

Accurate evaluation in sleep related breathing disorders is vital in the final management plan.

The muscle tone of the upper airway is different when you are awake from when you are asleep. Therefore it makes sense to evaluate your upper airway when you are asleep and potentially snoring and obstructing.

This process is called a sleep nasendoscopy and is also known as 'Drug Induced Sedation Endoscopy'.

During this procedure the ENT surgeon, with the help of an anaesthetist, will examine what is happening in your throat whilst you are sedated and asleep preferably whilst you are snoring.

Kotecha BT, Hannan AS, Khalil HMB, Georgalas C, Bailey P (2007): Sleep nasendoscopy: a 10-year retrospective audit study. Eur Arch Otorhinolaryngol; 264:1361-1367

Further information can be found in the References section of the Appendix at the end of this **Snorer.com** Guide.

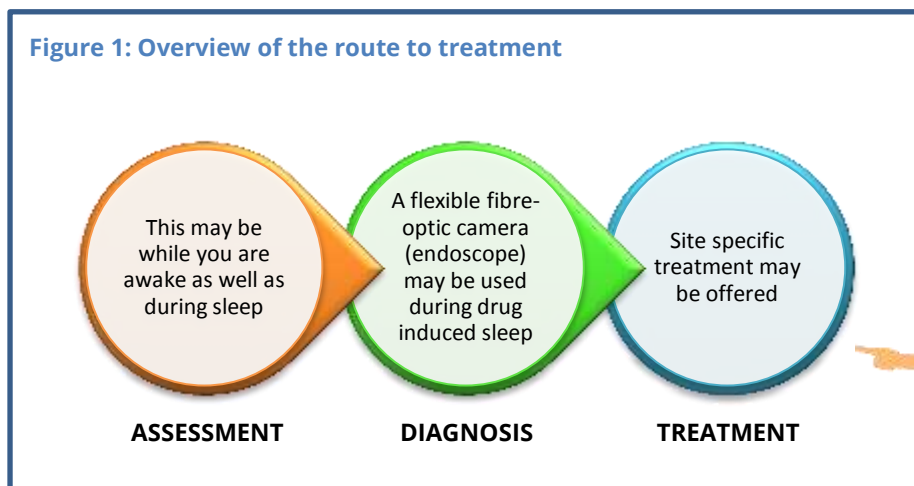
Things to discuss... when considering surgery for snoring & sleep apnoea

Radical surgery, as opposed to minimally invasive surgery, is irreversible. Once you have had surgery to remove something - it is gone. Minimally invasive surgery usually avoids removal of tissue and relies instead on scarring or stiffening floppy tissue.



JARGON ALERT!

Radical surgery is surgery that is usually extensive and complex. 'Minimally invasive surgery' means a procedure that is less intrusive than open surgery. Check out the Jargon Buster: <https://snorer.com/jargon-buster/>



1. **ASSESSMENT** – Together with a review or your history, this is to ask “*what is wrong*” and includes a review of your signs and symptoms (i.e. what you complain of and what the surgeon detects) together with examination and results of any tests.
2. **DIAGNOSIS** - The assessment may then facilitate a diagnosis, the underlying cause of your problem.
3. **TREATMENT** - Finally, provide the best answer to solve your problem, the ‘treatment’. This quite often involves more than one anatomical level – a so-called multi-level problem. Generally it is appropriate to undertake the simplest and safest procedure to address the diagnosed problem to correct any anatomical obstruction.



JARGON ALERT!

Multi-level being nose, soft palate and/or tongue. Multi-level upper airway surgery means, surgery upon many areas at the same time, to maximise effect.

Likelihood to gain weight

Your weight is an important confounding factor for sleep apnoea.⁶ If you lose weight it can have a positive impact and potentially lessen the severity of your sleep apnoea.⁷ Conversely, if you gain weight it can make your sleep apnoea worse. So, surgery for your current condition has to be considered in the context of your likelihood to change weight.

This is something to think carefully about, discuss with your partner and your surgeon.

If you are overweight and can lose weight, a simple analogy would be that post weight-loss you will be breathing through a larger diameter snorkel.

There is more about weight and sleep apnoea in the Bariatric Surgery section on page 23.

Further information can be found in the References section of the Appendix at the end of this **Snorer.com** Guide.



Things to discuss... when considering surgery for snoring & sleep apnoea

Surgery confined to soft tissue

There is currently some difficulty in identifying who would benefit from surgery. It is not yet clear who will find that surgery resolves their problem and who will find that after a period the symptoms return.⁸

Further information can be found in the References section of the Appendix at the end of this Snorer.com Guide.

Surgery may be required to address the nose, soft palate, tonsils and tongue. In many cases more than one anatomical region may need correction – this is known as multi-level surgery.



JARGON ALERT!

Multi-level being nose, soft palate and/or tongue. Multi-level upper airway surgery means, surgery upon many areas at the same time, to maximise effect.

Changes inside your nose, and further back, that restrict your breathing.

Allergic rhinitis often causes cold-like symptoms, such as sneezing, itchiness and a blocked or runny nose.

Polyps, tonsils, turbinates and deviated septums are abnormalities that compromise the nasal passage and result in patients complaining of nasal congestion. In addition, patients may also have other physiological complaints such as those of allergic rhinitis – the common allergens being pollen, dust mites or animals. Nasal congestion would certainly interfere with PAP therapy compliance and may need medical and surgical attention.



ACRONYM ALERT!

PAP = Positive Airway Pressure
ENT = Ear Nose and Throat

Any form of surgery would only occur after a thorough ENT assessment.



ENT (Ear Nose and Throat) Surgeons, Otolaryngologists, and Head & Neck Surgeons are three different titles for similar expertise.

Things to discuss... when considering surgery for snoring & sleep apnoea

Figure 3 illustrates a nasal polyp (white area in the middle of the image). It is blocking most of the air passage in the nasal cavity. As such, it makes it difficult to breathe through this nostril making the air in the *other nostril* travel faster vibrating the tissue (making a snoring noise) or perhaps even collapsing the nostril altogether!

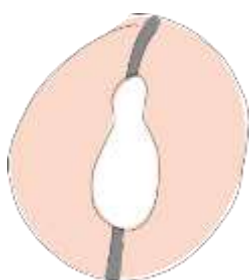


JARGON ALERT!

A **polyp** is a particular kind of abnormal tissue growth.

The **nasal cavity** is the air filled space above and behind your nose. The floor of the nasal cavity forms the roof of your mouth (palate).

Figure 3: View of the nasal cavity showing a polyp



This diagram represents a *view up your nose*. The pink area is your skin; the white area is the 'polyp' that is causing the problem and the dark area is where air travels as you breathe.

The polyp is blocking most of the nasal airway on this side of the nasal cavity.



Surgery is occasionally considered as a *first* treatment when patients with snoring and/or mild sleep apnoea have severe obstructing anatomy that is surgically correctable. For example, having enlarged tonsils which restrict breathing.⁹

Surgery may also be considered to improve your ability to use other treatments such as PAP and oral appliances (mouthpieces).¹⁰

Surgeons' assessments for snoring then focuses upon the soft palate.

Is it creating the snoring noise by 'flapping' in the airflow as you breathe? This is where careful assessment can help the surgeon identify the problem. These tests may include passing a camera up your nose while you perform jaw and breathing manoeuvres.

There are several approaches to stopping this 'flapping' tissue at the back of your throat – read on!



JARGON ALERT!

This procedure is known as a 'nasendoscopy' and is sometimes performed while you are asleep, which is known as - Drug Induced Sedation Endoscopy (see explanation on page 7).

Things to discuss... when considering surgery for snoring & sleep apnoea

Palatal surgery may be performed by a **minimally invasive** approach whereby the soft palate does not change its shape – instead it is tightened using injection **snoreplasty[®]**, **palatal pillar implants** or by performing **radiofrequency surgery**. Alternatively, more radical palatal surgery involves shortening and stiffening the soft palate by performing **laser assisted uvulopalatoplasty (LAUP)** or **uvulopalatopharyngoplasty (UPPP)**.



JARGON ALERT!

A procedure that is less invasive than open surgery.
Check out the Jargon Buster at <https://snorer.com/jargon-buster/>
These scary sounding and sometimes unpronounceable terms are explained further (with pictures!) on the next few pages.

- Surgical removal or reduction
 - Uvulopalatopharyngoplasty (UPPP)
Involves removal of the uvula (dangly bit at the back of the throat) and portions of the soft palate
 - Radiofrequency ablation
- Laser Assisted Uvulopalotoplasty (LAUP)
- Stiffening. Achieved through a process known as radiofrequency ablation or by implanting a rod into the soft palate.



Radiofrequency surgery

A number of procedures are available, and includes *Somnoplasty*[®], *Coblation*[®] or *Celon*[®] radiofrequency. These are different energy emitting devices that can be used on the soft palate and/or the tongue to reduce the size and amount of soft tissue.

In some cases, these procedures can be carried out under local anaesthesia but more often, if multi-level treatment is required, then general anaesthesia may be more appropriate.

Radiofrequency ablation might be worth considering as an option if you have mild/moderate sleep apnoea, and have tried PAP and a mouthpiece [oral device] without success.¹¹



JARGON ALERT!

Multi-level upper airway surgery means, surgery upon many areas at the same time, to maximise effect.

Radiofrequency ablation is a surgical method of reducing and stiffening soft tissue within the body by a minimally invasive procedure.

Figure 4: Radiofrequency ablation surgery



A small probe is inserted into the area to be reduced. The tissue is internally heated, thus reducing the bulk and stiffening the tissue, which makes it less likely to vibrate as you breathe and create the snoring noise.



Further information can be found in the References section of the Appendix at the end of this [Snorer.com](#) Guide.

In general, radiofrequency ablation does not have serious side-effects and pain is reported to occur for less duration (2.5 days on average) than other procedures.¹² It is a sequential procedure that may take 3 or 4 outpatient visits to complete and NICE have suggested that short-term effectiveness and long term outcomes of this procedure are uncertain.¹³

Further information can be found in the References section of the Appendix at the end of this [Snorer.com](#) Guide.



ACRONYM ALERT!

NICE = National Institute for Health and Care Excellence

Laser assisted uvulopalatoplasty (LAUP)

We have mentioned a form of surgery called laser assisted uvulopalatoplasty (LAUP). This procedure also assumes that the snoring noise is created by the soft palate.

Many patients do not have an exclusively soft palate problem, adding emphasis to the importance of thorough history, tests and examinations.

Figure 5: Laser assisted uvulopalatoplasty (LAUP)



A laser is used to scar and sometimes remove the tissue and stiffen it, making it less likely to vibrate and make the snoring sound.



LAUP is a sequential procedure that may take 3 or 4 outpatient visits to complete.¹⁴

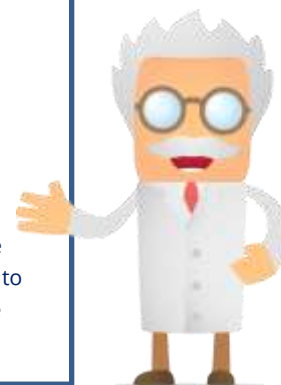
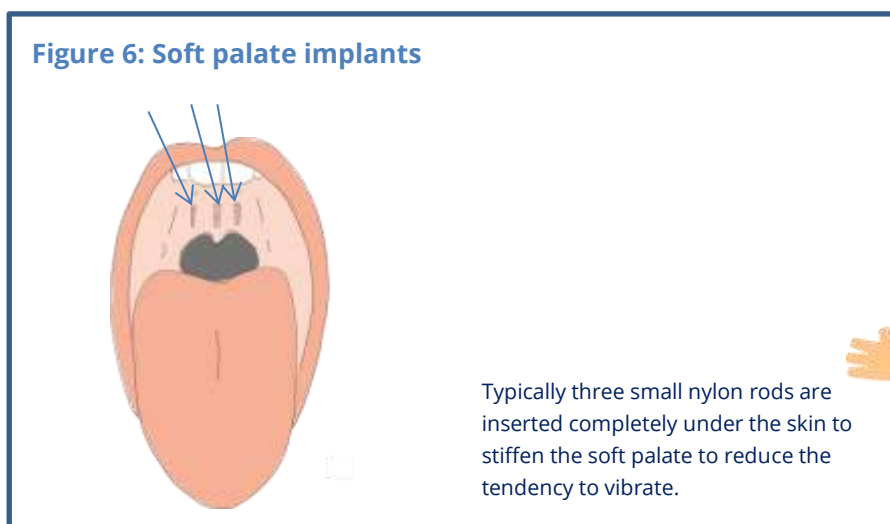
Obstructive sleep apnoea is a serious medical condition. As such, it is a problem for the patient themselves and not so much a partner perceived anti-social snoring problem.

LAUP is not usually recommended in isolation for the treatment of obstructive sleep apnoea¹⁵ however, in selected cases, it may be appropriate to perform LAUP in conjunction with other surgical procedures addressing upper airway obstruction.

Further information can be found in the References section of the Appendix at the end of this **Snorer.com** Guide.

Soft palate implants

This is a relatively new technique to stiffen the soft palate instead of remove it. The idea is that rods known as a 'pillar implants' are inserted into the soft palate under a local anaesthetic, to reduce the tendency to vibrate (and make noise).



In the USA, the **FDA** has approved certain soft palate implants in selected patients for snoring and mild to moderate sleep apnoea.

However, in the United Kingdom, **NICE** guidelines¹⁶ state that:

“Current evidence on soft-palate implants for obstructive sleep apnoea (OSA) raises no major safety concerns, but there is inadequate evidence that the procedure is efficacious in the treatment of this potentially serious condition for which other treatments exist. Therefore, soft-palate implants should not be used in the treatment of this condition.”



ACRONYM ALERT!

FDA = Food & Drug Administration (USA)

NICE = National Institute for Health and Care Excellence (*previously known as National Institute for Clinical Excellence*)

Further information can be found in the References section of the Appendix at the end of this **Snorer.com** Guide.

Things to discuss... when considering surgery for snoring & sleep apnoea

Although not currently offered by the NHS in the UK, pillar implants are available privately. Factors such as appropriate patient selection and correct placement of the implants are very important for success. In a recent study ~9% of the implants 'extruded' which means they came out from under the skin and had to be removed.¹⁷



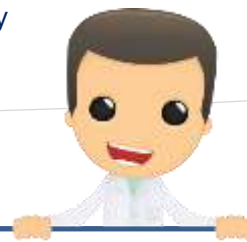
ACRONYM ALERT!

NHS = National Health Service (UK)

Further information can be found in the References section of the Appendix at the end of this Snorer.com Guide.

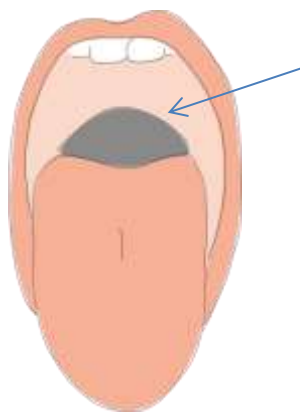
UvuloPalatoPharyngoPlasty (UPPP)

An invasive surgical procedure called a uvulopalatopharyngoplasty (UPPP) may, in certain circumstances, be performed. It is less commonly performed than in the past. Patient selection is very important to determine who will obtain a positive response from the surgery.¹⁸



Further information can be found in the References section of the Appendix at the end of this Snorer.com Guide.

Figure 7: UvuloPalatoPharyngoPlasty (UPPP)



This diagram represents a view of the back of the throat. The uvula (dangly bit in the middle) has been removed along with the tissue on both sides (pharyngeal walls).

While you are under a general anaesthetic, the surgeon trims the tissue at the back of your throat. Reducing the tissue in this area may open up your airway and make it wider. This sometimes can allow air to move through the throat more easily when you breathe, reducing the severity of obstructive sleep apnoea (OSA).

Things to discuss... when considering surgery for snoring & sleep apnoea

If your snoring is caused by large tonsils and/or adenoids, these can be removed in an operation called a **tonsillectomy or adenoidectomy**. Your surgeon would discuss this with you as this operation may be performed at the same time as the UPPP.



JARGON ALERT!

'Ectomy' means the surgical removal of tissue- in this case the Tonsils or Adenoids (lymphatic tissue).

Nasal incompetence describes a condition where what you normally swallow comes out of your nose instead.

There are serious risks associated with UPPP surgery, including what is known as **nasal incompetence** and severe post-surgery bleeding.

Trans-oral robotic surgery (TORS)

Trans-oral robotic surgery (TORS) is a new, **'salvage'** surgical procedure for selected patients with moderate to severe OSA, who have not tolerated or not successfully used other treatments.



JARGON ALERT!

Trans-oral robotic surgery is a futuristic technology that allows surgical removal of soft tissue in tight spaces.

The robot is guided by a surgeon from a command console using 3-D imaging and instruments attached to the robotic arms and even has the capability to work around corners!

When assessment and diagnosis have implicated the base of the tongue as being the cause of the problem, TORS improves access to the tongue base area (compared to conventional 'line of sight' approaches) because it enables the surgeon to operate 'around corners'.



JARGON ALERT!

Salvage in this case meaning it's a last chance option when other treatments have been unsuccessful.

This improvement may correlate with improved surgical outcomes, however, long-term comparative evaluation in larger patient samples is necessary.

Things to discuss... when considering surgery for snoring & sleep apnoea

Oral & Maxillofacial surgery

Oral & maxillofacial surgery is “surgery on the bones of the mouth, jaws, teeth and face.” It is indicated for treatment of severe sleep apnoea in patients who cannot tolerate or have found PAP and mouthpieces ineffective.¹⁹ Also, should your jaws not align, surgery can change this, it may be particularly relevant if your lower jaw is set well behind the upper (undershot). Oral & maxillofacial surgery is a useful single procedure able to correct airway obstruction at all levels with increasing evidence of success.²⁰

If you lie on your back with an obstructed airway, the first aid principle is to hold the lower jaw (and tongue) forward – the so-called ‘tongue thrust.’ Mandibular advancement surgery mimics this movement 24 hours a day, 7 days a week.

It is very important to weigh up the likelihood of success, goals of the surgery, possible side-effects, and complications and consider alternative options.²¹

Oral & maxillofacial surgery, in particular the advancement of both the upper and lower jaw, often known as MMA, is major surgery that will change your appearance, sometimes this may be considered a positive.²² It may be indicated where facial skeletal discrepancies are associated with sleep apnoea (confirmed by a sleep study) and is advocated for selected patients who have failed PAP and mouthpiece (oral appliance) therapy.

This type of surgery may have other unintended consequences; concerns, other than the surgery itself, include a change in your appearance, risk of nerve damage to the lower lip resulting in perhaps permanent loss of sensation (similar to numbness you may experience after a dentist visit) and two variables known as **remodelling and relapse**.



ACRONYM ALERT!

PAP = Positive Airway Pressure

Further information can be found in the References section of the Appendix at the end of this Snorer.com Guide.



JARGON ALERT!

Remodelling is where the soft tissue, that is attached to the bones of the face that have been moved, ‘remodels’ itself (changes its shape), perhaps reducing the benefit of the surgery.

Relapse is where the desired change in position of the bones of the face diminishes as the patient heals after the operation. Relapse is compensated for by over-correcting.

Both remodelling and relapse are effectively uncontrolled variables.

Things to discuss... when considering surgery for snoring & sleep apnoea

However, in general, MMA shows that the mild changes to facial profile / appearance are commonly an improvement. Those with severe obstructive sleep apnoea will usually have obstructions at multiple levels: nose, palate and base of the tongue. Advancement of the upper and lower jaw corrects obstructions at all levels.

Osteotomy

The cutting of bone is called 'osteotomy'. Surgery can be performed on the lower, upper or both jaws to treat sleep apnoea, as well as other conditions. This is sometimes referred to as orthognathic surgery.

For sleep apnoea, this is commonly to advance (bring forward) the lower jaw (mandible) to support opening the airway.

If surgery is required on both jaws at the same time, it is called a bi-maxillary osteotomy (because bi-maxillary = both jaws). This is often called MMA.



ACRONYM ALERT!

MMA = Maxilla (upper jaw) Mandible (lower jaw) Advancement

This type of surgery, if performed on one jaw, will alter how your teeth fit together (your bite). This might be appropriate if your lower teeth are behind your upper teeth. If both jaws are moved together your bite may stay the same.

Things to discuss... when considering surgery for snoring & sleep apnoea

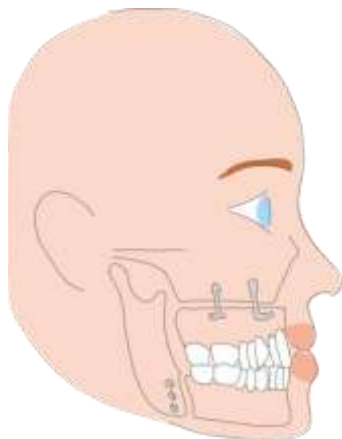
The surgical positioning adjustments of *both* jaws achieves a similar effect to **multi-level** surgery and may be considered an effective option when alternatives have failed or are not tolerated.



JARGON ALERT!

Multi-level upper airway surgery means, surgery upon many areas at the same time, to maximise effect.

Figure 9: Bi-maxillary Osteotomy



This diagram shows how *both* jaws may be cut and repositioned to facilitate the opening of the airway, to resolve snoring and sleep apnoea. This surgery could be carried out on one or both jaws depending on what is needed to resolve the problem.



It is becoming increasingly recognised that **MMA**, although complex surgery, is one of the procedures capable of correcting severe **OSA** at all levels of obstruction, and is rapidly becoming the main surgical treatment for severe obstructive sleep apnoea, where **CPAP** has failed or is not tolerated and where mandibular advancement is helpful but not acceptable long term.

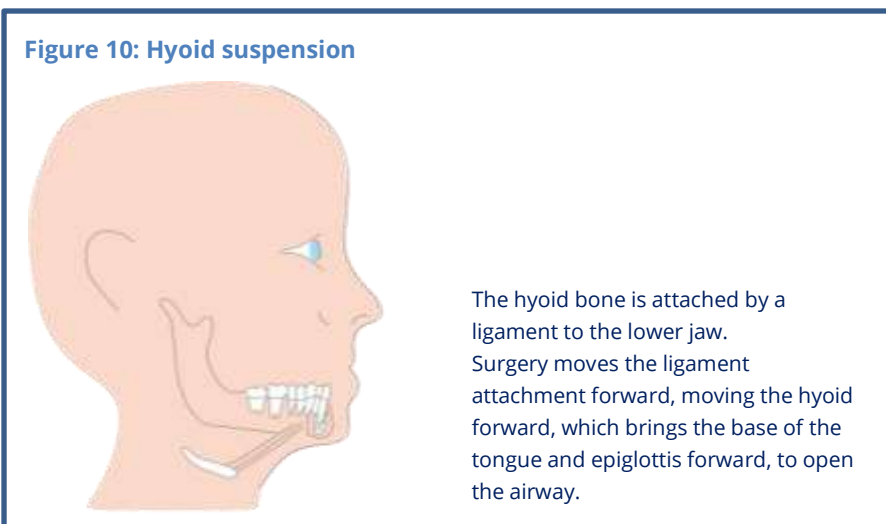


ACRONYM ALERT!

MMA = Maxilla (upper jaw) Mandible (lower jaw) Advancement
OSA = Obstructive Sleep Apnoea
CPAP = Continuous Positive Airway Pressure

Hyoid suspension

The image below shows the hyoid bone in your throat – it is just above your thyroid cartilage your (“Adam’s Apple”).



Surgery moves the ligament attachment forward, which in turn pulls the hyoid forward.

This brings the base of your tongue and **epiglottis** forwards, which may then open your airway, (only at this level in your airway), and overcome your sleep apnoea.²³

If oro-maxillofacial surgery to advance the lower jaw is carried out, this will move forward the hyoid in a similar way.



JARGON ALERT!

The epiglottis is a flap of cartilage located in your throat behind your tongue. It is usually upright allowing air to enter your lungs.

When you swallow, it folds backwards to protect the entrance to your lungs so that food and liquid do not enter.

After swallowing, the epiglottis returns to its original upright position.

Further information can be found in the References section of the Appendix at the end of this **Snorer.com** Guide.

Things to discuss... when considering surgery for snoring & sleep apnoea

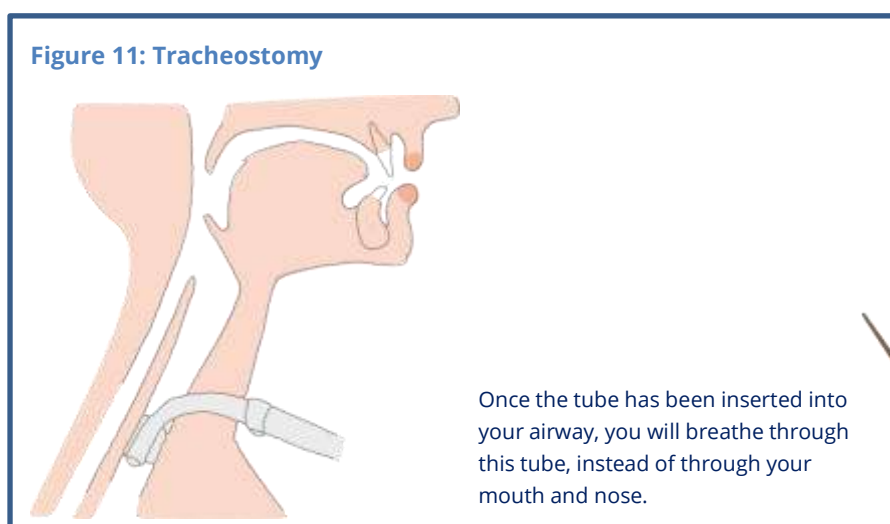
Tracheostomy

Historically, before PAP therapy, tracheostomy was the preferred treatment for obstructive sleep apnoea. A tracheostomy is a surgical procedure where a surgeon creates an opening in your neck, at the front of your throat, into your airway (known as your trachea).



ACRONYM ALERT!

PAP = Positive Airway Pressure



A tube is inserted into this opening to help you breathe. This is major surgery as it bypasses the area that is prone to collapse (your airway behind your tongue), hence it is a last resort, as it may affect your ability to talk.

This operation should only be considered when other options do not exist, have failed, are refused, or when this operation is deemed necessary by clinical urgency.²⁴

Further information can be found in the References section of the Appendix at the end of this Snorer.com Guide.

Things to discuss... when considering surgery for snoring & sleep apnoea

Bariatric surgery

Being overweight or obese can detrimentally affect your life-expectancy.²⁵ Excess weight is a significant contributing factor in sleep apnoea severity.

Further information can be found in the References section of the Appendix at the end of this **Snorer.com** Guide.

As OSA has been estimated to be present in 40%²⁶-90%²⁷ of obese patients drastic options such as bariatric surgery to reduce the severity of sleep apnoea are now considered. This is serious surgery and should only be considered as a part of managing your overall care - thinking about more than just sleep apnoea. Bariatric surgery should only to be considered in addition to PAP or mouthpiece (oral appliance) therapy.²⁸



ACRONYM ALERT!

OSA = Obstructive Sleep Apnoea

Further information for this and all the references on this page can be found in the References section of the Appendix at the end of this **Snorer.com** Guide.

It is indicated in patients with a BMI that is greater than or equal to 40 and in those with a BMI that is greater than or equal to 35 *with other important medical problems* (known as co-morbidities) who have found that changes in diet are inadequate.^{29,30}



ACRONYM ALERT!

BMI = Body Mass Index
Body Mass Index is a simple index of weight-for-height that is commonly used to classify underweight, overweight and obesity in adults. It is defined as the weight in kilograms divided by the square of the height in metres (kg/m²).

The World Health Organisation BMI classification is here:
http://apps.who.int/bmi/index.jsp?introPage=intro_3.html

PCP = Primary Care Physician

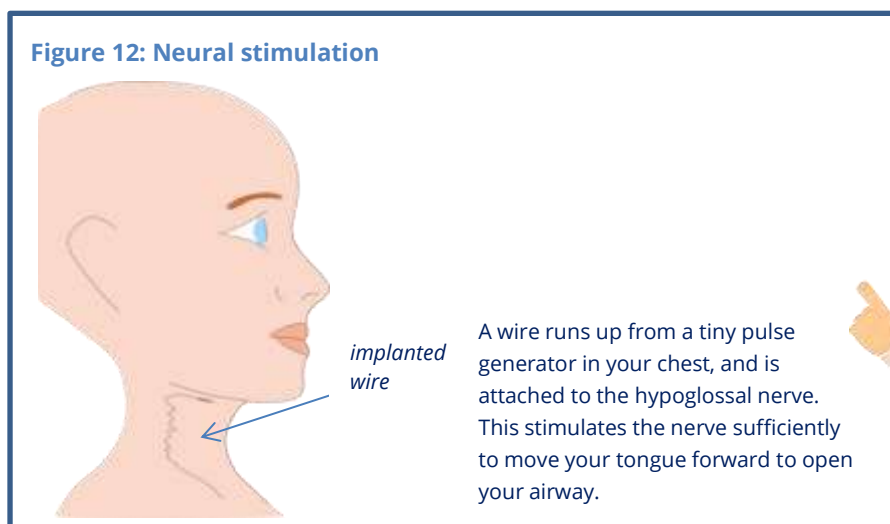
These BMI boundaries are occasionally changed upwards by funding bodies.

After the operation your nutritional intake may need to be monitored by your Doctor/PCP,³¹ as such you may need continual use of supplements and perhaps even vitamin injections. Additionally, some patients may experience insufficient or too much stomach acid which may require the use of long term medications.

Neural stimulation

There is a new, relatively unproven, surgical 'quick fix' known as HGN (hypoglossal nerve stimulation). The idea is that as the individual can maintain their airway when they are conscious, provision of an electrical stimulus to the tongue muscle while the patient is asleep, should keep their airway open.³²

Further information can be found in the References section of the Appendix at the end of this Snorer.com Guide.



A tiny pulse generator is implanted in your chest and a wire run up under the skin of your neck to the nerve in your tongue (known as the hypoglossal nerve). A sufficient electrical pulse is delivered to make you stick your tongue forwards enough to open your airway.³³

Further information can be found in the References section of the Appendix at the end of this Snorer.com Guide.

This is a new area and relatively unproven. Medical research trials are currently on-going, looking at two variations of this procedure.

One method requires perhaps more surgery as it needs the implanting of a 'sensing' lead to synchronise the electrical pulse to when you breathe in (inspiration).

Things to discuss... when considering surgery for snoring & sleep apnoea

The alternative approach, is to eliminate the sensing lead and avoid muscle fatigue, by varying where/how many sites of the tongue nerve receive the electrical impulse.³⁴

Further information can be found in the References section of the Appendix at the end of this **Snorer.com** Guide.

While **HGN** is an exciting new idea, further research is required, to thoroughly validate this option. The HGN device that has been approved to US market entry (it had already received regulatory approval in Europe).



ACRONYM ALERT!

HGN = Hypoglossal nerve stimulation

In short, in a subset of moderate to severe OSA patients that have failed PAP can be considered for HGN stimulation.



Things to discuss... when considering surgery for snoring & sleep apnoea

Summary

Soft tissue surgery may be considered firstly for what is known as 'simple' snoring and secondly for snorers with OSA to either facilitate PAP therapy or overcome the obstruction. Should these approaches prove inadequate oral & maxillofacial surgery may be an option to change the underlying structure of your face, move the bones and open up the airway.

Surgery for obstructive sleep apnoea should only be considered when more conservative options have not worked. It is essential that a thorough examination and review of all your options has been undertaken and you view the operation holistically, considering your likelihood of disease progression and possible changes in your weight.

Understanding of surgical options is improving and consequently historically performed operations (uvulopalatopharyngoplasty) are less commonly funded by insurers today, due to difficulty identifying suitable patients beforehand³⁵ and other options being available.

New options such as hypoglossal nerve stimulation (HGN) require further research but look promising, while pillar implants into your soft palate are currently not recommended for OSA in the UK but in the USA they may be considered for mild-moderate OSA.

Oral & maxillofacial surgery, tracheostomy and bariatric operations are normally only considered when all other avenues have been explored or are not tolerated.

In conclusion, obstructive sleep apnoea patients need on-going, long term management. **OSA is a serious condition which affects many aspects of your life and health.** Your condition may change and you may then need a different approach to use a therapy, manage the side-effects or perhaps, should a complication arise.



MEDICAL TERMINOLOGY!

'Simple' snoring refers to snoring without obstructive sleep apnoea.



Further information can be found in the References section of the Appendix at the end of this Snorer.com Guide.



Things to discuss... when considering surgery for snoring & sleep apnoea

What next?

You might like to read the other **Snorer.com** Guides:

- Overview Guide
- Partner's Guide
- How to choose... a mouthpiece to stop snoring
- How to choose... Positive Airway Pressure (PAP) therapy

Want to find out if you have sleep apnoea, but worried about the impact on your medical records? We suggest you consider the **Snorer.com** [ASAP Anonymous Sleep Apnoea Process](https://snorer.com/asap)TM for anonymous home sleep testing for sleep apnoea.

Find out more about other **Snorer.com** Guides at:
<https://snorer.com/information-guides/>

Find out more about the **Snorer.com** Anonymous Sleep Apnoea Process at:
<https://snorer.com/asap>

Things to discuss... when considering surgery for snoring & sleep apnoea

Appendix

Acronym glossary

- BDS = Bachelor of Dental Surgery
- BMI = Body Mass Index
- DLO = Diploma in Laryngology and Otology
- ENT = Ear Nose Throat
- FDSRCS = Fellowship in Dental Surgery of the Royal College of Surgeons of England
- FDA = Federal Drug Administration (USA)
- FRCS = Fellow of the Royal College of Surgeons
- HGN = Hypoglossal nerve stimulation
- LAUP = Laser assisted uvulopalatoplasty
- LRCP = Locum Royal College of Physicians
- M Phil = Master of Philosophy
- MAD = Mandibular Advancement Device
- MAS = Mandibular Advancement Splint
- MBA = Master of Business Administration
- MMA = Maxillomandibular Advancement
- MRCS = Member of the Royal College of Surgeons
- MRD = Mandibular Repositioning Device
- NHS = National Health Service (UK)
- NICE = National Institute for Health and Clinical Excellence
- OSA = Obstructive Sleep Apnoea
- PAP = Positive Airway Pressure
- PCP = Primary Care Physician
- UK = United Kingdom
- UPPP = Uvulopalatopharyngoplasty
- USA = United States of America



JARGON ALERT!

These acronyms and others that you may come across are explained in the **Snorer.com** Jargon Buster!
<https://snorer.com/jargon-buster/>



Things to discuss... when considering surgery for snoring & sleep apnoea

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Support groups

United Kingdom

- Sleep Apnoea Trust Association: <http://www.sleep-matters.org>
- Scottish Association for Sleep Apnoea (SASA): <http://www.scottishsleepapnoea.co.uk>
- Irish Sleep Apnoea Trust: <http://www.isat.ie>
- Hope2Sleep: www.hope2sleep.co.uk

United States

- American Sleep Apnea Association: <http://www.sleep-apnoea.org>

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Professor Bhik Kotecha is the Clinical Lead for the Sleep Disorders Unit at the Royal National Throat, Nose & Ear Hospital, London. He has been in this role since 1998. He was born in Kenya and has been in UK since 1972. He has a medical degree obtained in 1984 in Cardiff and a Postgraduate M.Phil., from the University of Sussex.



He is a Fellow of Royal College of Surgeons of England, a Fellow of Royal College of Surgeons of Edinburgh and a member of Court of Examiners for Royal College of surgeons of England. Previously, he was President of Sleep Medicine Section at Royal Society of Medicine, London 2009-2011.

- Assistant Editor for Journal of Laryngology and Otology.
- NHS Consultant in ENT Surgery at Queens Hospital, Romford, Essex. (Barking, Havering and Redbridge NHS Trust) and Royal National Throat, Nose & Ear Hospital (UCLH) since 1995.
- Senior Lecturer at UCL since 1995.
- Associate Professor at AUC, School of Medicine, USA.

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- Lectured nationally and internationally at various Sleep Medicine related conferences.
- Published widely in the field – see website for further information: www.snoringmanagement.co.uk.
- Appeared on various TV and Radio programmes to heighten the awareness of problems related to sleep disorders including, BBC Breakfast, BBC World, GMTV, Anglia Television and the Discovery Channel.

Prof. Ian Ormiston

FDSRCS, FRCS, FHKAM

Professor Ormiston is a Consultant Oral & Maxillofacial Cleft Surgeon. He is doubly qualified in Medicine and dentistry holding dental and medical/surgical fellowships, FDSRCS, FRCS and is also a Fellow of the Hong Kong Academy of Medicine.



While his dental and medical/surgical training were in the UK, much of his post medical maxillofacial training was under Professor Henk Tideman at University of Hong Kong.

He sits on the Board of Sleep Section of Royal Society of Medicine, London RSM.

He sits on the Board of British Society of Dental Sleep Medicine.

He is currently a consultant Oral and Maxillofacial Cleft Surgeon and also Head of service for the departments of Maxillofacial, Restorative Dentistry and Orthodontics at the University Hospitals of Leicester, UK.

He has recently (2017) been awarded a King James IV professorship from the Royal College of Surgeons of Edinburgh based on his body of work and publications involving sleep apnoea surgery.

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Adrian Zacher MBA

Adrian Zacher has a wide ranging experience in medical devices for both conscious and unconscious respiratory medicine. He is a recognised pioneer, inventor, author, expert and serial entrepreneur.



Adrian pioneered the first commercial dental sleep medicine laboratory in Europe; ZSA Ltd. During the 11 years of successfully running ZSA, he invented a sleep device that could be adjusted to suit the individual needs of the wearer, winning an award for the device. He went on to co-found the [British Society of Dental Sleep Medicine](http://www.bsdsm.org.uk/) (BSDSM) and instigated and assembled the sleep medicine team which ultimately developed the [Pre-Treatment Screening Protocol](http://www.nature.com/bdj/journal/v206/n6/full/sj.bdj.2009.214.html), which forms the benchmark for obstructive sleep apnoea screening in the UK. He continues to provide specialist dental sleep medicine knowledge to interested parties.

<http://www.bsdsm.org.uk/>

<http://www.nature.com/bdj/journal/v206/n6/full/sj.bdj.2009.214.html>

Adrian successfully completed his MBA in Oxford. After which, he was headhunted to lead international business development for a leading sleep business, working as subject matter expert on oral appliances and dental sleep medicine. He left in February 2012.

Adrian is often asked for advice and insight in the field of sleep medicine, recently co-authoring a chapter in Carranza's Clinical Periodontology Expert Consult, and has completed the 2013 update.

Whilst taking time off as a new parent (truly appreciating the need for good quality sleep!) he started work on **Snorer.com** Ltd.

<https://snorer.me>
<https://snorer.business>
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<https://www.linkedin.com/groups/4925339>
www.sleepsociety.org.uk/
www.hope2sleep.co.uk

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