SLEEP DENTISTRY

NON-SURGICAL TREATMENTS FOR OBSTRUCTIVE SLEEP APNOEA Part II


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The non-surgical treatments for Obstructive Sleep Apnoea (OSA) are similar to the non-surgical treatments for snoring. Treatments include behavioural changes, medications, Continuous Positive Airway Pressure (CPAP) and dental appliances.

Behavioural Changes

- These are the simplest treatments for mild OSA but often the hardest.
- Occasionally, apnoeas occur only in some positions (most commonly lying flat on the back.) A person can change his or her sleeping position and reduce apnoeas and thus improve their sleep.
- Obesity is a known contributing factor for OSA. A 10% weight gain will worsen the apnoea-hypopnea index (AHI) and 10% weight loss will decrease the AHI.
- Improved sleep hygiene
  - reduce lighting and noise in bedroom
  - avoid reading or watching TV in bed
  - use bedroom only for sleeping
  - keep work-related activities outside the bedroom
  - have a period of mental and physical relaxation before going to bed.

2. Medications

- People who have OSA due to hypothyroidism (low thyroid hormone production) improve with thyroid replacement therapy.
- Where sleep apnoea may be caused by an underlying condition, appropriate treatment of such conditions is advised and may be beneficial – eg. treating underlying heart failure may improve sleep apnoea if it is a contributing factor.
- About 1/3 of patients who use CPAP at night for sleep apnoea may continue to have somnolence during the day. This group could benefit from using MODAFINIL (Provigil) or ARMODAFINIL (Nuvigil).

3. CPAP

- CPAP is probably the best, non-surgical treatment for any level of OSA. CPAP uses air pressure to hold the tissues open during sleep. It is portable.
- The CPAP machine blows heated, humidified air through a short tube to a mask under pressure. As a person breathes, the gentle pressure holds the nose, palate, and throat tissues open.
- The mask must be worn snugly to prevent air leakage. There are many different masks, including nasal pillows, nasal masks, and full-face masks.

Determining CPAP pressure:

- Titration determines the lowest pressure to keep the airway open during sleep. Titration is often done on the same night or on a separate night as the polysomnogram (PSG).
- During baseline sleep, when the apnoeas and hypopneas occur, the CPAP pressure is slowly increased until the apnoeas and hypopneas stop or decrease to a normal level.
- A different pressure may be needed for different positions or levels of sleep. Typically, laying on the back and REM sleep promote the worst OSA.

Effectiveness of CPAP:

- When adjusted properly and tolerated, it is nearly 100% effective in eliminating or reducing OSA and decreasing apnoeas and hypopneas.
- Treating obstructive sleep apnoea with CPAP can reduce the risks of conditions related to obstructive sleep apnoea, such as, ischemic heart disease, heart attacks, abnormal heart rhythms, stroke, hypertension, and insulin dependence.

Problems with CPAP

- The first two to four weeks is the crucial time to become a successful CPAP user. The patient must try to sleep as many hours as possible with the mask.
- A large percentage of people who start using CPAP, stop using it.

4. Dental Appliance

- Regardless of the appliance chosen, a dentist should follow a detailed clinical protocol and titration sequence prior to starting oral appliance therapy. The initial medical assessment by a sleep specialist is crucial and precedes any definitive dental treatment.
- The American Academy of Sleep Medicine indicate oral appliances as the first-line therapy in patients with mild-to-moderate OSA and in more severe OSA patients who fail treatment attempts with CPAP therapy (Sutherland K. et al., 2014) and/or are poor surgical candidates.
- The Australasian Sleep Association states: "Oral appliances of various designs have been used increasingly over the past 15 years to effectively treat snoring and OSA" (Position paper of the Australasian Sleep Association).
- Mandibular advancement splints (MAS) have been shown to improve objective sleep measurements – such as Apnea-Hypopnea Index (AHI), arousal index, snoring and in some but not all studies, arterial oxygen desaturation.
- MAS maintain the patency of the

upper airway by preventing the tongue and soft tissues of the throat from collapsing into the pharynx while holding the mandible and attached soft tissues, including the tongue base forward.

Oral Appliance Designs and Definition of Treatment Success

- Existing studies suggest different oral appliances are similarly effective in treating OSA.
- Differences mainly relate to the degree of customisation to the patient's dentition and one-piece (monobloc) designs (no mouth opening) versus two-piece designs (separate upper and lower plates).
- Two-piece appliances also vary in permissible lateral jaw movement and in the coupling mechanisms which attach the two plates together. Other variations include the range of degree of advancement, amount of vertical opening, fabrication material and the amount of occlusal coverage.
- Treatment success is defined by a reduction in AHI with or without requirement for symptomatic improvement. Treatment success in terms of AHI are variously expressed as a reduction in treatment AHI below a specified value:
  - Less than 5 (resolution of OSA)
  - Less than 10 (very mild disease)
  - Percentage reduction in AHI from baseline which is deemed to be clinically significant (typically 50% AHI reduction)
  - There is also a reduction in the arousal index and improved oxygen saturation and REM sleep time.

Factors impacting the effectiveness of OSA Treatment with MAS

- The effectiveness of MAS therapy depends on the patient adherence to wear the device.
- Comfort level/tolerance to having the device in the mouth
- CPAP therapy is consistently more effective at reducing sleep-disordered breathing events but patients tolerate MAS better.

Summary of efficacy studies

(Aarab G. et al., 2011)

MAS has been shown to significantly improve objective sleep measurements such as

- AHI,
- arousal index, snoring, and in some but not all studies, arterial oxygen desaturation
- 24-hour blood pressure measurement devices.

DENTAL APPOINTMENTS

Maxillary and mandibular impressions employing polyvinylsiloxane impression material is recommended. Typically, the amount of advancement for the registration is set at 66% of maximum protrusion which can be determined by use of a George Gauge™.

http://www.dpsdental.com/documents/George%20Gauge%20Instructions.pdf

Titration

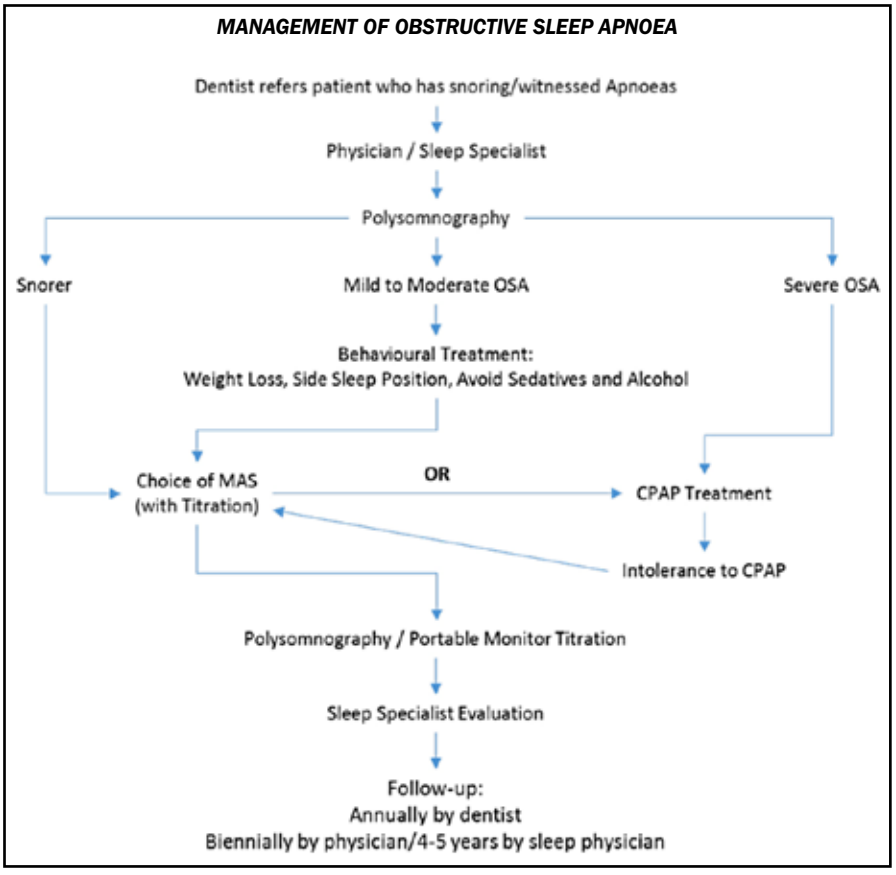
- Oral appliances may require up to 6 months of titration by the practitioner in order to be fully adjusted. Over a period of weeks, patients slowly, increase the advancement by adjusting the appliance until there is resolution of subjective OSA symptoms.
- Titration can be guided by a combination of both subjective symptomatic improvement and objective monitoring by overnight oximetry to find the optimally effective advancement level (Fleury N. et al., 2004).
- The patient is then referred back to the sleep physician for reassessment. A follow-up PSG with the device worn is required to ensure adequate improvement to breathing during sleep. Additional advancement of the appliance by titration carried out during the follow-up PSG has been shown to further increase the success of Oral Appliance Therapy.
- Dentist must monitor for any temporomandibular joint (TMJ) dysfunction symptoms due to the extended protrusion of the mandible.

Degree of vertical opening

- Patients prefer smaller degrees of mouth opening.
- Increased vertical mouth opening has an adverse effect on the upper airway patency in most OSA patients (Vroegop, Anneclaire et al. 2012).

Compliance and Side effects of Oral Appliance Therapy

- Compliance depends upon:
  - disease severity
  - type of appliance
  - patient subjective assessment of benefit
  - patient management (Studies report compliance rates between 48-90% after 2-5 years.)
- In initial acclimatisation to oral appliance therapy, adverse side effects are commonly experienced – excessive salivation, mouth dryness, tooth pain, gum irritation, muscle tenderness, headaches and TMJ discomfort.
- Adverse side effects are usually transient, lasting around 2 months.



- Assessment of dental changes with oral appliances relate to:
  - decreases in overbite and overjet (Martinez-Gomis J, 2010).
  - retroclination of the upper incisor and
  - proclination of the lower incisors
  - changes in anterior-posterior occlusion
  - reduction in the number of occlusal contacts
- Patients with the original greater overjet and/or overbite appear to have the most favourable occlusal changes after long-term therapy based on cephalometric and model analysis. Favourable reductions may result in overjet and/or overbite in Angle Class II Division 1 (Chen, Hui, Alan A. Lowe. 2013).
- Overbite and overjet changes are evident 6 months after initiation of treatment.
- Generally, occlusal changes are negligible and in over half of patients actually represent an improvement on the baseline occlusion. However, as a Mandibular Advancement Device (MAD) is a life-long treatment and changes do continue overtime, it is crucial to advise patients before starting treatment that some type of occlusion changes are likely to happen.
- The dentist should ideally collect cephalometric radiographs, dental models and intraoral photographs over the course of the treatment.
- Skeletal changes relating to prolonged oral appliance use on lateral cephalometry, mainly report an increase in lower face height and a downward rotation of the mandible. ❖

SUMMARY GUIDELINES FOR THE ROLE OF THE DENTIST

https://www.sleep.org.au/documents/item/574

1. Dentists screen both for symptoms and treatment effectiveness of OSA. The dentist must work with a sleep physician and the patient's medical practitioner. The diagnosis of OSA is not within the scope of dental practice. A dentist should be able to recognise and be familiar with the typical signs and symptoms, as well as be aware of the predictive co-morbidities (obesity, hypertension, ischaemic heart disease and Type 2 diabetes) and the fact that OSA may be asymptomatic.
2. Dentists should be able to provide patients with explanations and information on the treatment options available, including but not limited to: lifestyle modification, behavioural therapy, sleep hygiene, sleeping position, surgical and CPAP options as may be recommended by the attending physician. The role of the pros and cons for individual patients is provided by the treating physician.
3. If treatment with an oral appliance is medically indicated, the dentist determines if the patient is suitable from a dental perspective and can choose an appropriate device. Routine dental, periodontal health, TMJ, occlusal and radiographic examination are done before and during the term of the therapy.
4. Dentists also need to be aware of, and routinely examine for soft tissue and craniofacial morphology that predisposes to OSA, including a disproportionately large tongue and the association between sleep bruxism and OSA.
5. Dentists are the only dental care providers who are qualified to manage oral appliance therapy for Sleep Disordered Breathing and should demonstrate competency in this field.
6. The dentist refers patients suspected of having OSA to a sleep physician, who will determine the need for a diagnostic test (usually a PSG) and all treatment options, which may include an oral appliance.
7. Patients requiring more specialised care, such as a pre-existing TMJ dysfunction or orofacial pain should be referred to a trained dental specialist who will refer patients back to their regular dentist. If the patient's oral condition requires attention by the general dentist, this will be completed before a MAD is fitted.
8. The dentist follows up the patient after the fitting and adjustment of a MAD for effectiveness (often in collaboration with the referring physician) and detecting side effects, particularly changes to the occlusion.

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