



The Roles of Dental Professionals in the Management of Obstructive Sleep Apnoea

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This article has been selected by the Editorial Board of the Hong Kong Medical Diary for participants in the CME programme of the Medical Council of Hong Kong (MCHK) to complete the following self-assessment questions in order to be awarded one CME credit under the programme upon returning the completed answer sheet to the Federation Secretariat on or before 31 March 2010.

Obstructive sleep apnoea (OSA) is a disturbance in normal sleep patterns. It is characterised by repetitive episodes of complete (apnoea) or partial (hypopnoea) upper airway obstruction occurring during sleep. By OSA definition, apnoeic and hypopnoeic events should last a minimum of 10 seconds. The common morbidities of OSA are hypertension,¹ depression,² stroke,³ angina,⁴ cardiac dysrhythmia,⁵ diabetes and severe cases can be a direct cause of death during sleep. Untreated OSA is also associated with motor vehicle accidents,⁶ poor work performance, occupational accidents and reduced quality of life.⁴

Epidemiology

OSA occurs in 2 to 4 percent of the adult population between the ages of 30 to 60 years, though evidence suggests that many more patients remain undiagnosed. In Hong Kong, its prevalence was found to be 4.1% in the middle-age Chinese males.⁷ There is a large pool of undiagnosed OSAs in the community and particularly in hypertensive patients, the prevalence can reach up to 17%.⁸

Signs and Symptoms

The common signs and symptoms associated with OSA are: loud, habitual snoring, apnoeic events witnessed by the spouse or others, daytime sleepiness, restless sleep, choking sensation or gasping during the night, morning headache, personality and mood changes, sexual dysfunction (impotence and decreased libido) and gastro-oesophageal reflux.

Initial Evaluation

The presence and severity of OSA should be determined first before any therapy is given. When the patient presents for a consultation, a health history evaluation should be completed. The important components of the evaluation include a health history, physical examination, imaging studies and polysomnography.

Health history

A thorough sleep-related history and comprehensive medical history are essential components of this

evaluation. The primary indication for initiation of the evaluation process is the presence of OSA symptoms. A comprehensive medical history must be obtained because OSA is associated with a wide spectrum of medical conditions. The health history may reveal findings associated with obesity, hypertension, stroke or other cardiopulmonary or neurologic conditions linked to a high risk of OSA.

Physical examination

For each patient, the clinician should perform a comprehensive head and neck examination and assess the respiratory, cardiovascular and neurologic systems. A body mass index (BMI) of greater than 28 is known to be associated with a 5-fold increase in the probability of moderate to severe OSA in Caucasians. It should also be noted that a neck circumference of greater than 17 inches (43cm) in men and 16 inches (40.6cm) in women are highly associated with OSA. The most common orofacial characteristics encountered include retrognathic mandible, narrow palate, long soft palate, hypertrophic tonsils, nasal septal deviation and relative macroglossia.

Imaging studies

Imaging studies including a panoramic radiograph and lateral cephalograph should be part of the initial investigations. In the lateral cephalograph, the position of the maxilla and mandible in relation to the cranial base can be assessed. These findings are useful in planning treatment for the improvement of upper airway patency. Other imaging studies such as CT scan, MRI or sleep endoscopy may also be useful.

Polysomnography

The gold standard for diagnosing OSA is by polysomnography (PSG), which needs to be conducted at a sleep laboratory. The aims of polysomnography are to evaluate any abnormal sleep breathing, sleep architecture and oxygen saturation. A typical 8 hours nocturnal laboratory PSG involves measurements of multiple physiological functions including electroencephalography, electro-oculography, chin or leg movement via electromyography, electrocardiography, sleep positioning, respiratory activity and oxygen saturation. The primary measure of sleep-disordered breathing is the apnoea-hypopnoea index (AHI), which is the number of apnoeas and hypopnoeas per hour of sleep. Apnoea is defined as the cessation of airflow



(complete obstruction) for at least 10 seconds with a concomitant 2 to 4 percent drop in arterial oxygen saturation. Hypopnoea is defined as a reduction in airflow of at least 30 to 50 percent with a drop in oxygen saturation. The severity of OSA is commonly classified according to a patient's AHI score: mild (AHI score between 5 to 15); Moderate (AHI score between 15 and 30); and severe (AHI score greater than 30). Other factors that also influence the severity of OSA include oxygen desaturation, quality of life and the level of daytime sleepiness

Management

There are multiple specialties involved in the management of OSA. These would include internal medicine, family medicine, paediatrics, otorhinolaryngology, psychiatry, neurology, and dentistry. Currently, in the United States, Sleep dentistry qualifies for board certification by the American Board of Dental Sleep Medicine (ABDSM). Qualified dentists collaborate with sleep doctors at different sleep centres and provide treatments. There is no such certification for dentists in Hong Kong. The dental specialists commonly involved in the management are oral and maxillofacial surgeons and orthodontists.

Non-surgical

Possible treatment options for adult patients diagnosed with OSA are based on the severity of the sleep disorder, patient's preference and his/her overall health status. Positional therapy involves nocturnal aids to prevent patients from sleeping in a supine position. Sleeping in the lateral position is generally recommended, as it will displace the tongue from the posterior airway such that it is less likely to cause airway obstruction during sleep. Weight loss is universally recommended for obese patients. However, it is not known how much weight loss is required to eliminate OSA, and both the patient's gender and weight distribution may contribute to his or her OSA in an unpredictable manner. The most commonly recommended non-surgical intervention is continuous positive airway pressure (CPAP). The concept of nasal CPAP is to maintain upper airway patency during sleep. This treatment can be administered via either a nasal or oral mask. Due to its effectiveness, CPAP is the first-line treatment and the primary form of therapy for OSA, although its success is limited by the patient's level of compliance. About 20 to 30 percent of patients experience problems using CPAP, and the device is ineffective if it is not regularly used. The common problems associated with CPAP are nasal dryness, facial ulceration at the mask interface and claustrophobia.

Oral appliances gain recent recognition as an effective treatment option for mild to moderate OSA. The design is similar to an orthodontic functional appliance with the aim of maintaining a patient's lower jaw in a protruded position during sleep, hence enlarges the oro-pharyngeal airway. Many commercial devices offer treatment for snoring; however a device designed to treat OSA should be fabricated by a dental practitioner or specialist familiar with device design, maintenance and therapeutic efficacy. A multitude of oral appliances for OSA are available, but not all patients find the same

appliance effective. Patient's compliance with oral appliances appears to be adequate but not all studies agree. Difficulty with the device, owing to temporary or persistent occlusal disturbance, temporomandibular joint or individual tooth discomfort or perceived lack of efficacy may cause compliance issues.

Surgical

The main surgical treatments offered for OSA often target the anatomical areas of the posterior airway where collapse is suspected to occur. Treatment is designed to enlarge the posterior airway space, reduce airway collapsibility and stabilise the airway in the long term. The type of surgical procedure would include uvulopalatopharyngoplasty, palatal suspension via a lateral inversion flap. These types of surgical procedures are usually performed by otorhinolaryngologists. Successful surgical outcomes have also been reported with less invasive techniques such as radiofrequency thermal ablation, and palatal implants. Orthognathic surgery has the advantage of correcting any craniofacial abnormalities that may have caused the OSA. Maxillomandibular advancement surgery (MMA), which is based on conventional orthognathic surgery techniques, has been proven effective in retrospective studies for a range of OSA patients over 90% long term success.⁹

Distraction osteogenesis (DO) is a clinical biomedical tissue engineering method that generates new bone by gradual stretching of the divided bone segments. Since its first application in the cranio-maxillofacial region in 1992, patients with severe facial deformities benefit by the large surgical movement achievable with minimal morbidities and is particularly useful for children and infants suffering from OSA. The main benefits of distraction for OSA are enlargement of the posterior airway space, improved oxygen saturation, improved respiratory disturbance index and accelerated growth of infants and children. From our evidence-based review, distraction has been reported a cure of OSA in 97% of children and 100% of adults.¹⁰

Roles of Dental Professionals

It is of utmost importance for dental professionals to be aware of the prevalence and possible outcomes of OSA if left untreated. Screening of patients by general dentists or specialists, by conducting a thorough examination can aid in the diagnosis and treatment of OSA patients. Orthodontists can provide oral appliances as well as perform pre and post-surgical orthodontic treatments. Prosthodontists are also able to help in the construction of oral appliances. Oral and maxillofacial surgeons on the other hand can perform orthognathic surgeries for maxillomandibular advancement and distraction osteogenesis.

Conclusion

Management of OSA patients is recommended to be by multi-disciplinary teams dedicated to OSA. The dental professionals have a significant role to play as a team member in identifying potential OSA patients, making the appropriate referrals and assisting in the management of these patients. The dental specialists



can actively contribute to the management by provision of oral appliance therapy, orthognathic surgery and distraction osteogenesis.

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MCHK CME Programme Self-assessment Questions

Please read the article entitled "The Roles of Dental Professionals in the Management of Obstructive Sleep Apnoea" by Dr. Hannah Daile CHUA and Prof. Lim K CHEUNG and complete the following self-assessment questions. Participants in the MCHK CME Programme will be awarded 1 CME credit under the Programme for returning completed answer sheets via fax (2865 0345) or by mail to the Federation Secretariat on or before 31 March 2010. Answers to questions will be provided in the next issue of The Hong Kong Medical Diary.

Questions 1-10: Please answer T (true) or F (false)

1. A person who habitually snores has obstructive sleep apnoea (OSA).
2. Polysomnography is recommended for a person who presents with excessive daytime sleepiness.
3. OSA is a potentially lethal condition.
4. Factors that influence the severity of OSA are oxygen saturation, obesity and level of daytime sleepiness.
5. Oral appliances are the most common non-surgical intervention for patients with OSA.
6. Persons with retrognathic mandible and chin are common features of OSA.
7. CPAP keeps the airway open during sleep by pumping oxygen into the lungs.
8. The gold standard for diagnosing OSA is by polysomnography.
9. Maxillo-mandibular advancement is more effective than distraction osteogenesis in the surgical management of OSA.
10. The dental specialists and general dentists can contribute to the management of OSA.

ANSWER SHEET FOR MARCH 2010

Please return the completed answer sheet to the Federation Secretariat on or before 31 March 2010 for documentation. 1 CME point will be awarded for answering the MCHK CME programme (for non-specialists) self-assessment questions.

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Answers to February 2010 Issue

Management of Obesity - From Life Style Modification to Weight Reduction Surgery

1. T 2. F 3. F 4. F 5. F 6. T 7. T 8. F 9. T 10. F