Review Article

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Obstructive Sleep Apnea: A Comprehensive Review

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ABSTRACT

Background: Obstructive Sleep Apnea (OSA) is an increasingly common form of sleep related breathing disorder. The condition is characterized by frequent episodes of apnea and hypopnea leading to fall in oxygen saturation. OSA manifests as sound persistent snoring, excessive day time sleepiness and witnessed pauses in breathing, irritability and poor concentration. Diagnosis is based on history, clinical presentation and polysomnography. Untreated cases may lead to cardiovascular and neurocognitive problems along with metabolic effects like insulin resistance. Management includes a comprehensive approach towards the predisposing factors involved and the anatomical or physiological reasons involved in particular patient. This article reviews the diagnosis, clinical features and management of obstructive sleep apnea from the simplest form of treatments to the complex surgeries.

Keywords: Obstructive sleep apnea, Polysomnography.

INTRODUCTION

Obstructive Sleep Apnea has become common in the modern world. Everybody snores sometimes, orat least most people arelikely to snore sometime during their lifetime. However, as all practitioners of sleep medicine know, snoring and a good sleep are sometimes the opposites of each other. Snoring definitely becomes menace, when combined with impaired quality of sleep and/or difficulties of breathing during sleep, such as in obstructive sleep apnea (OSA). OSA is characterized by repetitive episodes of upper airway obstruction that occur despite continuous or increased respiratory effort.[1] The term apnea is used when obstruction is total and the term hypopnea when obstruction is partial. If the individual with OSA has accompanying symptoms (most often excessive daytime sleepiness, fatigue or tiredness), the term obstructive sleep apnea syndrome (OSAS) is used. "Obstructive sleep-related breathing disorders" is an all-embracing termfor these disorders.

Snoring can emanate from any of the soft structures in the pharynx such as the soft palate (including the uvula), the pharyngeal walls, the tonsils, the tongue base and the epiglottis, or any combination. Snoring encompasses a wide range of frequencies and can be of nuisance to the snorer, family members, and other cohabiters. Decibel levels >100dB(decibels) have been anecdotally reported in the lay press, but commonly snoring is in the range of 50-60 dB. But even levels

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of 50-60 dB are enough to wake a person from sleep and this sound pressure level is well above the World Health Organization's(WHO) recommendations for environmental sound pressure levels at night[2].

OSA is highly prevalent in the adult population[3][4] and even more prevalent in populations with overweight and with cardiovascular disease. Today the most used diagnostic measure is the apnea-hypopnea index (AHI), which is the average number of apneas and hypopneas per hour of sleep. OSA is considered to be at hand when AHI ≥5. OSA with or without symptomsis associated with an increased likelihood of hypertension, cardiovascular disease, stroke, daytime sleepiness, and motor vehicle accidents.The severityand prevalenceof OSA increase with time and age. [5][6] Even though OSA has gained an increased interest both among medical practitioners and the general population in the last decades, the majority of subjects with sleep apnea remain undiagnosed. This is, at least, partly explained by the fact that OSA in many cases is asymptomatic. With the associated morbidities and potential public-health implications in mind, it seems important to identify and treat subjects with OSA.

There are a great variety of signs and symptoms related to OSA. Most interestingly, the relationship between the number of pathologic respiratory events and symptoms is far from straightforward. Patients with low numbers of apneas and hypopneas can present with significant sleepiness and patients with high numbers of apneas and hypopneas can present without sleepiness.[7]Several studies on OSA and OSAS prevalence have shown that OSA without symptoms is more prevalent than OSA with symptoms[3][4][8]. This means that most individuals with OSA can be expected to have few and possibly mild if any symptoms at all.

In patients referred to sleep clinics for OSA evaluation, symptoms are often evident and marked. The patient or their partner/cohabitant often describes nocturnal snoring, choking, gasping sounds and breathing interruptions. Daytime sleepiness is a common complaint but it must be acknowledged that the patient instead of sleepiness can describe fatigue, lack of energy, tiredness or sleeping spells during the day.[9] Other common complaints include a sense of unrefreshing sleep, restless sleep, insomnia with or without frequent awakenings, nocturnal sweating, morning headaches, nocturia and dry mouth in the morning. Some patients describe forgetfulness, impaired concentration, decreased libido, personality changes or attention deficits.[9] A high index of clinical suspicion is essential in detecting OSA, since patient's awareness regarding the problem is low (especially in mild and moderate cases). Often the patient seeks help for associated problems like hypertension, headaches, dry mouth, fatigue, erectile dysfunction etc. The differential diagnosis of OSA includes other sleep disorders, like narcolepsy, restless legs syndrome, nocturnal seizures and idiopathic hypersomnia.

ASSESSMENT OF SLEEPINESS

Subjective assessment

In the Epworth Sleepiness Scale (ESS), the patient rates his or her propensity to fall asleep during eight situations ranging from lying down to rest, to sitting, to conversing. The likelihood of falling asleep is rated on a scale from 0 to 3, with 3 representing the highest likelihood of falling asleep. The total score ranges from 0 to 24, with a score of less than 7 considered within normal limits and a score of greater than 9 suggestive of sleep-disordered breathing.

The Stanford Sleepiness Scale (SSS) rates subjective sleepiness on a scale from 1 to 7 with alert and wide awake as 1, a little foggy as 4 and almost asleep as 7. It is worthwhile to remember that sleep deprivation due to any cause can elevate the ESS or SSS scores.

Objective assessment

Multiple sleep latency test (MSLT)

The MSLT is an objective test in which a patient is given four or five 20-minute opportunities to fall asleep at set intervals during the day (usually every two hours).[10]The tendency of a patient to fall asleep in a comfortable setting is measured. It is considered a reliable, validated measure of sleepiness, but does not correlate strongly with severity of OSA.

Maintenance of wake test

It is similar in concept to the MSLT with the tendency to sleep being assessed on exposure to multiple stimuli. [10]

POLYSOMNOGRAPHY (PSG)

Overnight PSG is required to make a diagnosis of OSA. The PSG consists of a modified electroencephalogram (EEG) to monitor brain activity, bilateral electrooculogram (EOG) to monitor eye movement, sub mental and anterior tibialis electromyogram (EMG) to monitor limb activity, oral and nasal thermistors to monitor airflow, chest-wall and abdominal piezoelectric bands and intercostal EMG to monitor respiratory effort, ear or finger pulse oximetry to monitor arterial oxygen saturation (SaO2), and V1 telemetry to monitor cardiac activity. Electrocardiography (ECG) may also be included. Respiratory effort may be monitored by respiratory inductance plethysmography or esophageal manometry. Overnight PSG study provides data on the RDI, AHI, AI, and the lowest oxygen saturation (LSAT). Continuous esophageal and pharyngeal pressure measurements may be added to indicate respiratory effort and to help determine the site of obstruction. Night-to-night variability in PSG findings due to inter-observer differences in scoring, variability in sleeping position, alcohol ingestion, or nasal congestion may explain seemingly inconsistent results within individual patients and the lack of correlation between symptomatic improvements and sleep test results.[10]

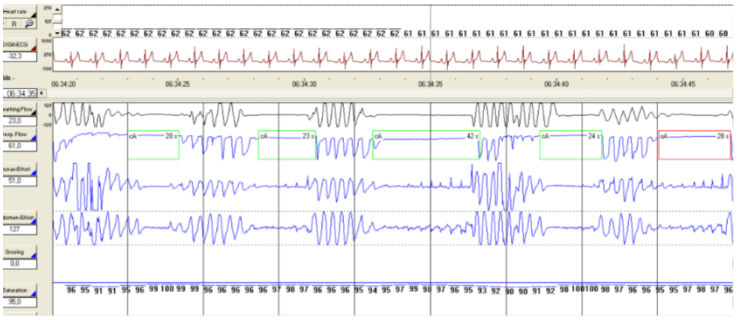
In patients with OSA who are advised CPAP treatment, there is a need for a repeat PSG study for titration of appropriate CPAP pressure for abolition of apneas and hypopneas. Often this separate PSG study is clubbed with the diagnostic PSG as a “split night” study.

Alternatives to overnight PSG

If, the estimated prevalence of sleep apnea at 2 to 4 percent of middleaged adults is accurate, then the material and manpower costs of full PSGs to diagnose all suspected cases would be prohibitive. Diagnostic approaches which might be viewed either as alternatives to PSGs or as screening tests to better select patients for PSG include: [10]

1. Partial channel PSGs;
2. Partial night or daytime PSGs;
3. Portable sleep monitoring devices for use at home: actigraphy;
4. Automatic pressure titrating CPAP based direct pressure titration study in suspected sleep apnea patients for diagnosis and management;
5. Radiology: imaging of the head and neck for anatomic abnormalities predictive of sleep apnea: cephalometry, magnetic resonance imaging (MRI), acoustic reflections and computed tomography (CT) scans; and
6. Anthropomorphic measurements: such as neck circumference, nasopharyngeal and laryngeal endoscopic measurements of both structure and function.

RISK FACTOR



Any mechanism or factor that negatively affects the lumen or the patency of the pharyngeal airway increases the risk for airway collapse during sleep. During sleep, the muscular tone naturally decreases and the horizontal position is adopted (meaning that gravity works in right angle to the airway), increasing the propensity for pharyngeal collapse. Other specific factors associated withan increased risk for OSA include higher age, male sex, menopause in women, obesity, a family history of OSA, craniofacial abnormalities, cigarette smoking and alcohol use.[11]

TREATMENT MODALITIES

Non specific therapy	Specific therapy		
Weight reduction in obese patients Reduced alcohol consumption Positional therapy	**Medical intervention**	**Oral appliance therapy**	**Surgical therapy**
	Oxygen administration Pharmacological agents Physical or mechanical therapy CPAP Auto titration Bi-PAP	Tongue repositioning devices Mandibular advancement devices(fixed and adjustable) Devices to lift soft palate Devices to lift uvula	Nasal surgeries Palatal surgeries Tongue surgeries Maxillomandibular advancement surgeries Maxillomandibular expansion surgeries Hyoid advancement surgeries Tracheostomy

Nonspecific Therapy

Nonspecificmeasures may be used in all cases of OSA but are specifically used in cases of mild sleep apnea.

- **Weight reduction in obese patients:**
  - Weight reduction has shown a significant improvement in cases of mild cases of sleep apnea. Even a 10% weight loss can reduce the number of apneic events for most patients.
  - Long term loss of a large amount of excess weight by dietary measures alone is usually unsuccessful, and the symptoms return as the weight is regained.[12][13]
- **Reduced alcohol consumption:**
  - Individuals with apnea are advised to avoid alcohol four to six hours prior to bedtime which otherwise might collapse the airway during sleep and prolong the apneic periods.[14]
- **Positional therapy:**
  - There are several strategies which can help patients who have mild apnea only when lying on their back. One is to sew or attach a sock filled with tennis balls length-wise down the back of their pajama top or nightshirt, which would make sleeping on their back uncomfortable there by causing a turn in the body to other side.[15]The other option is to use a pillow attached to the sleeper's back by a belt around the waist.[15]

Specific Therapy

The specific therapy for sleep apnea is based on medical history, physical examination and the results of polysomnography. Medications are generally not effective in the treatment of sleep apnea.

Medical Intervention

Oxygen administration

Oxygen is sometimes used in patients with central apnea caused by heart failure. It is not used to treat obstructive sleep apnea. Oxygen

administration during sleep in some cases can be harmful sometimes leading to significant worsening of the apnea. Oxygen at the correct flow rate when used in conjunction with nasal Continuous Positive Airway Pressure (CPAP), however, in many cases corrects this problem.

Pharmacological agents

- Thyroid hormone supplementation - if this is the sole problem.
- Control of blood sugar levels
- Certain medications which increase respiratory drive help some patients.
- Progesterone, a hormone secreted at a high rate during the third trimester of pregnancy, has been used with some degree of success in men and women alike.

Tricyclic antidepressants

Protriptyline in low doses has been used in people with mild apnea and snoring with mild success. It increases upper airway neuromuscular activity and decreases REM sleep. Protriptyline is not considered for primary therapy of OSA. It may be considered in a person with mild apnea who does not want CPAP or an oral appliance.Side effects such as dry mouth, urinaryretention, constipation and impotence are evident in approximately half of the patients taking this drug, thus limiting its use. [16]

Physical or mechanical therapy

Patients with mild apnea have a wider variety of options, while those with moderate to severe apnea should be treated with nasal CPAP.

Positive pressure therapy

Positive airway pressure is a very effective therapy for OSA. It has three forms:

- Continuous positive airway pressure (CPAP)
- Auto titration
- Bi-level positive airway pressure

Continuous positive airway pressure

Continuous positive airway pressure (CPAP), is the most common and successful treatment, currently known for OSA. It was first reported by Sullivan et al in 1981. [17]

Mechanism of continuous positive airway pressure

CPAP, the most common of the three therapy modes, is administered at bedtime through a nasal or facial mask held in place by Velcro straps around the patient's head. The mask is connected by a tube to a small air compressor. The CPAP machine sends air under pressure through the tube into the mask, where it imparts positive pressure to the upper airway. [18] This essentially "splints" the upper airway open and keeps it from collapsing in the deeper stages of REM sleep. The pressure acts much in the same way as a splint, holding the airway open. Regardless of the mechanism used, it is desirable to use the lowest possible pressure to eradicate sleep apnea. In most cases, positive airway pressure is easier to tolerate at lower pressures. To determine precisely the individual patients' optimum airway pressure, it is necessary to titrate the pressure to each individual patient during a polysomnogram. Approximately 55% of patients who use CPAP use it on a night basis for more than four hours. It is the most commonly prescribed treatment for OSA.

Auto titration

Devices are designed to provide the minimum necessary pressure at any given time and change that pressure as the needs of the patient change.

Bi-level positive airway pressure

It is a variation of CPAP. Most of the problems patients experience with CPAP are caused by having to exhale against a high airway pressure. Because the air pressure required for preventing respiratory obstruction is typically less on expiration than on inspiration, bi-level positive airway pressure machines are designed to sense when the patient is inhaling and exhaling and to reduce the pressure to a preset level on exhalation.

Oral Appliances

Of the several appliances available in the market today, more than 34 have been accepted by the American Food and Drug Administration for

intraoral use in the treatment of obstructive sleep apnea.

The appliances can be broadly classified into:

- Tongue repositioning devices, such as the tongue retaining device
- Mandibular advancement devices (MAD) which work by holding the lower jaw and the tongue forward during sleep
  - Fixed mandibular advancement devices[15]
  - Adjustable mandibular advancement devices[15]
- Devices designed to lift the soft palate
- Uvula lifters, which are not in use now due to discomfort.

Mechanism of Action

Oral appliances enlarge and stabilize the oro-and hypo pharyngeal airway space by advancing the mandible and stretching the attached soft tissue, particularly the tongue. A tooth-borne device requires firm retention on the teeth; a tooth- and tissue-borne appliance, such as a modified activator, is passive and has a loose fit. Both these appliances have been reported to reduce snoring and/or to improve the incidence of OSA.[19] When comparing differently designed oral appliances in various patient groups, the results may reflect differences between the groups, e.g. due to intra-oral and pharyngeal anatomy, rather than between appliances.

Appliance Designs

- Luco Hybrid OSA Appliance
- Adjustable PM Positioner
- AVEO- TSD(TONGUE STABILIZING DEVICE)
- Clasp Retained Mandibular Positioner (CRMP)
- CPAP Pro
- Elastic Mandibular Advancement Appliance (EMA)
- Elastomeric Sleep Appliance
- Full Breath Appliance
- Herbst Telescopic Appliance
- Hilsen Adjustable Appliance
- Mandibular Inclined Repositioning Appliance (MIRS)
- Medical dental Sleep Appliance (MDSA)
- Narval O.R.M. Device
- Nocturnal Airway Patency Appliance (NAPA)
- Nose Breathe Appliance
- OASYS-The OASYS Oral/Nasal Airway System
- Sleep Apnea Goldilocks Appliance (SAGA)
- Snore Silencer Pro
- TheraSnore
- Tongue Retaining Device (TRD)
- Somnoguard Adjustable
- Modified monobloc appliance[20]
- Snore guard
- Silencer system
- Klearway oral appliance[21]
- PM positioner
- Thornton adjustable positioner
- Modified herbst
- The elastic mandibular advancement
- Oral pressure appliance

Surgical Therapy

Nasal, septal and adenoid surgery

Weak or malpositioned cartilages around the nostrils, droopy nasal tip or excessively narrow nostrils, nasal septal deviation and enlarged adenoids are all indicated for surgical interventions.[22] Surgery is performed to open the breathing passages and to permit easier breathing.Nasal procedures are not proven to show statistically significant improvement as an isolated treatment option in OSA. But they generally improve nasal breathing and show an increased CPAP compliance. [23]

Tonsillectomy

This is an important component of surgery for OSA, especially if the tonsils are enlarged. [22] The removal of redundant tissue by tonsillectomy increases the caliber of the throat thereby reducing blockage to breathing. Adenotonsillar hypertrophyis usually associated with OSA in children[24]. Role of pedodontist primarily lies in identification of children with adenotonsillar hypertrophy.

Genioglossus advancement

The procedure produces a larger space between the back of the tongue and the throat thereby creating a wider airway. [22] Complications resulting from this procedure are very uncommon. This operation is often performed in tandem with at

least one other procedure such as the Uvulopalatopharnygoplasty (UPPP) or hyoid suspension.

Surgical Technique

The surgical approach is completely intraoral. The mucosal incision is made approximately 10 to 15 mm below the mucogingival junction and a sub periosteal flap is developed to expose the symphysis. Exposure and identification of the mental nerves are unnecessary. A rectangular osteotomy encompassing the estimated location of the GGC is performed under copious irrigation. The superior horizontal bone cut is approximately 5 mm below the root apices to prevent incisor root injury and the inferior horizontal bone cut is approximately 10 mm above the inferior border. Occasionally, the superior horizontal bone cut has to be made 1 to 2 mm below the incisor root apices because of the vertical position of the GGC.

Due to the elongated canine tooth roots that are often present, the vertical bone cuts are made just medial to the canine tooth to avoid root injury. Before completing the osteotomy, a titanium screw is placed in the outer cortex to control and manipulate the bone flap. Bleeding is controlled with electro cautery and a hemostatic agent such as Gel foam. Bone wax is not recommended for control of bleeding due to extrusion problems. The presence of the genial tubercles and the extent of the genioglossus muscle captured in the bone flap are examined at this time. The bone flap is advanced and rotated about 30° to 45°, just sufficient to create bone overlap for a fixation screw. The outer cortex and marrow are removed and the inner cortex is rigidly fixed with a 2.0 mm lag screw. The mentalis muscles are approximated and mucosal closure is performed. No surgical drains are necessary, and the procedure is routinely completed within 30 to 40 minutes.

Midline glossectomy

The efficacy of midline glossectomy (MLG) following failed UPPP is relatively low and is variably affected by body weight and OSA severity. The long-term outcome after MLG is unknown. Midline glossectomy (MLG) is a procedure that directly enlarges the hypopharyngeal airspace using the carbon dioxide laser. Midline glossectomy as the sole procedure was performed on 11 patients who had failed uvulopalatopharyngoplasty (UPPP) and who were felt to have significant hypopharyngeal collapse on physical examination and Müller's maneuver.[25] One patient with primary hypopharyngeal narrowing underwent MLG. There were no major complications, and no persistent difficulties with speech or swallowing. These results demonstrate that direct surgical modification of the tongue base and associated structures can significantly impact obstructive apnea. [25]

Uvulopalatopharyngoplasty

Uvulopalatopharyngoplasty (UPPP) has been the most common sleep apnea surgical procedure performed during the past 25 years. Traditional UPPP procedure consists of the removal of redundant soft palate and pharyngeal tissues as well as uvula so as to widen the oropharyngeal inlet. [26] The tonsillar tissues are also removed if present. Although UPPP can significantly improve oropharyngeal obstruction, hypopharyngeal obstruction is minimally affected by the procedure, thereby reflecting a success rate of only approximately 40%. Furthermore, potential complications including velopharyngeal insufficiency, stenosis and dysphagia are major concerns. Consequently, several modifications of the traditional procedure have been developed to improve outcomes and reduce complications.

Uvulopalatal flap

The uvulopalatal flap procedure (UPF) is a modification of UPPP, which results in the widening of the oropharyngeal airway by suspension of the uvula superiorly toward the hard–soft palate junction after a limited resection of the uvula, lateral pharyngeal wall and the mucosa. As such, this surgical technique results in the widening of the oropharyngeal airway.

Laser-assisted uvulopalatoplasty

Laser-assisted uvulopalatoplasty (LAUP) was introduced by Kamimi as an office-based surgicalprocedure for the treatment of snoring. [27]Theprocedure involves removal of the uvula and aportion of the soft palate by carbon dioxide laserincisions and vaporization. Most of the uvula

isamputated, and the soft palate (1–2 cm lateral tothe uvula) is incised and vaporized. Additionally,mucosal or tonsillar pillar tissue is vaporized asneeded.Although many studies have evaluated theefficacy of LAUP in the treatment of OSA, most ofthe studies are flawed by methodological discrepancies or statistical inadequacies such as ill-defined criteria for response and lack of adequatefollow-up. In addition, LAUP is associated withincreased risk of dysphagia as well as the risk ofdiscontinuation of treatment due to pain.

Maxillomandibular advancement

Maxillomandibular advancement (MMA) or double jaw advancement is a procedure where the upper and lower jaws are surgically moved forward. The concept is that as the bones are surgically advanced, the soft tissues of the tongue and palate are also moved forward opening the upper airway. Since the upper and lower teeth are moved the same amount, the bite would be similar before and after surgery. This type of treatment is usually done if previous procedures have not completely improved the obstructive breathing episodes and the patient has persistent symptoms of daytime sleepiness and fatigue. MMA will always alter and often enhance appearance, but is not disfiguring.

Distraction osteogenesis:

Mandibular retrognathism due to temporomandibular joint (TMJ) ankylosis is one of the important contributing factors to the obstructive sleep apnea (OSA). At the same time facial asymmetry due TMJ ankylosis leads to a progressive lack of confidence. Distraction osteogenesis is a less invasive surgical technique in the management of OSA, secondary to TMJ ankylosis. Various authors have proposed distraction osteogenesis for maxillomandibular advancement, as a reliable surgical method to alleviate the narrow upper airway in growing OSA patients, especially those with severe craniomaxillomandibular deformities.[28,29,30,31,32,33] Advantages of distraction osteogenesis include greater advancement possible, more stable results, non-requirement of grafting, low-risk procedure, obviating the need for intermaxillary fixation in an already compromised airway and at the same time correcting asymmetry.

Maxillomandibular expansion

A constricted maxilla with a high and narrowed hard palate contributes to increased nasal resistance and is a common finding in patients with OSA. Investigators have demonstrated that expansion of the maxilla can improve OSA in children, adolescent as well as adults. Furthermore, since patients with maxillary constriction often have a corresponding mandibular constriction, expansion of the maxillary and mandibular complex has also been shown to be beneficial in reducing the severity of OSA. The procedure consists of limited osteotomies to allow widening of the maxilla and mandible with distractors. The advantage of maxillomandibular expansion is that it is considerably less invasive than MMA. However, treatment time is lengthened and patients need to keep the distractors in place for several months after the operation to ensure that the expansion is stable. Therefore, patient acceptance for this treatment option may be affected. In addition, orthodontic therapy is also mandatory and may possibly influence patient acceptance to this treatment modality.

Hyoid advancement (HA)

Resistance of airflow is directly proportional to thelength of the airway; therefore, a decrease in airway lengthwill provide a decrease in resistance. The decrease inairway length can be accomplished by performing a hyoidsuspension, which was described in 1984 by Riley et al. [34]

The hyoid bone holds an intimate relationship with the tongue base and pharyngeal musculature, thus portraying an integral aspect of the upper airway anatomy. The hyoid bone may be surgically repositioned anteriorly by attaching it to the thyroid cartilage in order to expand the airway. The procedure is usually performed in conjunction with GA so as to contribute to the improvement of OSA. However, some surgeons have elected to combine it with UPPP alone.An inherent problem with HA is the requirement of an external incision on the neck, one aspect that may not be readily accepted by all patients. As with other sleep apnea surgical procedures, the results of HA are variable, ranging from 23 to 65%. In general, the associated surgical risks are low, and may include infection, seroma formation and dysphagia.

Radio frequency or somnoplasty

Radiofrequency tissue volume reduction (RFTVR) is a surgical method which uses radiofrequency heating to create targeted coagulative submucosal lesions resulting in shrinkage of the inner tissues leaving the outer tissues intact. The submerged wound undergoes healing, contraction and stiffening. The result is relief of nasal obstruction when used to shrink the nasal turbinates and diminished snoring when used to reduce the soft palate or elimination of OSA when used for tongue reduction. The disadvantages of somnoplasty treatment for OSA include the need for multiple treatment sessions and overall limited clinical experience with the technique.

Tracheostomy

Valero & Alroy demonstrated the effectiveness oftracheostomy (tracheotomy) as treatment for obstructive sleep apnea in a patient with acquired micrognathia(1965). [35]

This is one of the oldest, most shunned and least understood procedures for OSA. The concept with this procedure is that any area of blockage to breathing, from the nose to the voice-box, is bypassed by a hole placed into the windpipe. [22]This stoma must be maintained both by daily cleaning and by insertion of a tube. The tracheotomy tube must be kept exquisitely clean; otherwise, painful infections of the stoma will occur, or the tube and/or windpipe could become blocked with secretions. When OSA is severe and CPAP is not tolerated or ineffective or cardio-pulmonary failure has developed, tracheotomy may be the initial treatment of choice. Some patients who cannot tolerate CPAP and for whom, other measures have failed may require tracheostomy.

CONCLUSION

The field of sleep medicine is a relatively new arena that has undergone numerous changes in few recent years. There have been a number of significant advances as far as the diagnosis, consequences and management of sleep apnea is concerned. Increasing awareness and medical attention to the sleep related breathing disorders have resulted in enormous increase in the number of referrals to sleep labs over a decade or so. Despite of increasingly better ways and infrastructure to diagnose OSA currently, as it comes to the management part, we are still not having a treatment modality that can assure compliance along with cure.

Dentists have a key role in diagnosing obstructive sleep apnea in early age groups.A planned professional approach of various specialists in dentistry together can give best treatment results with respect to anatomical problems in maxillofacial area. It is our hope that continuous high quality research and practice will engender further understanding and treatment of patients with OSA.

CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

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