ISSN: 0975-833X

Available online at http://www.journalcra.com

International Journal of Current Research
Vol. 11, Issue, 01, pp.767-770, January, 2019

DOI: https://doi.org/10.24941/ijcr.34073.01.2019

INTERNATIONAL JOURNAL OF CURRENT RESEARCH

REVIEW ARTICLE

A REVIEW ON OBSTRUCTIVE SLEEP APNEA

[1]Dr. Manu M Kochupurackal, [2]Dr. Robina Rose Mathew and [1]Dr. David WT

[1]Post Graduate, Department of orthodontic and Dentofacial orthopaedics, Maharaja Ganga Singh Dental College and Research Centre, Sri Ganganager, Rajasthan, India
[2]Post Graduate, Department of Conservative Dentistry and Endodontics, Maharaja Ganga Singh Dental College and Research Centre, Sri Ganganager, Rajasthan, India

ARTICLE INFO

Article History:
Received 17th October, 2018
Received in revised form
24th November, 2018
Accepted 09th December, 2018
Published online 31st January, 2019

Key Words:

Potentially life threatening,
Undiagnosed.

ABSTRACT

Obstructive sleep apnea, cessation of breathing during sleep, is potentially life threatening and requires prompt intervention. Despite the numerous advancements in our understanding of the pathogenesis and clinical consequences of the disorder, amajority of those affected remain undiagnosed. Simple queries of the patient or bed partner for the symptoms and signs of the disorder, namely, loud snoring, observed apneas, and day time sleepiness, would help identify those in need of further diagnostic evaluation. The orthodontic approach is intended to provide patients with immediate relief from OSA, as well as changes to the airway that may address an underlying cause. It can be treated using surgery, continuous positive airway pressure and oral appliances therapy. This article review some of the basic aspects of this sleep-related disorder, its diagnosis and treatment modalities.

Citation: Dr. Manu M Kochupurackal, Dr. Robina Rose Mathew and Dr. David WT, **2019.** "A review on obstructive sleep apnea", *International Journal of Current Research*, 11, (01), 767-770.

INTRODUCTION

Sleep apnea, and particularly obstructive sleep apnea (OSA), is a common disorder that is characterized by repetitive partial or complete cessation of air flow, associated with oxyhemoglobin desaturation and increased effort to breathe. According to the American Academy of Sleep Medicine Obstructive sleep apnea syndrome (OSAS) is characterised by recurrent episodes of partial or complete upper airway obstructions during sleep (Guilleminault C *et al*.,1976). It is one of the most common sleep disorders which is an important public health problem (Young T *et al*.,1993).Sleep apnea syndrome is associated with a considerable number of adverse sequelae, both behavioral and physical. Behavioral consequences include daytime sleepiness, impaired concentration, and neuropsychological dysfunction, whereas physical consequences include cardiovascular disorders, particularly hypertension have been associated with increased risk of myocardial infarction, cerebrovascular accidents, hypertension, congestive heart failure, and motor vehicle crashes (Young T *et al*., 2004; Tilkian AG *et al*.,1977; Young T *et al*.,1997). The purpose of this review is to provide information on diagnosis, pathophysiology, prevalence, predisposing factors, clinical features and treatments in adult patient for the most common sleep breathing disorder obstructive sleep aponea.

Corresponding author: **Dr. Manu M Kochupurackal,**
Post Graduate, Department of orthodontic and Dentofacial orthopaedics, Maharaja Ganga Singh Dental College and Research Centre, Sri Ganganager, Rajasthan, India

Pathogenesis of OSA

In normal conditions, the muscles of the upper part of the throat keep the airway open to allow air to flow into the lungs. These muscles usually relax during sleep, but the passage remains open enough to permit the flow of air. The pathophysiology of OSA includes factors related to upper airway anatomy, upper airway resistance and upper airway muscle function during sleep.(Wolfgang*et al*.,1995)OSA is caused by repetitive upper airway obstruction during sleep as a result of narrowing of the respiratory passages. Patients with the disorder are most often overweight, with associated peripharyngeal fat infiltration and/or increased size of the soft palate and tongue. Some patients have a diminutive jaw that results in insufficient room for the tongue. These anatomic abnormalities decrease the cross-sectional area of the upper airway. Decreased airway muscle tone during sleep and the pull of gravity in the supine position further decrease airway size, thereby impeding air flow during respiration (Schwartz AR *et al*., 1998). Sleep apnea is classified as central, obstructive, or mixed, and it may be mild, moderate, or severe.

Central sleep apnea: it is characterized by the patient's having a loss of oxygen to the lungs caused by the respiratory (chest) muscles making no attempt to breathe as a result of a central nervous system disorder.

Obstructive sleep apnea: the respiratory muscles attempt to inspire, but a blockage in the upper airway prevents air from reaching the lungs.

Mixed: A patient with a combination of these problems is said to have mixed apnea. Oral appliance therapy cannot address central and mixed sleep apneas (Rodney *et al*., 1993).

Risk Factors

Compounding the lack of patient awareness, health care professionals in most medical specialties have not received the necessary training to help expedite case finding and institute early intervention. Knowledge of risk factors for obstructive sleep apnea is therefore crucial to properly direct diagnostic attention at those with the highest risk.

Age: With advancing age, sleep-related difficulties become increasingly common and often manifest as subjective complaints of difficulty falling asleep, the number and duration of night-time awakenings, and the amount of night-time sleep obtained. Epidemiologic surveys reveal that more than 50% of adults over the age of 65 years have some form of chronic sleep-related complaints (Punjabi NM.2008) However, when the prevalence is controlled for body mass index, the severity appears to decrease with age (Young T *et al*.,1993). Several studies have attempted to address the cause of age-related impact on sleep apnea but no conclusions have been reached.

Sex: It has long been recognized that men have greater vulnerability than women toward developing obstructive sleep apnea (Punjabi NM.2008)

Obesity: Obesity/visceral obesity is the major risk factor for the development of OSA, it is thought to be associated with anatomic alterations that predispose to upper airway obstruction during sleep, by increasing adiposity around the pharynx and body (Schwartz AR *et al*., 2008).

Family history and genetic predisposition: Familial aggregation and genetics factors are thought to play a role in the development of OSA. First-degree relatives of those with the disorder are more likely to be at risk compared with first-degree relatives of those without the disorder. Familial susceptibility to obstructive sleep apnea increases directly with the number of affected relatives (Redline S *et al*., 2000; Schwab RJ *et al* 2005).

Craniofacial abnormalities: The structural factors in the upper airway may alter its mechanical properties. Differences in craniofacial morphology may explain some of the variation in risk for OSA in different ethnic groups. Features such as retrognathia, tonsillar hypertrophy, enlarged tongue or soft palate, inferiorly positioned hyoid bone, maxillary and mandibular retroposition, and decreased posterior airway space can narrow upper airway dimensions and promote the occurrence of apneas and hypopneas during sleep (Punjabi NM.2008; Cozza P *et al*., 2004).

Smoking and alcohol consumption: Cigarette smoking and alcohol have been shown to be risk factors for OSA. Smoking is associated with a higher prevalence of snoring and sleep-disordered breathing. It can well be explained by the cigarette induced airway inflammation and damage which could change the structural and functional properties of the upper airway, and increasing the risk of collapsibility during sleep. Alcohol relaxes upper airway dilator muscles, increases upper airway resistance and may induce OSA in susceptible subjects (Khoo SM*et al*., 2004; Ekici M*et al*., 2008).

Other risk factor

There are several other conditions that have also been associated with an increased prevalence of obstructive sleep apnea. These conditions include polycystic ovary syndrome, hypothyroidism, and pregnancy (Punjabi NM.2008).

Clinical features of OSA

Symptoms may include Excessive daytime sleepiness, Fatigue, Snoring,Apnea observed by the bed partner, Early morning and nocturnal headache, Enuresis, Depression, Impairment of thinking, perception, and memory, Sexual impotency Physical findings may include Obesity, Increased neck circumference , Crowding of the upper airway structure, Enlarged tonsils, Nasal obstruction, Retrognathia, Hypertension, Lower limb edema, Signs of cor pulmonale (Bahammam A *et al*., 1999; George CF *et al*., 1996).

Diagnosis: A presumptive clinical diagnosis of OSA can sometimes be made in patients with a short, thick neck who complain of snoring and excessive daytime sleepiness. Still, objective testing can be helpful in confirming the diagnosis and excluding other sleep disorders that might be causing the symptoms. Diagnostic criteria for OSA is at least 10 apneaic events per hour. To grade the severity of sleep apnea the number of events per hour is reported as the Apnea-Hypopnoea Index (AHI). An AHI of less than 5 is considered normal. An AHI of 5-15 is mild; 15-30 is moderate and more than 30 events per hour characterizes severe sleep apnea (Steven G*et al*., 1993)

Subjective assessment of sleepiness: The following questions should be asked whenever a diagnosis of OSA is under consideration:

- Is this patient falling asleep regularly against their will?
- Is this patient often sleepy whilst driving?
- Is this patient experiencing difficulties at work because of excessive sleepiness?
- Is surgery for snoring being contemplated?

Patients with significant sleep apnoea may not realise that they have a problem as many of the features may be reported by a spouse or partner.

Objective assessment of sleepiness

The Multiple Sleep Latency Test (MSLT) measures the time to fall asleep
The maintenance of wakefulness test (MWT) where the subject is instructed to stay awake, rather than to fall asleep (Litter MR*et al*., 2005)

Sleep Studies are done to confirm the clinical suspicion of OSA and to assess its severity in order to guide the therapeutic choices to offer patients.

Polysomnogram (PSG): PSG is still considered the gold standard for the diagnosis of sleep apnea and other sleep disorders. It involves an overnight sleep in the laboratory with multichannel monitoring of multiple physiologic variables with the attendance of a technician throughout the study. During the study, sleep stages and sleep continuity, respiratory effort, airflow, oxygen saturation, body position, electrocardiogram, and movements are recorded. In the analysis of the study, the number of apneas per hour is expressed as the AI, which determines the severity of the OSA (Keenan S., 1992).

Split-Night Polysomnographic Studies: Instead of studying patients with OSA over two nights (first night for diagnosis and second night for CPAP [Continuous positive airway pressure therapy] titration), there is a trend to split the night into two halves. The diagnosis of OSA is established in the first half of the night and the optimal CPAP is determined in the second half (Bahammam A*et al*., 1999).

Portable Home Monitoring of Sleep: The rationale for the development of these systems was to have a portable system that does not require technician attendance during the study so it can be performed at home or in the patient's hospital room. New monitoring systems range from a device as simple as an oximeter, to multichannel systems including all variables usually recorded in the laboratory. Recent guidelines published by the American Sleep Disorders Association for portable monitoring recommended its use in: (1) patients with severe symptoms indicative of OSA when initiation of treatment is urgent and standard PSG is not readily available, (2) follow-up studies of patients with established OSA, and (3) patients who are unable to be studied in the sleep laboratory, such as non-ambulatory patients and medically unstable patients (Esnaola S *et al*., 1996; Bahammam A *et al*., 1999).

Treatment: The proposed management of the patient's sleep disorder is based on the diagnosis, along with consultation and the recommendations of the treating physician, and on the desires of the patient. Adjunctive measures that may be undertaken include weight loss, nutritional counselling, exercise, the use of a special cervical pillow, smoking cessation, alcohol counselling, or the alteration of the patient's sleep position (Wolfgang *et al*., 1995; Rodney *et al*., 1993) In most instances the dentist involved in the management of the sleep-disordered patient focuses on the management of a breathing-related disorder. The use of an appliance to advance the mandible or some form of a surgical procedure comprises the most significant component of the treatment.

Continuous positive airway pressure therapy: The application of a therapeutic level of CPAP results in immediate relief in the upper airway obstruction Continuous positive airway pressure (CPAP) is the most consistently successful and extensively studied treatment for obstructive sleep apnea. CPAP machines contain a fan that blows air under pressure into the nostrils. The airflow acts as a pneumatic splint that keeps the pharyngeal airway open. CPAP is not curative, and patients must use the mask whenever they sleep. A recent systematic review concluded that CPAP therapy improves quality of sleep and reduces problems of excessive daytime sleepiness in patients with obstructive sleep apnea. Despite the effectiveness of CPAP, many patients have difficulty tolerating this therapy. Patients may complain about the rush of air pressure during CPAP, especially on exhalation (White J*et al*., 2002). Nasal pillows are an alternative to the CPAP mask and may improve compliance. When nasal pillows are used, air is blown directly into the nostrils. Some patients elect to use a CPAP mask one night and nasal pillows the next night to reduce the chance of pressure irritation from either appliance (Jokic R*et al*., 1998).

Intra oral appliances: Intraoral appliances (IOA) have been introduced recently as a therapy for OSA, as an alternative to nasal CPAP in patients with a mild obstructive disorder or who cannot tolerate CPAP. Orthodontic appliances are made in such a manner that it can be worn permanently or removeably depending upon the condition. Appliance are designed to bring the mandible and tongue forward, opening up the lower pharynx to allow unrestricted breathing. Different appliances have been used, which can be grouped into two main types--mandibular advancing devices and tongue retaining devices (Ichioka M*et al*., 1991). Currently available appliances: First category: one piece appliance with no ability to advance the mandible incrementally; Second category: Appliance are principally two piece in design and offer the potential for incremental advancement; Third category: They permit incremental advancement and lateral movement of mandible; Tongue retaining devices: Tongue retaining device is a splint that holds the tongue in place to keep the airway as open as possible. They are excellent devices for patients with Temperomandibular joint sensitivity. There are several advantages of Tongue retaining devices, they do not require retention from dentition, minimal adjustments are required and cause minimal sensitivity to teeth and temperomandibular joint (Sathish Kumar *et al*., 2013). The American Sleep Disorders Association Standards of Practice Committee recommends the use of appliances in the following situations: primary snoring, mild OSA patients who do not respond to general treatment, patients with moderate to severe OSA who refuse or cannot tolerate nasal CPAP, and patients with moderate to severe OSA who refuse or are not candidates for corrective surgery.[16] IOAs are usually well tolerated in most patients. Excessive salivation and temporomandibular joint (TMJ) discomfort after awakening are the most common initial complaints. Late complications may include TMJ discomfort and tenderness and changes in occlusive alignment (L'Estrange PR *et al* 1996; Wolfgang *et al*., 1995).

Surgical Treatment: When the nonsurgical therapies for OSA fail or are unacceptable to the patients, surgical options are considered. The goal of surgery in such cases is to augment the upper airway and correct its disproportionate anatomy. Despite using different diagnostic techniques, it is very difficult to determine the exact site of obstruction in patients with OSA because different patients have different patterns of airway obstruction. For practical purposes, the pharynx can be divided functionally into two portions-the retropalatal pharynx and the retrolingual pharynx (Fujita S., 1993; Waite PD *et al* 1989; Bahammam A *et al*., 1999)

Procedures in which soft tissue is either removed or ablated

- UPPP (uvulopalatopharyngoplasty)
- Laser assisted uvulopalatoplasty
- Uvulopalato pharyngo-glossoplasty
- Laser midline glossectomy
- Radiofrequency ablation of tongue base

- Reduction of tongue base with hypoepiglottoplasty

Procedures in which soft tissue is repositioned through skeletal alteration

- Mandibular advancement (MA)
- Maxilla mandibular advancement (MMA)
- Transpalatal advancement pharnygoplasty
- Genioglossal advancement
- Hyoid myotomy and suspension

Tracheostomy

Tracheotomy is 100% effective in alleviating OSA by bypassing all obstructive sites. This procedure is usually reserved for the most severe OSA patients. In summary, in the absence of a correctable anatomic problem, surgery should be considered only in patients who fail CPAP or in whom CPAP is not an option. Patients who undergo surgery need close follow-up to document objective improvement. Some patients may need both CPAP and surgery to overcome the obstructive events. OSA is a common condition associated with significant morbidity and mortality. It is therefore important that dental professionals be aware of the signs and symptoms of OSAS, so that the diagnosis can be confirmed and treatment initiated as soon as possible.

REFERENCES

Bahammam A, Kryger M. Decision making in obstructive sleep disordered breathing: putting It all together. *Otolaryngol Clin North Am* 1999; 32(2):333-48.

Cozza P, Polimeni A, Ballanti F. A modified monobloc for the treatment of obstructive sleep apnoea in paediatric patients *Eur J Orthod* (2004) 26 (5): 523-530.

Ekici M, Ekici A, Keles H, Akin A, Karlidag A, Tunckol M, *et al*. Risk factors and correlates of snoring and observed apnea. Sleep Med 2008; 9 : 290-6.

Esnaola S, Durán J, Infante-Rivard C, Rubio R, Fernández A. Diagnostic accuracy of a portable recording device (MESAM IV) in suspected obstructive sleep apnoea. *Eur Respir J* 1996;9:2597- 605.

Fujita S: Obstructive sleep apnea syndrome: Pathophysiology, upper airway evaluation and surgical treatment. *Ear Nose Throat J* 72:67-72, 75-76, 1993

George CF, Boudreau AC, Smiley A. Simulated driving performance in patients with obstructive sleep apnea. *Am J Respir Crit Care Med* 1996; 154(1):175-81.

Guilleminault C, Tilkian A, Dement WC: The sleep apnea syndromes. *Annu Rev Med* 27:465-484, 1976

Ichioka M, Tojo N, Yoshizawa M, *et al*. A dental device for the treatment of obstructive sleep apnea: A preliminary study. *Otolaryngol Head Neck Surg* 1991;104:555- 558.

Jokic R, Klimaszewski A, Sridhar G, Fitzpatrick MF. Continuous positive airway pressure requirement during the first month of treatment in patients with severe obstructive sleep apnea. Chest 1998; 114:1061-9.

Keenan S. Polysomnography: Technical aspects in adolescents and adults. *J Clin Neurophysiol* 1992;9:21-31

Khoo SM, Tan WC, Ng TP, Ho CH. Risk factors associated with habitual snoring and sleep-disordered breathing in a multi-ethnic Asian population: a population-based study. *Resp Med* 2004; 98 : 557-66.

L'Estrange PR, Battagel JM, Harkness B, *et al*. A method of studying adaptive changes of the oropharynx to variation in mandibular position in patients with obstructive sleep apnoea. *J Oral Rehabil* 1996;23:699-711

Litter MR, Kushida C, Wise M, *et al*. Practice parameters for clinical use of multiple sleep latency test and the maintenance of wakefulness test. *Sleep* 2005;28:113-21

Punjabi NM. The epidemiology of adult obstructive sleep apnea. *Proc Am Thorac Soc* 2008; 5 : 136-43.

Redline S, Tishler PV. The genetics of sleep apnea. Sleep Med Rev 2000; 4 : 583-602.

Rodney C Kundson, Jack B Meyer. Managing Obstructive Sleep Aponea. JADA 1993; Vol 124: 75-78

Sathish Kumar N, Divya.K, Dr. Appasaheb Naragond, Smitha Naragond,K. Rajasigamani, V. Baskar.Obstructive Sleep Apnea -An Orthodontic review. *IOSR Journal of Dental and Medical Sciences.* 2013;vol 9 issue 6;68-72

Schwab RJ. G enetic determinants of upper airway structures that predispose to obstructive sleep apnea. *Respir Physiol Neurobiol* 2005; 147 : 289-98.

Schwartz AR, O'Donnell CP, Baron J, Schubert N, Alam D, Samadi SD, Smith PL. The hypotonic upper airway in obstructive sleep apnea: role of structures and neuromuscular activity. *Am J Respir Crit Care Med* 1998; 157:1051–1057.

Schwartz AR, Patil SP, Laffan AM, Polotsky V, Schneider H, Smith PL. Obesity and obstructive sleep apnea – pathogenic mechanisms and therapeutic approaches. *Proc Am Thorac Soc* 2008; 5 : 185-92.

Steven G McNamara, Ronald R Grunstein, Colin E Sullivan. Obstructive Sleep Apnoea. Thorax 1993; 48:754-764.

Tilkian AG, Guilleminault C, Schroeder JS, *et al*: Sleepinduced apnea syndrome. Prevalence of cardiac arrhythmias and their reversal after tracheostomy. *Am J Med* 63:348358, 1977

Waite PD, Wooten V, Lachner J, *et al*: Maxillomandibular advancement surgery in 23 patients with obstructive sleep apnea syndrome. *J Oral Maxillofac Surg* 47:1256- 1261, 1989

White J, Cates C, Wright J. Continuous positive airways pressure for obstructive sleep apnoea. *Cochrane Database Syst Rev* 2002; (2):CD001106

Wolfgang Schmidt Nowara, Alan Lowe, Laurel Weigand, Rosalind Cartwright, Francisco Perez Guerra. Oral Appliance for the treatment of snoring and obstructive sleep aponea: A Review. *An American Sleep Disorder Association Review* 1995;18(6):501-510.

Young T, Palta M, Dempsey J, *et al*: The occurrence of sleep-disordered breathing among middle-aged adults. *N Engl J Med* 328:1230-1235, 1993

Young T, Peppard P, Palta M, *et al*: Population-based study of sleep-disordered breathing as a risk factor for hypertension. *Arch Intern Med* 157:1746-1752, 1997

Young T, Skatrud J, Peppard PE: Risk factors for obstructive sleep apnea in adults. JAMA 291:2013-2016, 2004

****