Editorial

Sleep apnea and prosthodontic implications

The role of prosthodontist in managing sleep disorders with oral appliances is attaining more significance.[1] The prosthodontist has the opportunity to recognize, evaluate sleep-related disorders, and manage the situations ranging from snoring to moderate obstructive sleep apnea (OSA). It is vital to be aware sleep disorders and the possible impact that can aid in providing effective care to the patients reporting to prosthodontic clinics.[2]

Sleep apnea is characterized by recurring incidents of apnea happening during sleep. An apnea is a stop of inspiratory airflow lasting for 10 s or more and hypopnea denotes the decrease in inspiratory airflow (by at least 30%) lasting 10 s or more with an accompanying fall in oxygen saturation or sleep awakening.[3] Sleep apnea is of central sleep apnea (CSA), OSA, and mixed apnea. Each category can be further subclassified as mild, moderate, or severe depending on apnea hypoxia index (AHI). In CSA, both airflow and inspiratory efforts are absent due to the central nervous system disorder. In OSA, despite the inspiratory efforts, the airflow falls out happen due to obstruction. OSA syndrome (OSAS) is most commonly observed characterized with disturbances in normal sleep patterns and combined with excessive day time sleepiness.[3,4] OSAS initiates oxygen (oxyhemoglobin) desaturation, carbon dioxide accumulation, and in sustained situations, it causes various systemic issues such as headache, depression, hypertension, stroke, diabetes, heart diseases, chronic acid reflux, and other life-threatening situations. Mixed sleep apnea is a combination of CSA and OSA.[5]

Simple snoring is a common complaint affecting 45% of adults occasionally and 25% of adults habitually and is a sign of upper airway obstruction. Snoring is recognized as a potential risk factor for various diseases. The prosthodontist role is getting significant in recent years in managing snoring and mild-to-moderate OSA.[2-4] OSA is more prevalent in males than females, and it increases with the age. The cause of OSA is more related to fall of tongue during sleep or collapse of the lateral pharyngeal wall due to increase in thickness of fat. OSA is characterized by partial or complete obstruction of upper airway causing abnormal breathing patterns causing disturbances during certain stages of Rapid eve moment (REM) and non-REM sleep.[2]

The predisposing factors for OSA include obesity, abnormalities in oropharyngeal or craniofacial region, alcohol, and smoking. The decrease in tone of dilator muscles, especially the genioglossus pushes the tongue posteriorly in the pharynx causes obstruction, is often the primary disposing factor in many individuals. The obstruction can be divided into anatomical and nonanatomical factors. Common anatomical factors include narrowing of lumen due to ageing, increased fat deposition, and nonanatomical factors include reduced sleep arousal threshold, ventilator control instability. The better understanding of the etiology aids in adapted treatment that can benefit the patient. CSA is caused due to momentary failure of respiratory centers in the medulla to stimulate inspiration. The irregular control of apneic threshold in co2 partial pressures causes respiration suppression. The primary source can be due to hypercapnic, eucapnia, or hypocapnia.[1,2,6,7]

Comprehensive examination is essential to diagnose the sleep apnea. The sign and symptoms that can aid in diagnosis are day time sleepiness, morning headaches, snoring, witnessed apnea, and difficulty in concentration. The physical examination, assessment of medical history, and sleep assessment can support the diagnosis. Polysomnography remains the standard in establishing the disease. Home sleep apnea testing was used as a substitute tool, but it displayed lower accuracy and sensitivity in diagnosing nonrespiratory sleep disorders.[1-4] Epworth Sleepiness Scale, Malampatthy Scale, and questionnaires of BERLIN, STOP, STOP-BANG support in the evaluation of OSA.[3] These are adjunctive tools that can be used during examination. In addition, it can be used for long-term assessment of treatment efficacy and follow-up of OSA patients. These tools can aid in OSA diagnosis in the absence of polysomnography.[2,6]

The management of OSA involves behavioral modifications, medical, dental, and surgical interventions. The choice of

management would be behavioral changes, customized oral appliances for mild-to-moderate OSA situation. Behavioral therapies include weight loss, positional therapy for improving the airway patency, avoidance of alcohol, or sedative agents.[1,2] Continuous positive airway pressure (CPAP) and surgical options are chosen for patients with moderate to severe OSA. Positive air way pressure is an effective choice it reduces AHI and improves sleep and quality of life. It works by pneumatic splinting of upper airway and thereby reducing the obstruction and apneic events. Surgical management is classified as upper pharyngeal, lower pharyngeal, or global depending on the anatomy level at which it is targeted. Hypoglossal nerve stimulation is a form of surgery intervention has been effective in the treatment, particularly in nonadherence CPAP patients.[7-9]

Pierre Robin, French pediatrician in 1923 devised the first oral appliance, a prosthetic device similar to mandibular advance splints to manage the "*the dysmorphic atresia of the mandible.*" George Cattlin was the initial researcher to explore on the association between breathing and the quality of sleep. The oral appliances were less popular until the introduction of TRD by Cartwright and Samelson in 1980s. Later, the research and advancements led to the development of various forms of oral appliances.[8,9] Oral appliance majorly involves mandibular advancement splints (MAS) or mandible repositioning devices, tongue retaining or repositioning devices (TRD), and soft palate lifters. The soft palate lifters are seldom used. MAS is more commonly practiced that TRD though the later produced more significant observations. MAS protrudes and stabilizing the mandible to provide the upper air way patency. MAS works by mechanically enlarging the airway at velopharynx and oropharynx. It either improves the anteroposterior width/lateral width of the upper airway with supporting positions of the hyoid bone and the third cervical vertebra.[6,10-12]

American Academy of Sleep Medicine has endorsed the use of oral appliances in situations of snoring and mild-to-moderate OSA. The suggested indications were situations of lower degree of oxygen saturation, reasonably less day time sleepiness, reduced apnea frequency, patients intolerant to CPAP, and who decline surgery.[7,11] Oral appliances when used during sleep displayed significant progress in the blood oxygen saturation levels and eased apnea in 20%–75% of patients. The devices also possess the limitations of tooth tenderness, excessive salivation, gum irritation, dry mouth, TMJ pain, and discomfort. The long-term effect of MAS has evidenced changes in tooth positions and occlusion. The jaw exercises and supportive measures aid to improve compliance, expand the quality of life, and decreases the adverse effects. The limitations are greatly reduced by understanding the mechanics behind usage of the appliances.[13-16]

The advancement in the field has appreciably increased the understanding and science of OSA. The studies have reported on imbalance in amino acid neurotransmitter systems can be an etiloogyand potential biomarkers were established for diagnosing OSA. The scoping reviews have proved that interleukin (IL6) and IL10 have been established biomarkers in adults and kallikrein1, uromodulin, urocortin-3, orosomucoid-1 in children. Further studies required to explore other markers for definitive data.[3,5] The treatment of OSA is more subjective no definitive method has been proved to be successful. The proposed treatment methods are effective but a lot required to determine the definitive outcomes. The innovations in the management of OSA such as advanced CPAP, Nasal expiratory positive airway, oral pressure therapy, improvements in oral appliances, sensors for appliance titrations, outcome predictions-nasal endoscopy, volumetric air way imaging, questionnaires, positional therapy, electrical stimulation, surgical approaches techniques and newer drugs requires more evidences. The research required in demonstrating treatment effectiveness, titration of oral appliances, modifications in CPAP for more patient compliance, influence of oral appliances in TMD, limitations in the use of various questionnaires, novel interventions, and larger clinical trials required to generate higher evidences for defining universal guidelines. Fewer studies report on Indian patients, and it is required the customize and document the studies on Indian population.[17,18] There is a vast space that's left unexplored in OSA research. Hope we explore further and generate evidences.

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