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Contemporary Issue

# Obstructive sleep apnea (OSA): A prosthodontic perspective



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## ABSTRACT

The subject of sleep medicine, for dental profession in general and prosthodontists in particular, continue to offer great challenges and opportunities in terms of diagnosis, treatment planning and treatment based on qualitative evidence. Although the role played by the prosthodontists is still in its infancy, there is much to learn and understand in the rapidly evolving field of sleep medicine as the recognition of co-managing patients with sleep disorders by the prosthodontists is fast becoming a reality. This article discusses at length the prosthodontic perspectives of the research in the field of sleep medicine, particularly on obstructive sleep apnea.

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## Introduction

Sleep disordered breathing (SDB) is an extremely common medical disorder associated with important morbidities. Obstructive sleep apnea (OSA) is one such chronic condition of upper airway collapse during sleep characterized by repetitive episodes of cessation of respiration (apnea) or decrements in airflow (hypopnea), associated with sleep fragmentation, arousals and reductions in oxygen saturation.

Loss of teeth or edentulism plays a very important role in terms of respiratory process, body balance and in turn overall health of the stomatognathic system. The subject of sleep medicine, for dental profession in general and prosthodontists in particular, continue to offer great challenges and

opportunities in terms of diagnosis, treatment planning and treatment based on qualitative evidence. The recognition of co-managing patients with sleep disordered breathing, by the prosthodontists is well justified ever since interest began in the research associated loss of teeth and severity of sleep apnea during 1990s<sup>1–3</sup> and have been immensely influenced by the concomitant research data emerging in the field of sleep medicine.

The limited published data from the 1990's onwards, has addressed the technique for fabrication of oral appliances in sleep apnea patients.<sup>3</sup> The quality of evidence which has emerged linking the loss of teeth with increased incidence of OSA and the role of nocturnal wear of complete dentures in decreasing the severity of OSA has generated tremendous

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interest and contest.<sup>1,3–5</sup> Till date, the exact mechanism underlying the relation between edentulism and OSA remains to be clearly understood.

From a prosthodontic standpoint, reports on individualized oral appliance therapy for edentulous and partially edentulous sleep apnea patients continue to be published; however, consensus is yet to emerge on many aspects of management. Some of the unresolved issues include the effect of concomitant bite opening with mandibular advancement on efficacy of oral appliance therapy, the role of complete denture wear during sleep, the impact of increased vertical dimension during complete denture wear during sleep, and implant retained mandibular repositioner appliance for edentulous sleep apnea patients. Criticism has been expressed on the utilization of 2-D cephalometric imaging modalities in assessing 3-D upper airway dimensions in upright and awake condition to predict changes occurring during sleep.<sup>6,7</sup>

### Role of edentulism in pathogenesis of OSA

While edentulism has been linked to a wide range of health outcomes, its possible association with OSA has assumed greater significance due to the immense prosthodontic implications on sleep medicine. The links between poor health conditions and edentulism are obvious, yet evidence on a causal relationship via physiological mechanisms is limited, hence common risk factors are widely discussed. This is true in case of tooth loss; edentulism & its association with sleep disordered breathing such as OSA.<sup>8</sup>

Edentulism has been shown to produce anatomical changes in craniofacial structures, and hypothesized to increase obstructive sleep apnea (OSA). However, the relationship between patients with and without teeth and severity of OSA has not been well-studied. The following anatomical changes ensue due to loss of teeth (Figs. 1–3):

- Decrease in vertical dimension of occlusion
- Change in position of mandible
- Change in position of hyoid bone



Fig. 1 – Elongated uvula.



Fig. 2 – Enlarged tongue.

- Impaired function of oropharyngeal musculature such as loss of tone in soft palate and pharynx, macroglossia etc.

### Effects of complete denture wear with and without increased vertical dimension on OSA

In several ways, receiving prosthodontic treatment for tooth loss signifies a return to normal lifestyle and improved quality of life. Given the common occurrence of both loss of teeth and sleep disordered breathing conditions, the relationship between these two conditions has indeed warranted a detailed investigation of the mechanisms whereby loss of teeth leads to upper airway closure during sleep.

Bucca et al (1999) had confirmed that removal of denture significantly decreases the retropharyngeal space, and sleeping without dentures significantly increases AHI, and decreases arterial hemoglobin saturation.<sup>1</sup> Pivetti et al (1999), reported that edentulism may dramatically worsen severity of obstructive sleep apnea (OSA) and advised edentulous patients to wear dentures while sleeping.<sup>2</sup> Carossa et al (2000) concluded that edentulous subjects had a significantly higher prevalence of arterial hypertension and cardiovascular diseases, compared to subjects with natural teeth. Thus, in edentulous subjects, removing dentures during sleep may favor respiratory disorders, and increase the risk for hypertension and cardiovascular disease.<sup>9</sup>

Endeshaw et al (2004) found an association between sleep disordered breathing and denture use, which may represent a

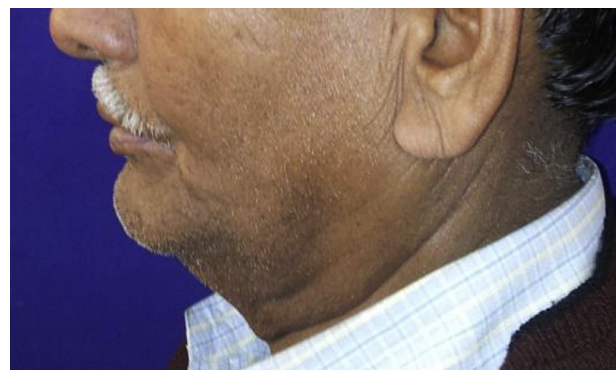


Fig. 3 – Loss of vertical dimension in an edentulous patient.

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