

Case Report

Sound Sleep without Sound: A Cutting Edge Device for Sleep Apnoea- A Case Report

Dr. Vivek B Chandran¹, Dr. P. Rajkumar², Dr. T. Sreelal³, Dr. Aparna Mohan⁴, Dr. Anil Koruthu⁵, Dr. Giri Chandramohan⁶

¹Post Graduate Student, Dept of Prosthodontics, Sree Mookambika Institute of Dental Science, Kulasekaram, Kanyakumari, Tamilnadu, India

²Post Graduate Student, Dept of Prosthodontics, Sree Mookambika Institute of Dental Science, Kulasekaram, Kanyakumari, Tamilnadu, India

³Professor and Head of the Department, Dept of Prosthodontics, Sree Mookambika Institute of Dental Science, Kulasekaram, Kanyakumari, Tamilnadu, India

⁴Reader, Dept of Prosthodontics, Sree Mookambika Institute of Dental Science, Kulasekaram, Kanyakumari, Tamilnadu, India

⁵Senior lecturer, Dept of Prosthodontics, Sree Mookambika Institute of Dental Science, Kulasekaram, Kanyakumari, Tamilnadu, India

⁶Reader, Dept of Prosthodontics, Sree Mookambika Institute of Dental Science, Kulasekaram, Kanyakumari, Tamilnadu, India

*Corresponding Author:

Dr. Vivek B Chandran

Email: vivek_b_c@yahoo.co.in

Abstract: Sleep-disordered breathing (SDB) includes mouth breathing, snoring, upper airway resistance syndrome (UARS), and obstructive sleep apnoea (OSA). Obstructive sleep apnoea is defined as 5 or more episodes of complete (apnoea) or partial (hypopnea) upper airway obstruction per hour of sleep. In this case report we are describing one such case of sleep apnoea where patient is treated using devices. Satisfactory results were acquired post appliance insertion in the patient thereby indicating that in moderate cases appliances can be used to manage sleep apnoea.

Keywords: Obstructive sleep apnea, Snoring, Mandibular advancement appliance.

INTRODUCTION

Sleep is a naturally occurring altered state of consciousness characterized by decrease in awareness and responsiveness to stimuli. Each one of us will spend about 27 years of our lifetime sleeping. On worldwide evaluation about 1/3 part of the population has sleep disorder [1]. A person is said to be suffering from sleep apnoea when they have disturbed breathing during sleeping. It could be due to central, obstructive or mixed cause. The occlusion of the upper airway is caused by sleep-induced physiologic change in muscle activity superadded with any structural defects of upper airway, sleeping position like supine position, edema of the upper airway due to deleterious habit like smoking or other systemic cause like hypothyroidism, acromegaly and nasal obstruction [2]. One of the symptoms of sleep apnoea is snoring, this causes discomfort to the patients as well as the people around them. There are various surgical and non-surgical methods for correction of this disorder amongst which is the use of a prosthesis clearing obstruction in the airway.

CASE REPORT

A 41 year old male patient reported to Department of Prosthodontics and crown and bridge, Sree Mookambika Dental College with the chief complain of snoring and sleep deprivation since 6 months. On detailed history patient revealed that his snoring gradually increased since 6 months along with disturbed sleep. Patient was asked to fill Berlin's questionnaire, based on responses to individual items and their overall scores patient was classified into high risk category. His past medical history revealed that patient had undergone uneventful extractions in the posterior as well as anterior tooth regions 1 year back. Medical history was not significant but his personal history revealed that he had excessive daytime sleepiness, waking up tired, loud snoring, problems with memory and concentration, morning headaches and also dryness of throat and mouth when he wakes up from sleep.

On general physical examination patient was found to be obese. On extra oral examination patient

was found to be having excessive fat deposition around the chin and neck region and a collapsed vertical dimension. On intra-oral examination patient was having macroglossia and on hard tissue examination, missing teeth i.r.t 26, 31, 36, 41 & 46, dental caries i.r.t 37 & 38. Patient had an improper posterior occlusion.

Based on the chief complaint, history, Berlin's questionnaire scoring and clinical examination patient was diagnosed of sleep apnoea. Later for the treatment, Primary impression was made using alginate material of both arches and diagnostic cast was obtained [Fig 1]. Master cast was obtained from heavy body rubber base impression(ADA SPEC 19). Face bow transfer was done and was transferred to Hanau Vide Vue semi adjustable articulator [Fig 2]. Centric occlusion record and protrusive record were obtained to find out the horizontal condylar angle of the patient and Bennet angle was adjusted accordingly. Functional movements of mandible were performed in the articulator and no interference was found during the normal excursive movements. Vertical dimension was also measured and

found that it was reduced by 4 mm. So a 4mm increase is made in the articulator by adjusting the incisal pin (Graduation present in mm). Maxillary and mandibular occlusal splints were fabricated with auto polymerising acrylic and were cross connected in the articulator [Fig 3]. After final finishing and polishing the prosthesis was inserted in to the patient's oral cavity [Fig 4]. Patient was advised to wear the prosthesis at night before going to sleep.

Patient was recalled after 2 weeks and 4 weeks for follow up and on evaluation he felt that there was easiness in breathing, reduction in snoring and reduced episodes of waking up abruptly at night. Berlin's questionnaire scoring in follow up revealed patient had come to the low risk category from earlier high risk category.

Though this was not a final treatment option yet this method has shown satisfactory results and as a next phase of treatment we had referred the patient for sleep study.



Fig-1: Primary impression and the diagnostic cast of the patient



Fig-2: face bow transfer to Hanau semi-adjustable articulator



Fig-3: Fabricated maxillary and mandibular occlusal splints and cross connection of it in articulator



Fig-4: Final prosthesis after insertion into the patient's oral cavity

DISCUSSION

Obstructive sleep apnoea (OSA) is a sleep disordered breathing disease involving repeated obstruction of the upper airway during sleep. It includes simple snoring, upper airway resistance syndrome (UARS), and sleep apnoea. Most of the patients with obstructive sleep apnoea complain of snoring, disturbed breathing pattern and increased day time sleepiness [3]. Snoring in itself is a condition which affects the patients as well as the people around them. It leads to disturbed sleep, dryness of mouth and tiredness [4].

HISTORY

George Cattlin was the first person to identify the relationship between sleep quality and daytime activity. With his evaluation he concluded that when comparing the North American Indians from the immigrant Europeans, North Americans had a healthier breathing as they were taught to breathe through nose from early itself [5]. The clinical work regarding this was later described by Pierre Robin in the year 1903, when he mentioned about a device called "Monoblock" which can be used for treatment of glossoptosis. Later he introduced an appliance to reposition the mandible, this work was introduced 30 years after his initial work [6]. Then in the year 1982, Cartwright and Samelson created a tongue retaining device [7].

ETIOLOGY

The upper airway consists of the nasopharynx, oropharynx, and the hypopharynx. The most common sites of obstruction are seen behind the base of the tongue (retroglossal) and behind the soft palate (retroplatal) [8]. The cause for obstruction is collapse of the lateral pharyngeal wall. When a patient sleeps in supine position, due to relaxation of the muscles the tongue falls on the posterior pharyngeal wall. This leads to obstruction and increased breathing which causes vibration of the soft tissues leading to snoring. Even obesity and macroglossia can lead to airway obstruction.

Types of appliances used for OSA

There are basically three types of appliance used for Obstructive sleep apnoea, they are:

1. Soft Palate Lifters (SPL)
2. Tongue Retention Devices (TRDs)
3. Mandibular Advancement Appliances (MAA)

Mandibular advancement appliances are most widely used devices for sleep apnoea. In our case also, Mandibular Advancement Appliances was used for obstructive sleep apnoea. Use of Mandibular Advancement Appliances leads to forward placement of the mandible thus preventing the upper airway collapse as enough space for passage of air will be available [9]. The amount of protrusion required can be calculated by taking the measurement of full protrusive movement of the patient. Patient compliance is an important aspect in the success of the treatment using the devices. The use of an oral appliance along with a positive airway pressure (PAP) machine may reduce the pressure required to treat severe obstructive sleep apnoea, possibly increasing the acceptability of treatment and patient comfort. [10] It is believed that there are certain occlusal changes on using these appliances for long term, like decreased overjet and overbite and posterior open bite in premolar areas. But these are relatively less. But being a prosthodontist we can easily monitor these changes and maintain the occlusion of the patient.

Proper understanding of sleep apnoea and training on sleep medicine is required to have a professional approach towards these patients prior to selecting them for oral appliance. One should assess the temporomandibular joint, occlusion, oropharyngeal structures, orofacial pain, and headaches for which we require additional training and certification as recommended by the American Academy of Dental Sleep Medicine (AADSM) [11] and the Canadian Sleep Society (CSS) [12].

CONCLUSION

Sleep apnoea or obstructive sleep apnoea is an obstructive condition where patient feels breathlessness and disturbed sleep and wakes up to tiredness and day time sleepiness. Obstructive sleep apnoea can be managed by appliances as well as by undergoing surgery. Where devices or appliances are used for management, there comes the role of prosthodontists. We can make various appliances like mandibular protrusion appliance or tongue retention device etc which has its own objective in management of obstructive sleep apnoea. Though these appliances are said to cause occlusal changes yet these changes are minimal. For better understanding of the best device to be used in such conditions, more systemic analysis or meta-analysis studies should be carried out. There is

scope for further research with regard to the use of mandibular advancement appliances in the treatment of obstructive sleep apnoea.

REFERENCES

1. Mohan, S. M., Gowda, E. M., & Banari, A. S. (2015). Obstructive sleep apnoea (OSA): A prosthodontic perspective. *medical journal armed forces India*, 71(2), S395-eS399.
2. Annapurna, K., Suganya, S., Vasanth, R., & Kumar, P. R. (2014). Prosthodontic Approach to Treat Obstructive Sleep Apnoea. *Ann Med Health Sci Res*, 4(4), 481-486.
3. Practice parameters for the treatment of snoring and obstructive sleep apnoea with oral appliances. (1995). American Sleep Disorders Association. *Sleep*, 18, 511-3.
4. Waller, P. C., & Bhopal, R. S. (1989). Is snoring a cause of vascular disease: An epidemiological review. *Lancet*, 1, 143-6.
5. Catlin, G. (1872). *The Breath of Life*. New York: Wiley.
6. Robin, P. (1934). Glossoptosis due to atresia and hypotrophy of the mandible. *Am j Dis Child*, 48, 541-547.
7. Cartwright, R. D., & Samelson, C. F. (1982). The effects of a nonsurgical treatment for obstructive sleep apnoea. The tongue-retaining device. *JAMA*, 248, 705-9.
8. Schwab, R. J. (2003). Pro: Sleep apnoea is an anatomic disorder. *Am J Respir Crit Care Med*, 168, 270-273.
9. Bratton, D. J., Gaisi, T., & Wons, A. M. (2015). CPAP vs Mandibular Advancement Devices and Blood Pressure in Patients with Obstructive Sleep Apnoea. *JAMA*, 314, 2280-2293.
10. Landry-Schonbeck, A., de Grandmont, P., & Rompre, P. H. (2009). Effect of an adjustable mandibular advancement splint on sleep bruxism: A crossover sleep laboratory study. *Int J Prosthodont*, 22, 251-259.
11. American Academy of Dental Sleep Medicine. (2015). Policy Statement on the Diagnosis and Treatment of OSA. Available online at <http://www.aadsm.org/osapolicystatement.aspx>. Accessed February 11, 2015.
12. Gauthier, L., Almeida, F., & Arcache, J. P. (2012). Position paper by Canadian Academy of Sleep Medicine. *Can Respir J*, 19, 307-309.