

Prosthodontic Management of Obstructive Sleep Apnea Syndrome in a Patient Earlier Treated by Laser Assisted Uvulopalatopharyngoplasty: A Case Report

Kashinath C Arabbi¹ Vikas B Kamble^{2*} Raviraj G. Desai³ Mukesh Kumar⁴ Preethi. R⁵ Swaralipi Datta Roy⁶

¹Reader, Department of Prosthodontics, Crown and Bridge, P.M.N.M Dental College & Hospital, Bagalkot, Karnataka, India.

²Professor and Head, Department of Prosthodontics, Crown and Bridge, P.M.N.M Dental College & Hospital, Bagalkot, Karnataka, India.

³Professor, Department of Prosthodontics, Crown and Bridge, P.M.N.M Dental College & Hospital, Bagalkot, Karnataka, India.

⁴Senior Resident, Department of Dentistry, S. K. M. C. H, Muzaffarpur, Bihar, India.

⁵PG Student, Department of Prosthodontics, Crown and Bridge, P.M.N.M Dental College & Hospital, Bagalkot, Karnataka, India.

⁶PG Student, Department of Prosthodontics, Crown and Bridge, P.M.N.M Dental College & Hospital, Bagalkot, Karnataka, India.

ABSTRACT

Background: Obstructive sleep apnea (OSA) is identified by cessation of airflow with partial or complete obstruction of upper air way leading to dropping in arterial oxygen saturation by 2 to 4 %. Depending upon severity of disorder the treatment of the OSA varies from conservative therapy to invasive surgical procedures. Laser assisted uvulopalatopharyngoplasty is comparatively less invasive and well tolerated by the patient. In case of mild to moderate OSA, behaviour modification and intraoral prosthesis are the preferred treatment modalities. Intraoral prosthesis positions the tongue and mandible at an increased vertical and protrusive position and thus minimizes the possibility of airway obstruction. In this article the technique of fabrication of intra oral prosthesis i.e. mandibular advancement prosthesis for the management of obstructive sleep apnea syndrome in a patient earlier treated by laser assisted uvulopalatopharyngoplasty is described.

Keywords: Obstructive sleep apnea syndrome, laser assisted uvulopalatopharyngoplasty, mandibular advancement prosthesis.

INTRODUCTION

Sleep apnea is one of the most prevalent sleep disorders. Gastaut¹ described the sleep apnea syndrome as daytime sleepiness, hypoventilation and upper airway obstructions associated with sleep disorders and apnea periods. Apnea is a cessation of airflow lasting for at least 10 seconds. Hypopnea is a 50% reduction in airflow for 10 seconds or more and is usually associated with a fall in oxygen saturation. Sleep apneas are classified as obstructive, central and mixed.² Obstructive sleep apnea (OSA) is the most common type. It is classified on the basis of the patient's AHI index into three categories, mild, moderate and severe.³ The severity of the OSA determines the treatment

modality. Mild to moderate OSA patients are treated by less invasive option like behavior modification or placement of appropriate oral prosthesis. The moderate to severe OSA patients are treated with continuous positive airway pressure and surgery. Amongst the various surgical treatment modalities, laser assisted uvulopalatopharyngoplasty is less invasive and well tolerated by the patients. However, Edmund AP et al¹ stated that the role of uvulopalatopharyngoplasty in the treatment of OSA remains poorly defined. This case report describes the prosthodontic management of obstructive sleep apnea syndrome in a patient earlier treated by laser assisted uvulopalatopharyngoplasty by fabrication of mandibular advancement prosthesis.

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*Correspondence Dr. Vikas B Kamble.

Department of Prosthodontics, Crown and Bridge, P.M.N.M Dental College & Hospital, Bagalkot, Karnataka, India.

Email: drvikaskamble2002@yahoo.co.in



Fig 1: Patient with obstructive sleep apnea syndrome.



Fig 2: Upper and lower impressions made with polyvinylsiloxane.



Fig 3: Undercut of master cast blocked out.



Fig 4: Intra occlusal with increased vertical and protrusive bite recorded.

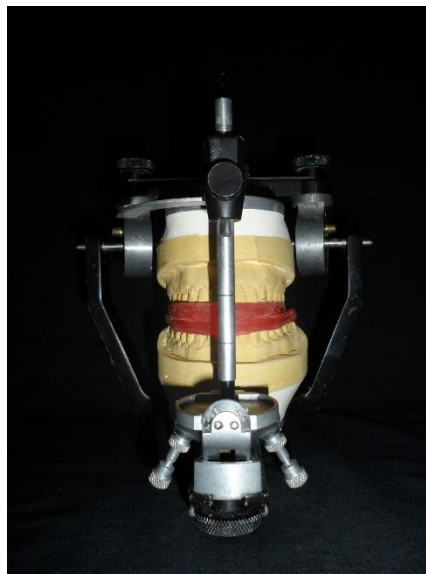


Fig 5: Casts mounted on semi adjustable articulator using the bite.



Fig 6: Upper and lower wax rims with smooth and flat occluding surfaces.



Fig 7: Sleep apnea prosthesis: Extraoral view.



Fig 8: Sleep apnea prosthesis: Intraoral view.

CASE PRESENTATION

A 45 year old male patient reported to the Department of Prosthodontics and Crown & Bridge with the complaint of snoring and disturbed sleep. He also complained of tired feeling and sleepiness during day time. (Fig 1) History revealed that the patient's condition was diagnosed as obstructive sleep apnea syndrome before 2 years. A polysomnography (sleep study) and oximetry study was done and laser assisted uvulopalatopharyngoplasty was performed. After the surgery, the patient's condition was improved. Recently the patient complained of redevelopment of snoring and disturbed sleep. Patient had good general health and gave no history of allergies, nasal congestion, alcohol consumption, smoking and sedatives. Dental examination revealed no malocclusion, good periodontal status, no tooth mobility, no parafunctional habits and adequate overjet and overbite. No abnormalities were detected in temporomandibular joints. Patient did not want another surgical procedure and wished to have a conservative treatment modality. As it was mild OSA, management by fabrication of mandibular advancement sleep apnea prosthesis was planned. Treatment plan was explained to the patient and written consent was obtained.

TECHNIQUE

1. Light body polyvinyl siloxane impression material (Aquasil LV. DENTSPLY India lot no. 28836) was used to make maxillary and mandibular impressions which were poured using type III dental stone (Gold stone, Asian

Chemical, Rajkot, Gujarat, India; batch no. 2468/414) for fabrication of master casts. (Fig 2)

2. Block out wax was used to block out the maxillary and mandibular master cast and by using irreversible hydrocolloid impression material (Imprint, Dental Products of India; batch no. 51614) the casts were duplicated. (Fig 3)
3. With an increased vertical and protrusive jaw relation, the wax interocclusal record was made. With the vertical opening of 12 mm, mandible was protruded till incisal edge to edge relation was achieved. (Fig 4)
4. The semi-adjustable articulator (Hanau Widevue. Made in USA) was used for mounting of the master casts and cross mounting of the duplicate casts using the wax interocclusal record. (Fig 5)
5. On the duplicate mounted casts A layer of separating medium (Cold mould seal, Dental products of India, Mumbai lot no. 3661) was applied and modeling wax was adapted on the surfaces of maxillary and mandibular casts such that the wax should overlap the incisal edges and the buccal surfaces by 3mm and extend onto the soft tissue palatolingually. At the level approximately half the intermaxillary space, the occluding surfaces were made smooth and flat. To facilitate the joining of two surfaces after processing between the maxillary and mandibular surfaces 1mm separation was maintained. (Fig 6)
6. Using type 3 dental stone (Gold stone, Asian Chemical, Rajkot, Gujarat, India; batch no. 2468/414) the wax patterns were invested in the flask after removing them from the duplicated cast.
7. Dewaxing was done and clear heat cured acrylic resin (Dental Products of India, Mumbai batch no. 366/255) was packed in the mold according to manufacturer's instructions, for polymerization.
8. The external surfaces were finished and polished after dewaxing and before joining the portions, they were fitted on master casts and intraorally.
9. Clearself-cure resin (Dental Products of India, Mumbai Batch No-4239) was used for joining of the maxillary and mandibular portions on the

prosthesis on articulator . For oral ventilation an anterior orifice was created.(Fig 7)

10. The disinfection of the sleep apnea prosthesis was done and inserted in patient's mouth and the patient was given instructions about its use and maintenance.(Fig8)

FOLLOW UP

Follow up of the patient was done on day 1 and day 7 and it was found that the stability, retention and comfort of the prosthesis was adequate. The patient had no complaints and was satisfied with the fit and comfort of the prosthesis . Followup after 2 months revealed that there was remarkable decrease in snoring and apneic episodes.

DISCUSSION

Obstructive sleep apnea occurs due to reduction in the diameter of the oropharynx because of reduced tone of the pharyngeal dilating muscles or when patient sleeps in the supine position, the muscle relaxation or force of gravity causing the base of tongue to approach the posterior wall of the pharynx. Because of the reduction in the diameter of the upper airway, the airflow will reduce causing increase in the speed of airflow to maintain the required oxygen supply to the lungs. This increase in airflow velocity causes vibration of soft tissues, which produces snoring. At the severe end of the spectrum, the pharyngeal airway of the sleeping patient repeatedly collapses and obstructs completely causing the patient to arouse from sleep. Arousals increase the tone of the pharyngeal dilating muscles, allowing unobstructed breathing and rapid return of arterial oxygen saturation to normal.

The use of intraoral prosthesis are recommended to treat primary snoring and mild to moderate obstructive sleep apnea. Moreover, these appliances offer an alternative that may be attractive for OSA patients dissatisfied with other therapies or unwilling to accept more complex interventions. Numerous appliances like mandibular repositioning or advancement devices, tongue repositioning or retaining devices, soft-palate lifters, tongue trainers and combination of oral appliance and continuous positive airway are used to treat OSA.⁴

Mandibular advancement devices consists of form fitting trays that fit over the maxillary and mandibular teeth and they may be fixed position, with no allowance for adjustment for advancement or retrusion of mandible or may be adjustable.⁵The mandibular advancement appliances modifies the position of the upper airway structures thus enlarging the oropharynx and also reduces its collapsibility .It also increases the muscle tone of pharyngeal and genioglossus muscle.⁶ Ariga Padma³stated that intra oral prosthesis improve the blood oxygen saturation levels as they relieve apnea in 20-25% of patients. According to Ka zuya Yoshida⁷ even the masticatory and tongue muscles were activated by intra oral prosthesis preventing the upper respiratory airway from collapsing.The main advantage of intra oral prosthesis are that they are non invasive ,inexpensive , worn only during sleep, can be carried anywhere by patients and have good patient compliance.

CONCLUSION

In case of mild or moderate OSA, mandibular advancement prosthesis is one of the non-invasive, inexpensive and one of the conservative treatment modality. It helps to minimize or prevent the airway collapse by maintaining the mandible and tongue in protrusive position during sleep. It also improves blood oxygen saturation, increases the muscle tone and reduces its collapsibility.

CONFLICT OF INTEREST

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

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