

Palatal Lift Prosthesis for Velopharyngeal Incompetence: A Case Report

Mirna Garhnayak¹, Lokanath Garhnayak², Kajal Kiran Sahoo³

¹Professor, Department of Prosthodontics, Institute of Dental Sciences, Siksha 'O' Anusandhan (Deemed to be University), Bhubaneswar, Odisha, India, ²Associate Professor, Department of Prosthodontics, SCB Dental College & Hospital, Cuttack, Odisha, India, ³Tutor, Department of Prosthodontics, Institute of Dental Sciences, Siksha 'O' Anusandhan (Deemed to be University), Bhubaneswar, Odisha, India

Abstract

Velopharyngeal incompetence often distorts the voice quality making it difficult for the listener to comprehend. A cost-effective treatment approach for this is palatal lift prosthesis. This prosthesis enables the incompetent soft palate to approximate with the posterior pharyngeal wall. As a result articulation of speech is improved.

Keywords: Palatal lift appliance, velopharyngeal incompetence, speech.

Introduction

The velopharyngeal mechanism plays a crucial role in the clarity and acceptability of speech.¹ It involves a sphincter, comprising the lateral pharyngeal walls, posteriorpharyngeal wall, and the soft palate (velum).² The contracture of the apparatus principally controls the oro-nasal sound pressure and amount of airflow in speech. Dysfunction of this mechanism due to congenital craniofacial syndrome, head and neck cancer, neurogenic injury, velopharyngeal insufficiency, or velopharyngeal incompetence may result in compromised voice quality.³ It may be attributed to nasal air emission, reduced oral pressure, impaired articulation (weak consonants), and hypernasality (Figure 1).³

Though surgical correction of velopharyngeal dysfunction with a pharyngeal flap or pharyngoplasty is preferred, it may not be possible in a patient with a cardiovascular or neurological problem.⁴ Such cases can

be treated with velopharyngeal or palatal lift prosthesis (PLP) in combination with speech therapy.^{5,6}

The palatal lift prosthesis was originally designed by Gibbons and Bloomer to uplift the neurologically weakened soft plate to a normal level. The aim was to decrease the size of palatopharyngeal opening during consonant sound production. This, in turn, improved the resonance and decreased nasal intonation of speech.⁷ Subsequently, the velar lamina portion of the prosthesis has been made movable using a hinge, orthodontic wire, wire spring, or a generic button attached to a single connecting wire. This facilitated the movement of velar lamina inferiorly-superiorly.^{8,9} This clinical case report focus on the stepwise fabrication of a palatal lift prosthesis for a patient with hypernasal speech.

Case Report: A 20-year-old male patient reported to the clinic with a chief complaint of nasal intonation in his speech since childhood. The speech of the patient was dysarthric. Intraoral examination revealed a normal velopharyngeal structure with a flaccid soft palate (Fig. 2). Velopharyngeal orifice closure was inadequate due to impaired movement of the soft palate during speech and swallowing. Both the maxillary and mandibular arch were completely dentulous with all teeth in good condition. So it was decided to treat the patient with a combination of palatal lift prosthesis and speech therapy. Counseling of the patient was done and consent taken for the same.

Corresponding Author

Mirna Garhnayak

Professor, Department of Prosthodontics, Institute of Dental Sciences, Siksha 'O' Anusandhan (Deemed to be University), Bhubaneswar, Odisha, India
e-mail: mirnagarhnayak@gmail.com

Procedure: The procedure was initiated with primary impressions of the upper arch using irreversible hydrocolloid (Zelgan, Dentsply, Constance, Germany) and working cast fabrication. Before this, the stock tray was modified with impression compound (Pinnacle, DPI, Mumbai, India) to cover soft palate posteriorly.

The PLP used for the patient had two parts: an anterior denture base for retention of the prosthesis and a posterior velar lamina to uplift the soft palate. Initially, the denture base portion with four pin head clasp and two C clasps was fabricated using heat cure acrylic resin (DPI heat Cure, DPI, Mumbai, India). The posterior extension of the denture base was kept up to the junction of the hard and soft palate.

For the velar lamina portion of the prosthesis, a segment of 21-gauge stainless steel orthodontic wire (3M Unitek, Monrovia, CA) was adapted in the form of a loop on the master cast. The loop was attached to the posterior portion of the denture base and adjusted in the patient's mouth, till the soft palate is slightly elevated. Due care was taken to avoid gag reflex. The gradual uplifting of the soft palate was done by molding the loop with a green stick modeling compound. Molding was done by asking the patient to breathe through the nose and pronounce plosive sounds like 'b' and 'p'. These

sounds require to increase intra-oral pressure and aid in decreasing hypernasality. The procedure was repeated, till the soft palate came in light contact with the posterior pharyngeal wall (Fig.3).

The efficacy of the molded prosthesis was assessed by asking the patient to blow out air, with the mouth being closed. Once air outflow through the nostril was greatly reduced, a satisfactory lift of the soft palate was assumed to be achieved. Then the velar lamina portion of the prosthesis was relined by zinc oxide eugenol impression material, which was subsequently replaced with heat cure acrylic resin (Fig.4). Insertion of the final prosthesis was done after proper finishing and polishing to ensure smooth and round border (Fig.5). The patient was advised to wear the prosthesis consistently except during sleep. Follow up of the patient was done in a weekly interval for a period of 1 month.

The speech therapy session was given to the patient by a speech therapist throughout the procedure. Audiometric analysis of the patient was performed periodically in the Department of ENT using the Temple Street Scale. After a post-insertion period of 3 months, the speech pattern was found to be improved with decreased nasal intonation clarity of speech.

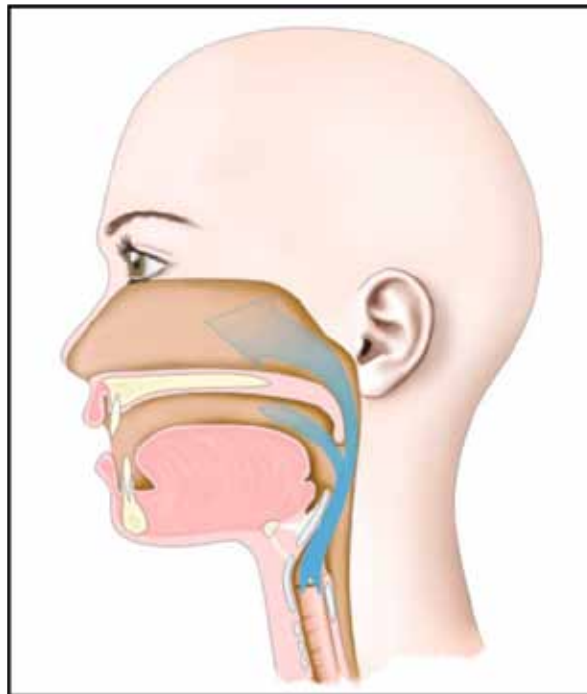


Figure 1. Mechanism of nasal air leak in velopharyngeal incompetence (Courtesy: The Role of the Speech Pathologist in the Care of the Patient with Cleft Palate Helen Extence, Siwan Cassidy, in Maxillofacial Surgery (Third Edition), 2017)



Figure 2. Pre-treatment flaccid soft palate

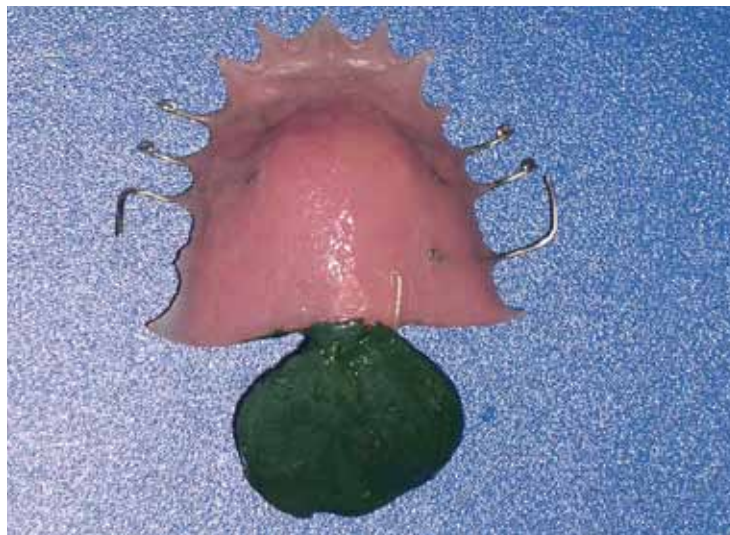


Figure 3. The molded palatal lift prosthesis



Figure 4. The molded palatal lift prosthesis with relining



Figure 5. The palatal lift appliance in position

Discussion

A palatal lift prosthesis was preferred in this patient as, the velopharyngeal closure was compromised, despite its normal structures. The soft palate was class II type, flaccid, and having inadequate movement vertically.^{10,11}

This prosthesis uplifts the velum in superior-posterior direction to the level of normal palate closure, aligning with the palatal plane.¹² Consequently, pharyngeal muscles are activated, decreasing the size of the palate-pharyngeal opening and the nasal intonation.¹³ So clarity of speech is improved.¹⁴ Even prolonged use of PLP might also reduce the disuse atrophy of soft palate and enhance its function.¹⁵ But the sudden and strong lifting of the soft palate is not recommended, as it might cause soreness. An interim PLP was planned for the patient, as he was a first time user. As it was made with PMMA, the palatal extension portion was gradually adjusted according to the patient's need. This resulted in better patient compliance. Once the patient is motivated and accustomed to the interim prosthesis, a definitive prosthesis can be planned for him.

The clinical efficiency of the prosthesis was assessed for nasal intonation, resonance, articulation, and clarity of speech in each visit. They were gradually found to be improved with the use of prosthesis. Effectiveness of prosthesis can also be assessed using the lateral

cephalograms, video fluoroscopy, naso endoscopy, nasometric analysis, and aerodynamics.^{16,17} Palatal lift prosthesis alone is effective in mild velopharyngeal insufficiency case. But in the long-standing case and repaired congenital cleft palate case require a combination of speech therapy along with palatal lift prosthesis.¹⁰ Patient compliance is crucial for the success of PLP. They often complain of dysphagia and lack of immediate improvement in speech.¹⁸

Conclusion

A team approach comprising surgeon, prosthodontist, and speech therapist are beneficial in the management of a patient with velopharyngeal insufficiency. Depending on the severity of the case, palatal lift prosthesis should be used alone or in combination with speech therapy. A definitive prosthesis should be delayed until the patient is comfortable with the interim prosthesis.

Conflict of Interests: None

Ethical Permission: Approved

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