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Case Report

A comprehensive prosthetic management of a velopharyngeal defect: A case report

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Abstract

Velopharyngeal dysfunction (VPD), resulting from soft and hard palate anomalies, can significantly compromise speech intelligibility, swallowing, and overall oronasal function. This report highlights the prosthodontic management of a patient with a congenital velopharyngeal insufficiency and a completely edentulous maxillary arch. The patient presented with nasal regurgitation and hypernasality, contraindicating surgical correction due to her medical condition and age. A pharyngeal obturator with a hollow bulb design was planned for the maxillary arch to restore velopharyngeal closure during function. For the partially dentate mandibular arch with root canal-treated abutments, fixed prosthodontic rehabilitation was executed to enhance occlusion and support. The obturator was functionally contoured using dynamic impression techniques to achieve optimal closure without impeding muscle movement. The prosthetic approach aimed to establish effective separation between the oropharynx and nasopharynx during speech and swallowing, reduce hypernasality, and prevent nasal regurgitation. This case emphasizes the importance of individualized prosthetic planning in managing VPD when surgical options are not feasible. Proper impression techniques and periodic adjustments are vital for long-term success. Prosthodontic rehabilitation, when tailored with anatomical and functional considerations, remains a reliable modality in restoring essential oral and pharyngeal functions, significantly improving the patient's quality of life.

Keywords: Velopharyngeal insufficiency, Obturator prosthesis, Cleft palate, Prosthodontic management, Hollow bulb, Speech rehabilitation, Non-surgical approach.

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1. Introduction

The human palate, comprising both the hard and soft palate, serves a critical functional and structural role in the oronasal complex. The hard palate forms the anterior bony partition between the oral and nasal cavities, offering foundational support for mastication and phonation. Posteriorly, the soft palate—a muscular and mucous membrane structure—contributes dynamically to the function of the velopharyngeal (VP) mechanism.[1] Together with the lateral and posterior pharyngeal walls, the soft palate forms a three-dimensional muscular valve known as the velopharyngeal sphincter, essential for competent speech, deglutition, respiration, and prevention of nasal regurgitation. Velopharyngeal dysfunction (VPD) arises when there is either a deficiency of palatal structure—classified as velopharyngeal insufficiency—or a failure in neuromuscular coordination—termed velopharyngeal incompetence. Cleft palate, whether isolated or syndromic, often presents as a complex combination of both. In such cases, the inability to achieve effective closure of the VP port significantly compromises speech intelligibility, resonance, and swallowing efficiency.[2]

While surgical correction remains the treatment of choice in early childhood, there are numerous clinical scenarios where surgical intervention is either contraindicated or fails to achieve optimal functional outcomes. In these instances, prosthodontic rehabilitation plays a pivotal role in re-establishing palatopharyngeal competence.[1,3] The use of prosthetic devices such as palatal lift prostheses and pharyngeal obturators is well-documented, with the later indicated primarily for structural deficiencies.

The pharyngeal obturator is a removable prosthesis designed with a posterior extension that effectively separates the nasopharynx from the oropharynx during function. It

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serves as an artificial continuation of the soft palate, facilitating VP closure during phonation and swallowing. In edentulous or partially dentate patients with combined hard and soft palatal defects, modifications such as hollow bulb obturators may enhance retention and patient comfort.[1,2] This article presents the prosthodontic management of a 63-year-old patient with congenital velopharyngeal insufficiency, treated comprehensively with a definitive complete denture incorporating a pharyngeal obturator irt maxillary arch and fixed rehabilitation in relation to mandibular arch. The case underscores the critical role of maxillofacial prosthodontics in the functional rehabilitation of patients with complex palatal defects when surgical options are limited or contraindicated.

2. Case Report

A 63-year-old female patient, reported to the Department of Prosthodontics, with a chief complaints of nasal regurgitation during swallowing, hypernasal speech, and difficulty in phonation. Clinical examination (**Figure 1** & **2**) revealed a congenital posterior palatal defect involving the posteriorly extending from the posterior aspect of the hard palate into the entire soft palate, consistent with a congenital cleft. The boundaries included intact lateral palatal shelves with a midline defect, resulting in an open communication with the nasopharyngeal space. Additionally, a comprehensive oral evaluation revealed a completely edentulous maxilla and a partially edentulous mandible with remaining teeth in relation to 36, 31, 41, 46, and 47.

Given her age and contraindications for surgical intervention, a prosthetic rehabilitation plan was formulated using a definitive maxillary obturator prosthesis with a hollow bulb extension to restore velopharyngeal function.

Figure 1: Preoperative maxilla

2.1. Maxillary prosthesis construction

The defect was initially blocked with gauze to prevent impression material from entering the nasal cavity. A primary impression was made with irreversible hydrocolloid (alginate), and the cast was poured using Type III dental stone. A custom tray was fabricated using autopolymerizing acrylic resin, extending into the soft palatal defect. Border molding of the tray was done with low-fusing green stick compound, while the patient performed functional movements such as swallowing and phonation to capture the dynamic anatomy of the velopharyngeal region. A secondary impression was made using light-body addition silicone for improved accuracy. The final cast was poured using Type III dental stone. An occlusal rim was constructed, and maxillomandibular jaw relations were recorded and facebow transfer was performed (**Figure 3**). Teeth arrangement followed, and a wax try-in was conducted to assess occlusion, esthetics, and phonetics.

Figure 2: Preoperative mandible

Figure 3: Face bow transfer

Figure 4: Hollow bulb obturator demonstrated floating in water

Figure 5: Definitive prosthesis

To fabricate a hollow bulb obturator (**Figure 4**) and reduce the prosthesis weight, the defect area was designed with a two-stage packing method using salt as a spacer, later removed after processing. The prosthesis was processed using heat-cure acrylic resin. The patient was instructed to repeat velar phonemes (e.g., /k/, /g/, /ŋ/), tilting of head and performed jaw movements to evaluate retention and stability. Post-insertion, the patient was advised to practice reading aloud to self-monitor speech improvement.

2.2. Mandibular prosthetic rehabilitation

Following maxillary rehabilitation with a velopharyngeal obturator, the treatment plan then addressed to the mandibular arch, which presented with multiple endodontically treated teeth. These teeth exhibited varying degrees of structural compromise, necessitating a full-coverage fixed prosthetic solution to restore function, occlusion, and esthetics.

A preliminary impression was made using irreversible hydrocolloid (alginate) and poured with Type III dental stone to obtain a diagnostic cast. A diagnostic wax-up was performed to evaluate the vertical dimension of occlusion, esthetics, and functional parameters. It served as a blueprint for prosthetic planning and fabrication of provisional restorations. Tooth preparations were carried out for conservative full-coverage crowns, ensuring proper taper, rounded line angles, and sufficient occlusogingival height for retention and resistance.

A definitive impression was made using a two-stage putty-wash technique with polyvinyl siloxane impression material, ensuring high accuracy and detail reproduction. The impressions were disinfected and poured with Type IV die stone to fabricate the master cast. Maxillomandibular relationship was recorded using the complete denture, and a facebow transfer was performed to mount the maxillary cast on a semi-adjustable articulator. The mandibular cast was related using a centric relation record with bite registration material, enabling precise articulation and occlusal analysis. Provisional restorations were fabricated using an indirect technique based on the diagnostic wax-up. Polymethyl methacrylate resin was relined intraorally (indirect-direct technique), finished, polished, and cemented with IRM temporary cement. The patient was recalled after 48 hours and 1 week for evaluation of esthetics, phonetics, occlusion, and tissue response.

Metal frameworks were tried intraorally to assess fit and marginal integrity. A bisque trial was done to confirm occlusion, contour, and esthetics. Final restorations were cemented using glass ionomer cement under isolation (**Figure 5**)

2.3. Post-insertion protocol

The patient was recalled after two weeks. Adjustments to the obturator's posterior extension were made to optimize velopharyngeal closure. At the 6-months follow-up, the patient demonstrated marked improvement in speech intelligibility, absence of nasal regurgitation, and significant enhancement in quality of life.

3. Discussion

Prosthetic rehabilitation of velopharyngeal insufficiency (VPI) remains a complex yet rewarding task in maxillofacial prosthodontics, demanding a nuanced approach tailored to the individual anatomical and functional challenges presented by each patient. In this case, a 63-year-old female patient with a congenital defect of the soft palate and multiple missing teeth underwent comprehensive oral rehabilitation. The prosthetic objectives were to restore speech and deglutition functions by achieving effective velopharyngeal closure and to simultaneously rehabilitate the mandibular arch for mastication and esthetics.

Velopharyngeal defects vary widely in their presentation, making the design and function of obturator prostheses highly individualized. The primary purpose of such prostheses is to act as a dynamic interface that compensates for the loss of soft palatal tissue, thereby minimizing nasal air emission and hypernasality during speech, while also preventing nasal regurgitation of fluids and food during swallowing. These goals were central to the maxillary rehabilitation in this patient, where a pharyngeal obturator with a hollow bulb design was constructed. This approach reduced prosthetic weight and improved retention, especially critical in elderly edentulous patients with compromised soft tissue support. The prosthesis was carefully designed to extend approximately 2–3 mm short of the posterior pharyngeal wall to avoid impeding the function of residual velopharyngeal musculature, as overextension may result in discomfort and increased hypernasality.[3,4] Functional impression techniques were employed to ensure the prosthesis adapted accurately to the dynamic soft tissue movements of the pharyngeal region. The incorporation of speech therapy through guided reading and phonation exercises contributed to the patient's adaptation and improved articulation, supporting previous findings that patient motivation and consistent follow-up are vital for success.[5,6]

Several previously published reports have demonstrated successful obturation of palatal defects using hollow bulb prostheses. For instance reported improved speech clarity and

nasalance outcomes in a patient with a congenital palatal defect managed with a hollow obturator and speech training.[7] The present case builds upon these outcomes by integrating simultaneous mandibular rehabilitation, thus addressing both phonetic and masticatory deficits within a unified treatment protocol.

Simultaneous rehabilitation of the mandibular arch was executed. The patient's mandibular teeth, which had undergone endodontic therapy, were restored with fixed partial dentures following a structured diagnostic wax-up and temporization. This stepwise prosthodontic protocol ensured proper occlusal balance with the maxillary obturator, contributing to overall masticatory efficiency. Establishing harmonious occlusion between the mandibular prosthesis and the maxillary obturator was especially critical to the stability and retention of the latter, as any occlusal discrepancies could negatively impact phonetics and prosthesis support. While successfully documented the prosthodontic management of a velopharyngeal defect using a maxillary obturator in a partially edentulous patient,[8] the present case contributes a further dimension by including a coordinated mandibular arch rehabilitation with fixed prostheses. This comprehensive approach ensured occlusal harmony and bilateral support, which may offer enhanced functional outcomes compared to maxillary-focused rehabilitation alone.

The collective management strategy emphasized the importance of integrating prosthetic rehabilitation of both arches in cases of VPI, particularly in elderly patients. The success of this rehabilitation lies not only in the design and fit of the prosthesis but also in the patient's capacity to adapt to the prosthesis functionally and psychologically.[9] The present case aligns with and extends this perspective by demonstrating that coordinated full-mouth prosthetic planning, particularly when combined with speech therapy, can enhance patient adaptation, compliance, and satisfaction.

The limitations of obturator prostheses must be clearly communicated, especially the fact that these prostheses do not restore lost musculature but rather compensate for its functional loss. However, with methodical clinical execution, regular monitoring, and patient cooperation, these prostheses can significantly restore oropharyngeal competence and improve quality of life.[10,11]

4. Conclusion

The successful prosthetic rehabilitation of velopharyngeal insufficiency demands a comprehensive understanding of anatomical and functional considerations unique to each clinical scenario. In this case, the integration of a maxillary pharyngeal obturator with definitive mandibular prosthodontic restoration resulted in marked improvement in speech, swallowing, and oronasal separation. Accurate functional impression techniques, systematic follow-up and guided phonetic adaptation were key factors in the favorable outcome. This case is limited by its single-patient design, short follow-up duration, and lack of objective outcome measures such as nasometry or videofluoroscopy. These limitations underscore the need for standardized assessment tools and longitudinal studies to better evaluate prosthesis stability and functional outcomes in patients with complex velopharyngeal insufficiency.

5. Source of Funding

None.

6. Conflict of Interest

None.

References

1. Chengappa MU, Pradeep N, Sreekumar AV, Priyadarshini MM. Prosthetic Rehabilitation Of Velopharyngeal Defect-A Case Report. *RGUHS J Dent Sci*. 2016;8(2):29–32.
2. Sen UK, Karmakar A, Maji A, Das SL, Das S, Das S, et al. Prosthetic management of velopharyngeal defect. J Indian Dent Assoc. 2016;32(2):17–9.
3. Subtelny JD. A cephalometric study of the growth of the soft palate. *Plast Reconstr Surg*. 1957;19(1):49–62. https://doi.org/10.1097/00006534-195701000-00007.
4. Rahn AO, Boucher CO. Maxillofacial prosthetics: principles and concepts. Philadelphia: W.B. Saunders; 1970:p.164-7.
5. Minsley GE, Warren DW, Hinton VA. Physiologic responses to palatal lift prostheses in palatopharyngeal incompetence. *J Prosthet Dent*. 1986;55(1):20–4.
6. Khan R, Gupta A, Sinha A, Sinha N. Rehabilitation of velopharyngeal insufficiency using palatal lift prosthesis. *J Indian Prosthodont Soc*. 2019;19(2):183–7.
7. Varghese K. Prosthetic Rehabilitation of a Congenital Soft Palate Defect. *J Indian Prosthodont Soc*. 2014;14(Suppl 1):181–6. https://doi.org/10.1007/s13191-012-0225-7
8. Banerjee S, Kumar S, Chakraborty N, Gupta T, Banerjee A. Prosthodontic Rehabilitation of Velopharyngeal Disorders—A Case Series. *J Indian Prosthodont Soc*. 2012;13(3):352–7. https://doi.org/10.1007/s13191-012-0161-6
9. 9. Tuna SH, Pekkan G, Buyukgural B. Rehabilitation of an edentulous cleft lip and palate patient with a soft palate defect using a bar-retained, implant-supported speech-aid prosthesis: a clinical report. *Cleft Palate Craniofac J*. 2009;46(1):97–102. https://doi.org/10.1597/07-216.1.
10. Velopharyngeal function in nonsyndromic cleft palate: relevance of surgical technique, age at repair, and cleft type. *Cleft Palate Craniofac J*. 1998;35(2):95–100. https://doi.org/10.1597/1545-1569_1998_035_0095_vfincp_2.3.co_2.
11. Beumer J, Curtis TA, Firtell DN. axillofacial Rehabilitation: Prosthodontics and Surgical Considerations. The CV Mosby Co., St Louis. 1979:130–56.

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