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Improving post-surgical speech: The impact of speech bulb prosthesis- A case report

Dr. Meshi Longdo[1], Dr Jeldi Kusuma[1], Dr Sangeeta Ahir[1], Rekha Gupta[2], Dr. Shubhra Gill[3]
[1] Department of Prosthodontics, Crown and Bridge, Maulana Azad Institute of Dental Sciences, New Delhi
[2] Professor (SAG) and HOD, Department of Prosthodontics, Crown and Bridge, Maulana Azad institute of Dental Sciences, New Delhi
[3] Professor (SAG), Department of Prosthodontics, Crown and Bridge, Maulana Azad institute of Dental Sciences, New Delhi

Abstract
Speech bulb prosthesis are an important treatment for those who have velopharyngeal insufficiency (VPI), which causes poor speech clarity due to insufficient velopharyngeal closure. The subject matter looks at the design and clinical benefits of speech bulb prosthesis, with a focus on how they improve speech resonance and intelligibility. Successful prosthesis fitting is performed by a multidisciplinary approach that includes speech-language pathologists, prosthodontists, and otolaryngologists. Clinical case studies and empirical data demonstrate the effectiveness of this intervention, emphasizing its major influence on improving communication skills and quality of life for people with VPI.

Keywords: Speech prosthesis, speech bulb prosthesis**,** velopharyngeal dysfunction

Introduction

A person's speech is a unique mode of expression for an individual. The soft palate is the movable posterior part of the palate that marks the start of the oropharynx. Defects of the soft palate cause various problems for patients, such as nasal resonance in voice, food regurgitation, fear of public - speaking, and sometimes lack of confidence [1, 2]. These soft palate defects could be congenital, acquired, or developmental. Cleft palate represents the third most frequently occurring congenital deformity, affecting 1 in 2,000 live births worldwide regardless of race [3]. A known clinical manifestation of the cleft palate can be velopharyngeal dysfunction, which requires treatment due to inadequacy. It requires interdisciplinary and transdisciplinary work between areas of dentistry and speech pathology. It may be the only alternative available to patients who have a poor prognosis for surgical correction of insufficiency [4, 5]. Obturation for velopharyngeal dysfunction aims to restore closure, limit nasal emission during speech, and avoid regurgitation of food and fluids during swallowing. The most popular conservative treatment option is the use of a "speech bulb prosthesis." The purpose of this case report is to describe the fabrication of a speech bulb prosthesis.

Case presentation

A 17-year-old male patient reported to the Department of Prosthodontics, Maulana Azad Institute of Dental Sciences, New Delhi with a chief complaint of nasal regurgitation of fluids. Upon examination, it was noted that he had a congenital soft palate defect, present since birth. Fig 1, Fig 2. Hypernasality of speech was present. A speech aid prosthesis with a speech bulb was planned for the patient since he exhibited symptoms of Velopharyngeal Dysfunction. The entire procedure was explained to the patient and his consent was obtained

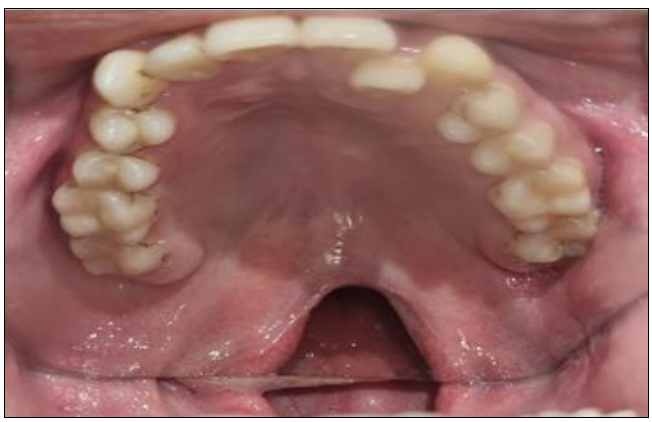


Fig 1: Preoperative stage of defect

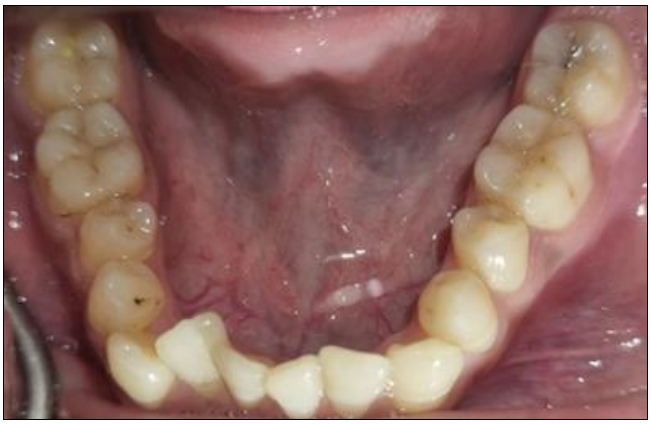


Fig 2: Intra-oral image of the mandibular arch

Procedure

- The soft palatal defect was blocked with a gauze piece and the primary impression of the maxillary arch was made using irreversible hydrocolloid impression material (Flexiprint,waldent)Fig 3
- Impression was poured using Dental plaster (Type II Khalabhai) to obtain a primary cast. After blocking out the area of teeth with wax Modelling modeling wax, a custom tray extending to the defect was fabricated using auto-polymerizing acrylic resin (DPI RR Cold cure) Fig 4
- The area of the defect was functionally molded using low-fusing green stick compound (DPI Pinnacle Tracing Sticks) Fig 5a
- Wax used for blocking the teeth was then removed and the final impression of the defect was obtained using medium-body elastomeric impression material. (Dentsply Reprosil)Fig5b · The final impression was checked for adequate extensions and poured using dental stone (Kalstone Type III).
- A split cast was made
- A stable denture base that extends to the defective area was fabricated in heat-cure acrylic resin.
- The extension of the prosthesis was made just posterior to the intact residual soft palate parallel to the soft tissue in the nasopharynx and a few millimeters short of the adjacent tissues at the maximum level of contraction.
- Functional record of the defect was lined with medium body elastomeric impression material (Dentsply Reprosil).
- The denture base with functional impression was invested.
- Molloplast-B denture relining material was placed in the posterior defect of the cast in the mold chamber in such a manner that the defect was slightly underfilled.
- Over this, heat-cured acrylic resin (DPI Heat Cure) was packed in the dough stage. A long curing cycle was followed for acrylization. Fig 6
- After the curing process, the prosthesis was carefully removed from the cast, finished, and polished.
- The prosthesis was placed in the patient's mouth and evaluated for proper extension.
- The patient was trained for the insertion and removal of the prosthesis.
- Post-insertion instructions were given, and a regular follow-up was advised. Fig 7

Fig 3: Preliminary impression

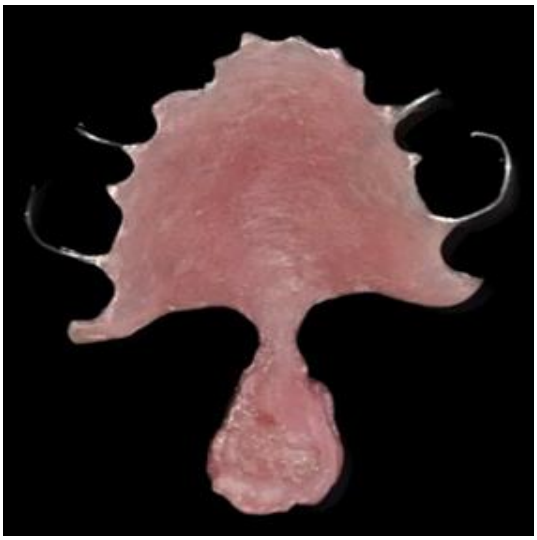
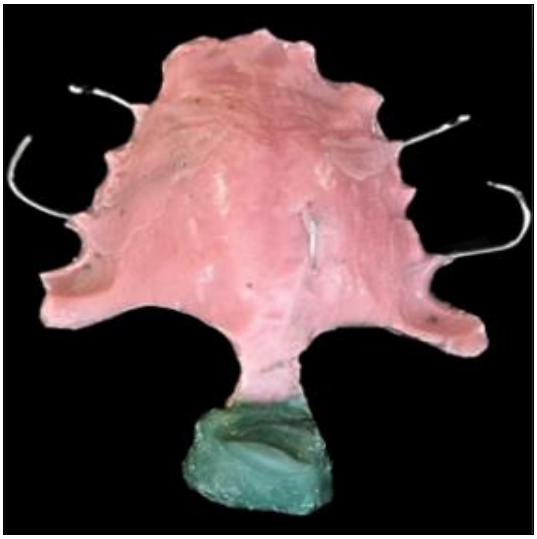


Fig 4: Autopolymerised made with alginate custom tray



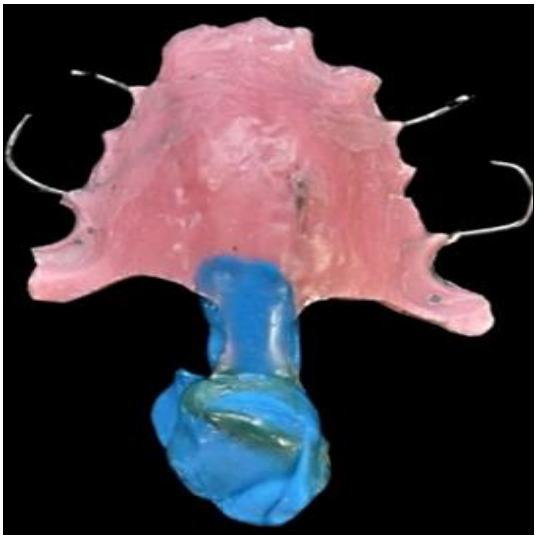


Fig 5: a) Border molding is done with low fusing compound **b)** secondary impression

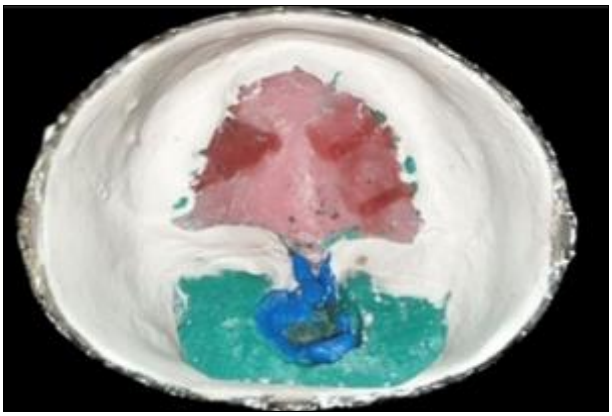


Fig 6: Acrylisation of the prosthesis by heat cure resin

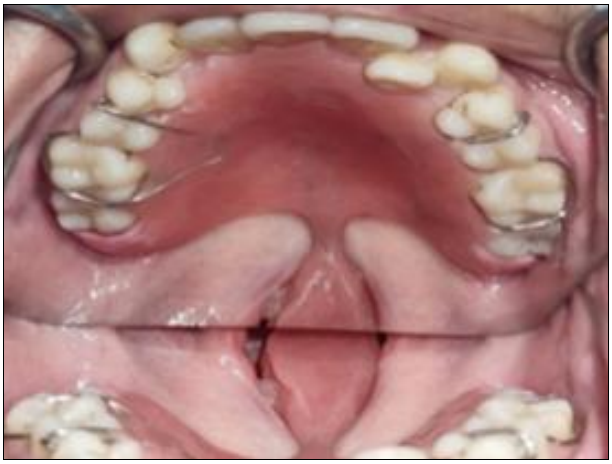


Fig 7: Final insertion of the prosthesis.

Discussion

Palatopharyngeal insufficiency is a condition where the soft palate has an acquired or congenital defect, leading to incomplete closure of the palatopharyngeal sphincter [6].

Defects in the soft palate can affect normal functions such as swallowing and speech. Proper management is necessary for velopharyngeal defects. In cases where surgical intervention is not possible due to systemic conditions, prosthetic rehabilitation should be considered to restore normal functioning [7].

A comprehensive treatment approach for velopharyngeal insufficiency often involves the assessment of articulation problems and incorrect oronasal resonance balance by a speech pathologist. [8]

Rehabilitation can be achieved through surgical or prosthodontic approaches. In cases where the surgically repaired soft palate is deficient in contacting pharyngeal walls during function, a speech-aid prosthesis or speech bulb may be the best choice. [9]

In this patient's case, a speech bulb was selected to help rehabilitate the soft palate. The purpose of using an obturator is to manage or prevent the nasal regurgitation of liquids and food and to enhance the quality of the voice. To improve speech, speech appliances are employed to separate the nasopharynx from the oropharynx. The device can be used in various ways to achieve this objective, including serving as a permanent solution for individuals with significant closure defects, as a stimulus to increase the movements of the pharyngeal walls and palate, or as a temporary aid in evaluating closure adequacy.

The idea of using speech prosthesis to address Velopharyngeal Dysfunction (VPD) in patients with Cleft Lip and Palate (CLP) dates back to as early as 1860 and has been adopted by others since then [10]. The use of a speech bulb obturator to address hypernasality decreased in the nineteenth century but regained popularity in the twentieth century, partly due to the introduction of tools that allowed for direct visualization of the VP mechanism and advancements in surgical procedures.

VPD occurs when a cleft palate is unrepaired or when a surgically repaired soft palate is too short to contact the pharyngeal walls during function. The use of the prosthesis can modify the extent of surgery if necessary. For instance, individuals showing little or no VP movement during endoscopic examination might require significant or complete surgical obstruction of the nasopharyngeal airway to improve speech function. In such cases, if improved muscle or structural function can be induced following the use of a palatal lift prosthesis, the current treatment plan might be substantially altered, leading to a less obstructive surgical procedure being recommended [11].

Patient perspective

The patient was satisfied with the prosthesis. The patient's speech was excellent while wearing the new prosthesis.

Conclusion

- This case describes the effective prosthetic rehabilitation of a patient with a soft palate defect (Veau's class 1).
- The design of the speech bulb obturator followed the basic principles of removable prosthesis construction with careful consideration given to the fabrication of the speech bulb.
- From questioning the patient during pre-treatment, and post-treatment, he was satisfied with the prosthesis and the provision of an obturator has improved his quality of life.

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