

# MANAGEMENT OF VELOPHARYNGEAL DEFECT BY SPEECH AID PROSTHESIS – A CASE REPORT

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**Abstract-Velopharyngeal (VP) insufficiency is a defect of the soft palate which renders the palatopharyngeal sphincter incomplete. In cases where a surgically repaired soft palate is too short to contact the pharyngeal walls during function, speech aid prosthesis or speech bulbs are optimum choices of treatment. This case report elaborates the correction of hypernasality of speech associated with VP insufficiency, by means of speech aid prosthesis. This speech bulb is an extension of heat cure acrylic material into the defect area making a barrier between oral and nasal cavity. This improved the hypernasality, speech, comfort, retention, and overall patient acceptance.**

***IndexTerms-Velopharynx, Velopharyngeal insufficiency, Palatopharyngeal sphincter, Hypernasality of speech, Velopharyngeal closure, Pharyngeal obturator, Hollow bulb obturator.***

## I. INTRODUCTION:

The utmost of palatal disfigurement cases are due to either acquired or congenital. Tumor enucleation, especially in malignancy, is the most common cause of an acquired type of palatal disfigurement; whereas cleft palate is due to developmental anomaly. In a palatal defect case, nasal escapement of food and fluid, and hypernasality of speech become unavoidable. Therefore, swallowing and speech become challenging in daily activity. The soft palate acts as a dynamic barrier between oral and nasal cavity.<sup>1</sup> The soft palate, lateral and posterior pharyngeal walls form the velopharyngeal (VP) closure so that all of them create a three dimensional muscular valve which is known as velopharyngeal sphincter.<sup>2</sup> Velopharynx can be insufficient or incompetent leading to functional disability.<sup>3-6</sup> Velopharyngeal insufficiency may be due to developmental disorder as in cleft lip and palate (CLP) or acquired as in surgical enucleation of palatal tumor.<sup>5,6</sup> In velopharyngeal incompetence even though the velopharynx is anatomically intact, due to neuromuscular disorders velopharyngeal mechanism is not in proper function.<sup>4</sup> VP insufficiency results in air-flow escape and hypernasality.<sup>8</sup> Secondly affect speech articulation. The speech may get distorted, and few words may get substituted or omitted.<sup>5,8</sup> Palatal defect can be repaired by reconstructive surgery and/or a dental prosthesis. Treatment protocol of velopharyngeal dysfunction include surgery in combination with speech therapy.<sup>5</sup> However, as surgical treatment is invasive procedure patient acceptance act as a barrier, hence a pharyngeal obturator is the only prosthetic management for improvement of patient's lifestyle.

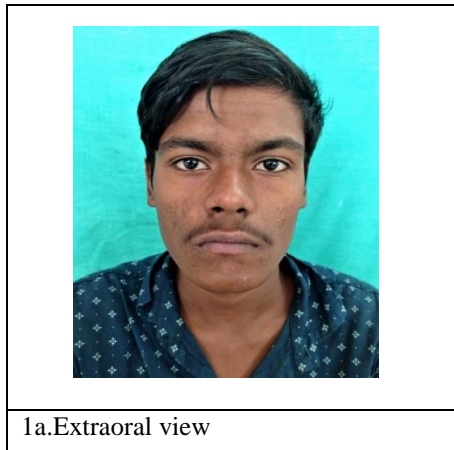
A pharyngeal obturator is a removable maxillary prosthesis which has a posterior extension to separate oropharynx and nasopharynx.<sup>6,8</sup> This obturator prosthesis not only allows adequate closure of palatopharyngeal sphincter but also restores the defects of the soft palate.<sup>6</sup> When plosives consonants such as P,B,T,D are pronounced, a pharyngeal obturator exhibit adequate separation between the oral and nasal cavities.<sup>9</sup> Success of a prosthesis is determined by restoration of speech, proper swallowing, and acceptable appearance.<sup>10</sup> Retention and stability remains the integral feature of prosthesis.<sup>11</sup>

## II. CASE REPORT :

A 18-year-old male patient reported to the Department Prosthodontics And Crown & Bridge, Haldia Institute Of Dental Sciences And Research, West Bengal, India with chief complaint of nasal regurgitation of food and fluids during swallowing, difficulty in speech and defect in the palate.

Besides, the patient needed a partial denture to restore his lost tooth and an obturator which would close his defect and help him for proper mastication and communication.

On examination, it was found that he had a congenital anomaly of the soft palate which was not extended to the hard palate and he had missing 16 and defect was diagnosed as a Veau Class-I cleft palate (Fig1a,1b,1c,1d). The patient was not willing for surgical correction to improve the nasal regurgitation. After taking a thorough medical and dental history, the patient was motivated, educated and prepared psychologically to undergo the procedure of obturator making. A pharyngeal obturator with removable partial denture was planned since the patient had one posterior missing tooth. For increased patient's comfort, it was planned to fabricate a prosthesis with a hollow acrylic bulb obturator followed by speech therapy.



1a.Extraoral view

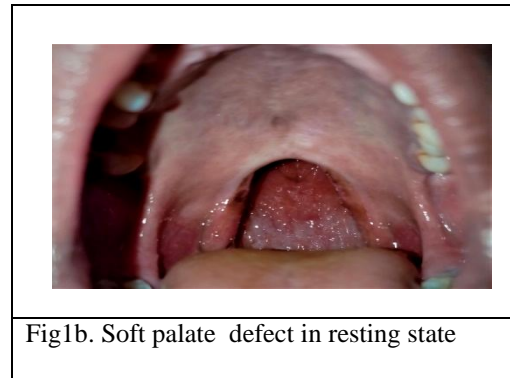


Fig1b. Soft palate defect in resting state

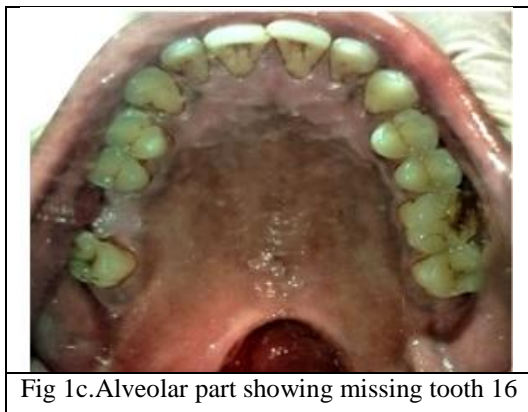


Fig 1c.Alveolar part showing missing tooth 16

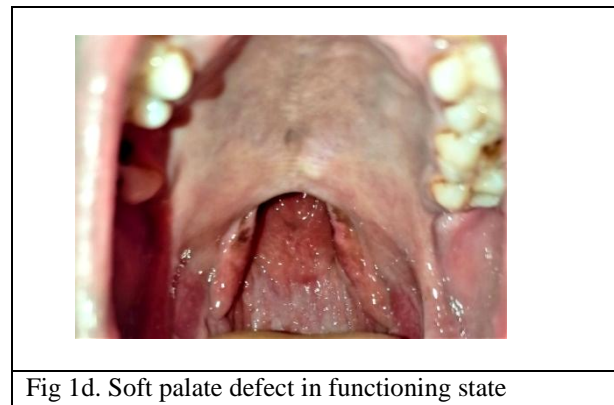


Fig 1d. Soft palate defect in functioning state

A dentulous perforated stock tray was selected for Preliminary impression making procedure. This stock tray was modified with impression compound (Y-Dents Impression Composition), so that the impression compound reached the posterior pharyngeal wall (Fig 2.).

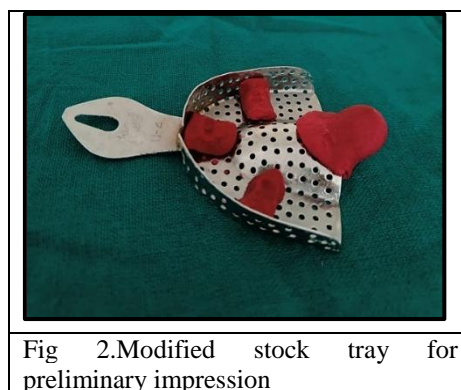


Fig 2.Modified stock tray for preliminary impression

A gauze strip lubricated with petroleum jelly was packed into the defect area prior to impression making to prevent impression material from being forced into the nasal cavity. A preliminary impression was made with irreversible hydrocolloid impression material (Algitex ) using the modified stock tray (Fig 3.). The patient was instructed to move his head side to side in circular manner and extend as far forward as possible and to speak k, g, ng so that remaining palatopharyngeal musculature is activated and would mould the impression.

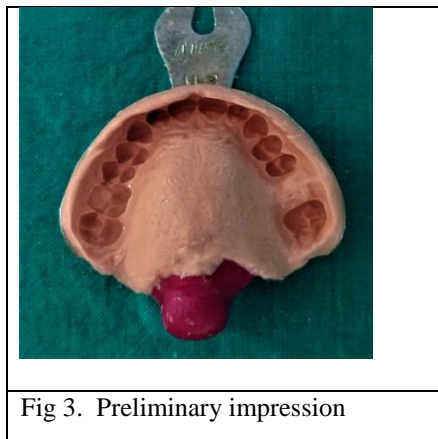


Fig 3. Preliminary impression

The impressions were poured with dental stone( Kalabhai, Type III Stone)to make diagnostic cast (fig 4.). After getting the diagnostic cast two sheet of modelling wax (Hindustan Modelling Wax)was applied on maxillary cast as a spacer (fig 5.).



Fig4. Diagnostic cast

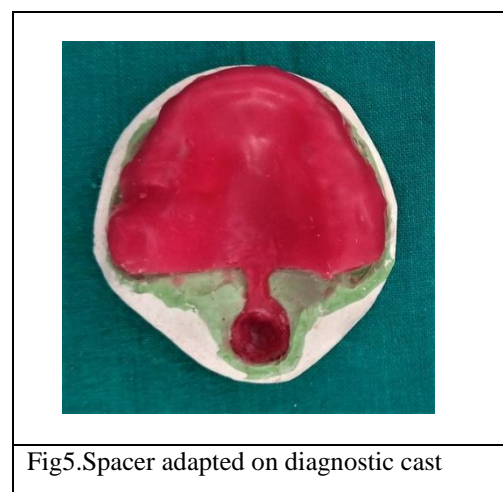


Fig5.Spacer adapted on diagnostic cast

The undercuts were blocked and custom tray withpharyngeal extension(Fig 6) was made of auto-polymerising resin (DPI RR Cold Cure Acrylic Repair Material). Thereafter, functional impression of the soft palate defect area was made using green modelling plastic impression compound (DPI Pinnacle Tracing Sticks). The above-mentioned movements were repeated several times until the patient was able to drink water and breathe comfortably. The final impression (Fig 7) was made with polyvinyl siloxane elastomers (Reprosil, Dentsply, USA).

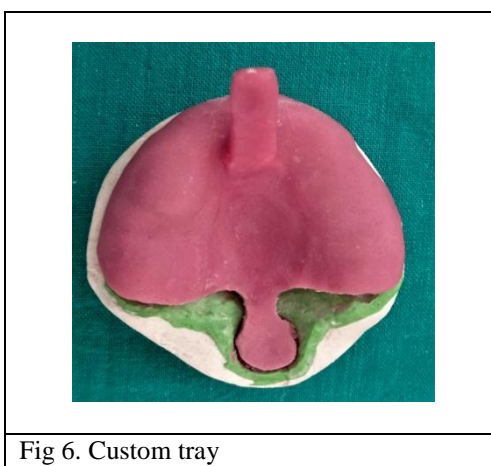


Fig 6. Custom tray

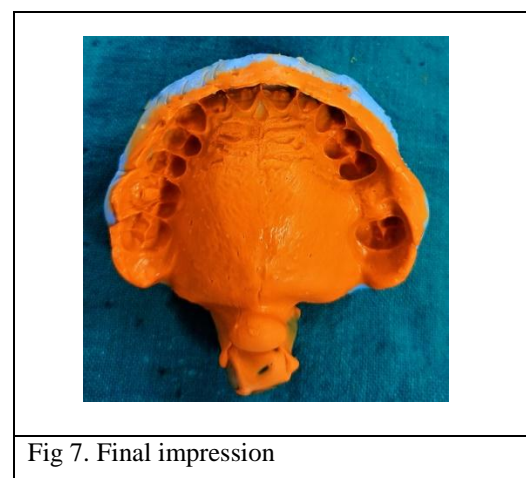


Fig 7. Final impression

The impression was poured with dental stone (Kalabhai, Type III Stone )to obtain master cast. Thereafter,the master cast of maxillary arch and mandibular arch is articulated using 3-pin articulator. missing 16 is replaced using acrylic tooth(Prestorock ).Two C-claspsare used around 15 and 17,one C-clasp is used around 27 and one Adams clasp is used around 25 for retentive

purpose. Lost salt technique was used to make the obturator hollow. Flasking and dewaxing were done and mould was packed with heat cured resin ( DPI Heat Cure Denture Base Material ). Pharyngeal extension part was packed in two parts. Initially heat cured resin was packed in palatal coverage area and lower part of defect then table salt placed over the heat cured resin and another layer of heat cured resin applied over the salt. Thereafter, flask is closed and cured. Deflasking was done and retrieval of prosthesis done (Fig 8 ).



Fig8.Processed speech aid prosthesis

Then a small hole was created in obturator part through which normal saline was injected to wash out the salt particle present within (Fig 9). After washing out salts the hole is sealed by auto-polymerising resin ( DPI RR Cold Cure Acrylic Repair Material ). The final prosthesis was delivered to the patient (Fig 10.1, 10.2) and checked for speech, comfort, and retention.



Fig 9.Small hole in obturator part



Fig 10.1. Post insertion palatal view



Fig 10.2. Post insertion occlusal view

After prosthetic rehabilitation, the speech of the patient was improved markedly, Adequate Velopharyngeal closure was detected when the patient was examined during drinking water in the upward head position. The routine follow ups were done at 1st week, 2nd week, 1month, and 6 months after insertion of the prostheses. During one year of follow-up period, patient was satisfied with the use of the prosthesis and also expressed his social and psychological satisfaction.



### III. Discussion

Velopharyngeal form and function is needed for swallowing, sucking, speech. It also helps in normal oronasal respiration. The patients who are not indicated for surgery are rehabilitated by obturator. Obturator is meant for re-establishing the velopharyngeal closure. Prosthetic rehabilitation of the patients suffering from VP deficits with obturator prostheses varies according to the location and nature of the defect or deficiency. There are differences between obturator prostheses constructed for patients with developmental or congenital malformations of the soft palate, as compared with those constructed for patients with acquired defects. However, the objectives of obturation are to provide the capability for the control of nasal emission and inappropriate nasal resonance during speech and to prevent the leakage of material into the nasal passage during deglutition. Impression should be made carefully and defect should always be blocked by gauze-piece to prevent the flow of impression material into the nose. The position and level of the nasopharynx is determined by the position and movement of the residual velopharyngeal mechanism. The posterior aspect of obturator should be 2-3 mm short of the posterior pharyngeal wall.

#### Limitations

- Success of the prosthesis depends upon the patient's adaptability and learning skills.
- Patient should always be well motivated as the procedure will have increased number of visits.
- The speech should be assessed well.
- The prosthesis may require relining whenever there is muscular activity.

### IV. Conclusion

Prosthetic treatment in combination with speech therapy is the ideal treatment of choice for velopharyngeal defect. The prosthodontist plays a significant role in complete rehabilitation of palatal defect. Thorough knowledge and skills, coupled with a better understanding of the needs of the patients enable the successful rehabilitation of such cases.

#### References

1. Zarb GA, Blonder CL. Prosthodontic Treatment for Edentulous Patient: Complete Dentures and Implant-Supported Prostheses. In : Jacob RF, editor. Maxillofacial prosthodontics for the edentulous patient. St. Louis: Mosby Inc; 2004. pp. 449-470.
2. Skolnick L, McCall GN, Barnes M. The sphincteric mechanism of velopharyngeal closure. *Cleft Palate J*. 1973;10:286-305.
3. Johns DF, Rohrich RJ, Awada M. Velopharyngeal incompetence: a guide for clinical evaluation. *Plast Reconstr Surg J*. 2003;112:1890-1897.
4. Wolfaardt JF, Wilson FB, Rochet A, McPhee L. An appliance based approach to the management of palatopharyngeal incompetency: A clinical pilot project. *J Prosthet Dent*. 1993;69:186-195.
5. Ragab A. Cerclage sphincter pharyngoplasty: a new technique for velopharyngeal insufficiency. *Int J Pediatr Otorhinolaryngol*. 2007;71:793-800.
6. Saunders TR, Oliver NA. A speech-aid prosthesis for anterior maxillary implant-supported prostheses. *J Prosthet Dent*. 1993;70:546-547.
7. Shifman A, Finkelstein Y, Nachmani A, Ophir D. Speech-aid prostheses for neurogenic velopharyngeal incompetence. *J Prosthet Dent*. 2000;83:99-106.
8. Beumer J, III, Curtis TA, Marunick MT. St. Louis: Ishiyaku EuroAmerica, Inc; 1996. Maxillofacial Rehabilitation: Prosthodontic and Surgical Considerations; Speech, Velopharyngeal Function, and Restoration of Soft Palate Defects; pp. 285-324.
9. Keyf F, Sahin N, Aslan Y. Alternative impression technique for a speech-aid prosthesis. *Cleft Palate Craniofac J*. 2003;40:566-568.
10. Branemark P-I, Higuchi KW, Oliveira de MF. Illinois: Quintessence; 1999. Rehabilitation of complex cleft palate and craniomaxillofacial defects: the challenge of Bauru; pp. 17-30.
11. Harrison JW. Dental implants to rehabilitate a patient with an unrepaired complete cleft of the hard and soft palate: a clinical report. *Cleft Palate Craniofac J*. 1992;29:485-488.