Prosthetic Rehabilitation of Velopharyngeal Insufficiency: A case of Pharyngeal Obturator with palatal lift prosthesis

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Palatal defect of any extent causes multiple problems in speech, mastication and esthetics. Cancer resection is the most common cause of acquired palatal defects. Palatal defect can be repaired by reconstructive surgery and/or a dental prosthesis. A soft palate defect may result from surgical resection, and its consequences could include hypernasal speech and nasal regurgitation of food and liquids. A speech aid prosthesis fabricated for patients can improve nasal emission during speech, and assist in preventing nasal regurgitation of food. This article presents a case of the reconstruction of a soft palate defect by prosthetic obturation.

Keywords: Pharyngeal obturator, Velopharyngeal insufficiency, Hyper nasality.

The major cause of palatal defect is either acquired or congenital. Tumor resection, especially malignancy, is the most common cause of an acquired palatal defect; whereas cleft palate is the main cause of congenital palatal defect. Palatal defect can be repaired by reconstructive surgery and/or a dental prosthesis. In patients with a tumor, it is accepted that a dental prosthesis is generally preferable to reconstructive surgery because the former provides easier inspection of the residual tissue after surgery.

Whenever the patient suffers from a palatal defect, nasal leakage of food and fluid, and hyper nasality of speech become inevitable. Therefore, swallowing and speech become serious problems in daily activity.

The soft palate acts as a dynamic separator between oral and nasal cavity.[1] 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 VP sphincter.[2] Adequate VP closure is required during swallowing and production of all consonants except for the nasal ones.[3]

Impairment of VP function can be due to insufficiency or incompetency.[3–8] VP insufficiency is distinguished by speech and nasal resonance abnormalities related to defects of the soft palate, which may be congenital as in cleft lip and palate (CLP) or acquired as in palatal tumor resection.[5–7] VP incompetence describes dysfunction of an anatomically intact VP mechanism as in patients with neuromuscular disorders.[3,4] The diagnosis of VP insufficiency can be made with perceptual speech evaluation, multiview videofluoroscopy (MVF), and nasendoscopy (NE).[8]

The primary effects of the VP insufficiency are air-flow escape and hypernasality.[9] Secondary effects are disorders in speech articulation (distortions, substitutions and omissions).[6,9]

Surgery in combination with speech therapy is a common approach to the treatment of VP dysfunction.[6] However, when surgical treatment is not considered as an option, prosthetic management of VP insufficiency is carried out by means of a pharyngeal obturator, whereas VP incompetence is traditionally managed by a palatal lift prosthesis.[4,5,7]

The prosthodontic rehabilitation of patients with acquired defects of the maxilla after surgical resection is the complete responsibility of a maxillofacial prosthodontist.

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A pharyngeal obturator is a removable maxillary prosthesis which has a posterior extension to separate oropharynx and nasopharynx.[5,9] This obturator prosthesis restores the defects of the soft palate and allows adequate closure of palatopharyngeal sphinter.[5,7] When a pharyngeal obturator is placed, the patient can exhibit adequate separation between the oral and nasal cavities during production of plosives consonants or while blowing with variable intensity.[12] An effective prosthesis will restore speech, allow proper swallowing, and have an acceptable appearance.[13] However, it should have sufficient retention and stability.[14] In dentulous and partially edentulous patients the retention and stability of the pharyngeal obturator prosthesis is easily achieved by the existing teeth.[9]

However, it may be hard to achieve adequate retention with conventional prostheses in edentulous patients.[1,10,11] If dental implants are considered, implant-supported overdentures are the best and sometimes unique choice for treatment in such patients.[7,14]

Herein, we report a case with soft palate defect rehabilitated by pharyngeal obturator prosthesis. Adequate VP closure was obtained with applied prosthetic treatments. Thereby, oro-nasal communication was prevented, esthetics and speech were improved.

CASE REPORT

A male patient aged 49years, who had undergone surgery for adenocarcinoma of the soft palate, reported to the Department of Prosthodontics, Faculty of dental sciences, Lucknow for the restoration of the palatal defect No radiotherapy or chemotherapy was done. The patient presented with an obvious and typical nasal twang and he was experiencing difficulty in speech and deglutition.

Besides, the patient needed a denture to restore his lost teeth and an obturator which would overcome his defect and make things easier for him in terms of mastication and communication.

On examination, it was found that the defect was not extended to the hard palate and he had missing 12,11,21 and 22. When the patient was instructed to say 'ah' a tethered velopharynx and insufficient velar elevation were observed due to the surgical scar at the velum. Speech evaluation was performed by speech pathologists that assessed resonance, the occurrence of inappropriate nasal air emission, and articulation. After taking a thorough medical and dental history, the patient was educated and prepared psychologically to undergo the procedure of obturator making. A pharyngeal obturator with removable partial denture was planned since the patient had four missing anterior teeth. For increased patient's comfort, it was planned to fabricate a prosthesis that would be light and easy to wear.

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 irreversible hydrocolloid impression (Plastalgin, septodont, Louisville Co., USA) was made using a stock tray. The impressions were poured with dental stone (Gypstone, Prevest Denpro Ltd, Jammu, India) to obtain primary casts. The undercuts were blocked and custom tray of auto-polymerising resin (RR-Rapid repair powder, Dentsply India Pvt.Ltd., Gurgoan, India) was made. Thereafter, functional impression of the soft palate defect area was made using green modeling plastic impression compound (DPI Pinnacle Tracing Sticks,The Bombay Burmah Trading Corporation,Mumbai) with the support of the 1 mm round orthodontic wire (S.S.WIRE, triodent meditech india pvt. Ltd.,mumbai) which was attached to the posterior part of the custom tray. Final impression was made using zinc oxide eugenol impression material (DPI Impression paste, The Bombay Burmah Trading Corporation, Mumbai) after instructing the patient for functional movements of his head. The patient was asked to move her head in a circular manner from side to side, to extend her head as far forward and backward as possible and to say 'ah' and swallow. The acrylic bulb was formed in wax and fabricated according to the impression using heat polymerized

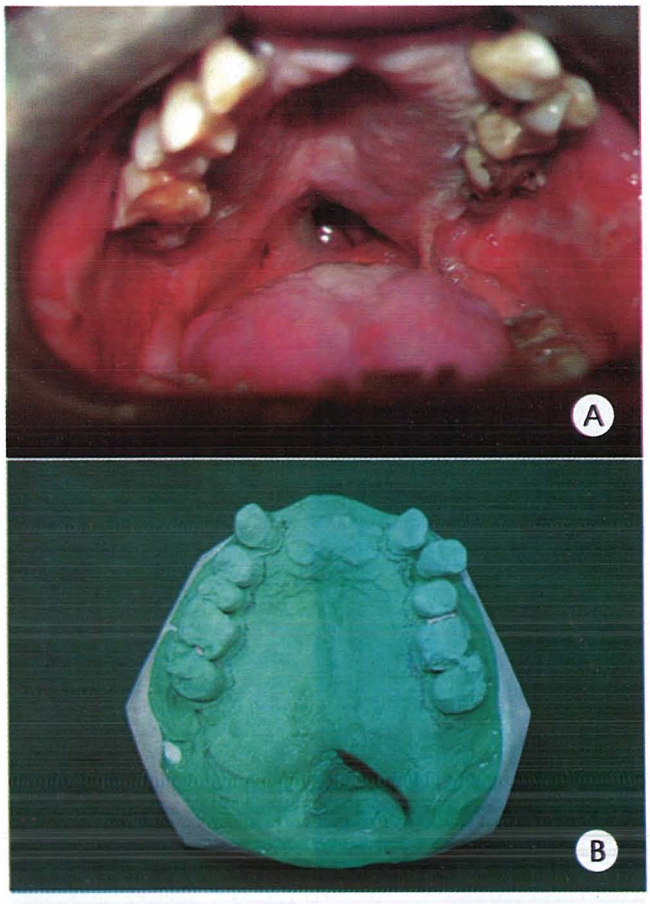


Fig. 1(a): Intraoral view of the defect.
(b) Final cast showing the soft palate defect.

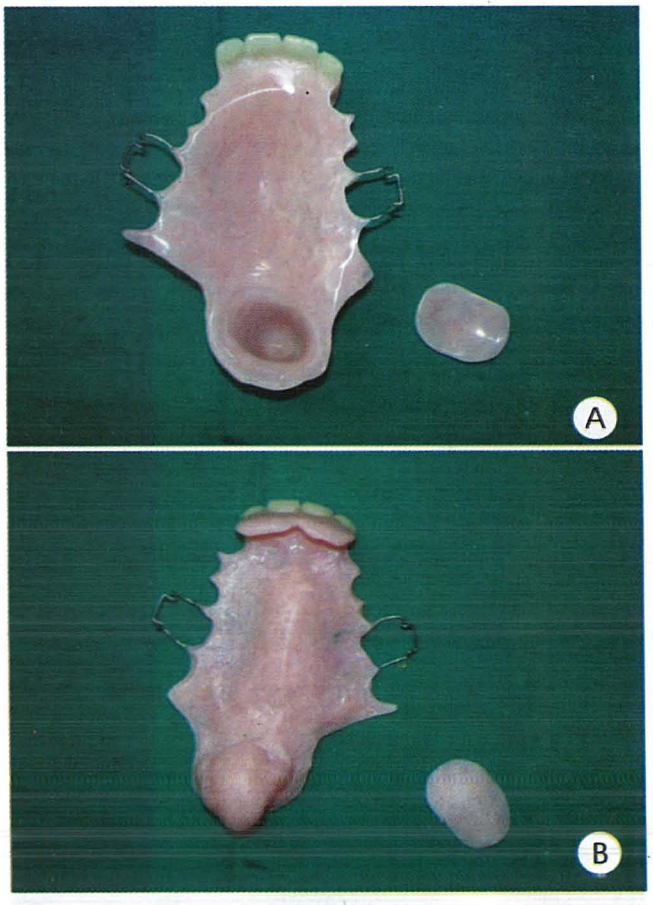


Fig. 2 (a) Polished surface of the speech aid prosthesis with separated lid.
(b) Intaglio surface of the speech aid prosthesis with separated lid

acrylic resin (Trevalon powder, Dentsply India Pvt.Ltd., Gurgoan, India)The maxillary denture were finished and polished. The palatal margins around the obturator opening were trimmed to be flush with the remaining hard palate. The next step was to prepare the lid or cap for the defect area. For the fabrication of the lid, 4-5 orientation grooves /notches were scored all around the defect wall of the denture. Notches of 1.5 mm depth were created to ease the re-orientation of the lid. The open defect area of the denture was filled with plaster, 2-3 mm away from the palatal surface of the denture. A lead foil was spread over the defect as a separating medium and then the wax was shaped to level and prepare the false palate.

The lid was separately cured in heat cure resin, and was later finished and polished. The next step was to close the open defect area by fixing the lid with the help of autopolymerising acrylic resin by using the pre-constructed orientation grooves. Definitive prostheses were delivered to the patient after making necessary.

After prosthetic rehabilitation, the speech of the patient was improved markedly. Adequate VP closure was detected after the patient was examined during drinking water in the upward head position. Moreover, no nasal reflux was observed. A speech pathologist confirmed that the hypernasality was reduced after testing the production of oral and nasal consonants and the speech was noticeably improved after perceptual speech evaluation. The patient was trained in oral hygiene and instructed in the specific care for his new prostheses. The checkups were done at 1st week, 2nd week, 1 month, and 6 months after

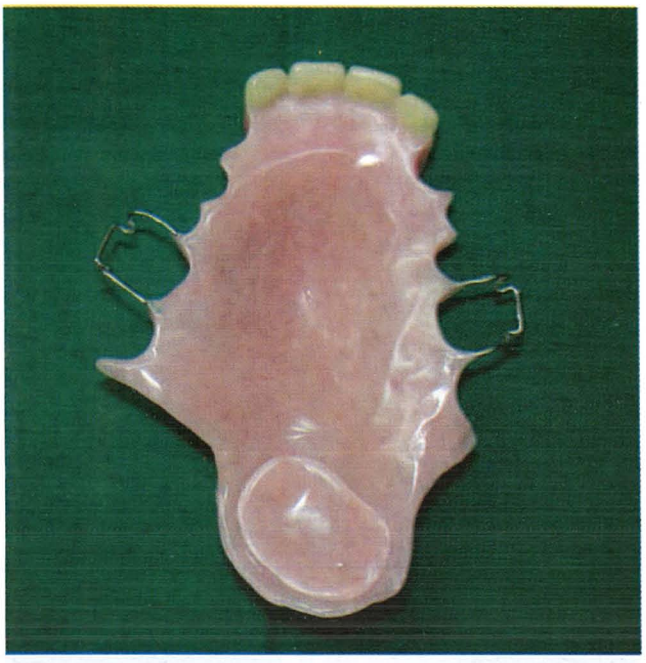


Fig.3 Final speech aid prosthesis with attached lid.

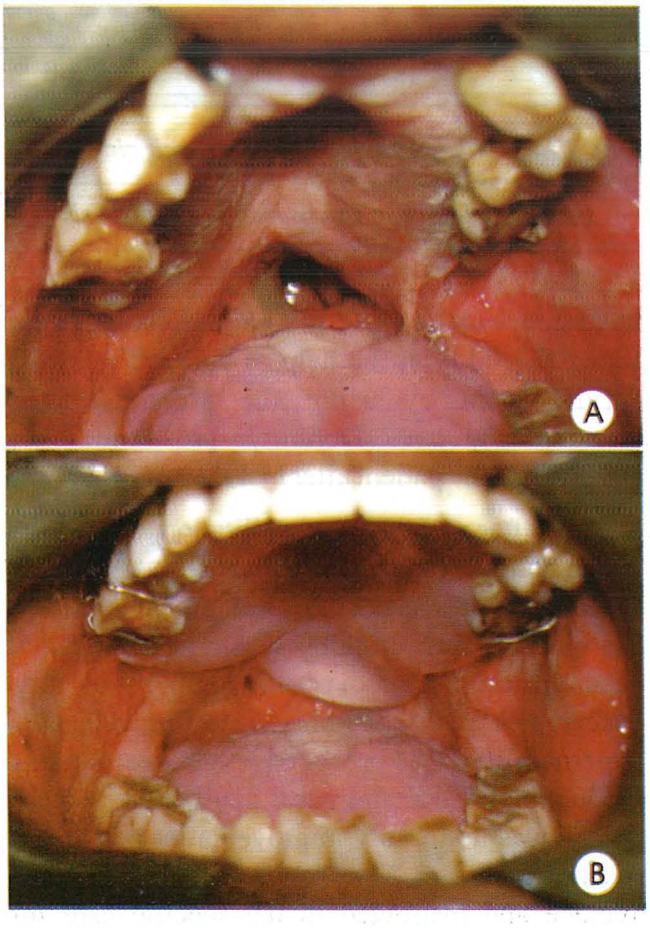


Fig. 4 (a) Intraoral preoperative view.
(b) Intraoral post operative view.

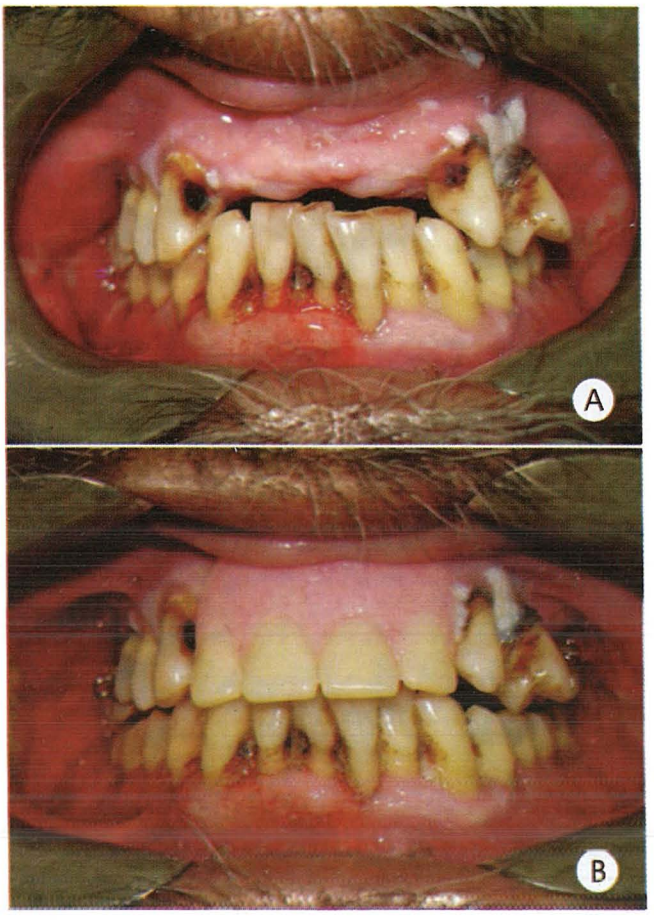


Fig. 5 (a) Intraoral preoperative view of the soft palate defect.
(b) Intraoral post-operative view with speech aid prosthesis in place.

insertion of the prostheses. During one year of follow-up period, patient was satisfied with the use of the prosthesis and also expressed her social and psychological satisfaction.

Discussion

Prosthetic rehabilitation of the patients suffering from VP deficits with obturator prostheses varies according to the location and nature of the defect or deficiency.[4,5,7] 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.[4,7,9] 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.[5,9] To achieve normal speech with a prosthesis, an accurate prognosis is extremely important for the patients exhibiting considerable movement of the residual VP complex during function.[2]

In the literature, several types of prostheses have been described to improve speech ability.[4,5,7] A pharyngeal obturator prostheses may prevent the hypernasality and/or nasal emission associated with VP inadequacies.[4,5] In order to obtain adequate VP closure during speech and swallowing a posterior extension is added to prosthesis.[5,12] The extension must be positioned at the level of the hard palate during the most active movement of the pharyngeal sphincter.[9] This movement can be achieved by asking the patient to say 'ahh' or by touching to posterior wall of the pharynx with an instrument to initiate gag reflex.[9,12] An acrylic resin extension must be formed functionally. This extension must be in static contact with the soft tissues and must not affect the stability of the prosthesis.[1,9] The impression should be examined for contact with the pharynx bilaterally and posteriorly.[12] In this report, patients were allowed to drink water to test the complete closure of the anatomical defect of soft and hard palate. The water should not reflux into the nasal cavity when the patient is in upright position.[9]

The success of the soft palate defect prosthesis depends on the functional adaptation of the impression material.[7,9,12] In current cases, modeling plastic impression compound was used in functional contouring of the palatal defect and VP portion. Zinc oxide impression material was added to make the final impression. Zinc oxide-eugenol impression material is accurate with dimensional changes during setting of about 0.1%.[12] Recently, elastomeric impression materials such as polyvinylsiloxane and polyether have also been considered appropriate for border molding procedures.[16]

The treatment of VP insufficiency requires multidisciplinary approach. In the present case, perceptual speech evaluations were demonstrated significant improvements in speech ability and VP function.

A full bulb is likely to increase the weight of the prosthesis and therefore, it cannot be used successfully. A hollow bulb prosthesis (either one piece or two piece) is a better choice, as it is lighter in weight and is more hygienic. Therefore, it was planned to fabricate a 'two piece hollow bulb prosthesis' for the patient.

Efforts were taken to fabricate the prosthesis by abiding the basic rules of denture preparation. In the course of time dissatisfaction of patients using definitive obturator increases. It seems that adjustment to an obturator might be a lengthy and changing process that requires close clinical monitoring.[17]

Conclusion

Definitive prosthodontic treatment is one of the final therapies which is instituted and it attempts to alleviate any anatomical and functional deficiencies. The prosthodontist plays a significant role in the complete rehabilitation of the palatal defect. Thorough knowledge and skills,coupled with a better understanding of the needs of the patients enable the successful rehabilitation of such patients. Mostly, the maxillofacial patients come from the lower socioeconomical group,who need the best out of the lowest expenses. The maxillofacial patient is a compromised person who requires total rehabilitation, physically as well as psychologically.

In this report, patient with soft palate defect as VP insufficiency was treated successfully by pharyngeal obturator prostheses.

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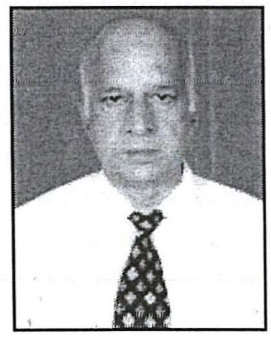
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Dr. John Sebastian passes away



Dr. John Sebastian, one of the stalwarts of PFA and IDA from Chennai, passes away on May 25, 2012.

Dr. John, an alumnus of the Dental Wing of Madras Medical College, Chennai (Government Dental College), had advanced training in Maxillo facial Prosthodontics at USA. He had keen interest in Research and worked as Research Officer under PL 480 Programme in Chennai. He was an eminent practitioner of Dentistry in Chennai.

Dr. John served the Indian Dental Association as President of Madras City Branch, President of Tamilnadu State Branch and as Honorary Editor of Journal of Indian Dental Association. He was a pillar for India Section of Pierre Fauchard Academy and served as the Chairman during 1999.

May hi soul rest in peace.