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Case Report

Maxillary defect rehabilitation using a hollow bulb obturator

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Abstract

The challenging rehabilitation for maxillofacial deformities can be restored with the removable prosthesis to maintain its original shape and function. Obturators are the treatment of choice after maxillary resection for the defect. Besides boost the patient with bite, occlusion maintenance, lower jaw and maxillary tissue support, phonetic restoration, and appearance preservation, Rehabilitation also tries to preserve anatomy and seal the oral and nasal cavities. To re-establish function and phonetic, and also retention, stability, and quality of life, there is a prosthetic evaluation post-surgery. In this case study, a hollow bulb obturator was fabricated to treat the defect of the patient.

Keywords: Rehabilitation, Prosthetic device, Hollow bulb design, Maxillofacial obturator.

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1. Introduction

Deformity of the mouth and jaw can be acquired through trauma or illness, or they might be congenital. Rehabilitating these problems is challenging since it requires a multidisciplinary approach that combines speech therapy, prosthodontics, surgery, and psychological counselling for the patient's overall health. Surgical excision of the nasal, maxillary, and oral cavities is required for maxillofacial abnormalities brought on by neoplasms. As a result, the antrum and the oral-nasal cavity can communicate. In order to prevent nasal cavity regurgitation, prenasal speech, and impaired function of the surgically removed maxillary space, rehabilitation of this condition requires exact compartment separation.[1] Restoring speech, mastication, and occlusion; restoring the midfacial contour by focussing on soft tissue support; and achieving a satisfactory aesthetic outcome that improves the patient's physical and mental health are the objectives of rehabilitation.

Ambroise Paré was the earliest to attempt artificial closure of maxillary defects in the 1500s. Later, in 1875, Martin pioneered the development of surgical obturators.[2] In 1927, Fry utilized prosthodontic impressions to close surgical defects after operations, while in 1956, Steadman used gutta-percha to support an acrylic resin prosthesis placed over a skin graft to seal a maxillectomy defect. Surgical closure of such defects is often not recommended due to factors like the large size of the defect, limited surgical access, poor vascularization, and the potential for tumour recurrence depending on its aggressiveness.[3] In such cases, obturators are preferred for the rehabilitation of maxillofacial defects. Initially, temporary obturators are provided to allow healing of the surgical site before a definitive prosthesis is delivered. These obturators offer a stable framework postoperatively, helping to reduce the emotional trauma of surgery, prevent nasal regurgitation, support intelligible speech, and improve facial aesthetics. They are also useful in managing extensive defects of the soft palate. In the absence of muscular function, prosthetic obturators help modify nasal airflow and resonance, which would otherwise be unmanageable.[4]

Aramany's classification of maxillary defects is also utilized as follows: Class I, a defect in which the resection is done in the anterior midline of the maxilla and there are

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abutment teeth on one side of the arch; Class II, a unilateral defect that preserves the anterior teeth on the opposite side; Class III, a palatal defect that results in the central part of the hard palate and may extend to the soft palate; Class IV, a defect that crosses the midline and includes both sides of the maxilla and there are abutment teeth on one side; Class V, a surgical defect that is bilateral and posterior to the abutment teeth (labial stabilization can be required); and Class VI, an anterior maxillary defect with bilaterally present abutment teeth in the posterior segment.[5] This case report falls under Aramany's Class I defect category. When designing a prosthesis, it is essential that it be lightweight, stable, retentive, and comfortable for the patient.[6] The method of fabricating obturators—whether open or closed hollow bulb types—depends on factors such as patient comfort, ease of use, and the ability to fully cover the defect. While open bulb obturators are easier to maintain, their major drawback is the accumulation of mucus. To address this issue, vents are incorporated into the hollow section to prevent the buildup of mucus, food, and fluids, which can otherwise lead to unpleasant taste and odor. Closed bulb obturators reach up to the superior border of the defect and minimize air space and mucus collection, lowering prosthesis weight by approximately 30%-35%, which is another advantage in these prostheses.[7] Prosthesis with minimized weight has been developed in the literature through different Methods and substances. Wax shim, gelatin soap, asbestos covered cellophane, polyurethane foam, pumice slurry and plaster of Paris, acrylic resin shim, modeling clay, dental stone, sugar, salt, alum, silicone putty, coated gauze with light-body, thermocol, and ice block are utilized in the production of a hollow in the prosthesis and in the weight reduction of the prosthesis.[8]

This article describes a traditional technique for fabricating a complete hollow bulb obturator for a patient who has undergone a subtotal maxillectomy.

2. Case Report

A post maxillectomy case was referred to the Department of Prosthodontics and crown & bridge (SDCH Rishikesh) by the Department of Head and Neck oncology (AIIMS Rishikesh) of a 55-year-old female patient for prosthetic rehabilitation following the surgical resection of adenocarcinomas from the right maxilla. The patient complained of difficulty in chewing, nasal leakage of fluid, compromised appearance, discord, and difficulty speaking with a nasal twang. Gross facial asymmetry with sunken face in the right region was found by extraoral inspection (**Figure 1**). Healthy intraoral post maxillectomy defect on right side of maxillary edentulous segment comprises part of posterior hard palate, alveolar ridge, maxillary tuberosity, and part of soft palate with teeth present wrt 23 24 25 on right side was observed (**Figure 2**). For her prosthetic rehabilitation, a hollow bulb obturator was made using a thermoforming unit.

Figure 1: (Extraoral examination)

Figure 2: (Intraoral examination)

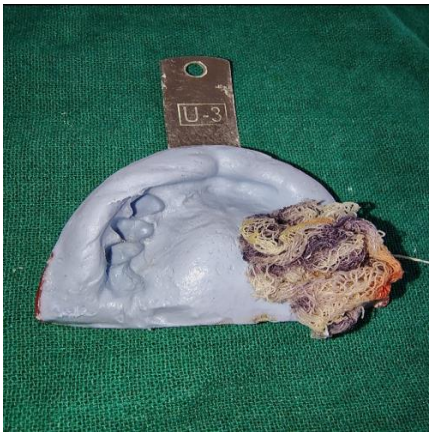

Figure 3: (Primary impression)

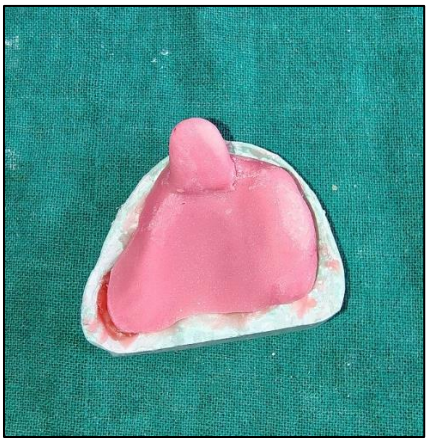

Figure 4: (Custom tray)

3. Procedure

Preliminary impression was recorded with irreversible hydrocolloid (Neoalgin, Orikam India Pvt. Ltd., Haryana) (**Figure 3**). Custom tray was prepared with autopolymerizing acrylic resin (self-cure acrylic repair material, DPI India Pvt. Ltd., India) (**Figure 4**) and border molding was done with green stick impression compound (DPI Pinnacle, tracing stick, Dental Products of India, Mumbai).

Final impression was then created using light viscosity addition silicone impression material (Neopure, Orikam, Indian) as indicated in (**Figure 5**) and master cast was prepared with dental stone (Denta Stone, Jaypee Pvt. Ltd., India).

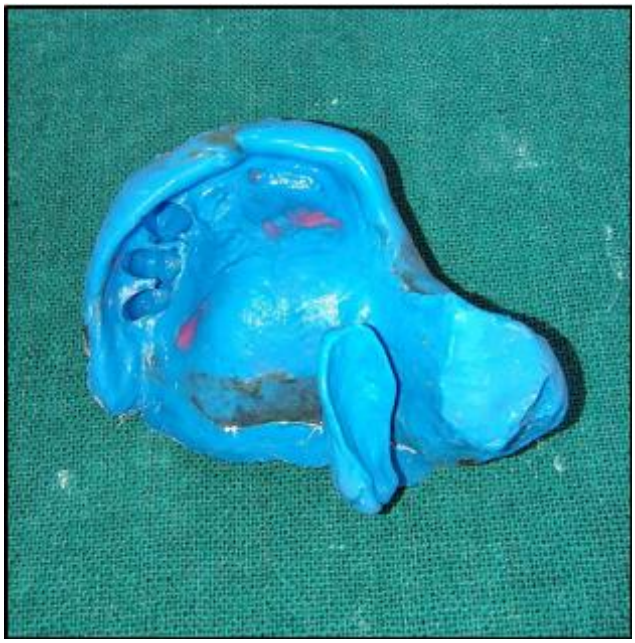

Figure 5: (Final impression)

To eliminate any undesirable undercuts within the defect, a baseplate wax layer of approximately 1.5 mm thickness was used to block them out. This wax was also modified in the defect region to provide adequate relief. Several small dimples were created to act as positioning stops within the defect. A 1.5 mm thick sheet of thermoplastic resin (MONOCURE) was employed to fabricate the bulb portion of the obturator using a thermoforming device (Erkopress 300Tp). The lid section of the obturator was also constructed using the same thermoplastic resin (MONOCURE). Both the bulb and lid components were bonded together with autopolymerizing resin to form a hollow structure that was one size smaller than the original. The integrity of the seal was confirmed by immersing the assembly in water.

An autopolymerizing resin was then used to create a denture record base, onto which an occlusal rim made of wax was built. Maxillomandibular relations were recorded and transferred to a semiadjustable articulator (Hanau Wide Vue Articulator). Teeth were chosen and arranged accordingly, and a trial insertion was conducted to evaluate retention, stability, function, and esthetics. Once the try-in was approved, the flasking and dewaxing procedures were carried out.

During the packing stage, the defect area was first loaded and packed using heat-polymerizing acrylic resin (ProBase Denture Material, Ivoclar Vivadent India Pvt. Ltd., India). The previously formed smaller hollow structure was then positioned and adapted over this. The remaining space was completely filled with heat-cured acrylic resin and cured. Standard finishing and polishing techniques were followed to complete the process (**Figure 6**)

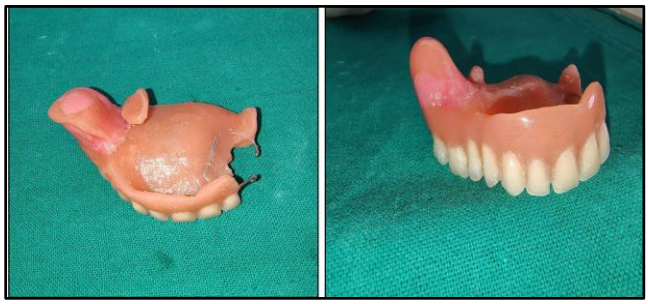

Figure 6: (final prosthesis)

At last, the prosthesis was delivered. The patient was satisfied and contented with her enhanced function, speech, and esthetics (**Figure 7**).

Figure 7: (Post operative)

After insertion the obturator, the patient expressed satisfaction with the improved function, aesthetics, and speech (**Figure 7**).

3. Discussion

Numerous methods for hollow bulb obturator fabrication exist due to the complex nature of the procedure. Habib and Driscoll introduced a technique involving grinding out excess material post-processing, although this makes controlling wall thickness difficult and is time-consuming. Other techniques involve placing disposable or meltable materials

inside the bulb during initial fabrication that are later removed through access openings.[9] These methods often result in open bulb designs that require a separate lid to seal the cavity.

The union between the bulb and its lid, often joined with autopolymerizing or light-cured resin, can be problematic. This junction may allow water seepage, foster microbial growth, and result in discoloration or increased weight of the prosthesis.[10]

The technique discussed in this report overcomes such issues by embedding the pre-formed hollow bulb within heat-cured acrylic, thus eliminating leakage points and contamination risks. McAndrew et al. described a two-step technique using heat-cure acrylic to produce a closed hollow obturator, but this method may lead to dimensional inaccuracies.[11]

Thermoplastic resin materials have gained popularity for interim prostheses and obturator baseplates.[12] These materials come in variable thicknesses, allowing better control over final prosthesis dimensions and weight. Using a single flask for processing simplifies the workflow and reduces production time.[13] However, adapting the pre-formed bulb to the defect before packing can be challenging, potentially compromising fit and structural integrity. Limited data exist on the mechanical properties and long-term durability of thermoplastic resin compared to conventional materials, warranting further investigation.[14]

4. Conclusion

This technique provides a viable and efficient method for crafting closed hollow bulb obturators. Using a single flask and eliminating the need for a separate lid reduces lab time, simplifies the process, and minimizes the risk of leakage and microbial contamination. Embedding the bulb entirely in heat-cure acrylic ensures a more hygienic, durable, and aesthetically pleasing prosthesis. Standardized thickness and lightweight construction contribute to improved patient comfort and satisfactio.

5. Source of Funding

None.

6. Conflict of Interest

None.

References

1. McAndrew KS, Rothenberger S, Minsley GE. An innovative investment method for the fabrication of a closed hollow obturator prosthesis. *J Prosthet Dent.* 1998;80(1):129–32.
2. The glossary of prosthodontic terms. *J Prosthet Dent.* 2005;94(1):10–92.
3. Wu YL, Schaaf NG. Comparison of weight reduction in different designs of solid and hollow obturator prostheses. *J Prosthet Dent.* 1989;62(2):214–7.
4. Ono T, Kohda H, Hori K, Nokubi T. Masticatory performance in postmaxillectomy patients with edentulous maxillae fitted with obturator prostheses. *Int J Prosthodont*. 2007;20(2):145–50.
5. Taylor TD. Clinical Maxillofacial Prosthetics. Chicago: Quintessence Publishing; 2000. p-304.
6. Keyf F. Obturator prostheses for hemimaxillectomy patients. *J Oral Rehabil.* 2001;28(9):821–9.
7. Deogade SC, Mantri SS, Naitam D, Dube G, Gupta P, Dewangan A. A direct investment method of closed two-piece hollow bulb obturator. *Case Rep Dent.* 2013;2013:326530.
8. Buzayan MM, Ariffin YT, Yunus N. Closed hollow bulb obturator-one-step fabrication: a clinical report. *J Prosthodont.* 2013;22(7):591–5.
9. Habib BH, Driscoll CF. Fabrication of a closed hollow obturator. *J Prosthet Dent.* 2004;91(4):383–5.
10. Chalian VA, Barnett MO. A new technique for constructing a one-piece hollow obturator after partial maxillectomy. *J Prosthet Dent.* 1972;28(4):448–53.
11. Worley JL, Kniejski ME. A method for controlling the thickness of hollow obturator prostheses. *J Prosthet Dent.* 1983;50(2):227–9.
12. Phankosol P, Martin JW. Hollow obturator with removable lid. *J Prosthet Dent.* 1985;54(1):98–100.
13. Kocacikli M, Yalug S, Yazicioglu H, Yilmaz C. Fabricating a hollow obturator with visible light-cured resin system. *J Prosthodont.* 2008;17(7):596–8.
14. Wu CW, Hung CC. An alternative method for fabrication of an open hollow obturator-case report. *J Dent Sci.* 2008;3(2):102–7.
15. Wieciewicz W. Changes of thickness of the Erkodur thermoplastic foil obturator plate after deep pressing. *Dent Med Probl.* 2003;40(1):81–4.

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