CASE REPORT

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Hollow Bulb Obturator Fabrication Using Glycerin Soap for Management of Hemi Maxillectomy Patient: A Case Report

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Abstract

The incidence of mucormycosis, particularly rhino-orbital-cerebral involvement, has seen a concerning surge, with many cases necessitating surgical resection followed by prosthetic rehabilitation using obturators. Among various options, the hollow bulb obturator stands out as a practical, economical, and efficient choice for restoring function post-maxillectomy. However, obturators can often become excessively heavy within the defect area, compromising comfort and retention. To address this, hollowing the prosthesis is a well-recognised strategy to reduce weight. This case report outlines a technique for fabricating a closed hollow bulb obturator using a glycerin soap to make it weigh less for an adult patient who underwent maxillectomy. This case report outlines an innovative technique for glycerin soap, which was used to reduce weight, emphasising both functional restoration and prosthetic optimisation.

Keywords: Hollow bulb obturator, Glycerin soap, Maxillectomy, Mucormycosis.

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1. Introduction

Diabetes Mellitus remains the foremost global predisposing factor for mucormycosis, a rapidly progressing and potentially fatal opportunistic fungal infection, most commonly caused by *Rhizopus species* within the *Mucorales* order. This condition predominantly affects immunocompromised individuals, especially those with poorly controlled diabetes, and carries a significant mortality rate of approximately 46% [1]. The rhino-orbito-cerebral form is the most prevalent, and it often necessitates extensive surgical intervention to contain the infection, ranging from partial to total maxillectomy. Such invasive procedures create oro-antral communication, severely compromising essential functions such as speech, chewing, and swallowing, while also impacting facial appearance [2]. These anatomical and functional impairments profoundly affect the patient's psychological and emotional well-being, making comprehensive rehabilitation critical [3].

Rehabilitating maxillofacial defects is a complex endeavour that demands a coordinated, multidisciplinary effort—including surgical reconstruction, prosthodontic intervention, psychological counselling, and speech therapy—to achieve holistic patient recovery and well-being [3,4].

Obturators are highly specialised prosthetic devices, designed to close congenital or acquired defects of the hard or soft palate and surrounding anatomical structures, playing a crucial role in restoring essential functions and facial aesthetics. However, due to the typically bulbous, large size of the defect area, these prostheses often require a substantial amount of material, which can result in excessive weight and compromised retention. This poses additional challenges in achieving optimal prosthetic performance and patient comfort [4-7].
In prosthesis fabrication, achieving comfort, stability, retention, and minimal weight is essential

for patient satisfaction and long-term success. Various techniques exist for constructing obturators, with both open and closed hollow bulb designs aiming to ensure full defect coverage, ease of use, and overall patient comfort [6-9]. Open bulb obturators, while simpler to clean and maintain, are often challenged by the accumulation of mucus, fluids, and food debris within the hollow section. This can lead to unpleasant odours and taste, necessitating the incorporation of vents to facilitate drainage and hygiene. Conversely, closed hollow bulb obturators offer distinct advantages by sealing off the internal cavity, thereby minimising air entrapment and secretion buildup [4,7-10]. Additionally, being hollow, they contribute to an effective 30%–35% reduction in prosthesis weight, enhancing both function and patient comfort [4,10]. The extent of the obturator varies depending on the type of defect.

Aramany's classification of maxillary defects is commonly used as follows:
Class I: a defect where the resection is performed in the anterior midline of the maxilla, with abutment teeth present on one side of the arch; Class II: a unilateral defect, retaining the anterior teeth on the contralateral side; Class III: a palatal defect that occurs in the central portion of the hard palate and may extend into the soft palate; Class IV: a defect that crosses the midline and involves both sides of the maxilla, with abutment teeth present on one side; Class V: a surgical defect that is bilateral and lies posterior to the abutment teeth (labial stabilization may be needed); and Class VI: an anterior maxillary defect with abutment teeth present bilaterally in the posterior segment. This case report presented a class 1 maxillary defect where a hollow closed bulb obturator was planned [1,11,12].

2. Case report

A 46-year-old male was referred to the Department of Prosthodontics, G Pulla Reddy Dental College and Hospital, Kurnool, Andhra Pradesh, India, for prosthetic rehabilitation post-maxillectomy due to mucormycosis. The patient had a history of significant underlying comorbidities, including poorly controlled diabetes mellitus, and was subsequently diagnosed with chronic invasive fungal rhinosinusitis, which progressed to mucormycosis. He was surgically treated by subtotal /partial maxillectomy, leading to an aramany class I maxillary defect (Figure 1). The treatment plan was to fabricate an interim obturator for 3 months, followed by a definitive closed hollow bulb obturator.

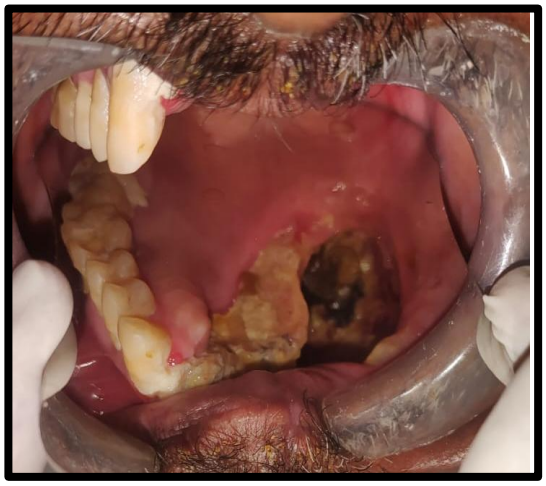

Figure 1. Left Maxillectomy.

3. Procedure

3.1 Fabrication of intermediate obturator

Initially, the defect was cleaned of food debris and dried mucus crusts. Sterile gauze was placed in the defect to prevent the inadvertent flow of the primary impression material into the defect. An irreversible hydrocolloid (DPI Algitex, India) was used to make an impression, and the cast was poured with a type-III gypsum product (Jaypee Dental Stone, India). A ball-end clasp was made to provide retention to the prosthesis (Figure 2). Using auto-polymerising acrylic resin (DPI RR Cold Cure Acrylic Repair Material, India), the intermediate obturator was made (Figure 3) and delivered to the patient. The patient was instructed to maintain the hygiene of the defect site by irrigation. After 3 months, a definitive prosthesis was planned.

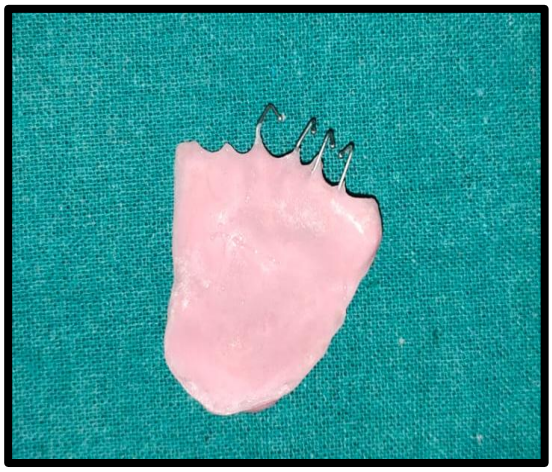

Figure 2. Intermediate Obturator.

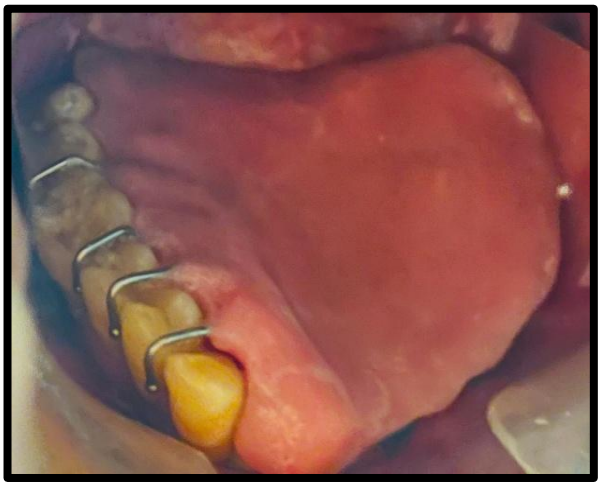

Figure 3. Intermediate Obturator inserted into the patient's mouth.

3.2 Fabrication of definitive obturator

Before making the preliminary impression, the defect was irrigated with saline. Sterile gauze was placed in the defect to prevent the inadvertent flow of the primary impression material into the defect. An irreversible hydrocolloid (DPI Algitex, India) material was used to make the primary impression and the cast was poured with type-3 dental stone (Jaypee Dental stone) (Figure 4). After obtaining the primary cast, a spacer was applied, and a special tray was fabricated with self-cure acrylic resin (DPI RR Cold Cure Acrylic Repair Material, India) for border moulding and the final impression (Figure 5). Border moulding was performed with low-fusing impression compound (Green-stick compound, DPI PINNACLE Tracing sticks, India). final impressions with low-fusing compound (DPI Pinnacle Tracing Sticks) and a monophase polyether wash impression [8]. Tray adhesive was applied to the tray. The final impression was made with light body addition silicone (DPI Photosil light body, India) (Figure 6).

The pick-up impression was made with irreversible hydrocolloid (DPI Algitex, India). The cast was poured using type-III dental stone (JAYPEE Dental Stone, India) material. The record base for the maxillary cast was fabricated using auto polymerising acrylic resin on which an occlusal rim was made with modelling wax (Maarc Modelling wax, India) (Figure 7). Jaw relations were recorded. The casts were mounted in an articulator in the proper relationship, and the tooth arrangement was performed. The ball-end clasp was designed to provide retention. The try-in was done (Figure 8). After try-in, the casts were demounted, flasking and dewaxing were done in the usual manner (Figure 9). Glycerin soap was trimmed and moulded such that it was 2 -3 mm smaller than the defect area, so as to provide space for heat-cure resin (DPI Heat-Cure Denture Base Material, India), which was placed below the defect site. The clear acrylic resin (DPI RR Cold Cure Acrylic Repair Material, India) was placed over the defect area (Figure 10). A clear self-cure acrylic resin was incrementally applied over the molded Glycerin soap using the sprinkle-on technique. Following complete polymerisation, perforations were strategically made in the acrylic mold to facilitate the removal of the underlying Glycerin. The mold was then immersed in boiling water to dissolve and evacuate the Glycerin soap, creating a hollow cavity. After thorough cleansing and drying, the perforations were sealed using additional clear acrylic resin. The finalised clear acrylic resin component was then seated in the defect area to assess adaptation, marginal integrity, and overall fit before definitive processing and packing (Figure 11). Initially, a layer of heat-cure resin in the dough stage was packed over the defect region and the ridge area, over which the prefabricated clear acrylic mould was placed, and the heat-cure resin in the dough stage was packed and the closure of the flask. Curing was done in an acrylizer (Unident Dental Acrylizer, India) after bench curing. The obturator thus fabricated had a hollow bulb incorporated in it. This results in decreased weight of the prosthesis (Figure 12).

Figure 4. Primary impressions.

Figure 5. Special tray with spacer.

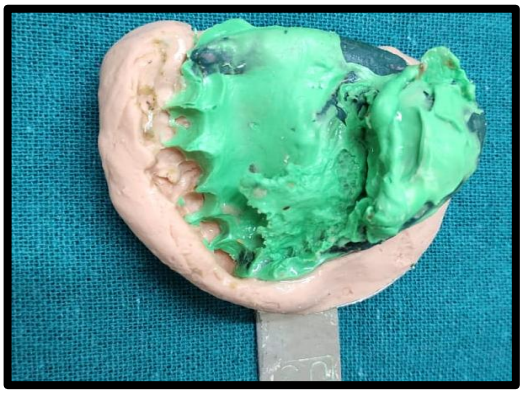

Figure 6. Secondary impression with light body and pickup impression with alginate.

Figure 7. Denture base with occlusal rims.

Figure 8. Try-in of wax denture

Figure 9. After dewaxing.

Figure 10. Try-in of molded Glycerin soap.

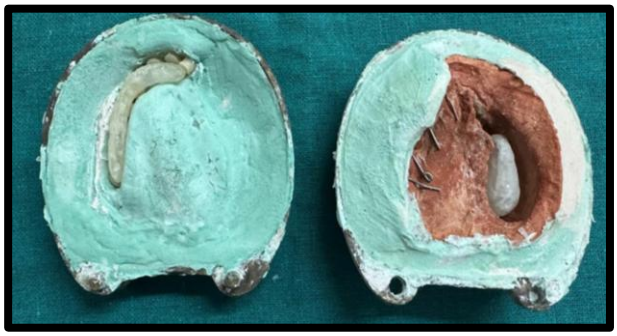

Figure 11. Try-in of hollow clear acrylic mold.

Figure 12. Closed Hollow bulb obturator.

Figure 13. Post-insertion of the obturator.

4. Discussion

The primary aim in rehabilitating a maxillectomy defect is to design a prosthetic obturator that fully seals the defect, effectively restoring the natural separation between the oral and sinonasal cavities [13,14]. Managing such defects, especially when significant tissue loss is involved, presents notable clinical challenges. Using the hollow fabrication technique, the weight can be reduced. Various methods in making a hollow bulb obturator using putty, salt, sugar, soap, polyurethane foam, sponge and gas injection using argon gas. However, these can be effectively addressed by minimising the weight of the prosthesis—most successfully achieved through the incorporation of a hollow design, which enhances both patient comfort and functional performance [15-18].

The technique discussed presents the prosthesis as a unified, single structure with uniformly thick walls. The glycerin soap spacer has many advantages, like ease of carving, easy retrievability, and it does not adhere to acrylic resin [19,20]. Drawing inspiration from previously established methods, it employs a pre-shaped glycerin bolus to create a precisely defined hollow chamber [20]. For optimal outcomes, several critical steps must be followed: First, a clear acrylic resin mold must be accurately seated in the defect area during the dough stage of heat-cured acrylic resin application. A second layer of dough-stage resin is then applied over this mould. Before final packing, it is crucial to thoroughly remove any residual soap from the internal bulb of the clear resin, ensuring the creation of a well-defined hollow space.

The completed prosthesis, featuring a lightweight hollow construction, was processed and delivered to the patient. Occlusal refinements were performed to ensure stability during mandibular movements, and prosthetic extensions were evaluated and adjusted to prevent soft tissue impingement within the defect area. The patient received training on insertion and removal techniques, along with comprehensive post-insertion care and maintenance guidelines [17]. At follow-up appointments, the patient reported high levels of satisfaction and demonstrated restored function in speech and mastication.

5. Conclusion

This case report presents a cost-effective, time-efficient, and reliable technique for fabricating hollow prostheses using Glycerin soap, which serves as an economical material. The method simplifies the process by utilising a single-bulb prosthesis design and overcomes limitations of conventional techniques while ensuring uniform wall thickness of heat-cured acrylic resin over the hollow bulb.

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