Maxillary hollow definitive obturator for hemi maxillectomy using biodentplast framework: A case report.

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Abstract

Defects inside the mouth can be present from birth or develop later and are most often found in the upper jaw. Typically, these are large gaps found in the roof of the mouth or the surrounding structures near the roof of the mouth. Many patients who have undergone maxillary surgery often experience persistent functional impairments and physical disfigurement. One of the most common jaw abnormalities is a patient with oral cancer. The goal in treating this condition is to provide a prosthesis that is comfortable and aesthetically pleasing, and can help restore normal functions such as swallowing, talking, and chewing. An obturator shows great potential for addressing this particular issue. It mainly functions to close the gaps and meet the essential needs and appearance of the patients in question. This article describes a case report of a hollow bulb obturator for a hemimaxillectomy patient

Keywords: Biodentaplast, hollow obturator, maxillary defect, rehabilitation.

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Email address: drc.raj24@gmail.com **Phone no:** 99677 76347. **DOI**: 10.5281/zenodo.13369184
Submitted: 01-Jun-2024 **Revised**: 18-Jun-2024 **Accepted:** 03-Jul-2024 **Published:** 16-Aug-2024
Bibliographic details: Journal of Orofacial Rehabilitation Vol. 4(2), Aug 2024, pp. 58-63.

Introduction

Maxillofacial defects can be either present from birth or acquired as a result of injury or disease. Restoring these imperfections is challenging as it requires a team of specialists in surgery, prosthodontics, psychology, and speech therapy for the patient's holistic recovery. Neoplasms result in maxillofacial defects requiring surgical removal of nasal, maxillary, and oral cavities.[1] This leads to the exchange of information between the mouth and nose cavity and the sinus cavity. In order to fix this problem, the compartments must be carefully divided such that the patient does not have nasal regurgitation, prenasal speaking, or reduced function in the maxillary space that was surgically removed. Aesthetically pleasing results that enhance the patient's physical and mental health are the primary goals of rehabilitation, which also includes reestablishing the patient's ability to speak, chew, and bite, as well as avoiding enophthalmos and double vision.

While Martin spearheaded the development of surgical obturators in 1875, Ambroise Paré pioneered artificial methods for sealing palate abnormalities in the 1500s. Steadman used gutta- percha to fix an acrylic resin prosthesis on a skin graft to cover a maxillectomy defect in 1956, while Fry used prosthodontic impressions to close surgical defects

following surgery in 1927. Due to factors such as the defect's severity, vascularization, restricted access, and the possibility of lesion recurrence based on tumour intensity, surgical closure of the defect is not recommended. [1]. Obturators aid in the restoration of maxillofacial defects by offering interim devices that allow surgically treated tissues to recover prior to prosthetic restoration [2]. Obturators offer a secure framework post-surgery, minimizing the psychological effects of the procedure, avoiding nasal reflux, enabling clear speech post-surgery, and enhancing aesthetics. Meatal obturators are employed for the restoration of significant soft palate abnormalities. While prostheses can compensate for lack of muscle activity, obturators create uncontrollable changes in nasal resonance and air emission. The size of the obturator changes based on the specific defect.

The following is a typical way to apply Aramany's maxillary faults classification: Class I defects involve abutment teeth on one side of the front midline of the maxilla; Class II defects are unilateral and retain front teeth on the opposite side; Class III defects are palatal and affect the central hard and possibly soft palate; Class IV defects cross the midline and affect both sides with abutment teeth; Classes I through IV are further classified according to their locations. Class V defects are located behind the abutment teeth on both sides (and may require labial stabilisation) while Class VI defects are located anteriorly in the rear segment with abutment teeth on both sides. [3] According to Aramany, this case report is a Class I flaw. It is important to consider the user's weight, stability, retention, and comfort while designing a prosthetic. Obturator manufacturing methods prioritize patient comfort, convenience, and total defect coverage. These methods include open and closed hollow bulb obturators. Despite their modest maintenance requirements, open bulb obturators can develop a foul odour and taste due to mucus buildup, which necessitates the installation of vents in the hollow area.[4] Additional benefits of closed bulb obturators include reducing the weight of the prosthesis by about 30– 35% and preventing the development of air and mucus at the top of the gap.[4] A mixture of techniques and materials were used to create a lightweight artificial prosthesis in the literature. To minimise the weight of the prosthesis, a variety of materials are used to create its cavity. These include wax, gelatin soap, asbestos-wrapped cellophane, plaster, siliconeputty, dental stone, sugar, salt, alum, silicone resin, gauze coated with light-body material, thermocol, and iceblock.[5] A patient who underwent subtotal maxillectomy was treated with a biodentplast framework single piece definitive hollow bulb obturator, as detailed in this case report.

Case Report

The primary complaint of a 58-year-old male patient referred to the Department of Prosthodontics was deformity of the upper midface as a result of surgical removal of a lesion, as well as difficulty in eating and speaking. The patient underwent hemimaxillectomy on the same side of their face because they had a history of mucormycosis. This was Aramany's class I flaw, according to the intraoral exam (Fig 1). After six months of rehabilitation with an interim obturator, the patient was scheduled to get a permanent obturator prosthesis with a biodentplast framework that consisted of a single piece and a closed, hollow bulb.

The preliminary impression was made using an irreversible hydrocolloid impression material by closing the deepest part of the defect with a sterile guaze. The impression was poured in a type III dental stone followed by surveying and planning of the framework (Fig 2). Rest seats were prepared on the tooth number 14-15 and 16-17 and a polyvinyl siloxane impression was made(Fig 3). The

impression was sent to the lab for fabrication of the biodentplast framework. The framework design included a complete palatal coverage major connector with occlusal rests on 14-15 and 16-17, with embrasure clasps engaging the undercuts of 14-15 and 16-17 and a gingival approaching clasp with 11. The final impression was accomplished using the framework and low fusing green stick compound followed by condensation silicone wash (Fig 4). The final impression was poured using split cast technique (Fig 5) and patient's bite was recorded in centric and mounted a mean value articulator. (Fig 6) shows the try in phase in the patient's mouth. The denture was made hollow using salt technique, the salt was dissolved after final fabrication of the bulb. The floating of the denture in the water showed its light weightedness (Fig 7). The final denture delivery was done (Fig 8) and the patient was kept on a periodic recall of 1 week followed by 1 month and 6 months. The patient was satisfied with the treatment.

Discussion

After a maxillectomy, patients often have functional and cosmetic facial abnormalities that require the expertise of a prosthodontist to correct. Proper prosthetic obturation, which seals the maxillectomy defect and forms a barrier between the oral and sinonasal cavities, is the primary goal of maxillectomy defect treatment.[6] The degree of difficulty and obstacle in prosthetic restoration is affected by the location and severity of the defects. The ease of fabrication and maintenance of maxillary obturator prosthesis has led to its increased adoption over surgical reconstruction. In order to improve speech quality after using resonance[7], it is essential to extend the bulb. An extension bulb might be solid, open-hole, or closed-hole. Advantages of the empty bulb include lighter weight, better retention, and more comfortable prosthetics. Full extension8, reduced airway blockage, and prevention of fluid and food buildupare all advantages of sealed empty bulb obturators.

A two-piece cast partial obturator was originally intended for the patient's rehabilitation, but a final hollow bulb obturator prosthesis was ultimately planned due to the well-healed defect. However, the prosthesis would have been heavier with a cast metal framework, and the patient would have found the two-piece obturator to be too burdensome. This led to the development of a biodentaplast framework with a hollow obturator.

Biodentaplast is a type of techno-polymer created using acetal (polyoxymethylene) resin. Injection moulding technique is used to process the dentures. Acetal resins are produced through the polymerization of formaldehyde. A chain of alternating methyl groups is linked together by an oxygen molecule. Its different benefits, such as durability, better resistance to wear, and increased stiffness, make it a good choice for use as a clasp in removable partial dentures. It has a minimal water absorption rate, which makes it perfect for creating temporary surgical prostheses for significant oral defects.[8] Due to its superior flexibility, the retentiveclasp arm of acetyl resin can engage deeper undercuts on the abutment compared to cobalt- chromium clasps.

Research was carried out to compare the compressive and tensile strengths of PMMA, Valplast, Breflex, and Biodentaplast with a traditional compression molded PMMA. In the research, BioDentaplast demonstrated the highest tensile strength at 66.0 MPa, outperforming all other tested groups, and its compressive strength of 70.2 MPa was second only to the conventional compression moulded Meliodent at 74.5 MPa.[9] Saliva plays a crucial role in assisting denture retention through its wettability. Farcasiu and Pauma observed that BioDentaplast exhibited better wettability than other heat-cured acrylic resins that were tested. This indicates that

BioDentaplast is a preferred material for patients with reduced saliva production or Xerostomia.[10]. BioDentaplast acetal resin frameworks can reach a thickness of 0.3-0.5 mm without visible defects, making it appropriate for flexible, esthetic clasps in removable partial dentures. Acetal resin can be utilized as a substitute material for traditional heat-cured acrylic resin.

Hence a Biodentaplast framework will provide a light weight and more comfortable and efficient option to the patient.The hollow obturator improved retention, increased physiologic function, reduced pressure on surrounding tissues and had easy retrievability.

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FIGURES

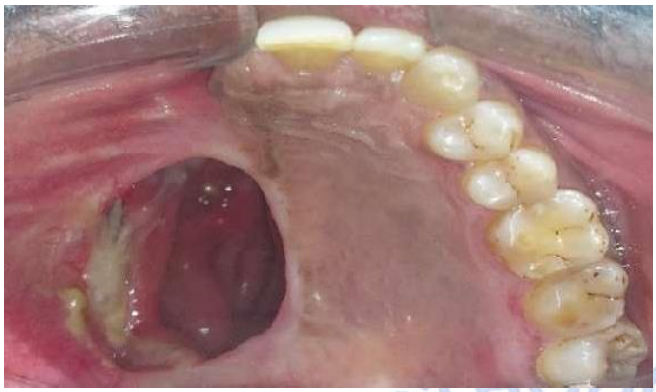


Figure 1.

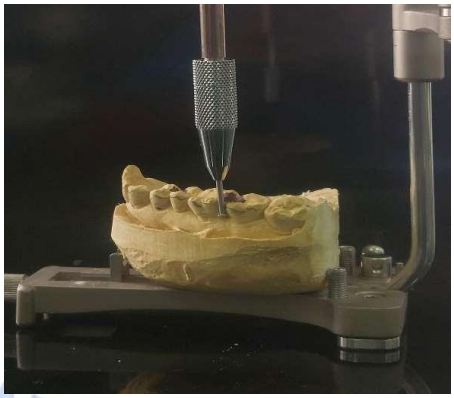
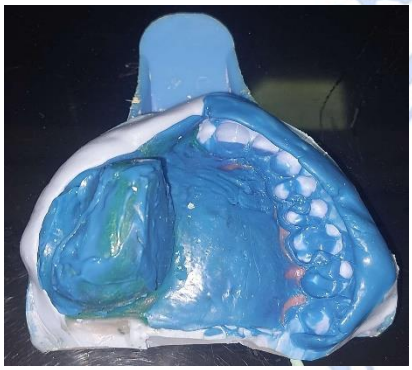


Figure 2.



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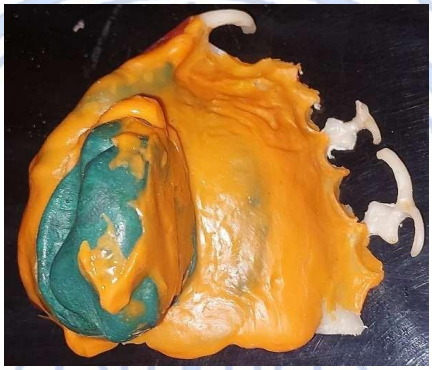
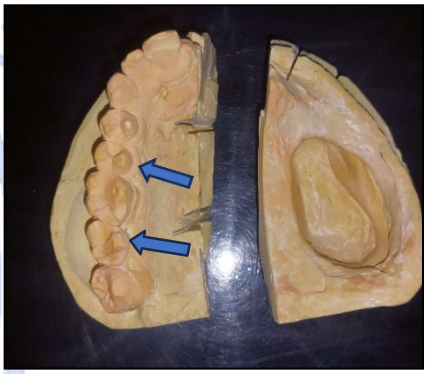


Figure 4.



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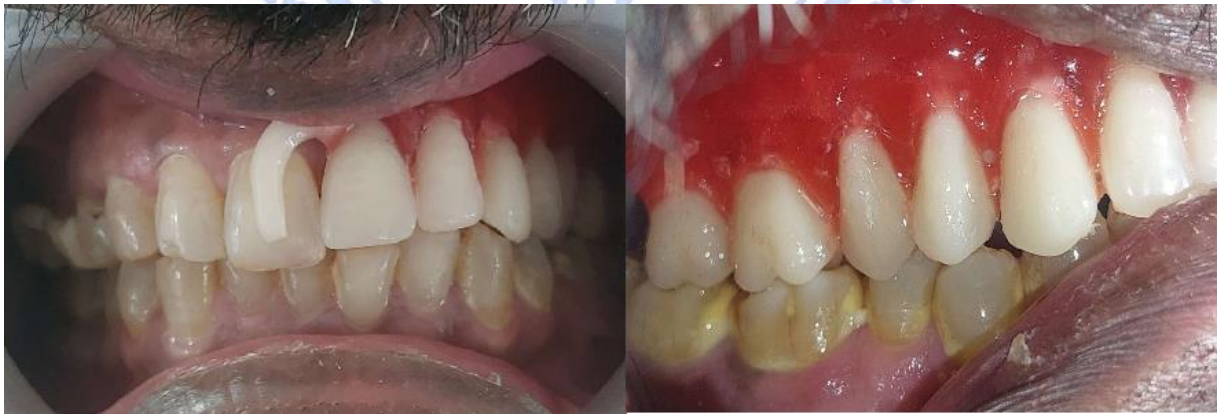

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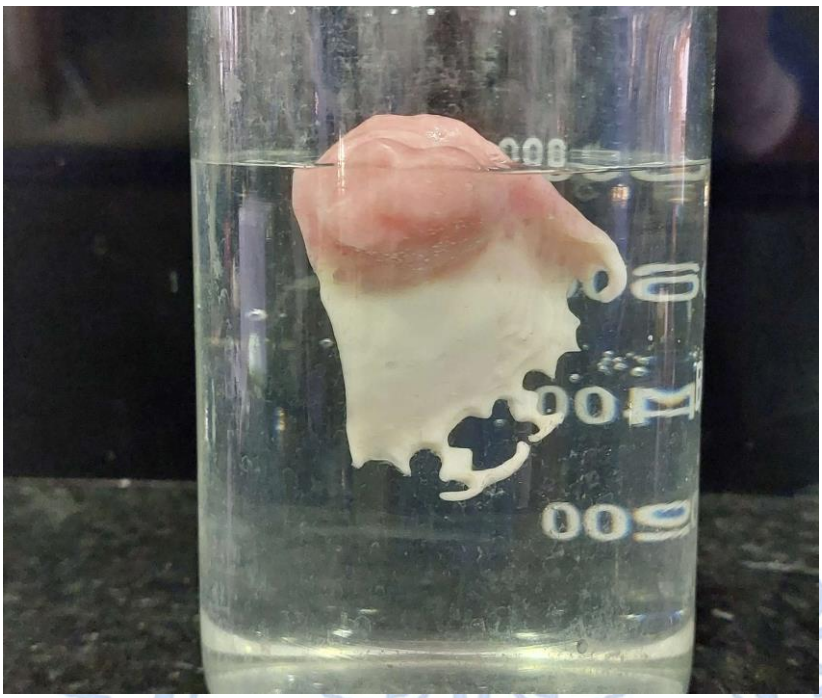

Figure 7

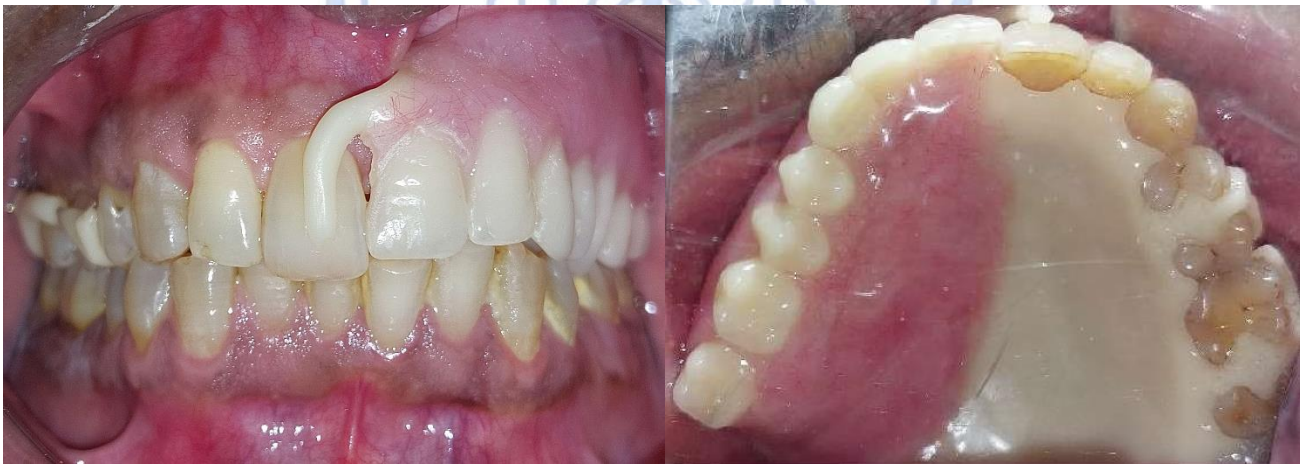

Figure 8