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International Journal of Oral Health Dentistry

Journal homepage: [www.ijohd.org](http://www.ijohd.org)

## Case Report

# Enhancing quality of life: A hollow bulb obturator in palatal defect rehabilitation - A case report

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## ARTICLE INFO

### Article history:

Received 10-09-2023

Accepted 24-09-2023

Available online 16-10-2023

### Keywords:

Maxillary defect

Hollow bulb obturator

Hemimaxillectomy

Rehabilitation

## ABSTRACT

The prosthodontic care for palatal defects is crucial for effectively closing oronasal communication in patients and enhancing various aspects of their oral health. This includes improving masticatory function, speech clarity, aesthetics, and overall comfort. Maxillary defects often arise as a result of surgical interventions for conditions like malformations, neoplasms, or traumatic injuries. In such cases, the primary objective of employing an obturator is to close the palatal defects that result from maxillectomy procedures, with the ultimate aim of enhancing both speech and masticatory function. This article presents a comprehensive case study highlighting the prosthetic rehabilitation of a maxillectomy defect resulting from osteosarcoma. The rehabilitation approach incorporates the use of a hollow bulb obturator, showcasing its transformative impact on the patient's masticatory function, speech clarity and aesthetics thus enhances the patient's quality of life.

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## 1. Introduction

The human maxilla, a crucial element of the upper jaw, is vital not only for mastication but also for speech articulation, facial aesthetics, and overall psychosocial well-being. Intraoral maxillary defects, whether resulting from congenital anomalies, surgical resections, or trauma, can profoundly impact an individual's ability to lead a functional and confident life. Rehabilitation of such defects is a paramount concern, encompassing various approaches, among which prosthetic intervention stands as a versatile and effective solution. These defects can have significant consequences for patients, such as hyper nasal speech, fluid leakage into the nasal cavity, and impaired masticatory function.<sup>1</sup>

The prosthesis constructed to rehabilitate the maxillary defect is termed as an obturator. Prosthetic rehabilitation

for patients who have undergone maxillectomy serves several objectives, including the separation of the oral and nasal cavities to enable proper swallowing and speech articulation, potential support for the orbital contents to prevent conditions like enophthalmos and diplopia, restoration of soft tissue support to reestablish the midfacial contour, and achieving a satisfactory aesthetic outcome.

The extent of obturator extension into the defect depends on several factors, including the defect's configuration, the characteristics of its lining tissue, and the functional requirements for stabilizing, supporting, and retaining the prosthesis.<sup>1</sup> Hollow obturators, while effective in some cases, present certain drawbacks, such as the accumulation of food particles, debris, and mucus within the hollow portion, potentially leading to unpleasant odors and increased weight. In contrast, closed hollow obturators offer advantages by preventing the retention of water and food, facilitating easier cleaning, and reducing overall weight while still achieving maximum extension.<sup>2,3</sup>

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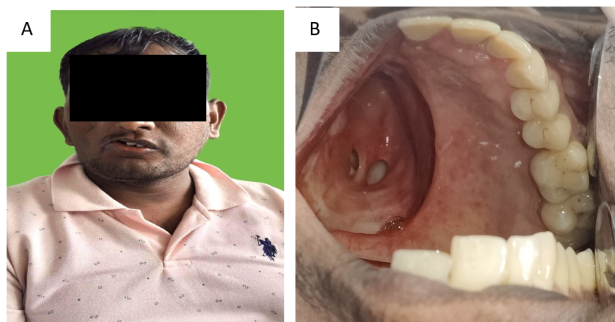
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Several factors come into play when determining the prognosis of treatment for palatal defects, including the size of the defect, the number of remaining teeth, the presence of remaining bony structures, and the patient's ability to adapt to the prosthesis. These considerations collectively shape the approach to rehabilitation and the anticipated outcomes of the treatment process.

## 2. Case Report

A 33-year old male patient reported to the department of prosthodontics of Seema dental college and hospital, Rishikesh, Uttarakhand with the chief complaint of difficulty in eating food and speaking since 3 years. History of present illness revealed that the patient had diagnosed osteosarcoma and was operated for same 3 years back. On extra oral examination depression of the nasal septum and scarring present on right mid-facial region & of the upper lip, also showed concavity in the malar region. Hypernasality in speech was also present (Figure 1).

On intra oral examination patient presented with a defect on the right side of the maxilla involving the hard palate. Residual teeth present after surgical resection were from 11 to 28. According to Aramany's classification, it was classified as a class I defect (Figure 1). Antero posteriorly defect extends from premaxilla behind central incisor extending till posterior palatal seal area. Mediolaterally it extend medially from mid palatal raphe involving alveolus obliterating the buccal vestibule. The patient presented with good oral hygiene.



**Fig. 1:** Pre-operative view. **A)** Extra oral view. **B)** Intra-oral view

### 2.1. Procedure

To initiate the primary impression, a meticulous approach was employed. The defect area was blocked using a gauge piece soaked in a betadine solution, and a modified prefabricated primary tray was thoughtfully crafted for recording impression (Figure 2). Capturing the primary impression is a crucial task executed with precision using an irreversible hydrocolloid impression material (Zelgan 2002, DENTSPLY) (Figure 3). The impression was then

poured with type 3 gypsum material (Kalstone, Kalabhai), ultimately yielding a primary cast of remarkable detail and accuracy.



**Fig. 2:** Blocking of the defect

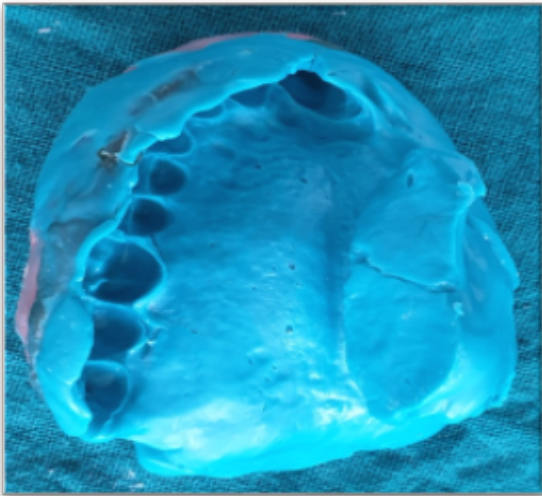


**Fig. 3:** Primary impression

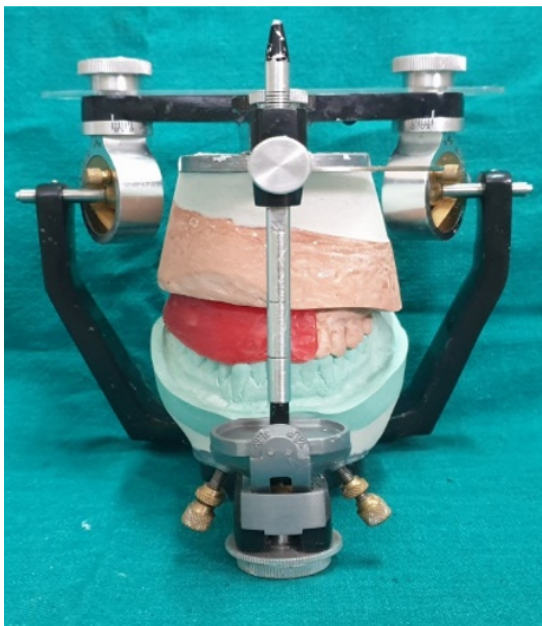
Subsequently, a custom tray, made to fit the patient's unique oral anatomy, was fabricated upon the primary cast. To ensure an impeccable fit and seal, border molding was done using green stick impression compound (DPI pinnacle tracing sticks). The final impression of the defect was obtained with the utmost precision, employing a regular viscosity addition silicone impression material (Reprosil, DENTSPLY) (Figure 4), thus yielding a master cast of exceptional quality.

Record base, in harmony with the patient's oral contours, was skillfully designed along with adjusted occlusal rim. The delicate task of capturing the patient's jaw relation was accomplished with accuracy, subsequently transferring this vital information to a semi-adjustable articulator (Figure 5).

Teeth arrangement, a crucial aspect of the prosthesis, was approached. A meticulous wax try-in was performed to ensure an optimal fit and function, leaving no room for compromise. Following the successful try-in (Figure 6), the waxed obturator underwent the final transformation using



**Fig. 4:** Final impression



**Fig. 5:** Articulation

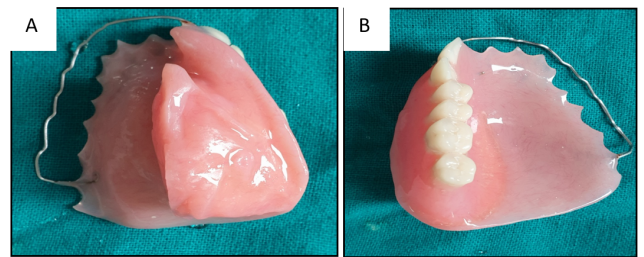
heat-polymerizing acrylic resin, resulting in a prosthesis of good quality and durability (Figure 7).

Upon insertion into the patient's oral cavity, intraoral adjustments were carried out carefully (Figures 8 and 9). The integrity of the obturator was put to the test, and the patient's ability to retain water in his mouth without any regurgitation through the nose confirmed a flawless seal, assuring the effectiveness of the prosthesis. Most notably, the patient experienced a marked improvement in his speech with the obturator in place.

After a brief interval of three weeks, the patient returned for a follow-up appointment. His adaptation to the



**Fig. 6:** Try in



**Fig. 7:** Final processed prosthesis. **A):** Polished surface of the prosthesis. **B):** Intaglio surface of the prosthesis



**Fig. 8:** Post insertion intra-oral view of the prosthesis

prosthesis was exceptional, and he expressed a high level of satisfaction with the outcome. This remarkable journey in prosthodontics showcases the artistry and precision required in creating a customized solution that not only restores function but also significantly enhances the patient's quality of life."

### 3. Discussion

Individuals with maxillary defects often encounter significant challenges in performing everyday functions, with primary impairments observed in deglutition and





**Fig. 9:** Post-operative extra-oral view of the patient

speech, especially when dealing with substantial defects.<sup>4</sup> Successful rehabilitation through the use of an obturator serves as an effective approach, with the primary goal being the restoration of essential oral functions and aesthetics by separating the oral and nasal cavities.

Several critical factors come into play in this process, including the size of the defect, the number and condition of remaining teeth, the integrity of surrounding bony structures, and the patient's compliance with treatment recommendations.<sup>5</sup> Customized obturators are tailored to address the specific dimensions and characteristics of the defect, ensuring optimal functionality and aesthetic outcomes.

The selection of an appropriate retainer for a patient's dental prosthesis is dependent on the remaining teeth, their location, and their number. This choice is crucial as it impacts the stress placed on the abutment tooth. In the design of the clasp assembly, it is essential to adhere to fundamental principles such as ensuring a passive fit, encircling the tooth properly, and providing stabilization.<sup>6</sup>

However, in cases where patients have extensive palatomaxillary defects, the stability and retention of the obturator may be compromised significantly. This can be due to reduced bone support or the absence of a terminal abutment tooth for long-term clasping.<sup>7</sup>

Various retentive aids are available for conventional hollow-bulb obturator prostheses. These include magnets, snap-on (friction type) attachments, acrylic buttons, retentive clips, and implants.<sup>6</sup> Implants are particularly effective in reducing prosthesis movement, preventing rotation, and promoting axial loading. When obturators are retained using implants and a cast metal framework, their design and weight may need to be adjusted accordingly.<sup>7</sup>

A range of materials has been proposed for obturator fabrication, keeping in mind the socioeconomic status

of patient, including heat-polymerizing acrylic resin, silicone rubber, and light-polymerizing acrylic resin. Among these options, heat-polymerizing resin stands out as the most widely used and successful choice due to its superior physical strength and resistance to fungal infections, distinguishing it from silicone rubber and light-polymerizing acrylic resin.<sup>8</sup>

A bulky obturator prosthesis places continual strain on the surrounding tissues, leading to discomfort and potential health issues. To mitigate the risk of dislodgement, it is essential to minimize the prosthesis's weight.<sup>9</sup> Heat-cured acrylic resin is the most commonly employed material for crafting obturator prostheses due to its durability and tissue compatibility.

The lost salt technique is typically employed in the fabrication of a hollow-bulb obturator in this case. This technique results in a lightweight prosthesis that effectively spans the defect area while being well-tolerated by the patient. Furthermore, this type of obturator is easy to maintain in terms of hygiene and significantly enhances speech intelligibility.<sup>10</sup>

#### 4. Conclusion

Rehabilitating a patient who has undergone hemimaxillectomy surgery presents a significant challenge, primarily centered around achieving optimal retention, stability, and support for their prosthetic device. Success in this endeavour relies heavily on the prosthodontist's comprehensive knowledge and honed skills, along with a deep understanding of the unique requirements and preferences of the patient.

The cornerstone of successful rehabilitation hinges on crafting a definitive obturator prosthesis with extensive coverage and meticulous design. This prosthesis serves as a critical factor in elevating the patient's quality of life, significantly enhancing their capacity to eat comfortably, articulate speech with precision, and ultimately, reinstating a sense of normalcy and well-being in their everyday life.

#### 5. Source of Funding

None.

#### 6. Conflict of Interest

None.


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**Cite this article:** Aeran H, Kumar V, Aeran M. Enhancing quality of life: A hollow bulb obturator in palatal defect rehabilitation - A case report. *Int J Oral Health Dent* 2023;9(3):234–238.