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### RESEARCH ARTICLE

#### PROSTHETIC REHABILITATION OF A MAXILLECTOMY PATIENT WITH A TITANIUM CLOSED HOLLOW BULB OBTURATOR USING LOST WAX BOLUS TECHNIQUE - A CASE REPORT

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#### Abstract

Maxillary intraoral defects due to surgical resection create an open link between the oral and nasal cavities causing difficulty in deglutition, speech, and an unaesthetic appearance. Maxillary obturator prosthesis is a more frequent treatment modality than surgical reconstruction for maxillectomy in patients suffering from oral cancer. The obturators often become heavy and hence are hollowed out in the defect portion to reduce its weight as a standard practice. This case report describes the prosthetic rehabilitation of a maxillectomy patient with a titanium cast hollow obturator using lost wax bolus technique.

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#### Introduction:-

Maxillary obturator prosthesis is a more frequent treatment modality than surgical reconstruction for partial or total maxillectomy in patients suffering from oral cancer<sup>[1]</sup>. Patients with palatal defects suffer functional difficulty and esthetic deformity. Large maxillary defects are associated with the loss of hard tissues including bone and teeth complicated with overlying soft tissue collapse. In such situations, the prosthetic obturators help to a great extent as they not only replace the defect portion but also provide masticatory and speech functions by replacing the teeth and natural anatomical form of the missing structures<sup>[2]</sup>.

Increased weight of the obturator prosthesis is usually a major concern to the prosthodontist. The obturator should be light in weight to provide favorable retention, stability, support, patient comfort and cleanliness.<sup>[3]</sup> Wu and Schaaf designed different types of obturator prostheses (both solid and hollow) based on Aramany's classification and evaluated for weight reduction. They concluded that hollow obturator prostheses had significantly increased weight reduction, from 6.55% to 33.06% depending on the size of the defect<sup>[3]</sup>. There are various methods to reduce the bulk of the prosthesis. Restoring the maxillary defect with a titanium hollow bulb obturator, is one of the methods, which reduces the weight of the prosthesis, improves the comfort to the patient. In this article we are presenting a clinical case treated with a titanium hollow bulb obturator in which the preshaped "wax-bolus" is incorporated during packing and eliminated later by melting it once the curing procedure is completed.

#### Case Report

A 38-year-old male patient was referred from the Regional Cancer Centre, Thiruvananthapuram, to the Department of Prosthodontics, Government Dental College, Trivandrum, for prosthetic rehabilitation of a maxillectomy defect. The patient had undergone surgical maxillectomy 10 months back for the treatment of SCC. The chief complaints

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reported by the patient were nasal regurgitation of food and fluids while eating along with difficulty in speaking. An extraoral examination revealed facial asymmetry, with a lack of support for the lips and cheek on the right side (Fig. 1)

Intraoral examination revealed an Aramany type II palatal defect involving the right side of the arch (Fig. 2)

### Procedure:

After clinical evaluation, primary diagnostic impressions were made using irreversible hydrocolloid impression material (Zelgan Alginate, Dentsply) after blocking out the undercut with gauze cotton. The maxillectomy defect was outlined and the cast was surveyed for designing the titanium metal framework. A special tray with a uniform 2 mm wax spacer was fabricated for the final impression procedure. Rest seats were prepared on mesio-occlusal of 24 and mesio-occlusal of 27, to receive rests of reverse circlet clasp. Guide planes were prepared on distal of 24 and mesial of 27. After completion of the mouth preparation, border molding of the defect side was done using low fusing compound in an incremental manner. The final impression was made using polyvinyl siloxane light body material (Aquasil, Dentsply) (Fig. 3) and the model was poured. The design was transferred onto the master cast. A refractory cast was made by duplicating the blocked-out master cast using reversible hydrocolloid. The wax pattern was cast in titanium (Fig. 4). The try-in of the metal framework was done in the patient's mouth (Fig 5).

After metal framework try-in, seal the bulb portion of the defect with modelling wax, keeping the metal frame work in proper position. Flasking and dewaxing done in conventional manner. (Fig 6) Grossly estimate the total surface area to be hollowed and soften the modeling accordingly to form a wax-bolus for filling-up the same space. After dewaxing, Small amount of heat-cure acrylic resin was mixed and it was placed in the bottom of the defect. Place the wax bolus on the specified areas then it is covered with mixed acrylic. The idea is to sandwich the wax bolus in layers of acrylic (Fig 7) and processed (Fig 8).

Then small holes were created on the bulb. Apply the forceful hot water through one of the holes to remove the wax bolus through remaining holes, forming a hollow space of the shape of the wax-bolus. After that the holes were filled with self polymerizing acrylic resin. Finishing and polishing of the hollow obturator done in conventional manner. Followed by maxillo - mandibular records were made. (Fig 9), Try in done (Fig 10). Processing was carried out by placing the thermocol in the denture portion to make it hollow. (Fig 11). After processing, standard finishing and polishing procedures were done (Fig 12), the prosthesis was inserted (Fig 13). The patient showed considerable improvement in phonation, and the obturator was very effective in preventing nasal regurgitation of food and fluids. (Fig 14). Periodic recall appointments were scheduled for the evaluation of the prosthesis.

### Discussion:-

Prosthetic rehabilitation of maxillary defects can be categorized into three stages in which different types of obturator are fabricated in each stage. The obturator design may vary based on the classification system of the surgical defect. In this case, the support was gained from the remaining teeth and palate. Complete coverage of the remaining palate was planned to ensure maximum distribution of the load during function. The weight of the prosthesis must be reduced to increase the retention of the obturator<sup>[4]</sup>. The main advantages of titanium are its low density (4500 kg/m<sup>3</sup>), good corrosion resistance, and high strength. The other advantage of the titanium framework is it significantly reduces the risk of infections with pathogenic oral microorganisms and may protect from local oral or systemic infections<sup>[5]</sup>. The hollowing procedure further decreases the weight of the prosthesis. Hollow bulb of the prosthesis reduced 33% the weight of the obturator and titanium plate reduced 13% of the weight of the prosthesis<sup>[6]</sup>

Several techniques and materials have been described previously to fabricate a lightweight, hollow obturator<sup>[7]</sup>. Grinding out the interior of the bulb,<sup>[8]</sup> fastening the lid to the superior border<sup>[9]</sup>, incorporation of the materials like sugar<sup>[10]</sup> and iceduring packing are some of the methods to create the hollow prostheses. Separate processing of two halves followed by joining them with an autopolymerizing resin.<sup>[11]</sup>, using preformed plastic shapes<sup>[12]</sup>, plaster matrix, resin shim and a polyurethane foam<sup>[12]</sup> are also described in the literature.

This technique is a modification of previous techniques which comprises the use of a preshaped wax-bolus to maintain a predictable internal dimension of a hollow space. Bench-polymerization of 24 hours immediately after packing is compulsory to avoid wax-bolus distortion in curing process. Make sure the wax-bolus is kept in ice-cold water to harden it to prevent distortion by packing pressure. Dimensional changes and properties of the processed

resin resulting from this technique may be one of the major issues. Studies are suggested to evaluate the material properties of the resin after processing with this technique.



**Fig 1:-** Preop Extra Oral.



**Fig 2:-** Preop Intra Oral.



**Fig 3:-** Impression.



**Fig 4:-** Titanium Framework.



**Fig 5:-** Framework try In.



**Fig 6:-** Acrylized Framework.





**Fig 7:-** Sandwiching the wax ball in the bulb Portion.



**Fig 8:-** Acrylized hollow bulb.



**Fig 9:-** Jaw Relation.



**Fig 10:-** Verification of Jaw Relation.



**Fig 11:-** Thermocol Placed in the denture portion.



**Fig 12:-** Hollow Bulb Titanium Obturator.



**Fig 13:-** Prosthesis Insitu.



**Fig 14:-** Post Op Extra Oral.

### **Conclusion:-**

Rehabilitation of the maxillectomy defect with an obturator prosthesis appears to be a functional and effective treatment modality. With proper diagnosis and treatment planning, the prognosis with the obturator will favor the patients to lead a life with self-confidence and respect. This case report discussed the prosthetic treatment of a maxillary defect with a titanium cast hollow definitive obturator.

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