Case Report:

Alternative technique for fabrication of hollow bulb obturator for hemimaxillectomy patient – a case report


ABSTRACT:
Maxillary defects are due to congenital or developmental malformations, surgical treatment of benign or malignant neoplasms and accidental trauma. Rehabilitation of such maxillary defect has direct effect on cosmetic function and psychology of the patient. Obturator prosthesis is commonly used as an effective means for rehabilitation of hemimaxillectomy patient. For the success of an obturator it should cover maximum supporting area, utilizing all the favourable undercuts and utilizing the remaining teeth and reduction of the weight of the obturator is important.

This case report describes a simple modified technique for fabricating an overdenture with closed hollow bulb obturator. It allows for control of the bulb’s wall thickness and weight while not requiring any additional materials or time-consuming steps to the conventional processing procedures.

Key words: Hemimaxillectomy, Closed hollow bulb obturator, palatal defect, Retention and Stability

INTRODUCTION: The intra oral defects are due to trauma, disease, pathological changes, radiation burns or surgical intervention, amongst which the most common are in the maxilla which may result in an opening into the antrum or nasopharynx. The defects may involve any portion of hard and soft palate, alveolar ridges and floor of the nasal cavity. Maxillary defects predispose the patient to hypernasal speech, fluid leakage into nasal cavity, impaired masticatory function.

The goals of prosthetic rehabilitation for such patients should include separation of oral and nasal cavities to allow adequate deglutition and mastication and achieve normal facial appearance for acceptable esthetic results. The prosthesis needed to repair such defects is termed as a maxillary obturator. An obturator (Latin: obturare, to stop up) is a disc or plate, natural or artificial, which closes an opening or defect of the maxilla as a result of a cleft palate or partial or total removal of the maxilla for a tumor mass.

To achieve stability of this type of prosthesis, it is necessary to extend the flanges to the lateral scar band, the mesial wall of the defect, and anatomical undercuts. The increased volume and weight of the obturator, however, impairs retention and results in
prosthetic loosening. To minimize the weight, a closed or open hollow design is recommended.\textsuperscript{9,13} Preservation of that which remains is the ultimate objective along with function, esthetics and comfort. Preservation of remaining teeth is particular importance because retention of the prosthesis is far less in the corresponding edentulous patients.\textsuperscript{(14)} and Proprioceptive ability of the teeth under over dentures might act as a signal against the physiological overload and thereby reduce bone resorption \textsuperscript{(15)}. This case report illustrates class II defect of Aramany classification which was rehabilitated by a definitive closed hollow bulb obturator.

**CASE REPORT:** A 75-year-old man visited the department of Prosthodontics, Government Dental College and Hospital, Hyderabad for the rehabilitation of a four-year-old maxillary defect after hemi maxillectomy due to squamous cell carcinoma of the right maxilla. The patient requested restoration of his masticatory function, improvement of speech and deglutition. On extra oral examination, the facial depression included the right suborbital area, the right nasal alar area, and the right angle of the mouth and intraoral examination revealed that partial resection of the right maxilla extending from the posterior border of the pre maxilla to the anterior border of the soft palate (fig:1). Single tooth was present (canine) on left side of the arch. The treatment plan was to fabricate an over denture by giving long coping to canine with closed hollow bulb obturator for the upper arch.

First maxillary left canine was endodontically treated and then tooth was prepared and cast metal (co-cr) long coping was given. Special tray was prepared on the primary cast, border moulding done on left side with green stick compound (DPI) and final impression was made with light body elastomeric impression material (reprosil) (fig:2). Master cast was prepared with type IV dental stone (kalarock). The master cast revealed that the lateral wall and scar band of the right sinus and anterior border of the soft palate and nasal septum were available to retain and support the prosthesis.

After undesirable undercuts within the defect portion were blocked out on the master cast, an autopolymerized acrylic resin (DPI) baseplate and wax rims with modelling wax (charminar) were fabricated. Then the maxillomandibular relationships were recorded. The casts were mounted on a semi adjustable articulator, and the anatomic artificial teeth (Bio rock) were arranged. To obtain balanced occlusion, occlusal disharmonies were corrected with methodical selective grinding as with traditional complete dentures. A clinical try in of trail denture was performed to evaluate the esthetics and occlusion. After tryin flasking was done. After dewaxing, once the flask was ready to be packed, a small amount of heat-polymerized acrylic resin (DPI) was placed at the apex of the defect to eventually become the lid. Cover the acrylic resin with a piece of aluminium wrapper which acts as a separator between the lid and the remaining obturator (fig:3). Continue to pack the rest of the obturator prosthesis in the conventional manner. Bonding of the two masses of acrylic resin was prevented by the aluminium wrapper acting as a separating medium.

Pry off the newly formed lid at the wrapper-acrylic resin junction and set aside (fig:4). Outline the margins at the point of separation on the bulb to ensure that there is no alteration when the bulb is made hollow. Make the bulb hollow by removing acrylic resin with a bur. Leave adequate thickness of
acrylic resin to allow for adjustments at the placement and post insertion visits (fig:5). Insert the obturator prosthesis without the lid and adjust as necessary. Send the patient with an open hollow bulb obturator, and monitor the patient during post-insertion visits. Finalize the thickness of the bulb walls when the obturator is deemed comfortable to the patient. Seal the lid with autopolymerizing acrylic resin (DPI)(fig:5). To confirm an air-tight seal, place the obturator prosthesis into a bowl of water and verify that it remains float(fig:6). Return the polished prosthesis to the patient( fig:7), post insertion instructions were given and patient was called for regular recall checkups which showed an improvement in speech, mastication, swallowing and facial esthetics.

**DISCUSSION:** Ambroise Pare was the first to use artificial means to close the palatal defect as early as the 1500s. Steadman described the use of an acrylic resin prosthesis lined with gutta-percha to hold a skin graft in a maxillectomy defect in 1956.

In 1953 Ackerman fabricated hollow obturator prosthesis. Recent investigations have confirmed the effectiveness of obturator prosthesis in terms of speech, masticatory functions, swallowing and appearance. Large maxillectomy defects in edentulous patients are often challenging to manage prosthetically. Maxillary defects predispose the patient to hyper nasal speech, fluid leakage into nasal cavity, impaired masticatory function. Obturation of the defects minimizes these problems. Obturator retention problems are exacerbated when the characteristics of the defect are unfavourable.

To attain maximum stability and retention, prosthesis must utilize all the retentive areas of the defect and remaining anatomical structures. In solid bulb obturators because of increased weight retention of the prosthesis get effected. Preservation of remaining teeth is particular importance because retention of the prosthesis is far less in the corresponding edentulous patients and proprioceptive ability of the teeth under overdentures might act as a signal against the physiological overload and thereby reduce bone resorption.

In hollow bulb obturator the weight of the prosthesis is reduced, making it more comfortable and efficient and the lightness of the prosthesis changes one of the fundamental problems of retention and increases physiologic function. There are many methods of constructing hollow bulb like lost salt process, gas injection technique, use of light cure acrylic resins. Here the technique used which gives an accurate fabrication of hollow bulb and control to maintain the bulb wall thickness.

**CONCLUSION:** Rehabilitation of acquired maxillary defect using definitive closed hollow bulb obturator took care of different domains of care, which improved physical, emotional, functional and social needs.

Fig.1 - Extra and Intra oral view.

Fig.2 - Secondary impression and Master cast.
Fig. 3 - Placement of heat cure acrylic resin and covering the acrylic resin with a aluminium wrapper

Fig. 4 - Separation of the lid

Fig. 5 - Bulb portion made hollow by removing acrylic resin and lid sealed with self cure acrylic resin

Fig. 6 - Floating obturator.

Fig. 7 - Post insertion of the prosthesis. Extra oral view.

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