

AN INNOVATIVE TECHNIQUE OF FABRICATION OF HOLLOW OBTURATOR FOR A CASE OF HEMI-MAXILLECTOMY

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Abstract

Hemimaxillectomy patients need rehabilitation for the closure of the defect so that the functions such as speech, mastication, esthetics and deglutition are restored to as normal as possible. Obturator is the prosthesis that is used for the patients with palatal defects. The palatal defects can be either congenital or acquired. The main problem while fabricating an obturator to close a larger defect is the weight of the prosthesis. An obturator need to be fabricated in such a manner so that the factors like retention stability and support are not compromised. This can be achieved by making the prosthesis as light as possible. This case reports deals with a unique way of fabrication of hollow obturator for a patient with a maxillectomy defect on the left side with only four posterior teeth remaining on the unaffected side. The uniqueness of this obturator is the hollowing of not only the bulb of the obturator, but also, the hollowing of the denture base.

Key words: Hemimaxillectomy, Hollow obturator, Armany's Class IV defect.

Introduction

Prosthodontic management of maxillary palatal defects has been employed for many years.¹ Restoration of maxillofacial defects is a challenging task for both the surgeon as well as prosthodontist.² Rehabilitation of a patient after the surgical procedure of hemimaxillectomy is very important. The sequence of treatment includes placement of a surgical obturator for 5 to 10 days followed by an interim obturator till the wound heals; finally the construction of a definitive obturator that is placed 3 to 6 months post-surgery when the major tissue changes have taken place and the entire wound has healed completely.^{3,4}

An obturator is defined as a prosthesis used to close a congenital or an acquired opening in the palate.⁵

Glossary of Prosthodontic Terms defines obturator as: -

1. A maxillofacial prosthesis used to close a congenital or acquired tissue opening, primarily of the hard palate and/or contiguous alveolar/soft tissue structures (GPT 7)
2. That component of a prosthesis which fits into and closes a defect within the oral cavity or other body defect.⁶

The closure of the defect becomes even more important so as to facilitate and restore speech, mastication, deglutition and esthetics.⁷ Hollow obturator can be open or closed. A closed obturator prevents the percolation of fluid and reduces air space in the defect.⁸ The weight of the prosthesis can be reduced upto 33% by fabricating a hollow obturator. To minimize the weight, a closed or open hollow design is recommended.⁹

According to Armany, the partially edentulous palatal defects are classified into six classes that are acknowledged in the prosthetic design of an obturator frame work.^{10,11} In this article, a light weight hollow obturator was constructed for a maxillectomy patient with Armany's class IV defect.

Case Report

A 49 year old male patient reported to the department of Prosthodontics, for the prosthetic rehabilitation of the

palatal defect on the left side due to bilateral extended inferior maxillectomy that was done 4 years ago. He was wearing a simple prosthesis with no extension into the defect. His existing prosthesis was fractured and he had difficulty in eating, drinking, nasal regurgitation of fluids and difficulty in speech as there was nasal twang in his voice. He also wanted the new prosthesis to have some anterior teeth that would improve his esthetics.

Extraoral examination revealed depressed nasal septum and collapsed middle third of the face (figure 1).



Figure 1: - Pre-operative frontal view

On intraoral examination Armany's Class IV maxillectomy defect was revealed on the left side (figure 2). The palatal tissues were completely healed. The defect was large involving almost 1/3rd of the palate. There were only four teeth present on the unaffected side i.e. 24,25,26,27 making retention and stability extremely difficult. Thus light weight prosthesis was planned with a hollow bulb to overcome the problem of the weight of the prosthesis. In the mandibular arch, 36, 37 and 47 were carious and mild calculus and heavy staining was present. (figure 3)



Figure 2: - Intraoral view of the maxillary arch showing the defect



Figure 3: - Intraoral view of the mandibular arch

Procedure

1. A thorough oral prophylaxis was performed in the first visit and carious teeth were restored.
2. In the second visit, primary impressions of maxillary and mandibular arches were made using irreversible hydrocolloid (Plastalgin, Septodont India Pvt. Ltd.) after blocking the defect with gauze coated with petroleum jelly. Primary cast was poured using dental plaster (Kalrock, Kalabhai) and wax spacer was adapted using modelling wax, followed by the fabrication of a special tray using chemically activated acrylic resin (DPI) (figure 4).



Figure 4: - Primary Cast and Custom-made special tray

3. Border molding was done using putty consistency of polyvinyl siloxane impression materials and final impression was made using putty-wash impression technique (figure 5). Due care was taken to block the deep undercuts of the defect with gauze coated with petroleum jelly.

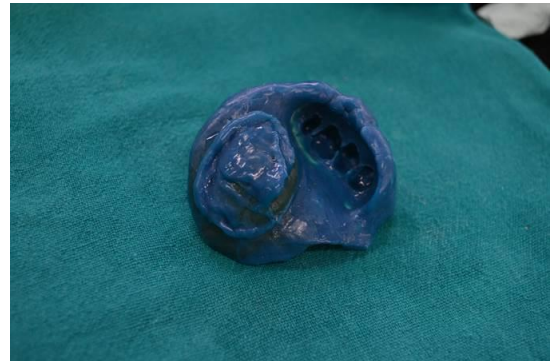


Figure 5: - Final impression of the maxillary arch with polyvinyl siloxane

4. Master cast was poured using dental stone (Kalstone, Kalabhai) and excessive undercuts in the defect were blocked using dental plaster.¹² A temporary denture base was made of auto-polymerizing acrylic resin and occlusal rims were fabricated using modelling wax over it.
5. Maxillomandibular jaw relations were recorded. Shade selection for artificial teeth was done. The casts were mounted on the articulator and anterior teeth arrangement was done using semi-anatomic teeth of the selected shade.¹³ Anterior teeth try in was performed to evaluate esthetics and speech. Arrangement of posterior teeth was done.
6. A continuous clasp of 19 gauge wire was adapted to the remaining four teeth on the master cast for retention of the prosthesis.
7. Final try-in of waxed-up prosthesis was done. (figure 6)



Figure 6: - Try-in of completely waxed-up of trial prosthesis

8. Completely waxed-up trial denture was hollowed out from the palatal surface by removing the majority portion of the wax of the occlusal rim leaving just a

thin layer of denture base extending up to the defect. Wax just enough to support the arranged teeth was left beneath the arranged artificial acrylic teeth. Extreme care was taken while performing this procedure in order to prevent any distortion of the teeth arrangement. A thin layer of wax was placed to cover the palatal surface with an opening at the middle of the palatal surface so that the plaster can enter the space between the defect and polished surface during the flasking procedure. The casts were invested in the flask. Dewaxing procedure was carried out, followed by packing with high impact heat cure poly-methyl metha-acrylate (PMMA) resin. The dental plaster which had flown through the opening of the completely waxed-up trial denture base leads to hollowing of not only the bulb, but also the entire denture base of the obturator. (figure7)



Figure 7: - Acrylized prosthesis showing the openings

9. Acrylized prosthesis was removed from the flask carefully. The opening on the palatal side of the polished surface of the prosthesis was filled with self-cure acrylic resin followed by finishing and polishing of the entire palatal surface (figure 8-9). The prosthesis was inspected for any defects or irregularities followed by finishing and polishing.



Figure 8: - Final hollow obturator after the closure of openings



Figure 9: - View of the tissue surface of the hollow obturator

10. This innovative technique led to fabrication of extremely light weight hollow obturator, which was floating on water due to its light weight. (figure10)



Figure 10: - Hollow obturator floating on water due to light weight

11. The prosthesis was finally inserted in the patient's mouth. The prosthesis instantly improved patient's esthetics and speech (figure 11). Post insertion instructions were given to the patient for the maintenance and care of the prosthesis. Follow-up was carried out at regular intervals.



Figure 11: - Postoperative frontal view of the patient

Discussion

A person's personality can be affected to a great extent due to facial disfigurement. Maxillofacial prostheses help in rehabilitating such cases and make them socially acceptable.¹⁴

Obturator become necessary for the patients who have undergone surgical procedure like maxillectomy and hemimaxillectomy. The functional requirements such as speech, mastication, deglutition and esthetics have to be restored to as normal as possible. A combination of a hollow bulb obturator and hollow prosthesis considerably reduced the weight of the prosthesis and improved retention, deglutition, comfort, efficiency, decreased pressure and improved regeneration of the surrounding tissue; reduced chances of muscle atrophy and improved self-confidence of the patient.

Various techniques were used by different clinicians to fabricate the prosthesis that is light weight.

Wu and Schaaf demonstrated the procedure to reduce the weight of the prosthesis for the partial maxillectomy patients by 6.55% to 33.06%.¹⁵

Shreshtha GK *et al* fabricated the hollow bulb obturator in two parts and joined them with autopolymerizing resin.¹⁶

Rilo B *et al* demonstrated the technique to fabricate the prosthesis on a dental chair at a single visit. He constructed the bulb with VLC resin and relined it with a silicon based relining material.⁴

Iramaneerat W *et al* demonstrated 'gas injection technique' for the fabrication of hollow bulb obturator in one step.¹⁷

Tanaka *et al* used polyurethane foam as core to reduce the weight of the obturator.¹⁸

This article describes yet another technique to fabricate the hollow bulb, light weight obturator. The waxed up denture is hollowed out and a small opening is left at the centre if the palate so that the plaster can enter in between the record base and the palatal wax up.

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