Hemimaxillectomy rehabilitation using simple hollow bulb obturator

Clinical Report

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ABSTRACT

Partial maxillectomy defect presents a considerable reconstructive challenge for the prosthodontist. It results in devastating effects on cosmetic, functional and psychological aspects of the patient. The factors which determine the prognosis of prosthetic reconstruction are size of defect, availability of hard and soft tissues in defect area, proximity of vital structures, systemic conditions and, the most important of all, patients' attitude and temperament.

This article describes the step by step clinical and laboratory procedure involved in the rehabilitation of a hemimaxillectomy patient using simple hollow obturator prosthesis to improve patient compliance for a more definitive future treatment plan.

KEY WORDS: Hollow bulb obturator prosthesis, partial maxillectomy, prosthetic rehabilitation

INTRODUCTION

Surgical removal of maxillary sinus due to pathologies should be associated with an appropriately contoured restoration to prevent a physically debilitating and psychologically demoralizing experience for the patient.[1] The defect frequently is complex and involves the skin, bone, muscle, cartilage and multi layers of mucosa.[2] Therefore, reconstruction of such defects is often challenging. Maxillectomy affects a variety of functions like mastication, speech, olfactory and gustatory sensation. Speech is usually unintelligible.[3-5] Patients also have seepage of nasal sections into the oral cavity, poor lip seal, xerostomia,[6] exophthalmoses and diplopia.[7]

An impression of the defect should be obtained as soon as the patient can tolerate the procedure.[10] Patient accommodation is usually slow and difficult after the initial obturator has been provided. Patient should also be educated that prosthesis is a functional and esthetic compromise that has many limitations.[11,12]

This case report describes the clinical and laboratory procedures involved in the rehabilitation of a similar patient.

CASE REPORT

A 65-year-old male patient reported to the Department of Prosthodontics, MCODS, Manipal, with chief complaint of missing upper jaw and teeth on one side since 10 months.

Review of his medical history revealed that right maxillectomy was done 10 months ago for inverted papilloma with septal perforation [Figure 1]. His medical history also included right-sided congenital Bell's palsy and dacryocystitis of right eye.

Extraoral examination revealed gross facial asymmetry with a collapsed right maxillary region [Figure 2]. The vertical dimension of face was reduced and mouth opening restricted. His intraoral examination was significant for the following findings. His right maxilla corresponding to the alveolar ridge with teeth, anterior wall of maxillary sinus and considerable portion of his nasal septum was found to be resected leaving behind a residual portion of soft palate [Figure 3]. The lower arch was edentulous. There was cervical abrasion with respect to 21, 23, 24, 25; root stump with respect to 22. Periodontal status of the remaining teeth was questionable.

Our treatment objectives include:

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Figure 1: Panoramic View with Resected Site

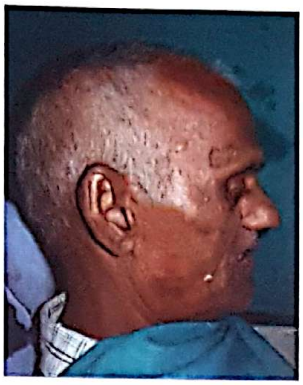

Figure 2: Pre-op Profile View of Patient

Figure 3: Intraoral View of Resected Site

Figure 4: Final Impressions (by putty wash technique - defect)

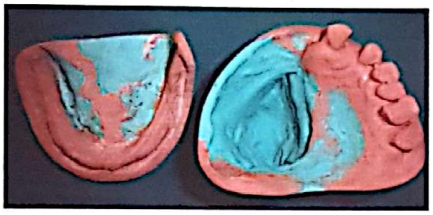

Figure 5: Master Casts

Figure 6: Master Cast Invested with Wax Block Out of Undercuts

Figure 7: Finished Obturator Portion

Figure 8: Finished Obturator Portion Tryin

Figure 9: Final Impression of Palatal Surface with Obturator in Place

Figure 10: Finished Prosthesis

Figure 11: Post-op Profile View

Figure 12: Post-op View of Prosthesis in Occlusion

- separation of nasal and oral cavities to aid in articulation and deglutition, restoration of mid facial contour and improvement of masticatory function
- complete oral rehabilitation consisting of oral prophylaxis, restoration of cervically abraded teeth, extraction of 22 root stump and complete denture for lower arch

Hence a multidisciplinary approach was required. To begin with, supra and sub gingival scaling, glass ionomer restorations for cervically abraded teeth and extraction of 22 root stump were done. This was followed by a definitive hollow bulb obturator incorporated with anti-rotational features and a denture portion retained by three clasps- two on the anterior and distal abutments and one triangular between the remaining premolars of the contra lateral side.

PROCEDURE

1. First, make a primary impression of the blocked out defect using an irreversible hydrocolloid -chromatic alginate. Pour primary cast for special tray fabrication with auto polymerizing resin (DPI-RR-dental products of India).
2. Carry out border molding to record the functional anatomy of buccal and labial soft tissues surrounding the defect. To make the final impression, record gross extent of the defect using soft putty material and make the final wash impression using medium body addition polyvinyl siloxane impression material (Reprosil; Dentsply USA). We also make secondary impression of the lower arch using medium body polyvinyl siloxane after border molding using greenstick compound [Figure 4].
3. After pouring master casts (after beading and boxing with modeling wax) with type IV dental stone, [Figure 5], block out of the master cast is done up to 2mm thickness of wax build up to provide adequate thickness of heat cure acrylic resin for strength of the obturator and for formation of mold space during investing for construction of the hollow bulb obturator portion [Figure 6].
4. The invested cast is dewaxed and packed using heat cure clear acrylic resin and lid with heat cure pink acrylic resin. (DPI – heat and PR Dental products of India.)
5. A contoured lid portion is fabricated simultaneously with anti-rotational features incorporated on to the palatal aspect of lid portion i.e. a raised wax beading of 2mm height is attached in a 'plus' sign fashion 3 x 3 cm. This prevents any rotation and also improves stability of upper denture portion by acting as an index for mechanical interlocking with the record base [Figure 7].
6. The lid and hollow bulb are secured tightly with auto polymerizing resin. Try in was done to check for the fit and retention was found to be satisfactory [Figure 8].
7. Secondary impression is made of the palatal aspect of obturator placed in the mouth to fabricate the denture portion [Figure 9]. This impression is then beaded, boxed and poured with type IV dental stone. Denture base is made using auto polymerizing acrylic and is ready for use as a record base for jaw relations. The freeway space is found to be 3mm.
8. Teeth selection, articulation and denture trial with obturator portion is done and found satisfactory. When patient is comfortable, did not complain of pain and there is a drastic improvement in speech, selective grinding of the remaining upper teeth is done to improve occlusion (for neutrocentric type of occlusion).
9. Three clasps are incorporated on to the denture portion to add to the retention of the prosthesis. A permanent soft lining material (silicone UFI gel, Germany) is used to reline the fitting surface of obturator portion, for additional retention, by engaging into the soft tissue undercuts [Figure 10]. The final prosthesis is delivered as a two-piece prosthesis consisting of obturator portion and denture portion with opposing lower complete denture [Figures 11 and 12 show post treatment outcome].

DISCUSSION

The basic objectives of prosthodontic therapy and principles should be applied in those patients requiring obturator therapy for maxillectomy defects. These objectives are.

1. Preservation of remaining teeth and tissues - The most important objective of prosthodontic care as emphasized by De Van.
2. Positive support within the defect – This is necessary to prevent rotation of prosthesis. It can be achieved by taking support from any anatomic structure which will provide a firm base. Example; temporal bone of infra temporal fossa and nasal septum.
3. Retention - If the obturator itself could minimize vertical displacement of the prosthesis it will have a greater advantage of reducing stress on residual structures. The intrinsic structures within and around the defect that can provide retention are residual soft palate, anterior nasal aperture, lateral scar band and height of the lateral walls.
4. The retention and stability of an obturator can be increased by weight reduction. Lightening the obturator portion improves the cantilever mechanics of suspension and avoids over taxing

of remaining supportive structures[8]

5. Stability - Maximal extension of prosthesis in all lateral directions should be provided so that the defect itself would enhance stability of the obturator prosthesis.[9]

Impression making, jaw relation, insertion and removal of prosthesis used for rehabilitation of mid facial defects require good mouth opening and proper neuromuscular coordination which were unfavorable in this patient due to Bell's palsy.

The advantage of using a hollow obturator is that it simulates the functional anatomy of maxillary sinus and adds resonance to speech. Heat polymerizing acrylic resin which was used for its fabrication has been proven to be one of the most durable tissue compatible materials till date. The conventional lost salt technique is not used for fabrication of this hollow obturator; rather a mold created by proper block out of undercuts technique is used.

The use of permanent soft lining material (Silicone, UFI Gel, Germany) to engage the soft tissue undercuts (by relining) is well tolerated by the patient and also added to retention.

Replacement of 22 as a modification space aids in extra retention of the denture portion and is, therefore, intentionally extracted. Patient is followed up 24 hours after insertion, one month and six months post operatively. When no discomfort is reported and patient compliance is satisfactory, the patient is prepared to be receptive to a more definitive prosthesis of a cast hollow bulb obturator in due course. In the meanwhile, hygiene maintenance of the prosthesis is emphasized by home protocol to be instituted by the patient. In this way the prognosis of a more permanent treatment option could be enhanced for the patient.

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