Original Research

Double Investment Technique of Hollow Bulb Denture Obturator Fabrication in a Completely Edentulous Patient

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Abstract

Introduction: Prosthodontic management of palatal defects has been employed for many years. Palatal defects of any extent cause multiple problems in speech, mastication and aesthetics. Obturator prosthesis for an edentulous patient is more critical in terms of its movements as there is no mechanical retention available. Obturators and facial prostheses are important not only for rehabilitation and aesthetics, but also in patient resocialisation. Maxillary defects are created by surgical treatments of benign or malignant neoplasms and by trauma, in which case, denture is supported only by the underlying residual ridge and the defect. This clinical report describes the rehabilitation of a maxillary resected patient with a single piece hollow bulb denture obturator fabricated by double investment technique. **Materials & Methods:** In this double investment technique of hollow bulb denture obturator fabrication two same size transposable flasks were used for flasking and curing of the prosthesis. Results: Hollow bulb denture obturator was obtained by this double investment technique. **Conclusion**: Decreased weight of prosthesis positively affects retention leading to improved physiologic function, and it also does not cause excessive atrophy in muscle balance.

Key-words: Double investment, Single piece, Hollow bulb obturator.

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Introduction

Fabrication of prosthesis for an edentulous patient with a large maxillary defect will challenge the skill of even the most experienced clinicians. With any size palatal perforation, retention in the classical sense of complete denture prosthesis is impossible. Several methods have been described for open and closed hollow bulb obturator fabrication. Both of these types of obturators are lightweight prostheses that can be easily tolerated by the patient (1-3). The bulb portion, which accommodates the defect area must add to the retention and stability by extending adequately into the defect to achieve a seal (4,5). However, greater extension means additional weight to the prosthesis and with the gravitational force; these forces may exert a dislodging force on the obturator (4). This article describes a double investment and double curing technique of fabricating a single piece hollow bulb denture obturator in a completely edentulous patient with partial maxillary resection.

Case Presentation

A 62 year old male patient was referred to the Prosthodontic Department of Government Dental College and Hospital, Ahmedabad, Gujarat, for restoration of a left side maxillary defect created after surgical intervention. The patient's medical history revealed that the patient had undergone surgery for a squamous cell carcinoma on the left side of the maxilla 14 months ago. The patient had used an interim obturator without teeth incorporation for the past 8 months. On intra oral examination, the defect was extending medially from the buccal mucosa to the midpalatine region and anteriorly from the canine region to the posterior extend of the hard palate, involving some part of the soft palate (Fig. 1). The patient presented with an obvious and typical nasal twang and he was experiencing difficulty in speech and deglutition. Extra oral examination exhibited sunken appearance on left side of face due to hemi-maxillectomy.

Figure 1. Intraoral view of the defect

Technique

A preliminary impression was made using putty body of rubber base impression material (Speedex, Coltene, Whaledent product, Switzerland) in a non-perforated stock metal tray(Jabbar &company, Worli, Mumbai, Maharashtra) to record the extension of the defect (Fig. 2). Then primary cast was poured.

- A severe undercut around the defect in the preliminary cast was blocked out by wax and one layer of 2 mm thickness modeling wax (Prime dental product pvt.ltd, Bhiwandi, Maharashtra, India) was used as relief before a custom tray was fabricated for proper extension into the defect, particularly for the superior extension of the lateral defect.
- The tray extension was checked intraorally, and border molding of the non-defect side was performed in sections using low-fusing modeling compound (DPI Pinnacle tracing sticks, The Bombay Burmah Trading Corporation Ltd). The patient was asked to perform various orofacial movements during border molding. Subsequently, the modeling compound was slightly cut back. The final impression of the defect was made using rubber base putty-body impression material while the wash impression was made in rubber base light body impression material (Speedex, Coltene, Whaledent product, Switzerland) , during this, the patient was again asked to perform various orofacial movements to obtain a functional impression (Fig .3).
- The master cast was poured in dental stone (Type III dental stone, Moldano, Heraeus Kulzer, Hanau, Germany) (Fig. 4).
- Jaw relation was recorded by conventional method.
- The teeth (Cosmo HXL, Dentsply Ltd, Surrey,UK) were arranged to contours established by the wax rims and conventiona1 anatomic landmarks. In this edentulous patient, bilateral balanced occlusion scheme with non-anatomic posterior teeth were preferred. The teeth were set in centric relation and adjusted to eliminate lateral deflective occlusal contacts.
- Waxed up dentures were tried and checked for retention, stability and comfort in the mouth. Phonetics was a cause of concern, so the denture movements were re-checked during phonation, and corrections were made accordingly.
- Before commencing with the laboratory procedures, two same size transposable flasks were selected. Then flasking and dewaxing were carried out in the usual manner in one of the two transposable flasks.
- After dewaxing, the upper member of the flask was holding the teeth and the lower was holding the defect in the cast. Then a 2 mm layer of modelling wax was applied on the cast with defect (lower member of the flask) (Fig. 5).

- Then the upper member of the second transposable flask was placed over the lower member and flasking, dewaxing (Fig 6), packing with heat cure acrylic resin (Trevalon, Dentsply India Pvt. Ltd., Gurgaon, India) and curing of the waxed up cast with defect was carried out in conventional manner as per the manufacturer's instructions (at 165°F for 12 hours).
- In this manner, definitive heat cured acrylic denture base of 2mm thickness was fabricated (Fig 7). Salt crystals were filled in the defect portion of the denture base (Fig 8) & cellophane sheet was placed over it (Fig 9). Then, heat cure resin in dough stage was packed accurately over the cellophane sheet & upper member of the first transposable flask having teeth was placed over the lower member of the same flask.
- Trial closure was done for removal of excess flash. Cellophane sheet & salt crystals were removed from the defect during trial closure & then final closure of the flask was done.
- The assembly of flask-clamp was kept at room temperature (25℃) for 24 hours for early bench polymerization of the heat cure acrylic resin before being exposed to higher temperatures. Curing cycle was carried out as per the manufacturer's instructions (at 165°F for 12 hours). The flask-clamp assembly was all over again kept at room temperature for 24 hours for bench cooling after the end of the curing cycle. The flask was separated after bench cooling. The processed hollow obturator was finished and polished conventionally (Fig 10).
- Lower denture was fabricated in the conventional manner.
- Required adjustments were made to fit the prosthesis intraorally. The prosthesis was inserted in the patient's mouth (Fig 11) with reinforcement of post-insertion care and recalled at intervals of 3 months for the first one year followed by every 6 months afterwards. On 3-month follow up, the patient had encountered no problems.

Figure 2. Primary impression of the defect

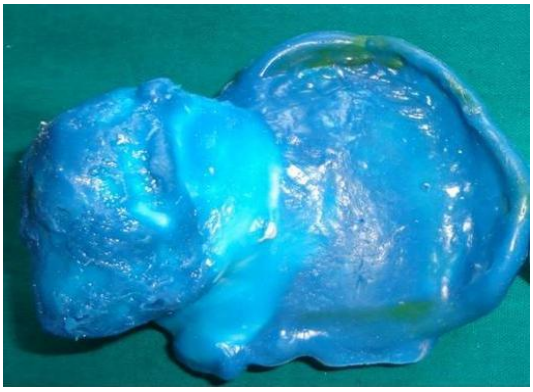

Figure 3. Final impression of the defect

Figure 4. Final cast of the defect

Figure 5. Subsequent to first dewaxing 2 mm thick wax up on master cast

Figure 6. Second dewaxing for denture base fabrication of the defect

Figure 7. Heat cure denture base for hollow bulb fabrication

Figure 8. Salt crystals in base of the defect for hollow bulb fabrication

Figure 9. Cellophane sheet over salt crystals for trial closure

Figure 10. Single piece hollow bulb denture obturator

Figure 11. Denture obturator in patient's mouth

Discussion

The present double investment technique for hollow bulb obturator has several advantages over the other techniques described so far. Because of prior curing of 2 mm thick denture base, the salt crystals do not glue to the unpolymerized acrylic resin in dough stage, resulting in complete removal of salt crystals during trial closure. This technique maintains the integrity of the obturator during final closure. It also avoids the tedious work of removing salt crystals from partially polymerized acrylic resin. As the chemically cured acrylic resin is proven to be carcinogenic and causes primary intraosseous carcinoma (PIOC) or squamous cell carcinoma in patients (6) , in this double investment technique, chemically cured acrylic resin was not used for closing the holes created while removing salt crystals after curing the prosthesis as in other techniques.

Design & type of the obturator prostheses vary according to the location and extent of the defect (7-10). Owing to the simplicity of fabrication and maintenance, maxillary obturator prosthesis is a more frequent treatment option than surgical reconstruction (11-14).

For favorable retention, stability, support, patient comfort and cleanliness, the obturator prosthesis should be light in weight. Increased weight of the obturator prosthesis is usually a foremost concern to the prosthodontists. When we review the previous literature, there are various techniques of hollow bulb fabrication in which it is proved that, by reducing the weight of the obturator through making it hollow, preservation of the existing residual alveolar ridge & defective margins is possible.

Hollow bulb obturators assign fabrication of the lightweight prosthesis that is readily tolerated by the patient, while effectively extending into the defect (1-3).

The material used for fabrication of hollow bulb obturator should be biocompatible with the oral structures. Hollow bulb obturator reduces the weight of the acrylic resin. In that way, patient becomes comfortable with the prosthesis.

Conclusion

At a distance, from thorough knowledge and skills of the prosthodontist, use of biocompatible materials & modifying the type of obturator also may be accepted by patients. By understanding the needs of the patient, clinicians can modify the technique of prosthesis fabrication for successful rehabilitation.

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