

CASE REPORT***Prosthodontic Management Of Sub-Total Maxillectomy: A Case Report***Kanesha Abrol¹, Sujata Pandey¹, Swatantra Agarwal², Siddhi Tripathi³**Abstract**

Maxillectomy defects can result in oroantral communication that compromises the integrity and function of the oral cavity. The maxillofacial prosthodontist, as a member of the surgical team, aids in the recovery and rehabilitation of the maxillectomy patient by fabricating and placing a surgical obturator. An obturator is a maxillofacial prosthesis used to close a congenital or acquired tissue opening, primarily of the hard palate and/or contiguous alveolar/soft tissue structures. An adequate obturator must be comfortable, esthetically acceptable, easy to fabricate, and lightweight, and must restore functions such as mastication, deglutition, and speech. Various authors have proposed different designs of obturator prostheses (both solid and hollow) based on Aramany's classification and evaluated for weight reduction. This case report describes the fabrication of closed-hollow bulb obturator restoring the patient's original dentition and facial and palatal tissue form. Also, due to his altered speech it was decided to customize the palatal contour of the obturator by using technique of palatogram.

Keywords: Maxillectomy, Obturator, Palatogram.

Introduction

Phonetics, esthetics, function and comfort form the foundation of a successful prosthodontic treatment. The rehabilitation of maxillary defects which occur due to surgical treatment of benign and malignant tumors, congenital malformation and trauma is a significant challenge. Such defects can result in oro-antral communication that compromises the integrity and function of the oral cavity. Functional challenges limit the ability to speak and eat. Moreover, un-esthetic facial disfigurement causes psychological impairment, thereby leading to social isolation and decreased quality of life.¹

The maxillofacial prosthodontist, as a member of the surgical team, aids in the recovery and rehabilitation of the maxillectomy patient by fabricating and placing a surgical obturator.² Small sized defect can be easily reconstructed surgically leading to favorable tissue response. Large maxillary defects are often associated with the loss of hard tissues including bone and teeth complicated with overlying soft tissue collapse.³ The usual treatment sequence includes placement of a surgical obturator during the intervention. Following this, five to ten days later it is removed, and a removable interim obturator is constructed for the wound healing period. Finally, the definitive obturator is constructed and placed about 3–6 months post-surgery, when major changes in tissue conformation are no longer expected.⁴ Because of communication between the oral cavity, the nasal cavity and maxillary sinus, the traditional design for complete dentures provides insufficient retention and stability. Also, the increased volume and weight of the obturator impairs retention and results in prosthetic loosening.⁵

Various designs of obturator prostheses such as solid or hollow; open or closed have been proposed by different authors^{1,3} in the literature and to improve speech intelligibility in such patients, palatogram plays an important role.

1. Post Graduate Student

2. Professor and H.O.D.

3. Professor

Department of Prosthodontics and Crown & Bridge

Correspondence Address

Dr. Kanesha Abrol

Post-graduate student,

Department of Prosthodontics and Crown & Bridge,

Kothiwal Dental College & Research Centre, Moradabad

E-mail: drkaneshaabrol92@gmail.com

The present case report describes the fabrication of closed-hollow bulb obturator with customized palatal contour by using the technique of palatogram, for restoration of patient's function, phonetics and esthetics.

Case Report

A forty-four year - old male patient reported to the department of Prosthodontics and Crown & Bridge with the complaint of difficulty in chewing, speaking and leakage of liquid into the oral cavity since 2 months. An intraoral examination revealed that patient had undergone partial maxillectomy for mucormycosis (superimposed with osteomyelitis) of right maxilla. The defect was a class IV type maxillary defect (figure 1) according to Aramany's classification (partial resection of the maxilla extending both the sides crossing the midline with few posterior teeth remaining).⁶ The treatment plan was to fabricate a closed hollow bulb obturator for the defect.



Figure 1: Intra-Oral Defect

Procedure

After the surgical debridement and proper anti-microbial therapy, the patient was examined carefully and further preparations for fabrication of obturator were initiated.

1. A dampened gauze was placed in the surgical site to cover the unwanted undercuts (anterior and medial) and to aid in removal of the impression.
2. A dentulous, perforated tray was selected and the preliminary impressions of the maxillary and the mandibular arch were made with alginate (irreversible hydrocolloid, Zhermack, Italy). Before making the impressions, defect was cleaned and ensured that it was free of mucus crustings. It was ensured to involve the lateral and posterior margin of the defect (figure 2). The impression was poured with type III gypsum material (Kalstone; Kalabhai Karson, Mumbai, India) to obtain a working cast.
3. The cast was retrieved (figure 3) and the undesirable undercuts within the defect portion were blocked out with the dental wax. A prosthetic baseplate incorporating clasps was fabricated with autopolymerized acrylic resin (DPI Cold Cure; Dental Products of India).
4. Border molding was done first on the un-resected side and then on the resected side (figure 4) using the green stick compound (DPI Tracing Sticks, Dental Products of India, Mumbai, India). Patient was asked to perform exaggerated head movements turning right to left with the head level and then with the neck flexed and extended. Also, patient was asked to open and close the mouth and move the mandible laterally.⁷ The final impression was taken with elastomeric impression material (Aquasil, Dentsply) followed by an alginate pick up impression to record the remaining teeth (figure 5).
5. The master cast was retrieved and denture base and occlusal rims were fabricated. The maxillomandibular relationships were recorded. The casts were mounted on a semi-adjustable articulator, and the artificial teeth were arranged (figure 6). To obtain balanced occlusion, occlusal disharmonies were corrected with selective grinding as with traditional complete dentures. A clinical wax try-in was performed to evaluate the esthetics and occlusion.
6. To improve speech, the palatal contour of the trial denture was customized by using the technique of palatogram. The alginate was used as a recording media. After the application of latter, the patient was asked to pronounce the english consonants such as 'so' (s sound), 'show' ('sh' sound), 'choke' ('ch' sound), 'no' ('n' sound), 'give', 'king' ('G' & 'K' sound) to record the palatogram (figure 7).⁸

7. After the try in of the waxed up palatal obturator prosthesis and recording of the palatogram, the master cast was invested along with the trial prosthesis in the Hanaus Flask. The flasking procedure was completed and the dewaxing procedure was performed in conventional manner. The record base was removed from the flask.
8. The curing of the prosthesis was done in two parts. The bulb portion was first cured followed by the remaining part of the prosthesis containing teeth. The hollow space replacing the defect in the obturator was identified and a thin layer of autopolymerizing resin was adapted on the maxillary cast (in the base flask) to cover the opening and a hollow bulb was created. Bulb portion of the prosthesis was made hollow by filling the defect with the table salt. A hollow shim was thus obtained which was encased within the obturator. Curing of remaining part of the prostheses containing teeth was done over the bulb portion using the heat cure resin (DPI Heat Cure; Dental Products of India, Mumbai, India). The two halves of the flask were closed and curing was completed using short curing cycle.
9. On completion of curing, a small hole was made on the base of the hollow bulb and it was placed in water to dissolve all the salt. The hollow bulb was washed with water in a syringe to remove all the salt completely. The small hole was then sealed with auto-polymerizing resin. The obturator was finished, polished and inserted in the patient's mouth (figure 8).
10. The post insertion follow up was done at an interval of 24 hours, three days and one week. Patient was asked to review after 10-14 days over the next two month period.



Figure 2: Maxillary primary impression



Figure 3: Maxillary primary cast



Figure 4: Special Tray depicting the border molding of the un-resected & resected side



Figure 5: Final Impression of the defect



Figure 6: Maxillomandibular relationship



Figure 7: Recording of palatogram



Fig 8: Post-operative photograph

Discussion

Prosthetic rehabilitation of edentulous patients with maxillectomy defects is often difficult because of the absence of natural teeth to retain and support an obturator. Retention is severely compromised in these patients resulting in difficulties in speech and mastication⁹. The primary goal of the treatment is to give a prosthetic obturation which closes the defect and separates the oral cavity from the sinonasal cavities.

Numerous methods and techniques are advocated in the literature: open or closed, hollow or solid bulb obturator fabrication. The technique employed in the present case was fabrication of hollow bulb prostheses using the lost salt technique. In comparison to the solid bulb obturator prostheses, the hollow bulb obturator has an advantage of being lightweight to provide better retention and comfort to the patient and it also has a greater surface area for relining. Similarly, the closed type of design over the open lid type of prostheses is more hygienic

since it does not pool moisture and accumulations of any type, while still extending adequately into the defect.¹⁰ Also it is esthetic, simple and also improves the speech by adding resonance to the voice. Since there are no lines of demarcation between heat cure and autopolymerizing resin, the complete prosthesis is obtained as a single unit with uniform wall thickness around the hollow space ensuring the least possible weight.^{3,9}

To improve the patient's speech, the palatal contour was customized by using palatogram which is a graphic representation of the area of the palate contacted by tongue during a specified activity, usually speech. J. Oakley Coles, in 1871, was the first to use palatograms. These serve as a guiding force for alterations and customization of palatal contour such that, speech deficiencies are corrected and the period of adaptation to new prosthesis gets reduced. Tongue and hard palate are considered as speech enunciators as they aid in articulation of various sounds. Various recording medium that can be used for palatogram includes gothic arch tracing ink, pressure indicating media, powdered gypsum, occlusal aerosol and impression waxes.⁸ In the present case report, alginate was used as a recording media by virtue of its ease of handling, time saving maneuver, inexpensive nature and dimensionally stability.

Thus, satisfactory functional and esthetic results can be achieved in patients with maxillary defects using obturator prostheses. The removable nature of the prostheses permits for the inspection of the surgical site for any evidence of recurrence of disease.

Conclusion

The technique described in the present case report proved to be simple, quick and cost effective method for construction of a closed hollow bulb obturator prostheses for acquired maxillary defects using readily available materials. The obturator delivered to the patient increased function by providing better masticatory efficiency, phonetics by adding resonance, and also improved the esthetics.

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