Case Report

Rehabilitation of the patient with a partial maxillectomy defect with an interim hollow bulb obturator

ABSTRACT

Maxillary obturator prosthesis is usually preferred for patient going through partial or total maxillectomy. The heavy weight of the obturator prosthesis is usually a major concern to the prosthodontist as it may cause inconvenience with masticatory function. The maxillary defect may be congenital or acquired; hence, the latter often leads to patients encountering an array of physical and psychological distress. Rehabilitation of such patients is often challenging due to the extent of the defect area. Achieving adequate retention is of utmost importance as it reinforces the obturator musculoskeletal coordination. The processing technique described in this case report is the lost salt technique using a single-step flasking procedure which was customized accordingly with heat-cure acrylic resin as stops on the flask to accommodate the closed hollow obturator prosthesis as a single unit. This article describes the management of a patient who had undergone partial hemimaxillectomy secondary to mucoepidermoid cell carcinoma rehabilitated with hollow obturator prosthesis.

Keywords: Lost salt technique, maxillary defect, obturator, reconstruction, rehabilitation

INTRODUCTION

Prosthodontic defects have been restored for many years. The most common of all intraoral defects are in the maxilla occurring as an opening into the antrum and nasopharynx. Defects in the maxilla may be divided into defects resulting from congenital malformations and acquired defects resulting from surgery or oral neoplasms. The opening arising from the defect appears extending into a small portion of the hard and soft palate, alveolar ridges, and the floor of the nasal cavity. Postsurgical maxillary defects predispose the patient to hypernasal speech, leakage of fluid into the nasal cavity, and impaired masticatory function.[1] The indications for the use of an obturator are as follows:

- To serve as a temporary prosthesis during the period of surgical correction
- To restore the esthetic appearance of a patient rapidly for social contact
- When surgical primary closure is contraindicated
- When the age of the patient contraindicates surgery
- When the size and extent of the deformity contraindicate surgery
- When the local avascular condition of the tissues contraindicates surgery
- When the patient is susceptible to recurrence of the original lesion which produced the deformity.

CASE REPORT

A patient aged 68 years reported to the department of prosthodontics with mucoepidermoid carcinoma of the left side of the palate [Figure 1]. The chief complaint of the patient was the inability in chewing and swallowing the food. On intraoral examination, there was a swelling seen on the left side of the palate which was 2 cm × 2 cm in dimension. The maintenance of oral hygiene was very poor.

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Submitted: 21-Nov-2022, **Revised:** 07-Dec-2022, **Accepted:** 09-Dec-2022, **Published:** 27-Dec-2022

Access this article online	
Website: www.sidj.org	Quick Response Code
DOI: 10.4103/sidj.sidj_18_22	

How to cite this article: Lakshmi CB, Pai SA, Ramachandra K, Afzaa SA, Kouser A. Rehabilitation of the patient with a partial maxillectomy defect with an interim hollow bulb obturator. Saint Int Dent J 2022;6:52-5.

Treatment planning for this case is as follows

1. Surgical resection of the left maxillary bone along with resection of the tumor tissue
2. Fit and insertion of the immediate surgical obturator
3. Interim hollow bulb obturator
4. Definitive hollow bulb obturator.

Fabrication of immediate surgical obturator

- Primary impressions were made using irreversible hydrocolloid (Neocolloid, Zhermack Clinical, Italy), and the extent of the surgical resection was marked out on the maxillary impression with an indelible pencil by the surgical team. A cast was poured using Type III dental stone. Orthodontic C-clasps with 22G stainless steel wires were prepared and adapted to the teeth 13, 16, and 17, and modeling wax (Hindustan Modelling Wax No. 2, Hindustan Dental Products, Mumbai, India) was adapted to the nonresected side [Figure 2]. The prosthesis was processed using heat-cured acrylic resin, retrieved, trimmed, and polished
- The prosthesis was disinfected using 0.2% chlorhexidine solution (Rexidin, Indoco Remedies Ltd., Aurangabad, India). Fit and insertion of the immediate surgical obturator was carried out in the operating theater. After the surgical resection was completed, the prosthesis was inserted and the borders were adjusted to ensure a passive fit over the reconstructed flap to avoid any irritation to the underlying tissues. The surgical team completed the closure of the operating site. A follow-up checkup was carried out after 48 h to check and refine the borders of the prosthesis.

Follow-up appointment evaluation

After 5 weeks, the patient was reported to the prosthodontic department with a surgical splint. An intraoral examination revealed a well-healed surgical lesion in the left palatal area, which caused oroantral communication. The maxillary anteriors and molars were assessed clinically and radiographically (panoramic). The hard tissue had no cavitation and was in satisfactory gingival/periodontal health. Due to lacking maxillary structures, the patient's masticatory and phonological functions were substantially impaired. According to the prosthodontic diagnostic index developed by McGarry *et al*., the patient's clinical state was classified as class II moderately compromised.[2] Prosthodontic rehabilitation with an intermediate closed hollow bulb obturator was envisaged.

Fabrication of interim hollow bulb obturator

- A preliminary impression was made using irreversible hydrocolloid (Algitex 2021 dust-free regular set, DPI, Mumbai, India), and the cast was poured with dental stone (Type III Kalstone, Kalabhai) to obtain a primary cast. The defect was blocked with a gauze piece lubricated with petroleum jelly before impression making. The primary maxillary cast was surveyed (Marathon-surveyor 103 Complete Milling Units # 100769) and undercuts were blocked
- The custom tray was fabricated using autopolymerizing acrylic resin (Self-cure Acrylic Repair Material, Dentsply India Pvt. Ltd., India), and border molding was carried out using green stick impression compound (DPI pinnacle tracing stick, DPI, Mumbai). The final impression was made with light viscosity addition silicone impression material (Reprosil, Dentsply-Caulk, USA) and pick up impression was done using irreversible hydrocolloid and the master cast was fabricated using dental stone (Kalstone, Kalabhai Karson Pvt. Ltd., India). The undesirable undercuts present in the defect were blocked using modeling wax. The denture base was made using autopolymerizing acrylic resin and the fabrication of the occlusal rim was done using modeling wax (no. 2,

Figure 1: Intraoral view showing mucoepidermoid carcinoma

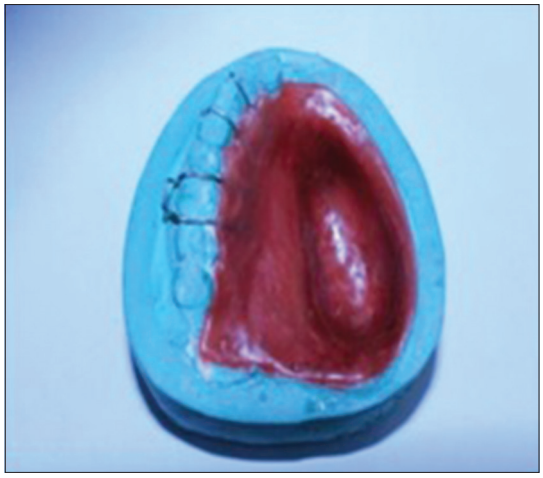

Figure 2: Wax-up of the immediate surgical obturator

the Hindustan dental products, Hyderabad). Jaw relation was recorded and casts were mounted on an articulator. Teeth arrangement and waxing carving were completed and evaluated intraorally [Figure 3]

- In this Class I maxillectomy[3,4] case, retention was mainly achieved by mechanical and muscular control mechanisms. Adams clasp on tooth # 16 was given and indirect retention from tooth #13 and 14 was obtained. The lateral margins of the defect and the polished surface of the prosthesis were also used to achieve retention by making a groove in the prosthesis which accommodated the left buccal fibrous scar tissue
- The waxed-up obturator was sealed with the master cast and invested in a base-flask (Handler manufacturing, Westfield, NJ) with the help of Type II gypsum material (Dental plaster; Kalabhai Karson, Mumbai, India). The conventional varsity flask (size no 9) was used for flasking in the usual manner by pouring a Type II gypsum material in a counter flask. Since the obturator design could not be accommodated in a conventional flask, the central portion of another flask was utilized to increase the available space to accommodate obturator. Self-cure acrylic was used to support the additional central portion of flask [Figure 4]
- The flask was kept under a mechanical clamp. The flask clamp assembly was immersed in a dewaxing unit (Aman International Ahmedabad, Gujarat, India) at 92°C for 5 min and dewaxing procedure was carried out conventionally. Complete wax elimination was ensured from the cast and investing-plaster surface. The prosthesis was cured with heat-cure acrylic resin. To reduce the weight of the prosthesis, lost salt technique[5] was used in the present case. Salt was filled inside the hollow portion of obturator and covered with butter paper on which self-cure acrylic resin was adapted. Once the acrylic resin was set, perforation was made to insert a needle with a syringe filled with water to drain out the salt packed inside the hollow part. The perforation was sealed with self-cure acrylic and the obturator was properly finished and polished
- Floating test was used to ensure that the weight of the prosthesis was reduced. Characterization of acrylic teeth of the prosthesis was done using acrylic stains to match the remaining anterior teeth. The prosthesis was finally inserted, and the patient was educated regarding oral hygiene and future maintenance of the prosthesis [Figure 5].

Figure 3: Try-in of an interim obturator

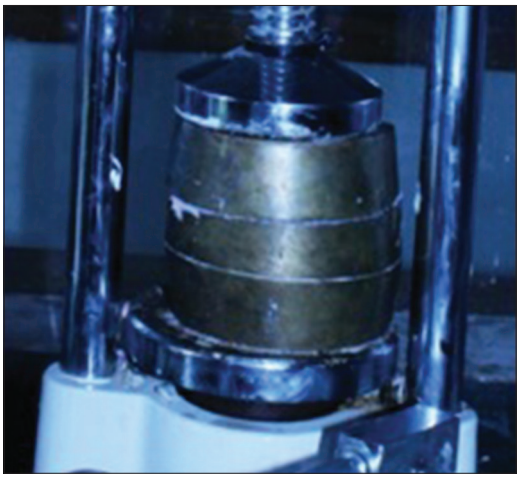

Figure 4: Flasking procedure was altered to accommodate the obturator

Figure 5: Patient with hollow bulb obturator prosthesis

DISCUSSION

An obturator prosthesis plays a crucial role in the recovery of oral function pertaining to postsurgical maxillectomy patients.[6] Almost all acquired palatal defects result from the resection of palatal and paranasal neoplasms. The extent of resection is dependent on the size, location, and potential behavior of the tumor.[3] Prosthodontic therapy for patients with acquired surgical defects of the maxilla can be divided

into three phases of treatment with each phase having different objectives.[7,8]

To avoid continuous stress and discomfort to the patient, we applied the hollow-type obturator for the treatment of this maxillary defect. Various methods for hollowing the prosthesis with the use of different materials have been well documented in studies.[9] Materials such as silicon, a slurry of plaster and pumice, gelatin, modeling clay, cellophane wrapped in asbestos, salt, polyurethane foam, and acrylic resin shim have been used for hollowing the prosthesis. However, clinically, it has been observed that the removal of these materials from processed prostheses is a tacky job. We used lost salt technique for this case because the removal of salt from the hollow portion of the prosthesis is easier compared to other materials. Matalon and LaFuente[10] described a technique by adding sugar or salt during the processing of obturator, which is later removed by drilling a hole in the superior surface and the hole is filled with autpolymerizing resin. The opening can also be filled using a mandibular screw cap. Srinivasan *et al*.[11] have described a simplified method for the construction of an interim hollow bulb obturator for an acquired maxillary defect using lost salt technique. He proved that this technique is a simple, quick, and cost-effective method for the construction of hollow bulb obturators for acquired maxillary defects. Krishna *et al*.[12] have described a procedure to fabricate a definitive hollow bulb obturator prosthesis for the rehabilitation of a total maxillectomy defect using lost salt technique.

Vadodaria *et al*.[13] have described the fabrication of a hollow maxillary complete denture using lost salt technique to reduce the weight of the complete denture. Nimonkar *et al*.[14] have described a technique for the fabrication of hollow obturator prosthesis using ice and also provided an overview of the pros and cons of different materials used for hollowing obturator prosthesis. The other reason for using a hollow-type obturator for this case was that the adjustment of the hollow-type obturator was easier due to the patient's deficient ability of mouth opening.

CONCLUSION

Following maxillectomy, an immediate obturator is required to restore eating and drinking, correct speech and deglutition, and improve esthetics. Obturators are made on a preoperative and postoperative cast and are frequently readapted to account for tissue changes over the defect healing period. Immediate obturators improve quality of life and provide a functional benefit during the recovery phase. Obturators' performance might be hampered by conditions such as radiotherapy, chemotherapy, and the extent of surgery.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given her consent for her images and other clinical information to be reported in the journal. The patient understands that her name and initials will not be published and due efforts will be made to conceal identity, but anonymity cannot be guaranteed.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

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