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CLINICAL REPORT

Rehabilitation of Hemimaxillectomy with Foldable Obturator in Restricted Mouth Opening: A Case Report

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Abstract Acquired defects of the head and neck region as in case of hemimaxillectomy can be devastating to the patients and presents considerable reconstructive challenge for the Prosthodontists. The defects created by the surgery results in damaging effects on functional, cosmetic, and psychological aspects of the patient. The purpose of this clinical report is to discuss the method of fabricating a foldable obturator for rehabilitation of a patient of hemimaxillectomy with restricted mouth opening.

Keywords Hemimaxillectomy · Hinge obturator · Foldable obturator · Restricted mouth opening

Introduction

The maxilla is functional and esthetic keystone of the midface forming part of the mid-facial elements, which are the orbit, the zygomatico-maxillary complex, the nasal unit and the stomato-maxillary complex [1]. Surgical intervention for the eradication of the maxillary neoplasm results in an abnormal communication between oral, nasal cavities and maxillary sinus, which results in esthetic, functional and psychological disabilities. The primary goals of prosthetic obturation are closure of the maxillectomy defect and separation of the oral cavity from the sinonasal cavities [2]. Efforts are also required to reconstruct the anatomic defects created by hemimaxillectomy to restore physiologic functions and the aesthetic appearance [3]. The functional restorations include the clarity of speech, mastication, transport of bolus, avoidance of aspiration and nasal regurgitation. The esthetic restorations include the reconstruction of oro-facial contour, appearance, facial expressions and the restoration of lip competence. These efforts can get complicated because of the reasons of limited mouth opening due to lack of elasticity of mucosal and skin grafts.

This case report describes the clinical and laboratory procedure involved in rehabilitation of a hemimaxillectomy patient having restricted mouth opening by fabricating a foldable hinge obturator.

Case Report

A male patient aged 52 years with poor financial background reported to the department of Prosthodontics and Implantology, Maharashtra Institute of Dental Sciences and Research, Latur, India with complaints of nasal regurgitation, disturbed speech, loss of teeth and unaesthetic appearance. Patient revealed the history of radiotherapy followed by hemimaxillectomy. On extra oral examination the left side of the face was found depressed inwards, the lips were found incompetent on left half because of insufficient maxillary lip (Fig. 1). On intraoral examination, a defect was found extending from left lateral incisor till third molar region anteroposteriorly and buccopalately, the defect extended from midpalatine raphe till buccal sulcus. Superoinferiorly the defect was found extending from residual hard palate till the orbital floor (Fig. 2). The buccal mucosa of the left cheek was replaced by skin graft. No abnormalities were found in TMJ examination.

Patient was informed about the procedure, consent was obtained for the treatment and to use his photographs for the purposes of scientific presentations/publications.

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Fig. 1 Pre-treatment extra-oral view

Fig. 2 Pre-treatment intra-oral view

Procedure of Fabrication of Foldable Obturator

Diagnostic impression was made with the putty consistency Polyvinyl Siloxane (Zetaplus, Zermack) after blocking the unfavorable undercuts with lubricated gauge. The impression material was placed and pushed against the residual hard palate and into the defect with finger pressure, as there was no sufficient mouth opening to insert the impression tray. Care was taken to record only the favorable undercut areas at the margin of the defect rather than pushing the material deep into the defect to prevent locking of impression material so as to facilitate the easy removal of the impression from the restricted mouth opening. The impression was poured in Type III dental stone (Goldstone, Asian Chemicals) and diagnostic cast was obtained.

Extensions for the special tray was marked on the diagnostic cast and unfavorable undercut areas were blocked using modeling wax (Rotex Modelling Wax). A sectional impression tray was fabricated using auto-polymerizing acrylic resin (DPI-RR Cold Cure) with the facility to inter lock the two portions of the handle and the tray by a key–keyway pattern. The right portion of the sectional tray was extended to cover the remaining maxillary teeth and the left portion was extended to cover the defect area. Sectional impressions (Fig. 3) were made in light body polyvinyl siloxane (Affinis Precious, Coltene Whaledent). The two portions of the sectional tray were removed separately from the mouth and were reassembled, boxed and master cast was poured in Type IV dental stone (Kalstone, Kalabhai Karson Pvt. Ltd,).

Retentive clasps were made around lateral incisor and first molar using orthodontic wire. The record base was fabricated in two portions using autopolymerizing acrylic resin with incorporation of a foldable stainless steel hinge (Titan industries) in the middle. The record base is made to engage the favorable undercut area at the margins of the defect so as to obtain the retention of foldable obturator on the defect side. The joint between the two portions of denture base was kept on the healthy mucosa covering the residual hard palate. Occlusal rim was made on the anterior edentulous area without hampering the foldability of the denture base and jaw relations were recorded.

After selection and arrangement of teeth, try-in of foldable obturator was done (Fig. 4). Autopolymerizing acrylic resin covering the extensions of retentive clasps and stainless steel hinge was trimmed off and modeling wax was added in place of trimmed acrylic to hold the clasps and hinge in desired position before flasking the trial obturator. Dewaxing was done in conventional manner and care was taken to not to dislodge the hinge from its place (Fig. 5a, b). Pink colored heat cure acrylic resin (DPI-Heat Cure Pink) was packed in the teeth portion and clear heat cure acrylic resin (DPI-Heat Cure Clear) was packed in the denture base area. Curing was done by conventional compression molding technique. The final foldable hinge obturator (Figs. 6, 7, and 8) was trimmed off the excess, polished and inserted into the patient mouth (Fig. 9).

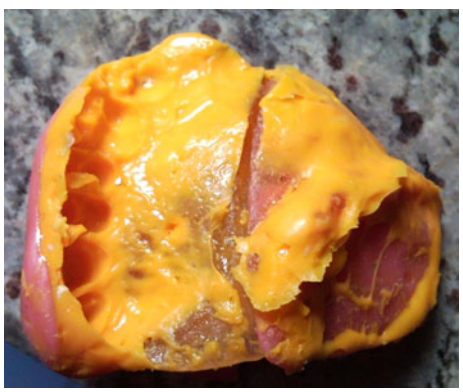

Fig. 3 Sectional impression

Fig. 4 Try-in of foldable obturator

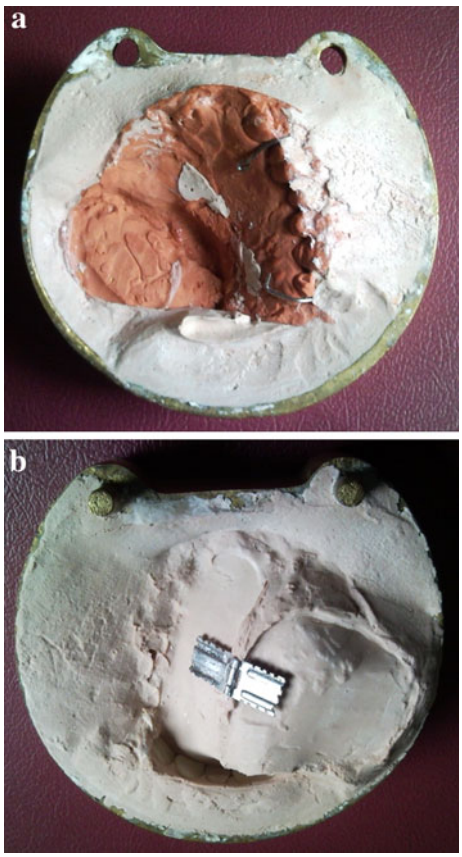

Fig. 5 **a** Base of the flask after dewaxing, **b** Counter flask after dewaxing

Fig. 6 Unfolded view foldable obturator

Fig. 7 Folded view foldable obturator

Fig. 8 Labial view foldable obturator

The patient was trained to fold the obturator, insert into the mouth and unfold to place it in position. He was also trained to fold it before removing the prosthesis from his mouth. Post insertion instructions were given. The patient was advised: (i) To remove the prosthesis from his mouth before bed time and to keep it in a box containing denture cleansing agent. (ii) To clean the prosthesis with a soft brush and not to use any abrasive agent for cleaning (iii) To not to apply too much of pressure during folding and unfolding of obturator so as to prevent damage to the foldable stainless steel hinge. Recall check-ups were scheduled at regular intervals to make necessary adjustments.

Fig. 9 Post treatment view of patient

Discussion

Frequently, the presence of oral cancer necessitates the surgical removal of all or part of maxilla, leaving the patient with a defect that compromises the integrity and function of the oral cavity. The traditional treatment sequence for a patient requiring rehabilitation of a maxillectomy is the initial insertion of an immediate surgical obturator at the time of surgery or soon thereafter, an interim obturator used after initial healing until the tissues are stabilized (approximately 3 months), and a definitive obturator prepared after the tissues have stabilized, with few appreciable changes [4, 5].

The type and extent of tissue loss from cancer ablative surgery relates to the defect created by loss of bone, mucosal or cutaneous lining or bulk of underlying soft tissues depending on the site, size and extent of surgical resection. Prosthodontic rehabilitation of patients with palatal defects is based on the principles of re-establishing the separation between the oral, nasal and maxillary sinus cavities so that normal speech and swallowing can be restored. In addition, the maxillary obturator prosthesis also improves the cosmetic appearance of the patient by providing support for the maxillary lip and cheek. The friability of tissues after radiation therapy, if it has been used, usually allows only the simplest type of prosthesis. Also, posterior teeth should not be added to interim obturator prosthesis since they may impose excessive stress on the wound and delay the healing process [5]. However the insertion and removal of large prostheses used for rehabilitation of mid-facial defects requires adequate mouth opening.

The patient had restricted mouth opening (22 mm of inter-incisal distance) which could have compromised the prognosis of treatment. The treatment procedure was modified to fabricate a foldable hinge obturator using a biocompatible noncorrosive stainless steel hinge (Titan industries). The incorporation of stainless steel hinge assisted in reducing the total width of obturator from 46 to 25 mm which could be inserted and removed easily through the restricted mouth opening.

Several methods can be used to fabricate an interim obturator, including conventional method without artificial teeth, making a matrix with irreversible hydrocolloid [6], using a celluloid matrix [7], modifying a surgical obturator [8], using a denture duplicator [9], using a hook loop system or orthodontic elastics [10], by using light cure [11] or heat cure acrylic resin [12]. Silicon rubber and light polymerizing acrylic resin lack strength leaving a long term durability of these materials in question. On the other hand, heat cure acrylic resin has been proven to be one of the most durable tissue compatible materials till date [13].

Conclusion

This clinical report demonstrates the procedure of fabrication of a foldable hinge obturator which is an inexpensive and conservative method for rehabilitation of a hemimaxillectomy patient having reduced mouth opening. In this case, treatment resulted in improvement of function and esthetics that caused a favorable change in the general health and psychology of the patient and installed a great confidence in him.

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