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Case Report

Prosthetic rehabilitation of acquired hard palate defect by obturator prosthesis through various stages of healing: A case report

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INTRODUCTION

Prosthetic Rehabilitation of maxillofacial defects which causes facial disfigurement and therefore affecting quality of life of patient can be challenging. The most common of all intro-oral defects are in the maxilla, in the form of an opening into the antrum and nasopharynx.[1,2]

"At the sight of whom all men turn in disgust and abhorrence and at whose presence, children cry and dogs bark"

-J.F. Dieffenbach{German Surgeon}

This statement proves to be true in today's modern world as well. The manner of looking at suchpatients has not changed much. Sometimes, even if the disfigurement is slight, the psychologicalwound is so great, that the disfigured person himself avoids social contacts. It is very important to give special consideration to such patients.[3]

Maxillary defects can be congenital, developmental, acquired, traumatic, or surgical involving the oral cavity and related anatomic structure. Absence or loss of some or all of the soft palate and/ or hard palate results in insufficient structure or altered function of the remaining structure. Defects can cause disruption of articulation and airflow during speech production and nasal reflux during deglutition. Nasal sounds such as "n," "m," and "ng" are seen due to the absence of closure of the pharyngeal wall. Patients after surgicall resection have altered anatomy due to scaring, tissue contracture, lack of bony support, and tissue edema. Surgical resection can lead to the restrictedopening of the jaws and altered range of mandibular movements with fibrosis and trismus. Thesepatients have the problem of regurgitation of water and food through nose. There may be difficulty inspeech, deglutition, maintaining oral hygiene, andprosthetic treatment. To prevent this and to helpthepatient in deglutition and speech, defects must be restored with prosthesis.[4]

In such situations, a prosthesis called as an obturator is designed to close the opening between theresidual hard and/or soft palate and pharynx. These changes require the fabrication of prosthesis and sometimes repeated prosthesis adjustments to confirm the soft tissue changes.

Obturator is derived from the Latin word "obturare" which means to close or shut off. Prosthesisfacilitates speech, and deglutition by replacing those tissues lost due to the disease process and can, asa result, reduce nasal regurgitation and hypernasalspeech, improve articulation, deglutition, and mastication.

DEFINITION

- An obturator is a prosthesis which is fabricated for the patients with the palatal defects in the form of cleft lip and palate, oroantral fistula, or surgical resection after removable of pathology-like tumor or cancer.
- **Chalian in 1971** described an obturator as a disc or plate, natural or artificial which closes anopening or defect of the maxilla as a result of cleft palate or partial or total removal of the maxillafora tumor mass.[1]
- **According to Glossary of Prosthodontic Terms,** obturator is a prosthesis used to close a congenital or acquired tissue opening primarily of the hard palate and/ or contiguous salveolar/

soft tissue structures.

The prime purpose of an obturator is to separate the oral cavity from nasal cavity and form a pressure resistance seal against the oral mucosa to prevent leakage of air and fluid from nasal cavity which helps in speech and swallowing functions.5

Proper surgical planning is utmost important for treatment success as it helps not only to eradicate the affected tissue but also gives the best possible aesthetic and functional repair; minimizes post surgical complications and helps preserve and increase the supporting areas for the obturator.6

THEST AND ARD TREATMENT PROTOCOL FOR ORAL REHABILITATION OF MAXILLECTOMY CASES ARE

Surgical obturator placed at the time of surgery, **Interim obturator** after 7–10 days after surgery and **definitive obturators** given 3–6 months post surgery.

An interim obturator supports the soft tissues after surgery and prevents irritation of the mobile, non-cicatrized, bleeding tissues and minimizes the scar contraction and facial disfigurement, helps in mastication and speech. It is worn till the wound healing is completely satisfactory. Different obturator designs are followed such as solid bulb obturator, open and closed hollow obturators, inflatable obturators, and two-piece hollow obturator prostheses.[7,8]

When healing has progressed for 4–6 months following the cessation of all therapy, interim obturator can be replaced with a definitive obturator.

- Timing will vary depending on: Size of the defect, progress of healing, prognosis for tumor control, effectiveness of the present obturator, presence or absence of teeth.
- Defect must be engaged more aggressively for edentulous patients to maximize support, retention,and stability.
- Changes associated with healing and remodeling will continue to occur in the border areas of thedefect for at least 1 year. Dimensional changes are primarily related to the peripheral soft tissuesrather than to bony support areas It is constructed from the postsurgical maxillary cast. This obturator has a false palate, false ridge, and closed bulb which is hollow.
- To reduce and improve adhesion and retention, a hollow obturator bulb is required for cleft palateprosthesesand for dentures following maxillectomy.[4]

ADVANTAGES OF A HOLLOW BULB OBTURATOR

- Weight of the obturator is reduced, making it more comfortable and efficient
- Light weight improves one of the fundamental problems of retention and increases physiological function so that teet hand supporting tissues are not stressed unnecessarily
- Decrease, in pressure on the surrounding tissues, aids in deglutition and encourages there generation of tissue
- Light weight reduces these lf consciousness of wearing a denture
- Light weight does not cause excessive atrophy and physiological changes in muscle balance.

The Dentist in general and Prosthodontist in particular has a major role in maxillofacial prosthetics because of his knowledge of anatomy, physiology and pathology as well as his skill and experience in using materials that are compatible with the patients remaining tissues.

Maxillofacial prosthetic therapy for acquired defects has become more complex and sophisticated with advances in surgical and radiation treatment procedures. More people are now surviving disfiguring injuries and diseases, which formerly claimed their lives. A team effort is essential for the effective and efficient treatment of patients with maxillofacial problems.

This case series reported scribes rehabilitation of maxillectomy case with the hollow bulb inter im obturator and finally with definitive hollow bulb obturator. Informed consent was obtained from patient included in this case report.

CASE REPORT

A 22 years female patient was referred to the department of prosthodontics, h.p. government dental college and hospital, shimla 10 days after she underwent surgery in E.N.T. department of igmc shimla. Patient was an operated case of left total maxillectomy with split skin grafting for biopsy pro venosteosarcoma of left maxillaryalveolar ridge($T_1N_0M_0$) Stage-I.

Surgical planning and treatment: Enbloc resection of left maxilla was done by mid facial de gloving approach. Left orbital floor as supported with septal cartilage graft and left maxillary cavity was grafted with spilt skin graft harvested from antero lateral aspect of left thigh.

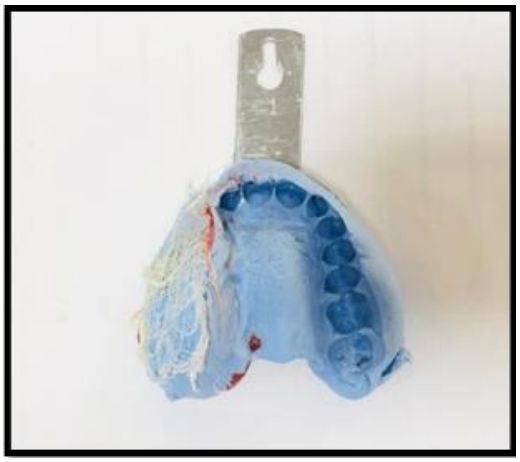
Intra-oral examination: revealed raw wound at the operated site.

Post-operative treatment plan: Patient was planned for hollow interim obturator without artificial teeth in initial phase of healing; which was later replaced with definitive hollow obturator.

INTER IMOBTURATOR

1. Preliminary impression of upper arch was made with irreversible hydrocolloid material (Plastalgin, Septodont Healthcare India Pvt. Ltd. Raigad, maharashtra) in an altered perforatedstock tray. The undercuts at the surgical site were blocked with vaselinized gauze, to prevent any trauma to the underlying tissues.(Fig. 1)

Fig1: Preliminary impression



2. Impressionwas poured using Type-III dental stone (kalstone, Kalabhai, Indore) Primary maxillary cast was fabricated and undercuts were blocked using plaster of paris (Fig.2) for the fabrication of customised acrylic tray and handle (Fig. 3 and 4)for recording full depth of the bulb portion of the defect of maxilla using low-fusing impression compound (DPI, pinacle tracing sticks) (Fig.5and6). Retentive holes were created in the initial recorded impression with compound (Fig.7) so as to finally record the defect in condensation silicone (Zhermack Zetaplus C Silicone, Piodent Health Care Ltd, Ahmedabad) (Fig. 8). Handle was trimmed carefully to accommodate this custom tray in stock trayand it was picked up by irreversible hydrocolloid material (Fig. 9). Impression was removed from mouth separately because of the size of the bulb, which was too large to be removed together. The bulb portion and the pickup impression were reoriented outside, impression was poured and cast was fabricated using type IV dental stone(kalrock, kalabhai, Indore)(Fig. 10).

Fig 2: Block out of cast done
Fig 3: Custom tray fabrication done
Fig 4: Handle fabricated

Fig. 5 and 6: Bulb portion of the defect recorded using low fusing impression compound
Fig. 7: Retentive holes made so as to engage the condensation silicone

Fig. 8: Bulb portion of defect recorded in condensation silicone
Fig.9: Pick up impression
Fig.10: Final master cast

3. A hollow bulb was made using self-cure acrylic resin (Trevalon Hi, Dentsply India, Gurgaon, India) and around stainless wrought wire 22guage clasps were adapted for teeth #14 and #16.(Fig.11a,b,c,d,e). Hollow prosthesis improves the retention as the weight of the obturator to fill in the defect as reduced.[9,10]
   The bulb supported the orbital portion, restored the cheek fullness. The palatal plate lined with softliner supported the bulb, formed a non-pressure seal with the surrounding tissue which improved swallowing and speech dramatically. The finished and polished final prosthesis as inserted and checked for peripheral seal. The pressure areas were relieved. The patient was taught the placement and removal of an obturator and was recalled for regular post-insertion visits. The obturator was periodically adjusted for 8 months till the healing process completed and then was replaced by definitive obturator.

Fig. 11: Steps in fabrication of hollow interim obturator; a) Clasps fabricated on #14 and#16. Bulb portion of defect fabricated in two steps by fabricating tissue aspect first blocked master cast, and then; b) Making it hollow with the help of wax spacer and secondly making the palatal plate of obturator.

Fig.11(c),(d),(e): Showing finished and polished hollow inter imobturator without teeth inserted in healing phase after surgery.

Fig.12a and b: Intra-oral pictures of inserted hollow inter improsthesis


DEFINITIVE OBTURATOR

After 8months of postoperative healing, definitive hollow obturator was planned with mono plane teeth as patient was wearing inter imobturator from last few months and got comfortable and adjusted with it.

The definitive prosthesis fabricated should be easy to construct, lightweight, and should have good retention, support, and stability keeping in mind comfort of patient.[11] Numerous techniques have been described in the literature for fabrication of hollow bulb obturators which can be open or closed obturators to reduce the weight of the prosthesis delievered.[12-14] The open hollow obturators are easy to fabricate but are difficult to maintain due to collection of moisture and debris, which leads to oral malodor and requires frequent cleaning. Hence, closed hollow obturators are preferred; however, the processing techniques are tedious and time consuming.

Onintra-oral examination, healthy and completely healed surgical site was seen. Deposits were seen around teeth because of inefficient brushing during post-surgical healing for which oral prophylaxis was done. Remaining teeth were caries free and healthy.

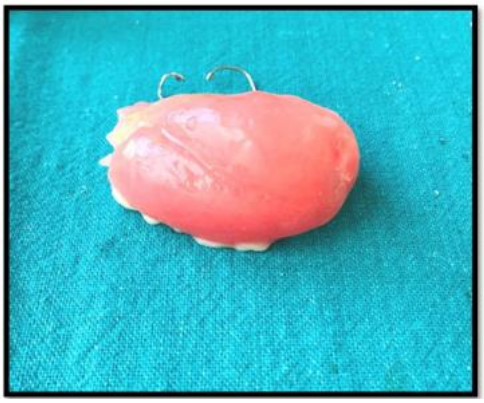
The processing technique used was a single-stage and simple technique was used for creatinghollow space as was followed before while fabricating interim hollow obturator using a wax spacer (or caramel spacer can also be used[15]), by having the only difference of resin used to fabricate it was heat-cure(DPI, Uttrakhand, India) instead of self cure resin.

TECHNIQUE

- The primary impression was made using irreversible hydrocolloid impression material (Plastalgin, Septodont Healthcare India Pvt. Ltd. Raigad, maharashtra) by packing the defect area with vaselinized gauze.
- Following this cast was fabricated using type III dental stone and custom tray was fabricated on defect side.
- Following this, border molding was carried out and impression of the defect area was registered using green stick compound. Wash impression of the defect area was made using elastomeric material (Addition silicone- COLTENE AFFINIS S.M.OVERSEAS NEWDELHI).
- The master cast was made in Type IV dental stone (kalrock, kalabhai, Indore, India). After obtaining the cast, record base was made using self-cure acrylic resin and an occlusalrim was fabricated.
- Jaw relation and try-in was done with monoplane dentition taking into consideration the esthetic and pho requirements (Fig. 13).
- Waxed-up trial denture was sealed to the master cast and invested in the flask.
- All components were covered with investing stone except the waxed-up part and the teeth during thefirstpour ofplaster. Second pour was done and flasking was kept for20 minutes.
- After dewaxing, 2 mm of modeling wax was adapted on two halves of the separated flask to ensure adequate and uniform thickness of acrylic resin around the future hollow cavity.
- For achieving the hollow cavity, a temporary three dimensional spacer was fabricated using waxspacer which as carved and adjusted according to the shape of defect so that flasks could be closed when packing was done (Caramel spacer can also be used instead of wax spacer). This spacer was used while packing was done with heat cure resin.
- After acrylization, obturator was de flasked and finished in usual manner.
- Wax spacer was retrieved by making a small opening in the palatal aspect of denture base and then syringing it with warm water.
- The hollow cavity was air dried and sealed with auto polymerizing acrylic resin.
- Relining was done with chair side soft-relining material (GC soft reliner) after reducing the slight pressure areas. (Fig.14 a)
- The obturator was finished, polished, and delivered to the patient.(Fig.14band c)
- Patient was called up for further follow-up and slight adjustments were done.

Fig.13: Try-in of prosthesisin patient's mouth
Fig.14 (a): Hollow definitive obturator- Occlusalvie

Fig14 :(b) Lateral view of the prosthesis with monoplane teeth;(c): Hollow bulb portion of the prosthesis.



DISCUSSION

The basic aim of prosthetic rehabilitation of a maxillectomy defect, at any stage, is to create a barrier between the oral cavity from the nasal cavity and paranasal sinuses. The surgical obturator restore and maintain function to an acceptable level during the early healing phase. The inter imobturator, a comfortable and functional prosthesis, facilitates proper healing in a constantly changing, and tender area. An early rehabilitation with interim obturator will prevent the collapse of soft tissues and helps to overcome the esthetic and psychological problems.

The article described a technique for fabrication of hollow obturator, i.e., simple, and economical and with less time consumption. There have been numerous techniques described inthe literature for creation of hollow obturator. Grinding out the unwanted part directly after processing described by Habib and Driscoll[17] was once a classic technique. However, this technique is time consuming and it is difficult to maintain the adequate and uniform thickness ofthe prosthesis wall. Also, techniques involving processing the obturator in two halves separately and later joining them together are described.[18,19] These techniques are tedious, time consuming, require attachments, and are also difficult to repair. The present technique is advantageous inmany ways. It provides a predictable internal dimension of the hollow space since the hollowspace is determined by the spacer used. This ensures uniform thickness of the obturator wall. Also, it is a one-step procedure where in the obturator is made as a single unit.

A definitive obturator is not indicated until the surgical site is healed and dimensionally stableand the patient is prepared physically and emotionally for the restorative care that may benecessary. The obturator may be displaced superiorly with the stress of mastication and will tendto drop without occlusal contact. The degree of movementwill vary with the number and position of teeth, the size and configuration of the defect, the amount and contour

of the remaining palatal area, height of the residual alveolar ridge, the size, contour, and lining mucosaof the defect, and the availability of undercuts. Lack of retention, stability, and support arecommon problems of treatment for patients who have had a maxillectomy. The height andcontour of the residual alveolar ridge and the depth of the sulcus are important in both the edentulous and the dentulous patient.[20]A lateral scar bandresults after surgicalresectionatabout the level of the mucobuccal fold. Because of its lack of bone support, the lateral scar bandalso tends to stretch with continued use. This stretching may necessitate sequential additions to the prosthesis which may be limited by cosmetic requirements and size and weight of the prosthesis. The height of the lateral wall of defect can be utilized for indirect retention. A high lateral wall of an obturator will undergo less vertical displacement with a given defect wal flexure than will a shorter prosthesis lateral wall.

The most important aspect of stability is occlusion. Maximal distribution of the occlusal force incentric and eccentric jaw positions is imperative to minimize the movement of the prosthesis andthe resultant forces on individual structures. The stress created by lateral forces is minimized bythe correct selection of an occlusal scheme, elimination of premature occlusal contacts, and widedistribution of stabilizing components. Acrylic resin teeth with a reduced occlusal contact areaare indicated. Altering the cusp angle of posterior teeth influences the stability of the prosthesisplaced on an edentulous resected maxilla. It may be necessary to accept an occlusion that is not bilaterally balanced in mandible.

Dimensional changes in tissue continue to occur for at least a year secondary to scar contracture and further organization of the wound. The prosthesis is re based to compensate for these changes. Changes in the tissues supporting a maxillofacial prosthesis maybe more rapid than inthose supporting a more conventional prosthesis. Therefore, the occlusion and base adaptationmust be re-evaluated frequently and corrected by selective grinding of the occlusion or rebasingof theprosthesis.

Though it is difficult to improve the quality of life for hemi-maxillectomy patients compared with patients with conventional prosthesis, this can be achieved with skill, knowledge, andexperience of specialists. The problem experienced by hemimaxillectomy patients are reduced ifa team approach is adopted and specialists are careful to apply skill and experience at all stagesandkeep the patient under regular review.

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