

RESEARCH ARTICLE

A DISTINCTIVE APPROACH TO REHABILITATE PATIENT WITH BILATERAL MAXILLECTOMY DEFECT BY TWO-PIECE HOLLOW OBTURATOR- CASE REPORT

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Manuscript Info

Abstract

Manuscript History Received: 28 July 2024 Final Accepted: 30 August 2024 Published: September 2024 Key words:-Definitive Two-Piece Obturator, Magnet Retained, PVC, Hollow Obturator

An obturator is a common tool for prosthetic rehabilitation following invasive surgery, particularly in a total maxillectomy case. However, loss of teeth, palatal denture-bearing area, and vestibular retentive undercuts leaves an inadequate anatomic base to construct the definitive prosthesis. This results in compromised retention and stability. The retention problem can be resolved by fabricating an obturator that engages remaining undercuts. But in such acquired large defects, if all undercuts are engaged, the prosthesis may become too heavy, non-retentive, and challenging to insert, particularly in patients with very high and large defects. Therefore, in this case fabrication of two-piece magnet retained hollow obturator was described to make a prosthesis light weight with the use of thermoplastic polyvinyl chloride sheet in first part which provides adequate retention by engaging the desirable undercuts. The second part of the obturator was made hollow by the use of urinary catheter that was removed easily after completion of denture processing. After this, both the parts were attached together with the use of magnets. This technique is economical and easy to use to restore both function and esthetics in patients with bilateral maxillectomy defect.

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Introduction:-

COVID-19 infection had led to the widespread use of corticosteroids in India, causing increase in surge of mucormycosis, a rare fungal infection associated with diabetes. Due to the invasive nature of mucor, extensive maxillary defects may develop following surgical excision and debridement of the affected areas. ¹Any palatal defect no matter how minor affect speech, mastication, and esthetics. An obturator that is comfortable, restores function and has acceptable esthetics should be provided to a patient with an acquired maxillary defect. ² It may be necessary for a clinician to occasionally alter or even disregard some fundamental prosthesis design principles for a patient with a significant maxillary defect. In large defects, the obturator is stretched both horizontally and vertically to engage the bony or soft tissue undercuts and to engage the surgical defect.³ As a result, the obturator becomes heavier and larger, which may make it less retentive under the effects of gravity and jeopardize its ability to perform. Additionally, because the patient is unable to insert the obturator through a small oral opening, fabrication of such a

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large obturator may not be feasible. To overcome this problem, the prosthesis can be split into two or more pieces if necessary. Beside this, hollow bulb obturators are created to lessen the weight of the prosthesis. Also, hollow obturators are readily tolerated by the patient while effectively extending into the defect areas.⁴ In edentulous patients having such defects, acrylic resin prosthesis can be ineffective as no dentition is present to adequately stabilize the acrylic prosthesis with clasp and also the aided weight of the prosthesis and effect of gravity compromises the retention. In this case report, the rehabilitation of an edentulous patient with a total maxillectomy defect was described in which two-piece magnet retained hollow obturator was fabricated by a simple, affordable, and time-saving polyvinyl chloride (PVC) sheet technique that offers a precise fit and enhanced stability of the obturator.

Case Report:-

A 79-year-old male patient was referred from the ENT department for the fabrication of a delayed surgical obturator for closure of his palatal defect after undergoing surgery for sino-nasal mucormycosis. He had a history of covid -19, steroids use, and diabetes since10-12 years. Extra-oral examination revealed reduced labial fullness and depressed mid-face due to loss of support. There was an adequate mouth opening. Intraoral examination revealed completely edentulous arches with a total maxillectomy defect and intact orbital contents (Fig. 1A, B). A big communication was present between nasal and oral cavity with retained turbinates. The patient was having difficulty in mastication, speech, and deglutition. In the absence of any anatomical features like hard palate and teeth for retention and support of conventional prosthesis, it was decided to retain the delayed surgical obturator utilizing extra oral customized headgear and face bow assembly to address his functional needs. After 2 weeks, it was found that the patient was not comfortable and it does not serve the purpose well. After that vacuum pressed thermoplastic polyvinyl chloride (PVC) sheet was used as an interim obturator to close the defect and the patient was found it very comfortable, retentive with improved function. After 3 months, as the defect was very high and complex to insert a one-piece obturator, so two-piece magnet retained definitive obturator was decided to fabricate. First part was the same PVC sheet used for closing the defect in interim obturator and second part fabricated in conventional manner as complete denture. Both the bulb and shim portion in two-piece to be made hollow to reduce the weight of the prosthesis.

Procedure

1. A primary impression of maxillary and mandibular arch was made with irreversible hydrocolloid material (Zelgan, Dentsply) by blocking out the severe undercuts and poured with type IV gypsum product (Kalabhai labstone) for working model.

2. A 3mm thick thermoplastic PVC sheet (Huaer and OEM Dental Vacuum forming sheet) was heated and pressed to model defect using vacuum machine (Biostar, Scheu-dental) (Fig. 2A). The margins of the PVC sheet were trimmed and finished to check in patient's mouth for retention. 3. After that condensation silicone putty (Zhermack Dental) adapted into the defect area over PVC sheet to create palatal contour. Acrylic shim was fabricated using auto polymerizing acrylic (Pyrax) over the putty (Fig. 2A, B). 4. Then acrylic shim separated to remove the putty for hollowing. Acrylic shim was joined to the underlying PVC sheet using auto-polymerizing acrylic to form palatal contour and hollow bulb portion of the obturator (Fig. 2 C, D). This assembly made the first part of obturator. Silicone point was used to trim and polish the adhesive component. 5. Magnetic attachments (Neodymium -Iron- Boron magnets; 8mm diameter and 3 mm height; Dental custom magnets) were then incorporated to the oral side of first part of obturator in tripod manner using auto-polymerizing acrylic resin (Fig. 3A) and an over impression was taken to obtain stone model cast. 6. Record base was made over this second cast and magnets were attached to similar sites opposing the magnets in the first part of obturator (Fig. 3B). Over that occlusal rim was fabricated and tentative jaw relation was recorded, after that try in and evaluation for esthetics and phonetics was done in conventional method. 7. Both maxillary (second part) and mandibular denture was then processed in conventional manner with hollowing of maxillary denture using urinary catheter that was removed easily by making access hole in thin area of denture (Fig. 4 A-C).

8. After that auto-polymerizing acrylic was used to close the access hole to achieve water tight seal. 9. After finishing and polishing of dentures, magnets were reattached to maxillary denture in similar position as in first part of obturator with the same orientation.

After occlusal adjustments, two-piece maxillary obturator and mandibular complete denture was delivered and phonetics was assessed (Fig. 5A-D).

10. The effect on the facial profile with and without prosthesis can be seen in Figure 6 A-D.

The instructions were given to the patient regarding its use and maintenance. The follow-up was done at every week for the first month followed by monthly follow-up upto 6 months. The patient was found very comfortable in using the obturator and hygiene was well maintained. The phonetics was also improved with time.

Discussion:-

There was increased surge in the number of cases of mucormycosis during the COVID-19 pandemic. The extensive maxillary defects resulting from surgical debridement of necrotic tissues leave the patient with problems like difficulty in swallowing, mastication, and speech.⁵ Obturator forms a seal between the oral and nasal cavity and helps in improving speech and swallowing. In total maxillectomy cases, due to absence of adequate hard and soft tissues for retention, it becomes very challenging for maxillofacial prosthodontist to rehabilitate such defects. In this case report the patient had very large and high defect with complex undercuts and retained turbinates. Acrylic resin prosthesis can irritate the sensitive turbinates and also becomes heavy due to its weight and effect of gravity which can compromise the retention of obturator. Also, it made difficult to insert the prosthesis in one piece through small oral opening. In such patients, obturator made with PVC sheet could be an effective solution in the early postoperative period as well as for definitive rehabilitation. PVC sheet show better adaptation and good stability by engaging the undercuts in the periphery of the defect, light in weight, monomer-free and non –porous in nature when compared to acrylic.⁶ Patients are able to maintain a hygienic wound site due to the simplicity of insertion and removal, which allowed for easier surveillance.

Similar techniques have been used earlier that shows the utilization of thermoplastic sheets for the fabrication of obturator for sub-total and total maxillectomies and it has been found very effective in improving the function.⁷⁻⁹ In this case, PVC was used for first part to engage the undercuts and heat cure acrylic for second part in conventional manner. Magnets were used to join the two-piece obturator. Magnets have been used earlier for the fabrication of two-piece obturator.^{10,11} The uniqueness of this clinical report were the materials and methods used here for the fabrication of the obturator and for the hollowing of the prosthesis. The technique used here is simple and easy to apply and economical to the patient who could not afford the treatment cost of patient specific implant retained prosthesis that would be best for such patients. After the follow up of 6 months, the PVC sheet becomes somewhat rigid and friable. Distortion of the prosthesis might be there that can be avoided by proper handling of the prosthesis. Also, it can be re-fabricated easily by replacing the first part of the obturator (PVC sheet) and reattaching it to the second part of obturator with the help of magnets. The limitation of this type of prosthesis is decrease masticatory efficiency due to the missing hard base.

Figures



Fig. 1:- (A) Bilateral maxillectomy defect (B) Completely edentulous mandibular arch.

Fig. 2:- Steps for the fabrication of first part of hollow obturator (A) Splint sheet adapted over primary cast (B) Putty adapted in defect area for hollowing (C) Putty removed to attach acrylic shim to underlying PVC sheet (D) Hollowed first part of obturator



Fig. 3:- (A) Magnets attached (B) First part of obturator in mouth.



Fig. 4:- Sequence of processing of second part of obturator (A) Flasking followed by dewaxing of second part of obturator (B) Hollowed using urinary catheter before packing heat cure acrylic (C) Processed denture showing catheter.





Fig. 5:- Definitive prosthesis (A) Two parts of obturator (B) Finished maxillary and mandibular denture (C) Twopiece magnet retained obturator (D) Definitive obturator delivered to the patient.





Fig. 6:- (A) and (B) Pre and post-operative frontal view (C) and (D) Pre and post-operative lateral view





Conclusion:-

This article describes a simple technique to rehabilitate an edentulous patient having total maxillectomy defect with the use of two-piece magnet retained obturator by utilsing PVC sheet in first part of obturator and heat cure acrylic resin in second part. Different hollowing techniques were used in both parts of the obturator to make the prosthesis light weight. Advantages to the technique described in the present case are reduced chairside and laboratory time and economical to the patient which can be a significant consideration for the patient who had already undergone extensive medical and surgical treatment and who can not afford implant retained prosthesis that is the best treatment option in such cases.

References:-

1. Oh WS, Roumanas E. Dental implant-assisted prosthetic rehabilitation of a patient with a bilateral maxillectomy defect secondary to mucormycosis. J Prosthet Dent. 2006; 96:88-95.

2. Desjardins RP. Obturator prosthesis design for acquired maxillary defects. J Prosthet Dent.1978; 39:424-35.

3. Maxillofacial rehabilitation: Prosthodontic and surgical considerations. J. Oral Maxillofac. Surg. 1997; 55:786.

4. Habib BH, Carl F. Driscoll. Fabrication of a closed hollow obturator. J Prosthet Dent. 2004; 91:383-5.

5. Raut A, Huy NT. Rising incidence of mucormycosis in patients with COVID-19: another challenge for India amidst the second wave? Lancet Respir Med. 2021; 9:e77.

6. Har-El G, Bhaya M. Intraoperative fabrication of palatal prosthesis for maxillary resection. Arch Otolaryngol Head Neck Surg 2001; 127:834-6.

7. Nakamori K, Yamagishi M, Takaya K, Igarashi T and Hiratsuka H. Effectiveness of a Custom-Made Temporary Obturator after Bilateral Total Maxillectomy. Surg Sci 2013; 4: 322-4.

 Deepika K, Goel S, Gupta R, Jain RA. Application of Polyvinyl chloride sheet as delayed surgical obturator in maxillectomy defects secondary to mucormycosis- A case series. J Oral Biol Craniofac Res. 2023;13:207-209.
Deepika K, Bansal K, Chaturvedi A, Gupta R. De Novo Method of Hollowing of Delayed Surgical Obturator in Maxillectomy Defects Secondary to Mucormycosis in Post-Covid-19 Era: Case Series. Int J Prosthodont Restor Dent 2022; 12:149-154.

10. Parameswari BD, Rajakumar M, Jagadesaan N, Annapoorni H. Case Presentation of Two Maxillectomy Patients Restored with Two-piece Hollow Bulb Obturator Retained using Two Different Types of Magnets. J Pharm Bioallied Sci. 2017; 9:S252-S256.

11. Mittal M, Kalra A, Dabra T, Isser Y, Kumar A. Two Piece Closed Hollow Bulb Magnet Retained Obturator: A Viable Modality Option of Rehabilitation in Maxillofacial Prosthodontics- A Case Report. Int. j. oral health dent, 2015; 1:142-145.