

A Novel Technique for Prosthetic Rehabilitation of A Post-Covid Mucormycosis Patient Using Magnet Retained Two-Piece Obturator: A Case Report

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Abstract

Rehabilitation of patients with maxillofacial defects pose a major challenge to a prosthodontist. Retention in such cases is difficult due to lack of anatomical structures and adequate seal. The main aim of the prosthesis is to restore proper form, function and esthetics along with obturation of the oroantral communication. This case report depicts prosthetic rehabilitation of a patient with maxillectomy due to post covid mucormycosis by means of a two piece obturator retained with the help of magnets.

Keywords: Mucormycosis, rehabilitation, magnets, obturator, Covid 19.

Introduction

Maxillofacial prosthetics is the branch of prosthodontics concerned with the restoration and/or replacement of the stomatognathic and craniofacial structures with prostheses that may or may not be removed on a regular or elective basis(GPT).¹ These deficiencies may be due to surgery, trauma, pathologies, congenital deformities or malignancies.²

COVID 19 pandemic has caused a major havoc in the past two years and has led to severe immune deficiencies in affected individuals. One of the most devastating after effect seen due to inadvertent administration of corticosteroids in these immunocompromised individuals was post- COVID mucormycosis which was caused by fungal infections and necrosis in the

craniofacial structures. According to WHO, incidence rate of mucormycosis globally ranges from 0.005 to 1.7 per million population. In India, the prevalence of mucormycosis is estimated to be around 140 per million population.^{3,4,5} These lesions if diagnosed in preliminary stages were debrided but extensive involvement was treated with surgical resection of either a part or complete maxilla along with other orofacial structures. This causes an anatomical defect which leads to a confluent communication between the oral cavity, sinuses, nasal cavity and nasopharynx resulting in difficulty in speech, deglutition and mastication. This requires fabrication of a prosthesis which obturates the defect along with the restoration of form, function and esthetics. Fabrication of such prosthesis is a challenging task due to reduced mouth opening as well as lack of retention due to loss of vestibule and peripheral seal.

A two-piece obturator retained with magnets is an alternative treatment approach for such situations. Magnets are efficient means of providing retention in sectional prosthesis because of their small size and strong attractive forces⁶

This clinical report describes the prosthetic rehabilitation of a post covid mucormycosis patient with complete maxillary resection using magnet retained two-piece obturator.

Case report

A 50-year-old male patient reported to the Dept. Of Prosthodontics, Govt. College Of Dentistry, Indore, (M.P.) referred by the Dept. of Oral and Maxillofacial Surgery with a chief complaint of nasal regurgitation, inability to chew food with existing prosthesis and loss of appearance.

On past medical history, it was found that the patient was diabetic since last 8 years. He underwent

maxillectomy for post Covid-19 necrosis of maxilla due to mucormycosis six months back.

On extraoral examination, there was facial asymmetry with collapsed cheek and prominent nasolabial fold on right side of the face.

On intraoral examination, completely edentulous maxilla was seen with well healed residual maxillary defect along with an oroantral communication on the right side. The vestibule was obliterated and lip support was lost.(Fig. 1)



Fig. 1

After examining the defect, treatment plan was decided to rehabilitate the patient using a two-piece obturator. On examining intraorally, it was found that the defect present was of Aramany's Class-V type⁷. Due to lack of peripheral seal and inadequate vestibular depth, it was difficult to achieve retention in such prosthesis. So, a magnet retained obturator was planned for rehabilitation of the defect.

Procedure

After taking a thorough medical and dental history, the patient was educated regarding fabrication of the prosthesis and the treatment plan.

A primary impression was made in irreversible hydrocolloid impression material and a primary cast was obtained. An interim obturator was given to the patient

to block the oroantral communication thus facilitating in eating.(Fig2a and 2b)



Fig2a.



Fig2b.

The fabrication of the definitive prosthesis involved three basic steps: (1) impression procedure, (2) fabrication of the antral part of the obturator using autopolymerising resin, and (3) fabrication of the oral part of the obturator.

Impression procedureAn appropriate perforated stock tray was taken and adjusted according to the defect. Before making the impression, the defect was blocked using a wet gauge piece to avoid flow of the impression material into the defect. A preliminary impression of maxilla was made using irreversible hydrocolloid impression material and a special tray was fabricated. Border moulding was performed and a definitive impression of the defect was made using impression compound on the special tray. Beading and boxing was performed and master cast was poured. It was retrieved using hot water to remove the impression compound. The master cast was duplicated using alginate.



Fig 3a



Fig 3b

Fabrication of antral part of the obturator

An autopolymerising resin was poured into the defect area for fabrication of the antral part of the obturator leaving the basal seat area and there an extension into the defect was self retentive. Indexing was done on the

basal seat surface of the antral part and a pick-up impression is made for fabrication of oral part. The fit, phonetics and breathing was checked and patient was comfortable. The superior surface of the antral part of the obturator, which was to come in contact with this space, was roughened with an acrylic bur, and was relined using a permanent soft liner(Fig4a). This impression was poured with the extension.(Fig 4b) Autopolymerizing resin (DPI) was mixed and formed into an approximately 3-mm thick sheet, and during the dough stage, the inferior surface (open part) of the antral part was placed over the resin. The excess was cut with a Bard Parker blade, and pressure was maintained until polymerization of the resin was complete. Thus, the antral part of the obturator was complete with the record base and the antral extension. The antral part was checked in the mouth and excess material from the periphery was trimmed and rounded off according to the extensions. Retention was adequate because of the presence of antral undercuts and patient was comfortable. (Fig 4c)



Fig 4a

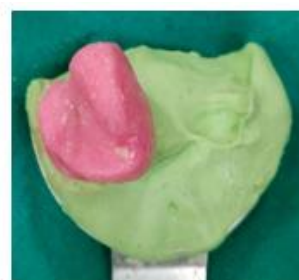


Fig 4b



Fig 4c

Fabrication of oral part of the obturator along with occlusal rehabilitation

The antral part of the obturator was positioned and the impression of the inferior portion of the antral part of the obturator and mandibular arch was recorded with alginate(Fig 5a). A record base was fabricated for the oral part and occlusal rim was made. There was difficulty in orientation of the oral part so vertical depressions and elevations were made for easy seating of the two parts. Jaw relation was recorded and casts were mounted.(Fig 5b) Teeth setting was done to achieve the best possible occlusal relationship but due to lack of lip support, an extremely prognathic mandible and hyperactive muscles, the overjet and overbite could not be achieved in anterior region. (Fig 5c) Try-in was done using tray adhesive in between the two parts. (Fig 5d) After try-in, the centre portion of the palate in the oral part of the obturator was removed to reduce the bulk and both the parts were processed after wax up and finishing. The processed denture was tried and occlusal corrections were done maintaining a passive contact with opposing teeth.(Fig 5e)



Fig 5b



Fig 5c



Fig 5d



Fig 5e

Three depressions (2mm depth) were created on the inferior part of the antral portion and three depressions on the superior part of the oral portion for placement of magnets. Three pairs of commercially available magnets(cobalt-samarium) were positioned with the help of self-cure resin after checking the opposite poles and the prosthesis was inserted in mouth. (Fig 5f)



Fig 5a



Fig 5f

Insertion and review

The prosthesis was examined for speech, comfort, retention, and esthetics.(Fig 6a, 6b and 6c) The patient was educated to insert and remove the prosthesis. During insertion, the patient was instructed to wear the antral portion. If it was comfortably seated, then the oral part of the obturator was to be inserted. Magnetic forces and

guiding slots facilitate easy insertion of the oral part of the obturator. During removal, the patient was trained to hold the central part of the antral part of the prosthesis in his left index finger and remove the oral part of the obturator with his right hand. This avoided removal or displacement of the antral part of the obturator along with the oral part of the obturator.



Fig 6a



Fig 6b



Fig 6c

The first follow up was done after 24 hrs. The patient had pain in the conchae region and mild discomfort

which was corrected by polishing. The limitations of the prosthesis were informed to the patient regarding eating soft semi-solid food. Also, the patient was explained regarding loss of magnetic forces with due course of time which may lead to lack of retention requiring replacement of the magnets. Next follow up was done after one month and the patient was comfortable.

Discussion

Post covid-19 mucormycosis necrosis of maxilla has lead to severe deformities in the orofacial structures in patients thereby compromising form, function and esthetics. So as a prosthodontist, it is particularly important to rehabilitate these post operative patients. Factors that affect the prognosis of the prosthesis are the size of defect, number of remaining teeth, amount of remaining bony structure, quality of existing mucosa, radiation therapy, and patient's own ability to adapt to the prosthesis ^{8,9} For a completely edentulous case, retention and esthetics are even more challenging due to loss of vestibule and peripheral seal.

Reduced mouth opening in this case posed a major challenge since a single piece obturator is difficult for insertion and removal. So a two piece prosthesis was fabricated to overcome this. Magnets are used because of their small size and strong attractive forces, attributes that allow them to be placed within prostheses without being obtrusive in the mouth.¹⁰ Advantages also include ease of cleaning, ease of placement, automatic reseating, and increased retention¹¹. Cobalt-samarium magnets have superior characteristics in terms of magnetic permanence (hardness). The only drawback associated with these magnets is the loss of magnetism after sometime for which the patient was informed and educated to get this replaced every six months.

One disadvantage with a two-piece magnet retained prosthesis is that on retrieval, both the parts tend to come

out together. Hence, the horseshoe shape was employed while fabricating the oral part of the prosthesis to allow holding of the antral part at the time of removal of the oral part. A constant follow-up on a longitudinal basis is necessary, and further research on the magnetic field of commercially available magnets is needed.

Conclusion

Maxillary defects caused due to mucormycosis present many prosthetic and rehabilitative challenges. In order to restore form, function and esthetics in such patients, additional retention aids need to be sought. The sectional prosthesis, retained by magnets, eliminated long-term use of a nasogastric tube, rehabilitated the patient's speech, and restored proper midfacial esthetics. The limitations of the prosthesis were explained to the patient. More studies need to be done regarding the loss of magnetism in such prosthesis and other alternative treatment approach.

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