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Rehabilitation of Hemimaxillectomy Defect Secondary to Mucormycosis Using Cast Partial Prosthesis with Hollow Shim: A Case Report

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ABSTRACT: Maxillectomy defects can causes difficulty in mastication and deglutition, impaired speech, and facial disfigurement. The prosthodontist plays an important role in the rehabilitation of such defects. This clinical report describes the details of a prosthodontic rehabilitation of an elderly patient who was diagnosed with post COVID mucormycosis and has undergone hemimaxillectomy. The defect has caused problems in mastication, aesthetics and phonetics. A definitive prosthesis with cobalt–chromium removable partial denture with hollow shim prosthesis was plannedwhich gained its support from the remaining teeth and tissues. Carved rock salt was used to make the shim hollow. The follow-up system revealed satisfactory results with no deterioration in the prosthesis.A patientisquitesatisfiedwithlightweightcastpartialand hollowshimprosthesis.

KEYWORDS: Hemimaxillectomy, Mucormycosis, Obturator, Hollow shim,

I. INTRODUCTION

Mucormycosis presents as an acute fungal infection with a typically fast and devastating course that affects blood supply-rich areas such as the maxilla[1]. Paltauf was the first to describe it in 1885. After candidiasis and aspergillosis, it is the third most prevalent opportunistic fungal infection. Mucormycosis, also known as black fungus, caused havoc in India during the catastrophic COVID-19 epidemic's second wave (between April and June 2021) by a rapid and deadly surge with up to a 50% fatality rate. While the actual reason for its sharp rise during the second wave is still unknown, it has been discovered that diabetics andimmunocompromised patients who have recovered from COVID-19 infection are more susceptible to mucormycosis[2].

Due to aggressive and invasive nature of the disease, extensive surgical resection is required which results in large complex maxillofacial defects[3].Even though surgical reconstruction is the preferred choice to manage these residual surgical defects, prosthetic rehabilitation is resorted to many a times because of the inherent advantages like, ease of covering large defects, multiple surgeries are avoided, predictable cosmetic results, ease of detection of the recurrence and is ideal for patients with advanced age and compromised health[4].

Maxillary resection without involvement of the orbit is relatively simpler to rehabilitate usually with hollow bulb obturator. According to GPT 9, obturator has been defined as maxillofacial prosthesis used to close, cover, or maintain integrity of the oral and nasal compartment resulting from a congenital, acquired, or developmental disease process, such as cancer, cleft palate, osteoradionecrosis of the palate; the prosthesis facilitates speech and deglutition by replacing those tissues lost because of the disease process and can, as a result, reduce nasal regurgitation and hypernasal speech, improve articulation, deglutition, and mastication[5]. Prosthetic rehabilitation of a dentulous maxillectomy patient is done by utilization of the remaining palate, the defect, remaining dentition and soft tissues to maximize retention, stability, and support. In the cases of large defects, the weight of the prosthesis is a major concern[6]. Hollowing the prosthesis reduces the weight up to some extent and helps in enhancing the retention and stability.

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This case report is the rehabilitation of the patient with hemimaxillectomy which was done for post COVID mucormycosis.

II. CASE REPORT

A 65-year-old female patient reported to the department of prosthodontics for the replacement of teeth. Patient had undergone hemimaxillectomy 4 months ago for post COVID mucormycosis. Lesions were restricted to the unilateral alveolar and palatal segment. Extra-oral examination revealed facial asymmetry with collapsed lower mid-facial region on the right side of the face. Intraoral examination showed completely dentulous lower arch, partially edentulous maxillary arch with oroantral communication at two position of 2-3mm dimension in right buccal vestibule. The right buccal and labial vestibule was obliterated with increased inter-ridge distance. All the teeth in maxillary right quadrant and left central incisor was extracted with the resection of alveolar bone. It required that the planned prosthesis should be lightweight with adequate retention so that the patient could overcome difficulty in mastication, speech and deglutition, Patient has controlled diabetes and is on medication for the same. No infection or inflammation observed intraorally. A thorough medical and dental history was taken and the patient counselled to reduce her emotional anxiety. Patient was given all possible treatment options, she chose cast partial denture with hollow shim obturator.

Figure 1: Preoperative occlusal view

Figure 2: Preoperative occlusal view

Maxillary and mandibular diagnostic impressions were made with irreversible hydrocolloid (Tropicalgin, Zhermack) using stock trays and diagnostic casts of Type III dental stone (Kalabhai Mumbai) were retrieved. A heavy prosthesis usually affects the function of the prosthesis, and since the buccal sulcus on the affected side was obliterated, it was planned to fabricate a hollow occlusal shim to enhance the retention of the prosthesis. The complete oral prophylaxis was done. The surveying of upper diagnostic cast were performed. After that, for the cast partial mouth preparations, saucer-shaped occlusal rest seats prepared on the left canine, premolars and molars. A definitive two phase two stage impression was made with addition silicone elastomeric impression material (Dentsply, Aquasil) using 1mm thick thermoplastic sheet as spacer. The cast was poured and again surveyed. The framework was designed and casted.

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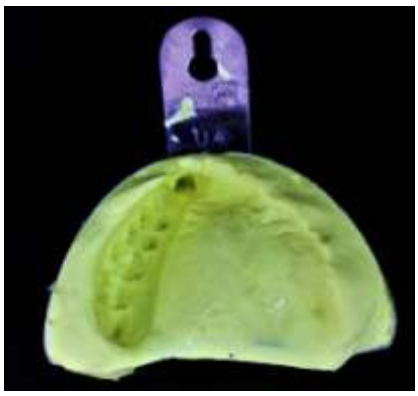

Figure 3: Primary impression

The framework was designed and casted.

The casted framework was tried in the patient's mouth and adjusted for proper fit. Wax rim was made on the framework and jaw records were taken and transferred to the semi adjustable Hanau articulator. Teeth were arranged. Waxed up denture were tried and checked for retention, stability, support, phonetics, and aesthetics in the patient's mouth. Adjustments were made accordingly. The trial dentures were further waxed carved and finished.

After flasking in conventional manner using dental plaster, a customized wax bead was adapted on the waxed up denture in flask which was 2 mm short of the cervical level of teeth of effected side over palatal and buccal side. This bead serves as a guideline for the height of the shim wax block. A putty index (condensation silicone impression material) is made below the bead wax. After that counter flasking, the dewaxing was done in conventional manner.

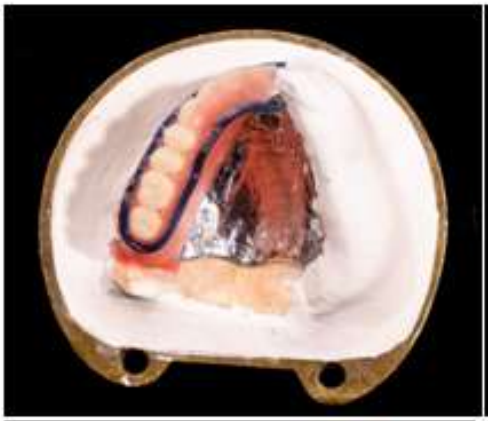

Figure 5: beading wax adapted 2mm bellow the cervical level on buccal and palatal side

Figure 4: Putty index with customized beading wax

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Figure 6: self-cured acrylic sheet adapted on teeth surface in counter flask

Figure 7: Rock salt carved in the shape of defect and positioned in counter-flask

Figure 9: final prosthesis- occlusal view

Figure 8: Final prosthesis - profile view

Figure 11: Hollow shim obturator

Figure 10: Post-op view

When in dough stage a self-cured acrylic resin sheet was added in counter flask, on tooth surface up to the level of marking by wax bead. A rock salt was shaped and carved in such a way that 2mm space will remain from buccal, palatal and tissue surface side. It is then placed in counter flask in appropriate position. After that the denture is processed with heat-cured resin in conventional manner.

Following retrieval of the denture a window is created on the buccal side of shim and rock salt was broken down using small round bur. Remaining salt was flushed out using water spray. The window was closed using self-cured acrylic resin. The denture is then finished and polished. The final prosthesis is tried and adjusted in patient's mouth. At insertion, the pressure indicator paste (PIP) was used to inspect for any pressure areas. The denture was inserted and post-insertion instructions were given to the patient in the care and use of prosthesis. The patient was re-viewed monthly for three months, then the visits were arranged to be every 3 months.

III. DISCUSSION

Opportunistic fungal infections such as mucormycosis usually occur in immunocompromised patients, but can infect healthy individuals as well[1]. The predisposing factors for mucormycosis are uncontrolled diabetes (particularly in patients with ketoacidosis), malignancies such as lymphomas and leukemia's, renal failure, organ transplant, long-term corticosteroid and immunosuppressive therapy, cirrhosis, burns, protein energy malnutrition and acquired immune deficiency syndrome. Our patient had uncontrolled diabetes in past, which is a well-known predisposing factor for mucormycosis

The reconstruction of maxillary defects with obturator prosthesis is one option to rehabilitate patients. In a short period of time, the patient can improve his abilities of deglutition and speech and therefore take part in a normal social life[7]. Framework designs for these prostheses may vary based on the defect. All removable prosthesis in these cases should be dictated by basic prosthodontic principles which include broad stress distribution, cross arch stabilization with the use of a rigid major connector, and stabilizing and retaining components at locations within the arch to best minimize dislodging functional forces[8,9]. Due to the extension of the prosthesis into the defect, the weight of the prosthesis invariably increases which further compromises the retention of the prosthesis. The weight of the prosthesis is a major concern for the prosthodontist. Several methods have been described to overcome the difficulty with fabrication of hollow bulb obturators[10-14]. Previous authors had used sugar and ice to make the bulb hollow by eliminating these materials later[15-17]. These techniques seemed cumbersome. Another technique using a light-polymerized resin record base was tried which was less time consuming[18]. Advocated technique used the bead wax and putty index for the height of hollow shim.

The current advocated technique is a variation of the past used technique. In this case rock salt and self-cured acrylic resin were used for making hollow shim which has been seemed a predictable technique because of the uniform thickness of the shim achieved as well as the ability to achieve a single-piece prosthesis which is always superior to a two-piece obturator[19]. The use of a beading wax and putty index improved the accuracy of the technique. Limitation of this technique is that it will be difficult to shape the rock salt in case of large irregular defects.

IV. CONCLUSION

The great challenge in rehabilitating a hemimaxillectomy patient is to obtain adequate retention, stability, and support. Thorough knowledge and skills coupled with a better understanding of the needs of the patients enable the successful rehabilitation of such patients. The current report concludes that the patient with cast partial denture with hollow occlusal rim, is very much comfortable. Over a period of 8 months of follow-up, the patient is satisfied with the lightweight prosthesis.

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