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Prosthetic rehabilitation of post COVID Mucormycosis Maxillectomy defect using cad-cam obturator with semi precision attachment: A case report

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Abstract

The fabrication of an obturator prosthesis is crucial for the closure of partial Maxillectomy defects caused by Post COVID Mucormycosis as it improves speech, appearance, acceptability due to better mastication without nasal regurgitation, and overall health status and quality of life for the patient. Patients who cannot undergo fixed prosthetic rehabilitation using implants may benefit from attachment retained obturator prostheses. It offers the prosthesis optimal retention, stability, and support. This case report concludes that attachment retained CAD CAM fabricated obturator prosthesis improves retention, excellent aesthetics, provide good adaptation of cast partial framework with adjacent structures and light weight of prosthesis enhances acceptability of prosthesis by patient.

Keywords: Mucormycosis, cad-cam, mastication, palatal obturators

Introduction

Maxillectomy is typically an acquired condition caused by carcinomas, Mucormycosis. These defects often leads to hyper nasal speech, nasal regurgitation, and impaired mastication [1]. Despite advances in surgical procedures, surgical reconstruction of Maxillectomy defects is not always possible because of the general health condition of the patient [2].

To overcome this problems prosthetic obturators are the efficient therapeutic option to rehabilitate. The separation of the oral cavity from the Sino nasal cavities and closure of the Maxillectomy defect are the main objectives of a prosthetic obturator [3]. It enables adequate deglutition, articulation, speech and restores facial contours.

The obturator's ability to perform its function depends on proper retention. Retention is affected by a many factors that includes the level of direct/in direct retention promoted by the remaining teeth; defect size; available tissue surrounding the cavity; and muscular control [4]. In terms of the patient's social life, stability and aesthetics are equally important for treatment effectiveness [5]. Conventional obturator frequently falls short in terms of retention, stability, and support. In these situations, precision attachments can be employed to increase the prosthesis' stability and retention. Additionally, it stops the common, ill-aesthetic clasping over the anterior region.

Since the development of computer-aided design computer-aided manufacturing (CAD-CAM) technology, new methods of metal processing, such as selective laser melting/sintering or milling, have also become available. Compared to traditional cast partial obturator prostheses, it offers the final obturator an acceptable fit, function, and aesthetic.

The present clinical report describes the prosthetic rehabilitation of Maxillectomy defect using a semi precision attachment-retained CAD-CAM milled obturator prosthesis with hollow rim (Acrylic shim).

Case Report

A female in her 40's reported to the Department of prosthodontics with the chief complaint of difficulty in chewing food and unaesthetic appearance since the past 1 year.

Medical History

Patient gave the history of Diabetes Mellitus and is under medication for the same since the past 2 years. Patient has been diagnosed with Post COVID Mucormycosis 1 year ago, underwent Posaconazole therapy. Patient underwent surgical resection of lesion along with the left maxillary posterior region. After the resection, the patient developed an Aramany Class II defect. The patient also complained of nasal twang, social stigma, loss of confidence and extreme difficulty in speech, mastication and deglutition.

On Extra-oral Examination: Asymmetry noted on left side of the face

On Intra-oral examination: Partially edentulous maxillary arch with Aramany Class-2 defect. Anteriorly, it extended from the first premolar to the posteriorly to second molar region. Right maxillary quadrant was intact with 12, 13, 14, 15, 16, 17 teeth present (Figure 1). The mandibular arch had a full component of natural teeth, with normal mouth opening and jaw movements.



Fig 1: Intraoral pre-operative photograph

Tissue around the excision showed good signs of healing. However, it was found that the left half of the patient's oral tissues, the palatal bone and the remaining residual ridge alone were incapable of supporting the prosthesis. The remaining teeth exhibited significant periodontal and bony support and the oral hygiene was fair. Various fixed and removable treatment options were discussed with the patient. Because of economic constraints and high chances of recurrence, fixed prosthetic treatment avoided.

Patient has been planned for Semi precision attachment retained CAD-CAM milled hollow rim obturator prosthesis.

1. The defect developed after the surgical excision extended from the first premolar to the second molar region antero-posteriorly and present in buccal vestibule area. The defect area was packed with gauze, so as to prevent the ingress of the impression material into the nasal cavity during recording the impression. Primary impression was made with irreversible hydrocolloid (Zelgan; Dentsply Intl) and a diagnostic casts were poured using Type II dental plaster.
2. Surveying has been done for the diagnostic cast with the defect area and the height of contours were marked.
3. Teeth 12, 13 were prepared to receive metal- ceramic crowns and rest seats were also prepared to receive embrasure clasp over first and second premolar, also on first and second molar. Definitive impression made using addition silicone impression material (Zermack Ellite HD+). (Figure 2) Temporisation crowns were cemented over 12 and 13 using NETC.



Fig 2: Final Impression after mouth preparation

4. PFM crowns along with Preci Sagix semi-precision attachment (Preci-Sagix × 2.2 castable male par and female standard size ϕ 2.2; height: 4.1 mm- ϕ 4.2 mm yellow color, Ceka/Preciline, Waregem, Belgium) attached to them were designed in CAD-CAM Exo-cad software.
5. PFM crowns along with Preci Sagix extra coronal attachment cemented over prepared teeth and another diagnostic impression made using irreversible hydrocolloid and cast of Type III dental stone was poured. (Figure 3) Maxillary Defect blocked using modelling wax and custom tray for definitive impression was fabricated over cast.



Fig 3: PFM crowns with SAGIX attachment cemented on prepared abutments

6. Border moulding of the sulcular depth done using custom tray fabricated on diagnostic cast followed with final impression was done using light Body Addition silicone elastomeric material. (Zermack ElliteHD+) such that the depth and extent of the defect area was recorded accurately by asking the patient to move her head right, left and bend downwards, which allowed to record the final impression in functional form.
7. The Master cast was digitized with a laboratory scanner and cast partial Framework was designed. The metal framework was fabricated with DMLS technology, using CAD CAM (Figure 4).

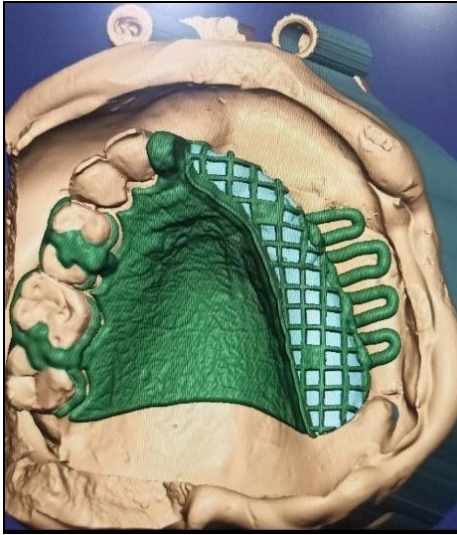


Fig 4: CAD- CAM designing of obturator framework

8. Cast Partial framework was tried into patients mouth and adjusted for proper fit (Figure 5).



Fig 5: Jaw relation and try-in of obturator prosthesis

9. Acrylic denture base was made on the framework and jaw records were taken and transferred to a semi-adjustable articulator. Teeth arrangement were done and tried into patients mouth for retention, stability, aesthetics, phonetics and proper occlusion. The trial dentures were further waxed carved and finished (Fig 6).



Fig 6: Trial of obturator framework

10. Final processing of obturator involved fabrication of hollow acrylic shim and processed with heat cured acrylic resin. Final Denture tried and adjusted into patients mouth (Figure 7).



Fig 7: Final obturator prosthesis insertion



Fig 8: Overall improvement in appearance

11. The female part of the semi-precision attachment was attached intraorally and fixed to the prosthesis with the help of self-cured resin.
12. Patient was satisfied regarding function, aesthetics and comfort of the prosthesis. Proper Instructions regarding maintenance of oral hygiene were given. Follow up was done after 1 week and 3 months. Favourable results were observed.

Discussion

One of the most typical intraoral defects is the maxillary defect. This results in facial deformity, nasal regurgitation, speech problems, and difficulty in chewing. The fabrication of an obturator prosthesis allows for the rehabilitation of such abnormalities. Obturators completely seal both the maxillary and lateral palatal defects, which enhances the quality of mastication and speech^[1].

Zygomatic and endosseous implants are the best way to rehabilitate patients with maxillary defects. In patients with near total and total maxillectomy, Schmidt *et al.*^[12] employed zygomatic and conventional endosseous implants to retain prostheses. However, due to financial limitations, medical issues, the possibility of recurrence, and low bone quality, implants are not always an option.

The typical clasp retained obturator prosthesis can be used to rehabilitate such patients. However, in these situations, retention and support are crucial issues. Clasps have a low retention capacity, and plastic deformation caused by repeated insertion/removal. To improve retention, stability, and support, precision or semi-precision attachment can be

employed in this situation.

In present case Semi-precision Preci Sagix extra coronal attachment used over abutments 12 and 13 which were periodontally sound. Preci Sagix attachment is easily available, economical and female component can be replaced easily. The use of attachment on the tooth adjacent to the defect not only provide adequate retention, but also better aesthetics. It eliminated unesthetic appearance of clasp used in conventional obturator design. It provides tripod effect, stability and optimum stress distribution over anterior hard palate.

Cast partial framework can be fabricated using CAD-CAM technology or by conventional manner. The virtual model can then be used to design and print the framework in resin followed by casting metal frameworks or to print the metal or resin frameworks directly^[8, 9]. Direct printing of the RPD metal framework using CAD and selective laser sintering (SLS) technology has the potential to further reduce mistakes compared to the conventional method of fabrication^[10]. CPD frameworks fabricated using CAD-CAM shows better mechanical properties, increased patient satisfaction, improved speech and mastication, shortens laboratory time, and the availability of preserved data for future prosthesis reproduction^[11].

Here in this case, cast partial framework was designed in Exo CAD software and printed using SLS technology. Purpose of using CAD CAM technology was to provide Excellent fit between the metal framework and the natural teeth and good adaptation of the denture base to the supporting tissues to enhance the stability and retention of the obturator. Along with retention and stability of obturator, weight of the prosthesis is also a major concern. In this case, hollow acrylic rim (Shim) was fabricated to reduce weight of the prosthesis.

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