Altered cast technique for management of large maxillary defects

Clinical Report

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ABSTRACT

Restoring defects of acquired causes in the maxilla presents an unique challenge to the prosthodontist due to the sheer size and anatomic nature of the defect itself. Since most of the maxillary defects are intraoral in nature, the prosthodontist should decide on the extent of the defect that can be restored. Recording, fabricating, inserting and removing the prosthesis is limited by mouth opening and undercuts present. The conventional techniques of impression making of large maxillofacial defects have inherent deficiencies as the visualization of the amount of extension that can be worn or inserted by the patient comfortably is difficult and also; due to limited mouth opening, custom fabricated trays can be quite difficult to insert. These difficulties can be circumvented by using altered cast technique. This article describes the technique of fabricating prosthesis for large maxillary defect using altered cast technique.

KEY WORDS: Altered cast, maxillofacial defects, obturator

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INTRODUCTION

It is indeed a great challenge to restore acquired large defects of the maxilla.[1] Etiology of acquired maxillofacial defects may be either in the form of trauma or carcinoma, especially by carcinomas of the alveolus or of the maxillary sinus.[2] The difficulties in restoring defects of this nature in the maxilla are restricted mouth opening, undercuts in the defects and obstruction of the path of removal by the lateral wall of the defect.

The size and location for maxillary defects determine the difficulty of prosthetic rehabilitation. In such cases, specially made obturator prosthesis is necessary to restore masticatory function and improve speech, deglutition and esthetics. Obturator prostheses vary in size and shape depending on the extent of the defect.

Various methods and techniques have been described for the fabrication of removable obturator prostheses. The extension of the prosthesis depends on the maximum extent of the tissues that can be recorded with the impression since it gives better stability for the prosthesis.[3] Even if the mouth opening is adequate, the size of the defect may be such that making an impression in such a scenario is a daunting task. Many techniques have been tried to record such a large defect like two piece impression technique, using a custom adapted tray to make a single piece impression, making a separate impression of the defect. The main disadvantage of these techniques lies in relating the defect to the palatal portion of the denture base which may lead to failure of the prosthesis.

The retention of obturators is achieved either by engaging remaining teeth or by undercuts in the defect which gain retention by obstructing the path of removal, especially in the lateral wall of the defect. The purpose of recording greater depths in a large maxillary defect is to create a long lever arm which will provide increased stability, which in turn translates into greater retention.

Most of the disadvantages with the previous techniques can be counteracted by using a two-stage impression

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technique with an altered cast technique.

CASE REPORT

A 58-year-old male patient reported to a private practice with a history of carcinoma of the maxillary sinus five years ago. Clinically, there was a unilateral maxillectomy defect on the left side extending from the central incisor to the soft palate and hence was diagnosed as a situation of Armany's class 1.[4] The patient was wearing an ill fitting interim acrylic obturator [Figure 1] that required to be changed. Examination of the interim obturator found it to be grossly under sized compared to the defect itself. Since the mouth opening was adequate, it was decided to record the maximum extent of the defect by an altered cast technique.

A preliminary impression was made with irreversible hydrocolloid (Tropicalgin; Zermack Dental) after blocking out of the severe undercuts [Figure 2]. The diagnostic cast was surveyed and planned for a metal frame work to support the obturator. Mouth preparation for the cast partial framework was made and the impression made with irreversible hydro colloid. The cast was poured and the cast frame work fabricated on the refractory cast.

Design of the Frame Work

A tripodal design was adopted in the planning of the framework.[5] For direct retention, an I-bar is placed on the central incisor #11 engaging the labial undercut, Y-bar placed on the canine and a half and half clasp on the second molar #2. Bracing and indirect retention is achieved with the help of palatal extensions of the anterior teeth. Additional retention is achieved with the implant placed in the region of #16 with a ball and socket attachment.

Retentive loops are provided on the side of the defect for attachment of the bulb of the obturator. After the trial of the frame work, an acrylic special tray is attached to the retention loops. The tray is coated with a tray adhesive to enhance retention of the elastomeric addition silicone material. Putty consistency addition silicone impression material is placed on to the tray and seated onto the defect.

Once the putty hardened, the extensions are checked for adequacy and ease of removal. If the extensions appeared inadequate, some more material is added and the frame work is repositioned. Reline impression is made with light viscosity addition silicone material to make an accurate impression of the defect [Figure 3]. The master cast is sliced off on the defect side, the metal frame work with the impression of the defect is inverted on to the cast and poured after beading and boxing. Once the cast is hardened it is removed from the impression to form the altered cast [Figure 4].

On to the altered cast, a denture base is fabricated with the frame work in place on the defect side. Jaw relation recording is done for centric relation and tooth setup [Figure 5] for esthetics and function. The teeth set try-in is verified and acrylization done. The acrylized denture will now comprise of the frame work, the intaglio surface of the defect side and the teeth [Figure 6]. The bulb is made hollow covering a palatal surface with cellophane sheath luted with cyanoacrylate glue and sprinkling self curing acrylic powder and liquid to form the palatal surface of the bulb [Figure 7]. The final obturator is evaluated for the adequacy of fit, esthetics and function [Figures 8-10].

DISCUSSION

Obturators and facial prostheses are important not only in rehabilitation and esthetics, but also in patient re-socialization. The level of reintegration is directly related to the degree of satisfaction with rehabilitation.[6]

Impressions in fabrication of an obturator of a maxillary defect, especially a large maxillary defect, are of prime importance. Any faulty impression making compromises an already complex procedure. Accurate recording of the various structures was done with various techniques like two piece impressions, impressions using custom fabricated trays,[7] materials like silicone, impression compound and reversible hydrocolloid impression materials are used.[8] However, all these techniques have difficulties when it comes to restoring large maxillary defects. In literature very little is written about usage of the altered cast technique for fabrication of maxillary obturator using a two stage impression technic.

Altered cast technique is typically used as a special procedure for removable of partial denture in distal extension situations [9] to equate the pressure between the teeth and the edentulous space. When adapted to make impressions for large maxillary defects, it provides distinct advantage since the framework seating makes verification of jaw relation and the trial procedure more accurate. The recording of the defect is relatively easy as the tray size is greatly reduced by using the framework to carry the impression material. Path of insertion and removal can also be determined.

The altered cast technique as an alternative to

Figure 1

Figure 2

Figure 3

Figure 4

Figure 5

Figure 6

Figure 7

Figure 8

Figure 9

Figure 10

Figure 1: Ill fitting Interim Obturator, **Figure 2:** Irreversible Hydrocolloid Impression, **Figure 3:** Final Impression on the framework, **Figure 4:** Altered Cast, **Figure 5:** Waxed up Prosthesis, **Figure 6:** Finished prosthesis, **Figure 7:** Polished Surface, **Figure 8:** Intra Oral View of Final Prosthesis, **Figure 9:** Intra Oral view in Occlusion, **Figure 10:** Postoperative

conventional impression making in maxillofacial defects has not been discussed in literature. Hence description of this technique may be quite useful in restoration of large maxillary defects.

CONCLUSION

Due to various debilitations involved with cancer therapy, many of the maxillofacial defects come to

the prosthodontist as an inherent compromised scenario. The best of efforts is required to make even small amount of improvement in the quality of life for these individuals. Altered cast technique is one of the improvisations that can be made while making an obturator for large maxillary defects. It not only improves the impression making and fabrication easier but also provides comfort to the patient by not trying to stretch open the mouth during impression procedure.

The impression procedure, jaw relation recording and try-in procedures are very accurate because of the stability of the framework that is retained and supported by remaining teeth.

REFERENCES

1. Lynch CD, MacGillycuddy CT, O'Sullivan VR. Pierre Fauchard and his rôle in the development of obturators. Br Dent J 2005;199:603–5.
2. Abadi BJ, Byron RJ Jr. Maxillary obturator a clinical case report. Gen Dent 2008;56:709-13.
3. Laney WR, Gibilisco JA. Diagnosis and treatment in prosthodontics. p. 400.
4. Aramany MA. Basic principles of obturator design for partially edentulous patients. Part I: Classification. J Prosthet Dent 2001;86:559-61.
5. Aramany MA. Basic principles of obturator design for partially edentulous patients: Part II: Design principles. J Prosthet Dent 2001;86:562-8.
6. Goiato MC, Pesqueira AA, Ramos da Silva C, Gennari Filho H, Micheline Dos Santos D. Patient satisfaction with maxillofacial prosthesis: Literature review. J Plast Reconstr Aesthet Surg 2009;62:175-80.
7. Thomas A Curtis, Beumer III: Restoration of acquired hard palate defects in maxillofacial rehabilitation: Prosthodontic and surgical considerations. John In: Beumer J, Thomas a Curtis, Firtell. p. 229.
8. Rahn AO, Boucher LJ. Obturators for use following maxillary resection, in maxillofacial prosthetics principles and concepts. W B Saunders; 1970. p. 93.
9. Verrett RG. Special impression procedures for tooth-tissue supported removable partial dentures. In: Pheonix RD, Cagna DR, Defreest CF, editors. Stewarts clinical removable prosthodontics. 3rd ed. Quintessence Books; 2003. p. 364.
10. Desjardins R. Early rehabilitative management of Maxillectomy patient. Oral Surg Oral Med Oral Pathol 1997;38:311.

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