

MODIFIED SILICONE CORE CLOSED-BULB OBTURATOR : AN INNOVATIVE TECHNIQUE

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ABSTRACT

Rehabilitation of hemimaxillectomy cases are always challenging for a prosthodontist as patients who underwent resection of maxilla due to benign or malignant tumor, or accident will have defect in palatal area. The most common problem encountered during rehabilitation with such patients are the size and location of the defect which usually influences the amount of impairment and difficulty in prosthodontic restoration. Obturator prosthesis is commonly used for rehabilitating acquired/congenital defects. In cases of large acquired defect, movement of the prosthesis is inevitable and requires a form of indirect retention for controlling the rotation of the prosthesis. The present case report described the rehabilitation of a partial hemimaxillectomy patient with a two-piece closed bulb acrylic obturator, with silicone core in the defect area. This approach adequately increases the retention and stability of the prosthesis, which helped to improve the general well being of the patient.

KEY WORDS

Maxillectomy, Silicone Obturator prosthesis, rehabilitation

INTRODUCTION

Prosthodontic rehabilitation of the patient with congenital or acquired defects in maxillae after surgical resection helps them to restore functional activity, hope and ambition to lead a normal life in society. The common etiologic factors for acquired defects of palate are trauma, pathologic changes, radiation burns or surgical intervention. The resultant defects create oro-nasal or ora-antral communications with difficulty in eating, speaking and breathing. "Whenever there is a breach in the continuity of the palate due to congenital or acquired defects, there is a communication exist between oral and nasal cavity known as oral-antral communication. (1) So restoring the normal separation that exist between oral cavity and nasal cavity is critical in allowing a patient to maintain speech and swallowing function after maxillectomy. (2) To overcome these problems, surgical intervention or prosthetic treatments are used. Often, surgical reconstruction is very difficult to achieve when the defect area is large, as the treatment choice is limited for prosthodontic rehabilitation.

When treating patients of such defects prosthetically, several

factors should be considered; the size and location of the defect, accessibility, degree of jaw opening, and planning the age of the patients, presence of any systemic factors, prognosis of the tumor itself, esthetic and functional expectations of the patient along with the motivation.

Removable obturator prosthesis gets retention, support and resistance mainly through anatomical structures such as teeth, alveolar bones and palate. When surgical intervention removes much of these structures, remaining tissues becomes too compromised to support the necessary prosthesis. The prognosis for prosthesis becomes worse for Class I defect which have difficulties in retention, support or resistance. Therefore, considerations should be given to attain extra retention, support and resistance when planning for obturators of maxillary defects. (4)

Obturator is a prosthesis used to close a congenital or acquired tissue opening, primarily of hard palate and/or contiguous alveolar/soft tissue structures. For acquired defect obturator may be of three types: Immediate temporary Obturator, Interim Obturator, Permanent Obturator. The part of the obturator which remains extended into the defect area is called as bulb which helps

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After dew axing separating media was applied everywhere except the resin teeth. Recommended polymer-monomer ratio of heat cure acrylic resin was mixed and contoured in the flask. The flask was closed and allowed to set for approximately 30 minutes. Curing was done and after curing deflasking was performed.

Steps for the fabrication of heat-processed record base for the silicone obturator are as follows:

- Duplication of master cast was done using agar impression material for fabrication of silicone prosthesis. The cast was neatly cut through the defect area with a frit saw into two parts for ease of adaptation and removal of the wax pattern of the prosthesis.
- A double thickness of baseplate wax was adapted into the defect surface within the cast without leaving internal undercuts and was extended up to the palatal borders .
- A thin ring of wax that served as a retentive lip for the acrylic denture was added to the inside just superior to the palatal border.
- The master cast was prepared and an undercut around the periphery of the defect was created on the master cast. The undercut was used to serve as a snap-in lock of the prosthesis. After the completed and finished wax-up, flasking and de-waxing was done.
- Silicone rubber was mixed

according to manufacturer instructions & packed in the flask and curing was accomplished.

- The obturator was next reseated in the master cast and a silicone core was checked up for the fit.
- Finally the maxillary prosthesis was attached to the acrylic section. Curing, finishing and polishing of the prosthesis was done and the finished prosthesis was given to the patient.

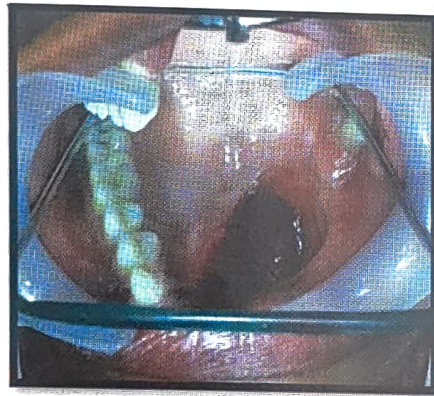


Figure : 1

- Maxillary obturator prosthesis and silicone core were remain as two different parts (figure-2)

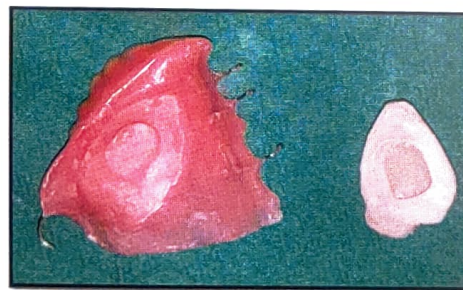


Figure : 2

and patient was trained about how to fit silicone core into the acrylic prosthesis and wear the prosthesis (figure-3).

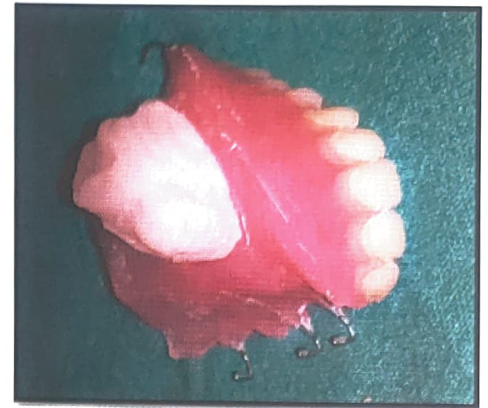


Figure : 2

- The finished prosthesis was inserted into the patient's mouth and necessary occlusion adjustments were done (Figure-4). The post insertion instructions were given to the patient and patient was educated and motivated for meticulous oral hygiene. Special attention was given for cleaning of silicone core.

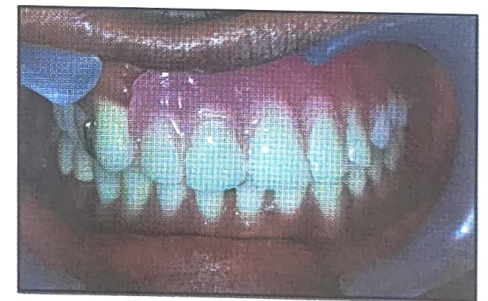


Figure : 4

- During follow up sessions, patient expressed relative satisfaction with his mastication, deglutition, speech and appearance.

DISCUSSION

During the surgical intervention communication exist between the oral and nasal cavities, that causes difficulty in deglutition, speech and an unaesthetic appearance. Apart from this, it also results in psychological trauma to the

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in enhancing retention, stability and support. The superior surface of bulb can be either left open or closed. If the obturator is left open, nasal secretions accumulate in it leading to bad odour, added weight, difficulty in polishing and cleaning the internal surfaces and inability to obtain support from the superior aspect in the defect area. So obturator should always be closed superiorly. However, sealing the top of the obturator is advantageous if patient demonstrates normal secretory output.

The present case report discussed the procedure for fabricating two-piece close bulb interim obturator for the restoration of class I defect (Arm any). To distribute load on the abutment teeth while getting a rigid closure silicone core was made separately. At the apex of the defect area and locked on to the bulb area of interim obturator.

CASE REPORT

A 29-year-old man, reported to the Department of Prosthodontics, with chief complaint of defect in upper back region of mouth. (Figure-1) The patient had undergone surgery (partial maxillectomy) for malignant melanoma of the maxilla. The problems faced by the patient after surgery were nasal regurgitation of fluids, impaired functions, pooresthetics, resonance of voice and psychological depression. Intraoral examination revealed class I defect (Arm any 1978) in palate. The oro nasal and oroantral communication were present due to partial maxillectomy.

Immediate surgical reconstruction

was not recommended due to the need for further treatment with radiation therapy. The patient received postoperative external beam radiation therapy by anterior direct beam on a telecobalt machine with a total dose of 60 Gy in 30 fractions over a period of 6 weeks. The patient tolerated the radiation well and was subsequently referred for possible prosthetic restoration of the palatal defect after radiation therapy.

Various modalities of prosthodontic construction were discussed with the patient and the patient indicated a desire for an economical solution. Hence, A heat-polymerizing acrylic resin obturator prosthesis with silicone core was planned as fabrication of maxillofacial prosthesis with silicone rubber material has been proved to produce the best results in function

STEPS IN REHABILITATION

For making primary impressions defect area was analyzed and lined with sterilized gauge piece to prevent flow of material in undercut areas. The gauge piece was tied with a sterile silk suture material which was hanging out of the mouth for the easy retrieval and prevention of accidental loss of gauge in defect. Maxillary Preliminary impression was made with impression compound including defect area in a stock tray after modification. A wash impression was made with irreversible hydro colloid Alginate impression material. Mandibular primary impression was also

recorded with irreversible hydro colloid material. Impressions were poured using dental stone to produce casts .

For constructing custom tray Undercuts were blocked out and wax spacer was adapted. A custom tray was fabricated using chemically-activated auto-polymerizing resin and the extensions were checked in patient's mouth and adjusted. Border-molding procedure was performed using low fusing compound. Posterior palatal seal area was recorded with special attention. The spacer was removed and perforations were made in the tray after that final impression was made using regular addition silicone putty and a wash impression was made using light body material. The final impression was analyzed and poured using type IV die stone to produce master cast. Trial denture base was fabricated using chemically activated acrylic resin. Wax occlusal rim were constructed over the denture base. Orientation jaw relation was recorded using Hanau face bow and transferred to semi adjustable articulator. Bite registration was recorded, the occlusion in natural teeth present on left side of both the arches was used as guidance in recording the jaw relations. Casts were mounted on semi adjustable articulator. After the selection of teeth, arrangement was done. To aid in retention an adam's clasp on molars and pin head clasp on premolar were used. After the try in of denture, the denture was finally waxed up .

patient. Small defects are usually closed by surgical means, but larger defects are often prosthetically rehabilitated by obturators. Class 1 defect is a unilateral defect which is most commonly seen in maxillofacial rehabilitative practice. It represents the classic maxillary defect where the hard palate, alveolar ridge, and the dentition are removed to the midline¹. Extension of denture base into the undercuts would result in a bulky heavy prosthesis and consequent reduced retention

This clinical report illustrated a class 1 defect which was rehabilitated by a closed silicone obturator. The main objective was to decrease the weight and minimize the rotation of the prosthesis. Silicone obturators help to reduce the weight of the obturator, to decrease pressure to the surrounding tissues and to aid in deglutition and to encourage regeneration of the tissues. Knowledge of material science is the key to providing the best care for patients⁶. The rehabilitation procedure needs careful planning of the surgical technique and prosthetic fabrication. An appropriate method for fabrication of the less weight obturator is the silicone core method on the master cast which helps to achieve a smooth surface in the internal walls of the bulb. The Advantages of Silicone prosthesis includes as: It offers maximum retention within the defect due to its flexible nature. Moreover, it is easy to insert and remove by the patient. It is more compatible to soft tissue structures and also

permits functional stimulation of the tissues. It allows close adaptation within the defect to be more snugly obturated, thus preventing collection of any debris. It permits a good seal to be established in the defect area consisting of vital anatomical structures⁵. The disadvantages of using silicone prosthesis are: Procedure of fabrication is technique sensitive. Materials used are more expensive. The silicone shell is more difficult to clean. The silicone is more susceptible to fluid uptake.

The patterns of forces affecting the Obturator prosthesis are complex because of their concurrent occurrence and mostly destabilize the prosthesis. In the class 1 situation, the functional fulcrum line lies along the bony contours, next to the resected area resulting in destabilizing forces so to provide maximum retention there was a need of effectively and strategically positioning the indirect retainers in the premolar region. In this case, a modified labial flange was also given in canine and premolars and was connected to the obturator by means of wire clasps. This modification in the design helped in minimizing the rotation of the prosthesis around the functional fulcrum line and also, it is easy to fabricate and greatly enhances the retention of the obturator.

Apart from providing treatment for the defect, the psychological aspect of the patients should also be considered. The trauma which they endure because of the social stigma has a profound

effect. Many patients with these defects have been rehabilitated successfully with prosthesis. Pertaining to the fabrication of obturators, controversies do exist between the closed and open hollow bulb obturators. The closed hollow bulb obturator prosthesis can prevent food and fluid collection; minimizes the air space and favours for maximum extension.⁽⁷⁾ The open hollow bulb obturator has the problem of collecting mucous and fluids and need frequent cleanings or a vent placement to eliminate accumulation in the bulb

Fabricating less weight obturator with silicone core helps to achieve a smooth surface in the internal walls of the bulb. Closed hollow bulb obturators with silicone core also provides a means of enhancing the retention and stability of the prosthesis. Such designed prosthesis provides a functional solution to the compromised state of the patient.⁽⁶⁾

CONCLUSION

The most challenging part in rehabilitating the patient with hemimaxillectomy, is to obtain adequate retention and stability. We have to extend our horizon and update our knowledge on the current methodologies of treatment options to satisfy the patient's need.

A simplified technical approach for the treatment of a patient with palatal defect of and other supportive structure has been presented. The technique presented here offers a method of obtaining a detailed impression of the defect and promptly provides

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the patient with a light weight, easy-to-use and flexible tissue-tolerant obturator

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TOOTH TRUTH: HUMAN TEETH TELL THE STORY OF HUMANITY THROUGH OUR FRAGILE RELATIONSHIP WITH THE SUN

A group of McMaster University researchers, working with colleagues in Quebec and France, reveals the potential of the method in a paper in Current Anthropology.

“This is exciting because we now have a proven resource that could finally bring definitive answers to fundamental questions about the early movements and conditions of human populations -- and new information about the importance of vitamin D for modern populations,” says McMaster anthropologist Megan Brickley, lead author of the paper and Canada Research Chair in the Bioarchaeology of Human Disease.

In 2016, the researchers first established that dentine -- the material that forms the bulk of the tooth -- carries a permanent record of Vitamin D deficiency, or rickets. During periods of severe deficiency, new layers of dentine cannot mineralize, leaving microscopic markers scientists can read like rings of a tree.

Those markers can tell the story of human adaptation as early man moved from equatorial Africa into lower-light regions, and may explain changes in skin pigmentation to metabolize more sunlight, or how indoor living has silently damaged human health.