Management of palatal defect post hemimaxillectomy: a case report

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ABSTRACT
A 42-year-old woman was referred to the Department of Prosthodontics, Hasanuddin University Dental Hospital with speech, swallowing and chewing difficulties caused by a fractured and non-reusable acrylic obturator. The patient had been using the obturator since maxillary tumor resection in 2012, which resulted in a significant and deep defect in the right maxillary region. Intraoral examination revealed a defect in the midline of the palate that extended to the left alveolar bone, and 21, 22, 23, 24, 25, 26, 27, 16 were edentulous. The maxillary defect did not appear inflamed or infected, and the surrounding area appeared normal. The treatment plan was fabrication of a maxillofacial skeletal partial denture to rehabilitate the maxillary defect. Primary impressions were made with irreversible hydrocolloid material with a stock tray to obtain a study model. Custom tray was made for individual impressions with polyvinyl siloxane material to obtain working models. A survey was conducted, and framework and bite rim were made. Maxillary denture was designed with Akers clasps at 35, 37, RPI at 45, full palatal palate as main connector. The denture framework was tried on, followed by determination of vertical dimensions. Denture alignment was done in the articulator using A3 color. The was prostheses were tried in and evaluated of retention, articulation, phonetics, and aesthetics; then sent to dental laboratory for processing and the obturator was then inserted into the patient's mouth. Patient follow-up was scheduled 24 hours and 1 week after insertion. It is concluded that the maxillofacial partial denture is a rehabilitation device that can result in decent retention and stabilization, especially in cases of acquired defects. The prosthesis can improve patient adaptation and ability with speech, mastication and swallowing functions.
Keywords: hemimaxillectomy, metal frame, obturator, maxillofacial prosthesis
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INTRODUCTION

The tumor lesions in the maxillofacial area are often treated surgically, such as resection of the maxillofacial area to remove tumors or local lesions that cause the defects in the form of perforation of the palate.[1] A surgery on the facial area can cause the facial defect, impaired speech, swallowing, mastication, aesthetics, and psychological functions. The magnitude of the problem that occurs depends on the extent of the resection and how to restore the shape of the face into the normal conditions as well as the psychological factors of the patient to accept the reality he was experiencing.[2]

Hemimaxillectomy is a maxillary resection surgery done by removing a portion of the maxillary bone on one side. The size of the defect that occurs after surgery depends on the cause and the surgical technique performed. Maxillectomy is differentiated into three categories; total, radical, and marginal. Total maxillectomy is a partial excision of the maxillary bone to the median line involving the maxillary sinus but still below the orbital floor. The radical maxillectomy is the cutting of the maxillary bone involving the maxillary sinus and orbital floor. The marginal maxillectomy is a partial excision of the maxillary bone without involving the bone, palate and maxillary sinus. The type of maxillectomy chosen for treatment depends on the bone defects.[3]

Defects that occur after maxillectomy can vary depends on the diagnosis and the resection performed. According to Aramany, the classification of the defects is divided into six classes. Class I is a unilateral maxillary defect affecting all anterior and posterior teeth. Class II is a unilateral maxillary defect affecting the posterior teeth. Class III is a defect in the middle of the palate without involving the teeth. Class IV is the bilateral maxillary defects crossing the median line with remaining teeth in the posterior region of one side. Class V is the bilateral maxillary defects in the posterior region with remaining teeth in the anterior region of both sides, and class VI is the bilateral maxillary defects in the anterior region with the remaining teeth in the posterior region of both sides.[4] Meanwhile, Veau classified the maxillary defects into several groups, such as clefts in the soft palate only, clefts in the soft and hard palates extending forward to the incisive foramen, clefts of the lips and unilateral complete palate starting from uvula, soft and hard palate to the alveolar bone and lip on one side, and the cleft lip and palate bilaterally from the uvula, soft and hard palate, to the alveolar bone and lips on both sides.[5]

To restore the dental and oral tissues that were removed at the time of maxillectomy, rehabilitation is urgently needed by making a maxillofacial prosthesis.[1] The defects was closed by replacing the

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hard, soft tissue, and the missing teeth using an obturator as an intraoral maxillofacial prosthesis.[6] Obturator is a kind prosthodontic appliance that is used to close the cleft palate, assist swallowing, improve the speech function so as to avoid nasal or hissing sounds, maintain maxillary arch width and tooth arrangement and to improve the palatal growth.[7]

Obturator is aimed to restore the function of speech and chewing, helping the healing process of soft tissue and the psychological condition of the patient. Maxillofacial prosthesis should be made immediately after surgery, to prevent contraction of the facial muscles that can reduce the retention so that the patient becomes disabled and disappointed.[8] This article is aimed to manage of palatal defect post hemimaxillectomy.

According to Da Breo et al, the requirements of an obturator should meet three goals, such as: to form a good oral seal to make the effective swallowing and speech functions, to provide retention and stabilization support for the prostheses and to improve the facial shape after partial loss of facial bone. This will be very helpful for the psychological conditions of the patiens.[9]

The general principles of partial denture design also apply to obturator design, including the need for a connector, the presence of supporting components for stabilization and retention, the presence of rests placed on the abutment teeth as support, the designs with maximum support, and the passive direct retainers and rests that the loads that are not excessive on the abutment teeth, and controlling occlusal forces against the defect, especially when natural teeth are involved.[4]

Obturators with metal frames are made with consideration for the comfort and strength because it also made to support dentures that replace missing teeth in the anterior and posterior parts that resist a large masticatory load.[10]

CASE

Figure 1 Extra oral profile of the patient

A 42-year-old female patient has had a tumor in the maxilla since 1992, then surgical removal of the tumor in 2012 left a wide and deep defect in the left maxillary region. The patient had used an obturator prosthesis made of acrylic, but the prosthesis was broken so that the patient felt uncomfortable and had some troubles in speaking, chewing, and swallowing.

Figure 2 Intra oral; **A** upper jaw, **B** lower jaw

Figure 3 Panoramic radiograph view

Intra oral examination showed a defect in the midline of the palate extending to the left alveolar bone, and the missing teeth were 16, 21, 22, 23, 24, 25, 26, and 27. The defect showed no signs of inflammation or infection and the surrounding looked normal. The patient's oral hygiene is good (Fig.2).

Radiographic examination with panoramic view revealed an image of the missing maxillary bone in the left region as a defect in the maxillary bone in that region. Multiple missing teeth can be seen in the panaromic view (Fig.3).

MANAGEMENT

After discussed with the patient, the prosthesis of choice was metal frame obturator with a combination of acrylic resin to rehabilitate the defect on palate and replace missing teeth in the maxilla. For the mandible, a metal frame partial denture was chosen. Before starting treatment, patients were asked to sign an informed consent.

At first visit, preliminary impression was done with the irreversible hydrocolloid impression material using a stock tray. Before the impression material was inserted into the mouth, a gauze was placed on the side of the defect to prevent the impression material from entering the nose. The results of the maxillary impression showed that the impression material looked prominent, indicating

Figure 4A Physiological impression of the maxilla, working model of **B** maxilla, **C** mandible

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that the impression material entered the defect and printed the shape of the defect. Then this mold was filled with dental stone to obtain an anatomical model. The next stage was followed by the stage of making the obturator design.

At the second visit, physiological impression was carried out using an individual impression tray which was previously done with border molding to get a good border adaptation from the obturator, especially in the defect area. The impression of the working model used polyvinyl siloxane material, then was poured with dental stone to obtain the working model.

The working model was then surveyed to get the path of insertion of the metal frame dentures. The working model and the design of the denture were sent to dental laboratory to make a metal frame. A C-clasp retainer was used in the upper jaw for 13 and a double Akers for 14, 15 and 17, 18. An Akers clasp was used in the lower jaw for the 35 and 37, an RPI used on 37. The maxillary major connector was a full metal frame palatal plate with modified mess that extends to the cleft palate. A lingual bar was used for the lower jaw.

At the third visit, after the metal frame and the bit rim were finished, the frame was tried in (Fig.5A) and the relationship between the maxilla and mandible was measured by using the two dots method. At this stage, the path of insertion of the metal frame was also checked, then the frame and its bite rim were fixed and transferred to the working model and then mounted in the articulator. The arrangement of the teeth was carried out in the mean value articulator, with A3 as the tooth color.

At the fourth visit, a try in was done for the wax obturator and dentures (Fig.5B). At this stage, the retention, stabilization, occlusion, articulation, phonetics, and aesthetics of the denture were examined. The purpose of this examination was to ensure that the denture is able to withstand the forces that can release it both at rest and when functioning. In addition, it was ensured that there was no premature contact at the time of occlusion and articulation as well as phonetic examination in the form of clarity of word pronunciation. After the denture can function properly and the patient agrees, the wax prosthesis was sent to the dental laboratory for the processing.

The fifth visit was the insertion of the obturator and the removable denture (Fig.6). Retention, stabilization, occlusion, phonetics, and the aesthetic examinations were performed. The obturator did not fall off when it functions, showing good retention and stability. The examination of the occlusion with articulating paper showed that there was no traumatic occlusion. The phonetics were clearer. The aesthetics of the patient's smile was also satisfactory. The patient was given some instructions on how to insert and remove the dentures and how to maintain it. For initial adaptation, the patient should wear the dentures for 1x24 hours, then after that the dentures are removed every night before going to bed and placed in a container filled with water. The patient was scheduled for a follow-up one week after insertion (Fig.7).

At the time of the follow-up, subjective and objective examinations were carried out. Subjective examination revealed no complaints of pain, and the patient could bite and chew better. Patient also communicate with a clearer voice and felt more self-confident. Objective examination found no soft tissue inflammation due to the use of the dentures. In addition, retention, stabilization, occlusion, articulation, and phonetics were all good. The aesthetic appearance of the obturator was good because it covered the defect in the left buccal region

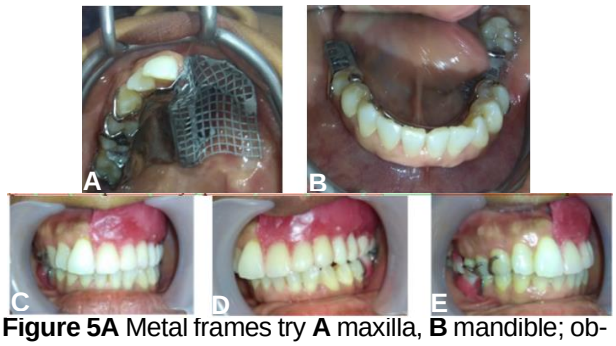

Figure 5A Metal frames try **A** maxilla, **B** mandible; obturator wax try in, **C** frontal view, **D** buccal left view, **E** buccal right view.

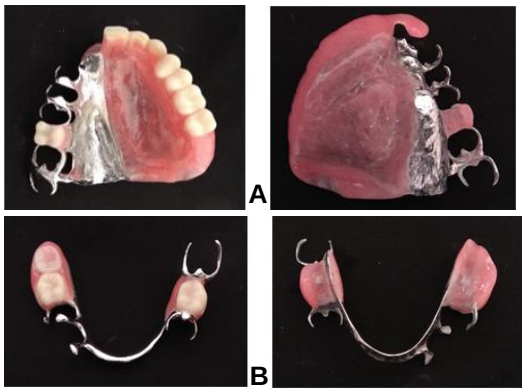

Figure 6A Maxillary obturator, **B** mandibular removable denture

Figure 7 Insertion of maxillary obturator; **A** frontal view, **B** palatal view, **C** insertion of mandibular removable denture.

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Figure 8 Extra oral profile of the patient after insertion of the obturator and the removable denture.

that was visible when the patient smiled (Fig.8).

DISCUSSION

Obturator is a maxillofacial prosthesis to rehabilitate maxillofacial for restoration of speech, chewing function, and healing process acceleration of psychological trauma. To help reduce the suffering of the patient, it is advisable to immediately make a prosthesis to rehabilitate the patient's condition; an obturator.[11] The maxillofacial prosthesis requires three goals, such as forming an oral seal to make swallowing and speech functions more effective, providing retention and stabilization support for prostheses and improving facial shape after facial bone loss, where this will increase self-confidence for patients.[9]

Obturators with metal frame are made with consideration for comfort and strength because the obturator also functions to support the dentures that replace the missing anterior and posterior teeth that receive a large masticatory load.[12]

The basic principles in constructing a definitive obturator depend on the condition of the defect and which provides the greatest benefit in function and comfort.[13] Consideration must be given to the size and location of the defect, the number and position of the remaining teeth, and the distribution of the maximum load to support the obturator. This can be accomplished by involving as many of the remaining teeth as possible, using an occlusal or cingulum rest, and extending the metal frame plate as widely as possible.[14]

The definitive obturator made in this case used a C-clasp, Akers, and double Akers. The teeth used as abutments were 13, 14, 15, 17, and 18, because these teeth have a large crown and wide root surface. The major connector used was a bilateral metal framework palate plate with an extension of the mess to the defect area for retention of acrylic resin that enters the defect. This is in accordance with Owall et al who stated that an extension towards the defect can increase retention and stabilization as well as increase the accuracy in making a peripheral seal of the obturator.[15] A good seal makes sound and pronunciation of letters clearer because there are no gaps between the prosthesis and the mucosal tissue. This is in accordance with the opinion of Hammond and Berger who stated that the loss of maxillofacial structure not only changes the articulation space of speech but can also affect voice clarity and pronunciation.[16]

Evaluation of the patient after using an acrylic resin metal framework obturator prosthesis showed improvement in phonetic, aesthetic, masticatory, and swallowing functions. This is in accordance with research by Kapoor et al. which states that the use of an obturator can improve the patient's aesthetic, phonetic and masticatory functions.[17] The use of an obturator in the case of cleft palate provides an increase in the patient's phonetic function because the nasal voice is reduced, and the patient's speech becomes clearer.

It is concluded that the use of a metal frame obturator combined with acrylic resin in cleft palate patients after hemimaxillectomy influences pressure and has excellent durability because it has a very strong structure. This also has an impact on retention and stabilization which is very good and stable during use because it is supported by a solid grip. Thus, the patient will feel more comfortable and satisfied where the nasal sound can be reduced when speaking, as well as correcting the masticatory and swallowing functions.

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