Definitive obturator rehabilitation onthe maxilla defect post-tumor surgery

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ABSTRACT
Obturator is a prosthesis to replace the tissue lost after a tumor surgery in the maxilla called maxillectomy. Obturators are made of acrylic and consist of operative, intermediate and definitive obturators. The definitive obturator is made using the hollow bulb technique to be lightweight and stable when used. In this case, a definitive obturator was made for a patient who was using an intermediate obturator. This article is aimed to inform that obturators can rehabilitate maxillary defects to restore the patient's masticatory, digestive, phonetic, aesthetic, and mental functions. A 28-year-old male presented for post cleft surgery management. The diagnosis is post-op hemi maxillectomy dextra. The procedures were impressions to obtain a study model and fabrication of individual trays, grinding the remaining teeth for occlusal rest placement. Double impressions were taken to obtain working models and bite block fabrication. Then, bite block trial on the patient and placed on the working model for fixation on the articulator, followed by tooth color determination and laboratory instructions, trial of the wax obturator and checking of occlusion, articulation, aesthetics and phonetics. The following visits were the installation of the definitive obturator and follow-up. It was concluded that definitive obturators can rehabilitate postoperative defects of maxillary tumors.
Keywords: maxillary defect, definitive obturator, hollow bulb technique

INTRODUCTION

An obturator is a prosthesis, which is a removable device that is made and used to replace tissue lost in the maxilla due to surgery, accidental trauma, birth defects, radiation and others.[1] Without rehabilitation of the lost tissue, this defect causes problems in the form of difficulty in mastication, swallowing food or drink, impaired speech function, aesthetics, psychology and others.[2]

Obturators are most often made and inserted as a result of surgery for the presence of tumors in the maxilla called maxillectomy.[1] Maxillectomy is cutting and removing part or all of the soft tissue and hard bone of the upper jaw which causes perforation of the maxillary sinus which even reaches orbital floor and can even involve nasal floor.[3]

The obturator is usually made of acrylic, both hot curing and self-curing acrylic, a combination of hard acrylic with soft acrylic, a combination of hot curing acrylic, metal and soft acrylic, and others.[4,5] Especially for the intermediate obturator and definitive obturator, usually is made using a technique called a Hollow bulb so that the prosthesis is light in the mouth, not too burdensome for the patient and so that it does not fall easily. The hollow bulb is a cavity created in the center of the obturator that is inserted into the surgical gap.[6]

There are three stages of obturator insertion for surgical defects with different time, namely surgery obturator (made before surgery and inserted immediately after surgery in the operating room), intermediate obturator (made and inserted 2 weeks after surgery), and definitive obturator (made and inserted 3-4 months after surgery).[3,7]
In this case report, a definitive obturator was made and inserted for a patient who had previously used an intermediate obturator which can restore the mastication, swallowing of food and drink, speech, aesthetic and psychological functions.

CASE

A 28-year-old male came to the Oral and Dental Clinic, dr. Wahidin Sudirohusodo Hospital, Makassar, consulted from the Department of Tumor Surgery of the hospital for treating the defect of post-surgery. The patient was in healthy and there were no physical or psychological complaints (Fig.1).

About four months ago, surgical removal of the tumor in the maxilla dextra area was performed and caused a large defect or hole. Bone and soft tissue were lost from the anterior maxilla to the anterior region of the soft palate. The patient was wearing an intermediate obturator made of acrylic with a broken clasp at teeth 26, which causes the obturator to be unstable. After examination, it turned out that the obturator was no longer compatible with the defect. Obturator is loose and often falls in the mouth, broken clasp, no complaints of pain.

After surgery in the operating room, a surgery obturator was inserted, and two weeks after the use of the surgery obturator, an intermediate obturator was inserted. There was no history of congenital/acquired/developmental disorders.

Extra oral examination, head was normal, there were folds of skin with stitches under the eyes, neck was normal, the right eye looks wider than the

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Figure 1A Extra oral facial appearance, using interim obturator, **B** Intra-oral condition with interim obturator.

Figure 2A Intra-oral condition with defects in the maxilla post hemimaxillectomy, **B** interim obturator

Figure 3A Impression to patient, **B** the impression

left, lips were normal, saliva was normal, TMJ was normal, extra oral muscles were normal. Intra oral examination, there is a defect or wide gap in the right hard palate with the borders of teeth 21 and 22 to posterior until the soft palate with a height almost to the base of the eye which seems to have healed from the surgical wound. Dental status were teeth 22,23,24,25,26,27 and 28 was sound with no caries but there was food debris; teeth 21,11,12, 13,14,15,16,17 and 18 is missing (Fig.2A,B). There was no follow-up examination. The diagnosis was post-op hemimaxillectomy dextra and was planned to make a definitive obturator.

MANAGEMENT

On the first visit, the history taking, physical, extra oral, intra oral, and dental examination is performed and the diagnosis is decided. After that the impression is done to obtain a study model and to make the individual tray. This impression is done by using a tray which is usually used in impression of natural teeth and jaws and hydrocolloid impression material (Alginate). Initially, the defect or cavity post-surgery is blocked with a tampon; then, the impression material on the tray is coated with *cling-wrap* to prevent the material to flow deep into the defect so it does not create retention which makes the impression material difficult to remove or cause pain due to surgical wound injuries. The tray with impression result is then filled with gypsum.

On the next visit, grinding was performed on the remaining teeth for the placement of occlusal rest in order to avoid jamming with the opposing teeth during occlusion with the occlusal rest. Furthermore, by using the individual tray and using the silicone impression materials (putty and light body), impression is carried out to get a working model. The tray with impression result is filled with gypsum. After the dental stone has been set, a biting block is made with red wax.

On the third visit, the bite block that is made with red wax is inserted into the mouth in the defect area and the patient is instructed to bite properly to get the correct occlusion. The correct occlusion is marked with bite marks on the bite block and transferred to the working model for further fixation and implantation to the occludator or articulator. During this visit, the tooth color is determined. The model that has been implanted in the occludator or articulator is sent to the dental laboratory for the manufacture of metal frames and the arrangement of artificial teeth by including information on the clasp design and teeth color.

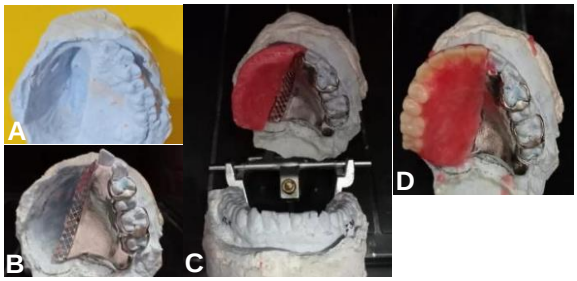

Figure 4A The working model, **B** metal frame from the laboratory to connect with acrylic hollow bulb, **C** hollow bulb made with red wax from the occlusal direction, **D** wax model with artificial teeth from the occlusal direction.

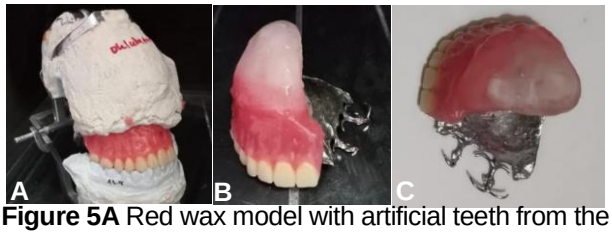

Figure 5A Red wax model with artificial teeth from the horizontal direction, **B** obturator with metal frame, acrylic hollow bulb and soft acrylic, **C** the definitive obturator view from the frontal direction.

On the fourth visit, the metal plate obturator and artificial teeth arrangement that were still attached to the red wax were inserted into the mouth and checked for bite relation, occlusion, articulation, aesthetics and speech function.

Insertion of the definitive obturator is done on

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the fifth visit, by checking the occlusion, articulation, aesthetics, stability, swallowing, comfort, pain occurrence and others.

On sixth visit, follow up is done by checking the presence or absence of prosthesis pressure to the soft tissue that causes pain, and re-examination of the occlusion, articulation, stability, comfort in swallowing food and drinks and others.

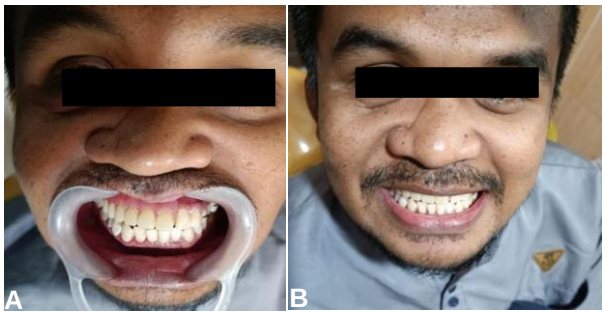

Figure 6A Insertion of the definitive obturator, **B** the patient's smile line with the use of the definitive obturator

DISCUSSION

Patients who have had maxillectomy surgery have lost their mastication, swallowing, speech, aesthetic and psychological function.[1,8] The job of a prosthodontist is to provide services that restore these functions as much as possible. The main goal is to replace the missing body part in the maxillary or mandibular region.[2,6] Obturator is a maxillofacial prosthesis for patients after maxillectomy surgery with the aim to restore the function of mastication, speech, and psychological healing.[9] The maxillectomy performed in this patient according to the Aramany classification was class 1, i.e. unilateral maxillary defect up to the median line and the remaining teeth were located on the other side.

Obturator is made of acrylic resin is the treatment of choice in cases of defects caused by maxillectomy surgery. Making a definitive obturator with the hollow bulb technique which is extended into the defect, in addition to closing the defect, the prosthesis will be lighter and can increase the retention and stability of the prosthesis.[6-8]

The definitive obturator was placed two months after using the interim obturator. The requirements for inserting a hollow bulb obturator must meet 3 three objectives, namely 1) forms a good seal to make the function of swallowing and speaking effective; 2) provides retention support and stability. The basic principle in making a definitive obturator depends on the condition of the defect; and 3) improving the shape of the face after losing part of the facial bone is very helpful for the patient's psychology.[6]

Insertion of the obturator can provide benefits in terms of function and convenience. It is necessary to consider the size and location of the defect, the number and position of the remaining teeth, as well as the distribution of the maximum load to support the obturator. This can be done by involving as many of the remaining teeth as possible, using an occlusal or cingulum rest and extending the plate as wide as possible.

The definitive obturator in this case can benefit from maximum retention because it has 3 abutments.[10] The teeth used as abutments were 24, 26, and 27. The anterior teeth were not used due to aesthetic considerations. The base used in this case is made of acrylic combined with titanium metal with the aim that the patient still feels the hot and cold sensation of food and drink which can be transmitted to the patient's palate. The obturator for this case uses a 2-piece hollow bulb which is expanded into the defect, namely to close the defect and the prosthesis becomes lighter with the presence of a cavity in the obturator and can increase retention and stability of the obturator in accordance with *the principle concepts and practice in prosthodontics* which stated that extension to the defect can increase retention and existence, which can be made with a hollow to make the obturator lighter.[11]

Evaluation of the patient after using an acrylic base definitive obturator with a combination of cast metal base and clasps showed improvement in phonetic, aesthetic, mastication and swallowing functions. This is in accordance with the statement of Kapoor et al. that the use of an obturator can improve the patient's aesthetic, phonetic and mastication function.[12]

At the time of the first one week follow up after the prosthesis insertion, a subjective examination was carried out, there was no pain, pressure or looseness when used to function. Likewise, on objective examination, the occlusion was good, the pronunciation of letters and speech was clear and there was no irritation of the oral mucosal tissue.

It is concluded that patients with post maxillectomy cases using hollow bulb obturator prosthesis with combination of acrylic and cast metal base and clasps can speak and chew normally, and can restore aesthetics and psychology. Therefore, obturators with a hollow bulb can rehabilitate defects resulting from surgery of maxillary tumors.

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