

Closed Hollow Bulb Obturator: Laboratory Procedures

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ABSTRACT

Patients with maxillectomy face problems with speech, swallowing, chewing and appearance. These defects are prosthetically rehabilitated with obturators that prevent oronasal communication, restoring function and social reintegration.

An obturator must be light-weight, tight, easy to make and low cost. This article describes a simplified technique for fabrication of an acrylic hollow bulb obturator in two pieces using single flask. The prosthesis is made entirely of heat cure acrylic resin. The two parts of the obturator are sealed with the self-curing resin.

Keywords: Hollow bulb obturator, Maxillectomy, maxillofacial Prosthesis.

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I. INTRODUCTION

Maxillectomy causes communication of the oral and nasal cavities. The size of these defects can vary from small to very large resections, and sometimes they can extend to the extraoral structures. It leads to dysfunctions of speech, mastication, swallowing, fluid leakage, temporomandibular joint problems and facial disfigurement [1], [2]. These deficiencies may be due to surgical treatment, trauma, pathology, or congenital malformation [3].

Prosthodontic treatment consists mainly of separating the oral and nasal cavities by using an obturator which has a very important role in functional recovery [4], [5]. These prostheses vary in size and shape depending on the extent of the defect and should ideally be easy to fabricate, lightweight, and provide retention, stability, and patient comfort. By fabricating a hollow maxillary obturator, the weight of the prosthesis may be reduced by up to 33% [6]. Numerous

references in the literature describe various methods for fabricating open and closed hollow obturator prostheses. Both types have advantages and disadvantages [4].

The open hollow obturator is easy to manufacture and to adjust. However, its main disadvantage is the accumulation of nasal secretions inside the hollow part, which can lead to a bad smell and the need for frequent cleaning. The closed obturator facilitates oral hygiene measures, its weight is reduced, and its extension is maximum, but its fabrication is complex, and it cannot be used in case of reduced mouth opening [4].

This paper presents a simplified technique for fabrication of closed hollow bulb obturator using a single flask which considerably reduces the laboratory time and makes the procedure simple.

II. PROCEDURE

This is a completely edentulous patient who had a partial maxillectomy because of maxillary carcinoma and for whom it was decided to make a complete removable prosthesis with a hollow bulb obturator. Only the laboratory steps of the realization of this technique have been covered in this paper. The other clinical and laboratory steps are conventional.

After validation of the teeth fitting, the wax model is sealed to the cast at its borders with molten wax. A cavity was created in the wax that fills the defect area using a hot wax knife in such a way that the cavity-wall must be free of undercuts (Fig. 1).

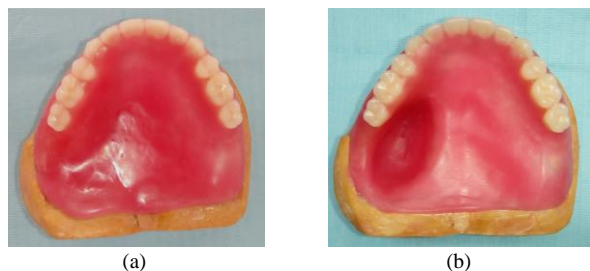


Fig. 1. (a) The setting of the maxillary teeth and (b) Aspect of created cavity.

An adaptation of a part of the wax to serve as a lid for the created cavity. Lower half of flask is poured with plaster, and the cast is put in place with the wax lid (Fig. 2).

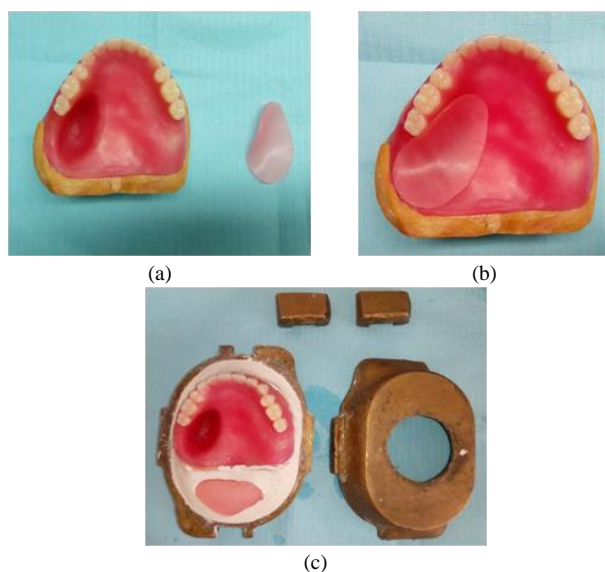


Fig. 2. (a) and (b) View of the lid and verification of its adaptation and (c) Polymerization of the prosthesis and the lid on the same flask.

Silicone was applied to the vestibular surfaces of the teeth. Separator is used between two pours of stone in the lower and upper portions of the flask. After that, the flask is placed in boiling water for 5 min to soften the wax. The two halves of the flask are carefully cleaned by rinsing them with boiling water.

Separator varnish was applied to the dewaxed mold space prior to packing the acrylic resin, excluding teeth. The part of the plaster that will ensure the hollow is indicated by the red arrow in Fig. 3.

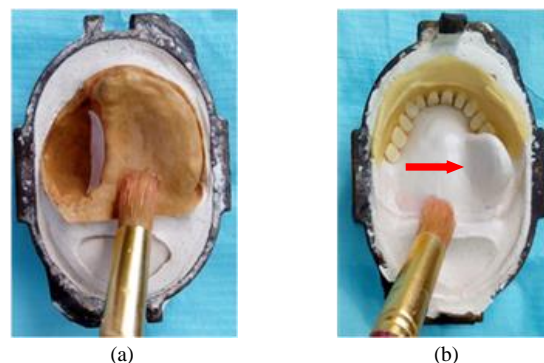


Fig.3. (a) and (b) the surface of dental stone in both halves of flask is coated with separator varnish.

The heat-cured acrylic resin is mixed to a kneadable dough according to the manufacturer's instructions and placed in the cold flask halves in which the denture teeth are positioned, in the defect area and in the lid impression. Sufficient resin should be used to ensure complete filling of the mould space. The two halves of the flask are pressed with mechanical press, slowly so that the dough spread out to fill the mould space. Any excess resin will flow out between two halves of the flask (Fig. 4).

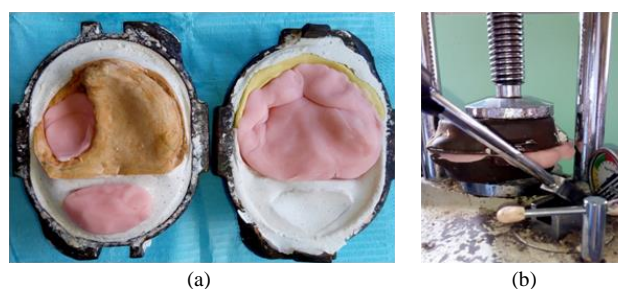


Fig. 4. (a) and (b) The resin dough is placed on the part of the flask containing the teeth, on the defect area and on the lid. (c) The excess resin will flow between two flask halves under pressure.

After polymerization, deflasking is performed carefully to avoid damaging the denture and the lid. The thickness of the resin in the defect area is checked and any necessary corrections are milled out (Fig. 5).

Self-curing resin was used to seal the lid; the seal was tested in water pressure pot.



Fig. 5. Control of the lid adaptation.

If there is water in the bulb, continue to shake it until the water percolates from inside the bulb, out of the sealed area that is leaking. A N. 8 round bur can also be used to drill a hole to open the leaking area; and compressed air should be used to clear out the water in the bulb. And the hole can be sealed with autopolymerized resin. The prosthesis was polished in the conventional manner (Fig. 6).

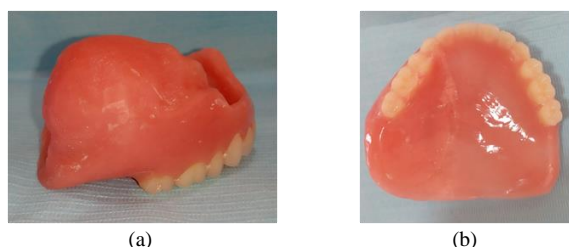


Fig. 6. (a) Lateral view of the obturator and (b) Polished palatal surface of completed obturator.

III. DISCUSSION

Obturator prostheses have an important role in the recovery of oral function in congenital or acquired maxillary defects [5].

Factors that affect the prosthetic prognosis for these patients are the size of defect, the number of remaining teeth, the amount of remaining bone, quality of existing mucosa, radiation therapy, and patient's ability to adapt to the prosthesis.

For completely edentulous patients, surgical removal of the tumor usually causes a poor prosthetic prognosis because of inadequate denture bearing area, lack of stabilization and structures for denture retention; for this reason, a hollow bulb obturator is a better choice to partially solve these problems caused by maxillectomy [3].

The goal of rehabilitation is the creation of a prosthesis, which can restore aesthetics and function, while being easy to use, easy to clean to prevent recurrent infections, and which can be readily fabricated by simple, time-saving techniques [7].

Numerous techniques have been described to fabricate a closed hollow obturator in one piece or two pieces [4]. Two-piece obturator prosthesis is fabricated by creating a separate lid to close the defect and both parts are sealed together with autopolymerizing or light polymerized resin. A one-piece obturator is fabricated by incorporating a spacer during packing which is removed following polymerization of the prosthesis. [4],[6],[8]. A variety of materials and techniques have been described for the fabrication of hollow bulb obturators, including dissolvable materials such as sugar, salt, frozen ice... After the placement of these materials in the defect area, they are removed from the prosthesis after polymerization with the help of a hole made, then this region is closed with autopolymerized acrylic resin [1], [5], [8], [9].

Other techniques involving the placement of a thermoplastic resin or polyurethane foam in the defective area of the obturator to create a hollow bulb, or techniques using potassium alum crystal, glycerine soap, gas injection and removing resin from inside the obturator to make it lightweight have been described [8], [10], [11], [12].

Patil and Nimbalkar-Patil described the incorporation of the preshaped "waxbolus" during the packing procedure of the obturator prosthesis and eliminated later by melting it once the curing procedure is completed [13].

It is easy to prepare a hollow obturator in two separate parts and then join them after curing. This two-step procedure, though a little time consuming, is advisable, as there is less chances of inaccuracy [14].

Some of these methods, however, increase the weight and the thickness of the hollow bulb obturator.

The main advantage of the present technique is that the definitive prosthesis is light weight, and the hollow bulb is of a uniform thickness; and it avoids contamination and incorporation of foreign bodies that can alter the polymerization quality of the acrylic resin that forms the obturator. This technique is also easy and time saving. The polymerization of the prosthesis and the lid is done on the same flask. The patient has expressed his satisfaction after the insertion of the prosthesis.

The use of computer-aided design and computer-aided manufacturing (CAD-CAM) technology in the design and fabrication of obturator prosthesis can be an alternative processing technique to conventional one used for direct construction of one-piece closed hollow bulb obturators. The digital technique avoids complications related to impression materials that may be retained by undercut areas and offers the patient a more comfortable procedure for the fabrication of the prosthesis. However, this assumption should be further investigated [2], [15]. The capture of the peripheral joint in final impression, the impact of the lips, cheeks and other muscles and the determination of the compressibility of the posterior palatal seal can be a challenge for the digital technology. In this case, the combined use of conventional and digital techniques can be beneficial for the patient. More researches should be done to adapt the new technology to the clinical conditions of the patients.

IV. CONCLUSION

Obturators prostheses are important not only in rehabilitation and aesthetics, but also in patient resocialization. The level of reintegration is directly related to the degree of satisfaction with rehabilitation.

The present technique uses a single-step flasking procedure, resulting in a comfortable, and light-weight prosthesis with reduced fabrication time.

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