

## Frame designed partial prosthesis for the rehabilitation of a maxillectomy patient

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### Summary

**This article is a case report and it describes a technique for fabrication of a frame designed partial prosthesis obturator for an Armany class I maxillectomy patient. The design principles to reduce potential damage on the abutment teeth are presented, while enabling stability, retention and acceptable functional levels. Because of the ever-increase in the number of partially edentulous patients undergoing partial resection of the maxilla, as well as the increase in their life expectancy after surgery, the need for this kind of metal framework design of the obturator prosthesis is pointed out.**

**Keywords:** maxillectomy, obturator, partial prosthesis.

### Introduction

There is an increasing number of people who undergo surgery for tumors of the maxilla. After maxillectomy, patients experience major dysfunction in speech, swallowing and mastication with a very negative psychological effect [1]. *The Glossary of prosthodontic terms* define the maxillofacial prosthodontics as “the branch of prosthodontics concerned with the restoration and/or replacement of the stomatognathic system and associated facial structures with prostheses that may or may not be removed on a regular or elective basis” [2].

Various clinical situations of maxillectomy edentulous arches may result. Mohamed A. Armany [3] developed his well-known classification for partially edentulous maxillectomy dental arches and Parr GR et al. [4] proposed the correspondent frame designs. The frame design and arrangement of clasps is critical to the retention of a maxillary partial denture obturator.

In partially edentulous cases with large defects, lack of support and retention causes loss of stability of the obturator prosthesis and the forces exerted on the artificial teeth on the defect side cause a cantilever effect on the abutment teeth. In each case the prosthesis should have occlusal rests for support, long guide plane, clasps that engage significant retentive areas and reciprocal tooth contact for stabilization [5]. Some authors suggest the use of multiple teeth for retention to distribute the stress of retention to multiple abutments by a hybrid gate design of the framework, in selected patients [6]. Attention must be directed toward the surgical area to gain additional retention [7,8].

We present a case of prosthetic rehabilitation of a patient who had an Armany first class maxillary edentulous arch, after maxillectomy for an ameloblastoma, performed in the Clinic of Oral and Maxillo-Facial Surgery from Targu Mures (*Figure 1*). The resection in Armany’s Class I is performed along the midline of the maxilla and

**Figure 1**

The patient status after maxillectomy

the remaining teeth are situated only on one side of the maxillary arch. The abutment teeth are more subject to dislodging and rotational forces, due to the heaviness of the obturator bulb.

In our case, after maxillectomy the remaining teeth are 2.1, 2.2, 2.3 and 27. This arrangement results into an Armany class I edentulous arch, corresponding to a situation that could be related to a Kennedy class II/1 edentation. The prosthetic treatment concerned in a hollow-bulb obturator with soft lining material extension, attached to a metal framework. Wu and Schaaf [9] showed that hollowing the obturator for partial maxillectomy patients significantly decreased the weight of the obturator from 33.06% to 6.55% depending on the size of the defect. Closed hollow obturators allow for the fabrication of a lightweight prosthesis that is readily tolerated by the patient while effectively extending into the defect. This kind of obturator prosthesis can prevent fluid and food collection, reduce air space, and allow for maximum extension [10]. Engagement of the retentive areas of the defect with an elastic extension from the obturator is necessary to help retain the

obturator. The prosthesis is composed by two elements: the obturator and the saddle covering the defect, made of acrylic resin, and the metal framework of the partial prosthesis. Finally, when the artificial teeth are mounted, the two components are put together and a single prosthesis results. The direct retention of the obturator prosthesis is ensured by:

1. a circumferential cast clasp on 2.7., engaging the distobuccal undercut with an occlusal rest for support;

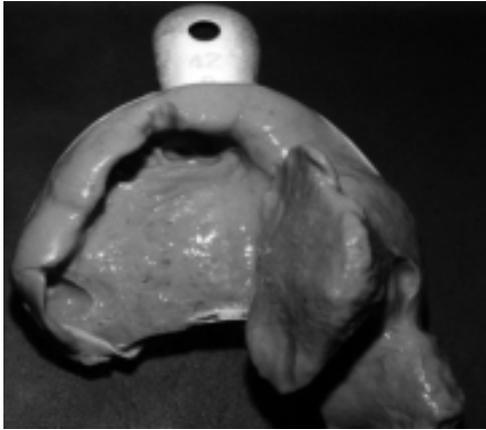
2. the obturator component of the prosthesis. Brown [11] and Desjardins [12] reported how the lateral vertical high of the lateral portion of the obturator above the buccal scar band can help prevent vertical displacement. This authors have suggested that, to maximize support, retention and stability, the remaining teeth should be engaged by intracoronal or extracoronal direct retainers and the lateral wall of the bulb should be extended higher geometrically. Other authors [13] believe that a low lateral wall height is desirable to reduce the weight of the obturator. As indirect retainer we have designed a continuous bar placed in prepared rest seats on the lingual surfaces of the resting anterior teeth.

The step-by-step laboratory procedures are presented in the images from below (*Figures 2-7*).

### Conclusions

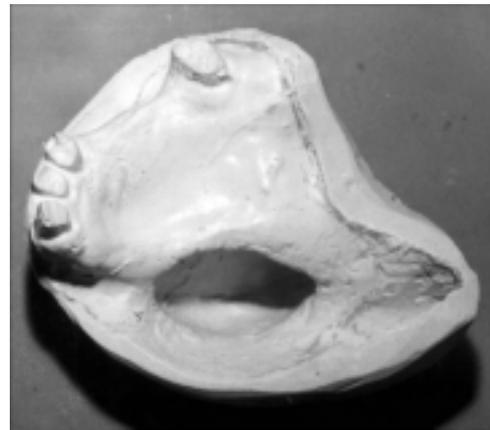
1. The hollow-bulb obturator is lightweight and it is able to provide retention, stability, patient comfort and cleanliness;
2. The soft lining material extension from the obturator allowed profound engagement of undercuts within the defect, resulting in adequate retention, support and stability of the prosthesis;
3. Retainers are very important components; properly designed retainers reduce the stress transmitted to the abutment teeth;

**Figure 2(a)**



The preliminary impression (a) and stone cast (b)

**Figure 2(b)**



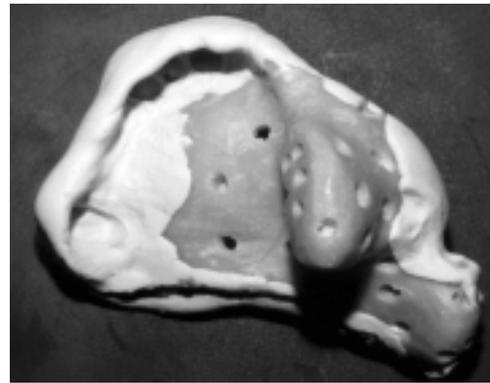
The preliminary impression (a) and stone cast (b)

**Figure 3(a).**



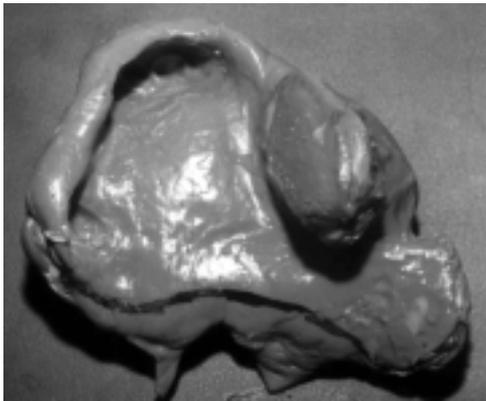
The individual acrylic resin impression tray (a). Periphery of impression defined in silicone putty (b) and final impression with light bodied silicone material (c).

**Figure 3(b)**



The individual acrylic resin impression tray (a). Periphery of impression defined in silicone putty (b) and final impression with light bodied silicone material (c).

**Figure 3(c)**



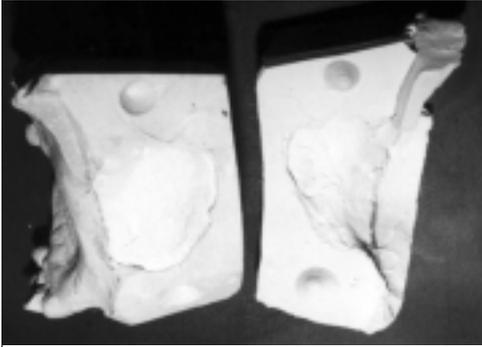
The individual acrylic resin impression tray (a). Periphery of impression defined in silicone putty (b) and final impression with light bodied silicone material (c).

**Figure 4(a)**



The working cast with the dental preparations (a) made by two separate pieces (b) enable the waxing and the removing of the obturator part of the prosthesis.

**Figure 4(b)**



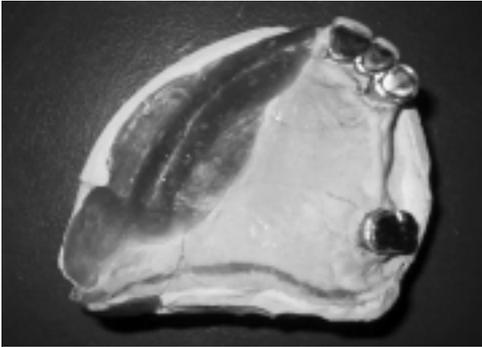
The working cast with the dental preparations (a) made by two separate pieces (b) enable the waxing and the removing of the obturator part of the prosthesis

**Figure 5(a)**



The waxed obturator-saddle component (a) and its placement on the working cast (b). The precisely shaped rest seats and guide planes can be observed.

**Figure 5(b)**



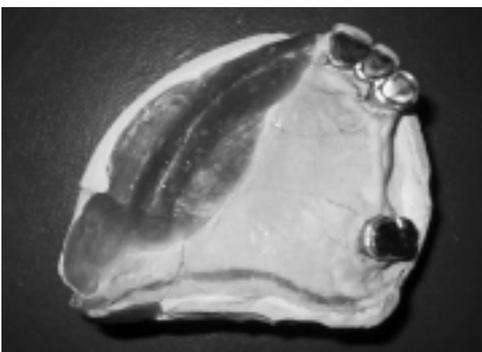
The waxed obturator-saddle component (a) and its placement on the working cast (b). The precisely shaped rest seats and guide planes can be observed.

**Figure 6(a)**



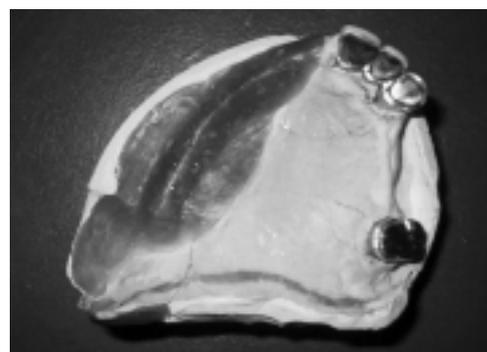
Duplicating the stone cast: the wax blackout (a), the duplicating flask with the impression in hydrocolloid material (b), the duplicated (investment) cast (c).

**Figure 6(b)**



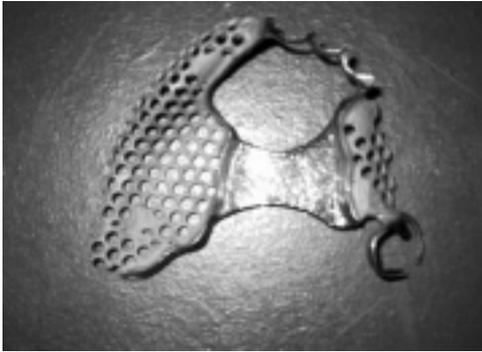
Duplicating the stone cast: the wax blackout (a), the duplicating flask with the impression in hydrocolloid material (b), the duplicated (investment) cast (c).

**Figure 6(c)**



Duplicating the stone cast: the wax blackout (a), the duplicating flask with the impression in hydrocolloid material (b), the duplicated (investment) cast (c).

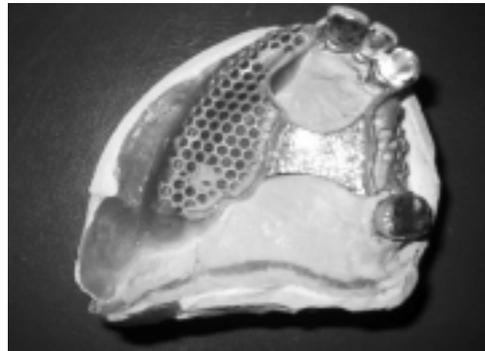
Figure 7(a) .



The partial denture frame work (a) and its location on the working cast (b)

After waxing, the acrylic resin base will be processed, together with the acrylic obturator element, so that finally a single frame designed obturator prosthesis will result.

Figure 7(b)



The partial denture framework (a) and its location on the working cast (b)

After waxing, the acrylic resin base will be processed, together with the acrylic obturator element, so that finally a single frame designed obturator prosthesis will result.

4. Stabilization and indirect retention components must be carefully positioned to effectively retard movement of the defect extension portion away from its terminal position;

5. Because of the ever-increase in the num-

ber of partially edentulous patients undergoing partial resection of the maxilla, as well as the increase in their life expectancy after surgery, the need for metal framework design of the definitive restorations is obvious.

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