Mushroom-Shaped Resilient Retainer for Maxillary Obturator Prostheses

A new type of highly resilient retainer for maxillary obturator prostheses is described. The obturator component is composed of an acrylic resin connector and a round resilient wing, with the combined shape resembling a mushroom. The retainer is designed to absorb mechanical stresses, which are transmitted from the denture portion to nasal soft tissues through the obturator extension, and to use tissue undercuts more effectively than do conventional hollow extension prostheses. Renewability of the retainer part is another advantage of this retainer. From these properties, the retainer seems to have many indications for the prosthodontic treatment of maxillary defects. *Int J Prosthodont* 1991;4:473-476.

An ideal prosthesis for treating patients after they have undergone a partial maxillectomy has long been sought by many dentists. Since Nidiffer and Shipmon reported on hollow, light-weight obturators, several modifications have been made. Chalian and Barnett described a one-piece hollow obturator, and Ohyama et al modified the obturator using a resilient layer of silicone. As stated by Hahn, hard acrylic resin created problems with the nasal tissues through irritation of the fragile mucosa lining the turbinates and sinuses. Poly(vinyl siloxane) or other such resilient materials recently have been used for the obturator prosthesis. However, it appears that additional modification or improvement in structure or materials is still needed to prevent tissue irritation, provide additional retention, reduce the weight, and improve the cleanliness of the obturator prosthesis.

This paper presents a new type of highly resilient retainer for a maxillary obturator prosthesis and discusses the indications and characteristics of this retainer compared to conventional hollow extension prostheses.

**Procedure**

A schematic diagram of the new obturator prosthesis retainer is shown in Fig 1. The resilient}

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Fabrication procedures are as follows:

1. Make a final impression using an individual tray and irreversible hydrocolloid impression material.

2. Block out the relief areas on the working cast with wax (Fig 3a). The edge of the resected maxilla should be elongated with wax as a preparation for making the extension of the resilient portion. Make an impression of the cast to produce the modified cast (Fig 3b) for processing the mushroom-shaped retainer.

3. Using paraffin wax, wax the pattern of the retainer on the modified cast. Although the proper thickness of the wax depends on the type of resilient material used, it is approximately 3 mm when the soft material subsequently described is used. After waxing, reduce the border of the modified cast (Fig 3b) to make an entrance hole for packing the resilient material, then embed one end of the preprocessed acrylic resin connector. The connector is approximately 5 mm in diameter and the embedded end is widened to be connected with the resilient portion. If necessary, a metal rod can be contained in the resin connector, as shown in Fig 4.

4. Flask the wax pattern of the retainer on the cast with the acrylic resin connector (Fig 4).

5. After wax elimination, pack and process the resilient material for the mushroom-shaped retainer. A soft resin of polyfluoroethylene copolymers for denture base lining (Kurepeet Dough, Kureha Co, Tokyo, Japan) is usually used as the resilient material in the authors' laboratory. The processed retainer is shown in Fig 5.

6. Fabricate the denture prosthesis separately using conventional methods.

7. Place a hole in the palatal portion of the denture prosthesis through which the connector of the retainer can be passed. Insert the retainer into the maxillary defect (Fig 6a) and place the denture in the mouth over the retainer (Fig 6b). Attach the connector of the retainer directly to the denture prosthesis intraorally using autopolymerizing acrylic resin. Remove the excess portion of the connector and finish the prosthesis.

Discussion

Resilient materials such as soft silicone have been used in the fabrication of obturator prostheses to gain adequate retention while not mechanically irritating nasal soft tissues."\(^4\) Although
Figs 3a and 3b  Schematic cross-section of the working cast (left) and the modified cast for wax up of the mushroom-shaped retainer (right). a, area that should be blocked out with paraffin wax before making the impression for the modified cast; b, elongation of the edge of the resected maxillae with wax, in preparation for making the overhang of the resilient portion; c, portion that would be removed before flasking to provide an entrance hole for packing the resilient material.

Fig 4  Schematic diagram of the flanked wax pattern and the modified cast. s, preprocessed acrylic resin retainer; c, modified cast; w, wax pattern; m, metal rod.

Fig 5  Finished mushroom-shaped acrylic resin retainer.

Fig 6  Mushroom-shaped retainer placed in the maxillary defect (left) and denture prosthesis placed in the mouth over the retainer (right). Note that the support of the retainer exits from the hole in the denture and is ready to be attached using autopolymerizing acrylic resin in the mouth.
the soft obturator reported by Hahn\(^1\) seems to have overcome many of the disadvantages of the conventional hollow obturator, it still appears to be difficult for the obturator to absorb functional mechanical stresses transmitted from the denture portion to nasal soft tissues through the obturator extension. It is, therefore, still necessary to have an effective stress absorber in the obturator prosthesis, especially in situations where the ability of the nasal soft tissues to bear the mechanical stresses is poor. The mushroom-shaped retainer presented here is designed not only to gain adequate retention and stability, but also to play a role as an effective absorber of mechanical stresses. The mushroom design enables the quantity and extension of the resilient material between the connector and the tissue undercuts to be suitable for absorbing the mechanical stresses.

Morphologic change of the maxillary defect is another important problem for prognosis of the obturator prosthesis, especially when the prosthesis is made shortly after surgery. However, unlike the conventional hollow extension obturators, the mushroom-shaped retainer can be replaced with a new one and the denture portion can continue to be used. When a new retainer is needed, only an impression of the defect is needed. The new retainer can be attached to the denture using autopolymerizing resin. From these properties, the mushroom-shaped resilient retainer seems to have many indications for the treatment of a maxillary defect.

The mushroom-shaped resilient retainer has been used by the authors for 1 year, and the retainer was applied for all nine patients who presented to the authors' department with a maxillary defect. All of these patients have adapted well to their prostheses. One retainer is to be replaced because of a morphologic change of the maxillary defect. The soft material has retained its resilience and no degradation of the material has been clinically observed. Also, although it is only an empirical observation without corroborating data, microbiologic colonies are rarely observed on the soft material of polyfluoroethylene copolymers, unlike the conventional silicon soft materials.

**Summary**

A new type of highly resilient retainer for maxillary obturator prostheses has been described. This mushroom-shaped retainer is designed to absorb mechanical stresses transmitted from the denture portion to the nasal soft tissues through the obturator extension and to be able to engage tissue undercuts more effectively than the conventional hollow extension. The retainer presented here can be applied to many types of maxillary defects and appears to be especially effective for those situations in which the ability of the nasal soft tissues to bear mechanical stresses is poor.

**References**
