

## Augmentation prosthesis fabricated with the use of a soft denture reliner as a functional impression material: A clinical report

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The objective of this case report is to describe a functional impression procedure for improvement of the sealing between a maxillary defect and an augmentation prosthesis. Three-step impression was implemented in the fabrication of the prosthesis. The primary impression was made for reproduction of dentition and palate, and the secondary impression was taken mainly for maxillary defect, using a combination of two silicone elastomeric materials. A slow-setting soft denture reliner was then used as a functional impression material under a loaded condition to facilitate palatal seal of the obturator. The patient recovered facial outline form, mastication, nasal respiration, and swallowing with the use of the augmentation prosthesis. The three-step impression technique including the final functional impression procedure is useful for sealing the interfacial gap between the movable oral tissue and the hard denture segment. (*Int Chin J Dent* 2003; 3: 31-35.)

**Key Words:** augmentation, functional impression, soft denture reliner.

### Introduction

The augmentation prosthesis is used as an obturator not only for the alleviation of speaking, swallowing and chewing difficulties but also for separation between the oral and nasal cavities. The prosthesis needs to be made elaborately for effective obturation of the maxillary defect. It is difficult, however, to make a precise impression of surrounding structures including the defect due to the severe undercut. A number of reports demonstrated the effectiveness of impression techniques for palatal and alveolar bone defects,<sup>1-5</sup> one of these being a functional impression technique.<sup>6</sup> The appropriate methods and materials vary considerably according to the status of the defects. This report describes the application of a soft denture relining material as a functional impression material in fabricating an augmentation prosthesis for a patient with maxillary defect.

### Clinical Report

A 52-year-old woman was referred to our dental hospital by the otorhinolaryngology department of a local hospital for prosthetic treatment for missing teeth and maxillary defect. The defect resulted from

surgical treatment of a verrucous carcinoma of the left maxilla two months earlier. The chemotherapy, the only post-operative treatment since radiation therapy was unnecessary, had been completed by the time of her first visit, and it was predicted that the final outline form of the defect would not change significantly. Her medical history was notable for deaf-mutism. Her left premolars and molars were missing, and only about two thirds of the palate was intact. The mobility of the left canine was not remarkable, since the proximal alveolar bone support remained (Figs. 1-2). The teeth had been extracted during the surgical operation, and the patient had not been wearing any interim obturator by the time of the first visit to the dental hospital. Examination revealed problems associated mainly with chewing capability and swallowing. Difficulty in speech was not a major concern for the patient because of her deaf-mutism. After additional examinations based on X-ray photographs and a study cast, we decided to implement an augmentation prosthesis for reconstruction of the left maxillary defect and obtained the patient's consent to this treatment.



**Fig. 1.** A radiograph shows the alveolar bone support on distal side of the left canine.

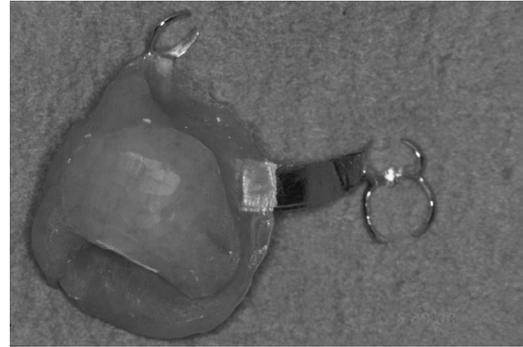
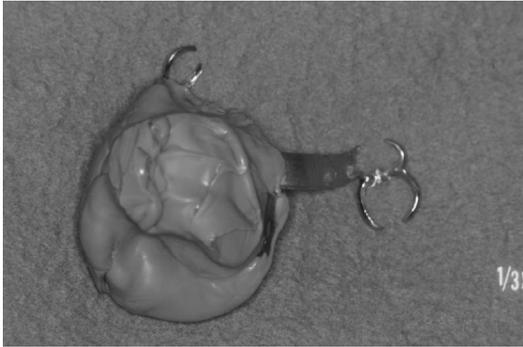
**Fig. 2.** Occlusal view before prosthetic treatment.

The primary impression of the dentition and palate was made with a combination of two silicone elastomeric materials (Exafine Regular and Injection, GC America Inc., Chicago, IL, USA) using a custom tray. The impression of the perimeter structure of the defect was also taken at this time. The metal framework of the removable denture was made with a cobalt-chromium alloy (Summalloy Cobalt, Shofu Dental Corp., Menlo Park, CA, USA), and a wax obturator-bite rim was inserted. After registration of the maxillo-mandibular relation, composite artificial teeth (Endura, Shofu Dental Corp.) were arranged in the left molar area.

When the wax model denture was tried-in, a secondary impression of the maxillary defect was made. A silicone impression material (Exafine Regular) was applied to the tissue side surface of the obturator, and the denture framework was inserted into the patient's oral cavity. The patient was instructed to maintain the centric occlusion position until the impression material settled (Fig. 3).

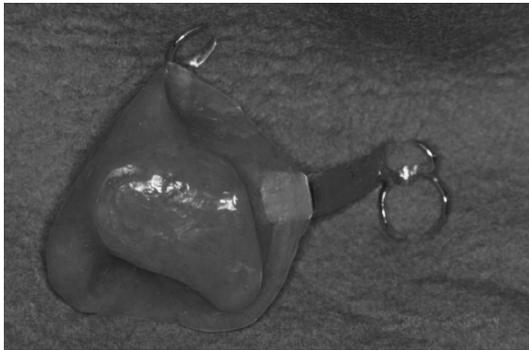
The impression was poured with die stone, and a working cast for the obturator was made by the altered cast technique. The cast was surveyed, severe undercut was blocked out, and the prosthesis was processed with a heat-polymerized denture-base acrylic resin (Acron, GC America Inc.). The internal block of the

obturator was thereafter excavated so as to be light in weight. The denture was carefully adjusted, and adaptation of the obturator was tested by having the patient swallow water. Fig. 4 shows the tissue side surface of the transitionally formed obturator. At this stage, the patient complained that the sealing of the defect was unsatisfactory.



**Fig. 3.** Secondary impression for the palatal defect.

**Fig. 4.** Obturator made from the secondary impression.



**Fig. 5.** Obturator relined on the basis of functional impression.



**Fig. 6.** Frontal view with the seated prosthesis.

**Fig. 7.** Occlusal view of the prosthesis.

A functional impression was then made to improve the peripheral seal of the obturator. The surface to be modified was ground with a carbide rotary cutting instrument, followed by application of an adhesive agent

(Sofreliner Primer, Tokuyama Corp., Tokyo, Japan). A soft denture relining material made of silicone rubber (Sofreliner Medium Soft, Tokuyama Corp.) was applied to the obturator surface and the prosthesis was inserted into the cavity. The patient was instructed to tap the prosthesis very gently into the centric occlusion position to achieve the proper vertical dimension. The denture was removed five minutes after insertion. The reliner was then carefully trimmed, lubricated and again placed in the original position. Since the reliner sets gradually, the impression procedure extended for 48 hours. A working die was again prepared, and the soft relining material was replaced with a heat-polymerized denture-base acrylic resin (Quick Acron, GC America Inc.).

Figs. 5-7 show the completed augmentation prosthesis. The patient recovered mastication and swallowing abilities with the use of the prosthesis. In addition, the palatal seal was considerably improved after relining of the obturator. The prosthesis is functioning for more than two year and six months, and no recurrence has been detected at the resected area.

## Discussion

To achieve an ideal prosthesis, it is essential that the defect be properly sealed by the obturator and that the denture be supported in its optimum position with varying types of retainer. The denture support in the current case was facilitated by extending the metal framework to the right second premolar and first molar. The obturator should be extended into the nasal aperture or onto the nasal surface of the soft palate<sup>5</sup> when the denture cannot be retained with the remaining dentition. Since the retention of the denture was established in the present case, the sealing of the palate was the primary concern. The original obturator made by the two-step impression technique resulted in inadequate sealing performance, probably due to the outline form of the obturator prepared on the basis of a static impression technique. Specifically, static impression reproduces only limited movement and shape of oral tissue in the impression material, thus creating the possibility of gap formation depending on the movement of soft tissue.

Functional impression is a technique for recording neutral zones in removable dentures. This technique was used in the current case for obturation of a narrow gap between the soft tissue and the prosthesis under loaded conditions. A soft denture relining material was selected for the impression material. The excellent elasticity and long setting time of the material made it possible to record a dynamic impression of the palatal defect and to win the satisfaction of the patient with the sealing characteristics of the obturator. Although alternative techniques and materials may be available for this type of treatment, the use of soft denture reliner as functional impression material is a practical choice for the fabrication of augmentation prostheses.

## Conclusion

A procedure for fabrication and adaptation of an augmentation prosthesis to maxillary defect has been described. In order to take precise impression of the defect, three impressions including functional impression were made for this case. The functional impression technique using a soft denture relining

material was considered to be clinically useful for obturation of the defect and separation between the oral and nasal cavities.

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Received on April 1, 2003. Revised on May 1, 2003. Accepted on May 12, 2003.

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