

A Simplified Technique for Fabrication of Maxillary Reservoir Denture – A Case Report

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Abstract

Xerostomia is defined as dry mouth resulting from reduced or absent salivary flow. It is a symptom associated with various medical conditions, a side effect of radiation to head and neck, or side effect of wide variety of medications. It is based on the cause of treatment which is provided to the patient. In partially edentulous or completely edentulous patients, reservoir denture with artificial salivary substitute is one of the treatment options. The methods advocated for reservoir denture fabrication are time consuming and requires multiple processing of denture. Therefore, the purpose of this article is to provide a simplified technique for fabrication of maxillary reservoir denture.

Keywords: Radiotherapy, Reservoir denture, Salivary Substitute, Squamous cell carcinoma, Xerostomia.

INTRODUCTION

Oral squamous cell carcinoma is the most common malignant epithelial neoplasm affecting the oral cavity. Over 95% of people with oral carcinoma smoke, tobacco, drink alcohol, or both.^[1] Treatment is with surgery, radiation, or surgery followed by radiation. Squamous cell carcinoma is radiosensitive and so in most of the cases, surgery followed by radiotherapy will be the treatment option. One of the most common complications of post-radiotherapy is xerostomia.

Xerostomia is defined as a condition resulting from decreased salivary flow or absent saliva which leads to dryness of the mouth, change of taste, difficulty in chewing, and swallowing. In denture wearing patients, saliva plays an important role in retention of dentures through adhesion, cohesion, and capillary action. The treatment for xerostomia includes increased water intake, dietary intake of citrus fruits, and chewing gums for saliva stimulation.

In severe xerostomia cases, salivary substitutes containing carboxymethylcellulose can be used.^[2] In denture wearing patients, salivary substitutes can be used through reservoir dentures. Hence, the flow of saliva can be achieved which enhances the retention of denture. The methods used to fabricate reservoir denture are technique sensitive, time consuming and might incorporate multiple processing errors. To avoid these processing errors and save time, this article

provides a simplified technique for fabrication of maxillary reservoir denture.

CASE REPORT

A 60-year-old male patient reported to the department of prosthodontics with the chief complaint of dryness in mouth, difficulty in mouth opening, chewing food, and swallowing. The patient had a medical history of squamous cell carcinoma of lower lip for which he got treated surgically followed by radiotherapy 1 year back. Before radiotherapy, he underwent total extraction of all mandibular teeth and partial extraction of maxillary teeth. On extra oral examination, patient had decreased facial height, inverted lower lip with lack of vermillion border. On intraoral examination, maxilla was partially edentulous with deep palate and mandible was completely edentulous. Oral mucosa was dry and the salivary secretion was measured using blotting paper method. The salivary secretion was less than 1 ml under stimulated condition which concluded xerostomic condition.

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Treatment plan

The conclusive treatment plan was to fabricate mandibular conventional complete denture and maxillary removable partial denture with reservoir and the patient consent was obtained.

Procedure

Clinical procedure

Maxillary and mandibular preliminary impression was made using alginate (Algitex DPI). Mandibular border molding with green stick compound (DPI) and final impression with addition silicone light body (DPI Photosil light body) was recorded using special tray. Wax occlusal rims (Hindustan Modelling Wax HDP) were fabricated on self-cure acrylic (DPI Cold Cure) denture base and jaw relation was recorded followed by articulation and teeth selection. Try-in of wax trial completed and the space needed for reservoir was determined in maxillary wax trial denture using phonetics method.

Laboratory procedure

In the maxillary trial denture, the reservoir area is marked and filled with salt (Tata Salt) for about 5 mm thickness in the marked area. Filled salt was covered with self-cure acrylic (DPI Cold Cure) material as lid and the marked area was removed from the denture base using a straight fissure bur. The removed denture base with the salt will act as a reservoir [Figure 1]. Reservoir was placed back in position and wax up and flasking completed in conventional manner [Figure 2]. After dewaxing, the reservoir was placed in position and processing procedure was completed using heat cure material (DPI Heat cure).

Mandibular complete denture was processed in conventional manner. Both the maxillary removable partial denture and mandibular complete denture were finished and polished [Figure 3]. An inlet hole of size 21 Gauge and an outlet hole of size 23 Gauge were drilled on the palatal surface and polished surface near mid palatine raphe, respectively. This permits the slow and continuous flow of the salivary substitute from the reservoir. Melted salt was flushed out using syringe and water through the inlet and outlet hole. Reservoir was filled with salivary substitute (Wet Mouth, ICPA HEALTH PRODUCTS LTD.) [Figure 4] solution which can hold up to 3 ml through the inlet hole. The patient was also taught to fill the reservoir every 4 h and maintain denture and oral hygiene. Denture insertion was done and the patient was reviewed at 24 h, 72 h, 1 month, and after 6 months.

DISCUSSION

Complete denture wearing can be an extreme discomfort for patients with xerostomia. Saliva is one of the important factors in the retention of complete denture which acts as a thin film between the denture base and oral mucosa. Lack of saliva decreases the retention and increases the ulceration of the oral cavity. And so, the complete dentures are poorly tolerated in xerostomic patients.

Several treatment options are available for the treatment of xerostomia based on the etiology. Salivary reservoir denture is



Figure 1: Reservoir area is marked, filled with salt and covered with self cure acrylic. The reservoir is separated from the denture base using straight fissure bur



Figure 2: The reservoir placed back in position and covered with wax up. Dewaxing is done and the reservoir is placed in position after the application of separating medium

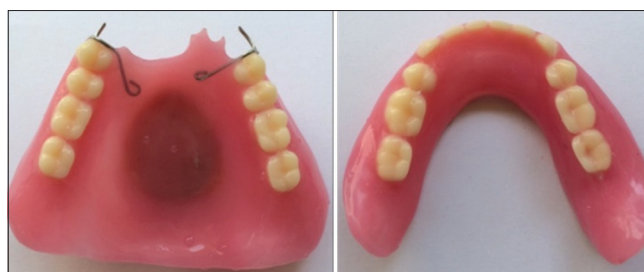


Figure 3: Processed maxillary removable partial denture with the reservoir

an effective solution to deliver the salivary substitute constantly in patients with partially or completely edentulous condition.



Figure 4: Salivary substitute is injected through the inlet of the reservoir

Various methods of fabrication of reservoir denture have been described in the literature for the slow, sustained, continuous release of salivary substitute.

Mendoza and Tomlinson described a technique for mandibular reservoir denture which was split into upper and lower parts.^[3] The technique required double toothed Lego blocks for attachment of two parts of denture and furthermore two articulators and two denture processing. Similar methods were used by Dabas *et al.*^[4] and Hallikerimath *et al.*^[5] Burhanpurwala *et al.*^[6] described a technique for mandibular reservoir denture where they divided the denture base into male and female portion using snap buttons. However still, the laboratory steps were complicated.

Sinclair *et al.*^[7] used similar method where he used samarium magnets instead of snap buttons. Although the reservoir had maximum capacity, fabrication procedure was exhaustive. Ladda *et al.*^[1] also used the same method of fabrication with stainless steel rods to separate the upper and lower part of mandibular reservoir denture. Joseph *et al.*^[8] fabricated maxillary reservoir denture using thermoplastic resin sheet as the reservoir. Although the technique used was simpler than the above techniques, it obstructs the tongue which affects the phonetics of the patient.

Gurkar *et al.*^[9] and Srivastava *et al.*^[10] described a similar technique for maxillary reservoir denture but both the methods

required multiple processing. All the methods advocated required double or multiple processing which may incorporate errors and were technique sensitive. Hence, in this article, the technique mentioned requires only single processing by minimizing processing errors and saving time. However, the disadvantages are increased palatal thickness which may affect speech, the reservoir can be displaced at the time of processing and as it is embedded with in the heat cure denture, the reservoir holding capacity is minimized compared to other methods.

CONCLUSION

This article describes a simplified technique for the construction of maxillary reservoir denture which is helpful to both dentist and the patient. The advantage of this fabrication method over other techniques is that the steps involved are simple and less time consuming. The patient had been using it and found it helpful to relieve the symptoms of xerostomia. This technique can be modified and used in mandibular denture also.

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