

# Salivary reservoir fabrication by using soft relining material in completely edentulous radiotherapy treated patient: A case report

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## ABSTRACT

Dry mouth or throat (xerostomia) condition is characterized by desiccation of the intraoral tissues. One of the major problems associated with dry mouth patients is the poor tolerance and retention of removable dental prostheses because of thin dry atrophic mucosa and lack of saliva film. This report describes a novel technique for the fabrication of a palatal saliva reservoir in completely edentulous xerostomic patient. The technique uses soft relining material in the floor of the reservoir. The tongue presses against the reservoir floor during swallowing, resulting in flow of saliva substitute through a hole in the anterior part of the floor of the reservoir.

**Keywords:** Squamous cell carcinoma, Xerostomia, desiccation, soft relining material

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## INTRODUCTION

Oral cancer ranks the first among commonly occurring malignancies in India and majority of them are squamous cell carcinomas. The Squamous cell carcinoma is usually radiosensitive and patients who receive radiotherapy to the fields involving the oral cavity experience various oral complications <sup>[1]</sup>. Xerostomia is one such common complication after radiotherapy because salivary glands are highly sensitive to radiation. The changes in the salivary glands following radiotherapy include progressive fibrosis, loss of fine vasculature, and parenchymal degeneration. The degree of xerostomia is directly proportional to the radiation dose administered and the volume of salivary gland exposed to radiation <sup>[2,3]</sup>. Xerostomia is defined by the glossary of prosthodontic <sup>[4]</sup> terms as dryness of the mouth from lack of normal secretions.

Xerostomia is a symptom, not a diagnosis or a disease. It is a subjective feeling of oral dryness. It disrupts the normal homeostasis of the oral cavity, leading to changes in the taste, difficulty in speech, difficulty in swallowing, and decreased dietary intake <sup>[5,6,7]</sup>. These changes adversely affect the patient's health and overall quality of life <sup>[8]</sup>. The oral mucosa becomes dry and tends to crack and ulcerate, which makes wearing removable prostheses uncomfortable <sup>[9,10]</sup> due to absence of saliva as a thin film between the removable prosthesis and the oral mucosa decreases retention of the dentures and increases inflammation and ulceration in the oral cavity. Hence, removable prostheses are often poorly tolerated in patients with xerostomia <sup>[11]</sup>. Several treatment options are available to the clinician depending on the etiology of xerostomia. Most cases require symptomatic treatment and include changes in dietary pattern, patient counseling, lifestyle modifications, salivary stimulants, and use of salivary substitute. A salivary reservoir denture is an effective solution in edentulous patients with xerostomia to deliver salivary substitute constantly into the patient's mouth without affecting the normal routine <sup>[7]</sup>. This article describes a simple and innovative technique for fabrication and designing of a functional maxillary salivary reservoir complete denture for a patient with xerostomia secondary to radiation therapy.

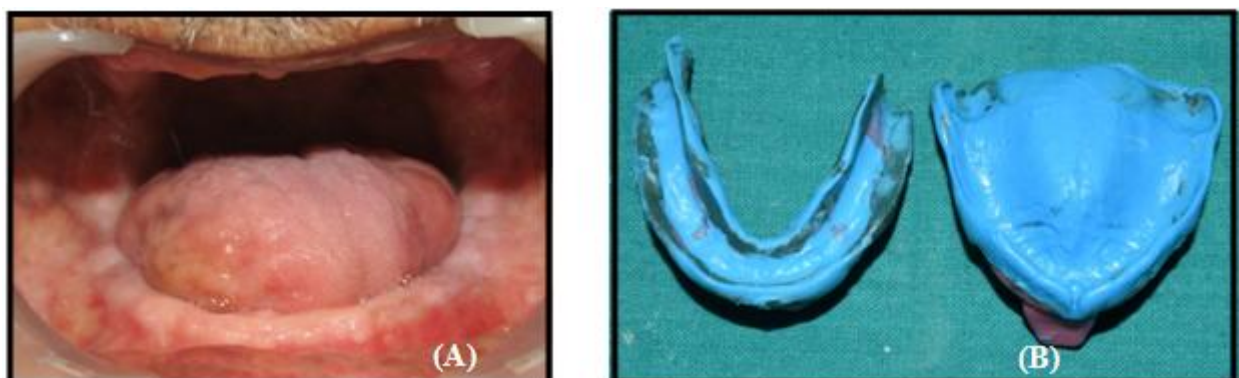
## CASE REPORT

A 64-year-old patient reported to the Department of Prosthodontics at Postgraduate Institute of Dental Sciences, Rohtak for the replacement of missing teeth. The patient also complained of difficulty in swallowing and mastication and experienced difficulty in opening his mouth. The patient gave a history of radiation therapy 2 years back for focal keratinizing squamous cell carcinoma of posterior most region of tongue. The mouth opening was reduced, but it was within the normal range. The patient was diagnosed as a case of radiation-induced xerostomia. The patient was instructed to perform active mouth opening exercises to improve the reduced mouth opening. The patient was advised to take a good diet, multivitamin supplements, and frequent drinking of water.

The complications associated with radiation therapy and the importance of using a modified form of denture was explained to the patient. It was decided to construct a salivary reservoir complete denture in the maxilla containing salivary substitute to relieve symptoms of xerostomia and aid the patient in the daily activities. A saliva reservoir is a chamber incorporated into a removable prosthesis that provides a flow of salivary substitute for a certain period of time. It is still unclear whether the reservoir is better placed in the maxillary or mandibular dental prosthesis. The advantages of a reservoir in the maxillary prosthesis include its greater available volume because of its larger base area, better flow because of its superior position, and reduced clogging of the holes of the reservoir because of less food collection in the palate than in the floor of the mouth. However, the weight of a maxillary reservoir can hamper prosthesis retention that's why we made a hollow cavity for reservoir in upper denture. Saliva reservoirs range in volume from 2.3 mL to 5.3 mL and provide a flow of artificial saliva for 2 to 5 hours. This procedure was thoroughly explained and well accepted by the patient.

### Technique

1. All the steps for complete denture fabrication in a conventional manner up to the trial placement appointment were completed except the light body final impression in place of Zinc oxide eugenol impression material.
2. At the trial placement appointment, modelling wax was added to the palatal surface of the denture base and speech was evaluated and palatal contours were adjusted as necessary Fig. 2(B).
3. After the addition of wax, a hydrocolloid impression of maxillary trial denture's palatal surface was made and an index of the Type III dental stone was prepared (Note that this index serves as a guide while fabricating the floor of the reservoir.)
4. Excess of modelling wax from the maxillary trial denture was removed and curing & finishing of complete denture was done.
5. A sheet of modelling wax was adapted over the surface of the stone index. It was flaked and processed in clear heat-polymerized acrylic resin Fig. 2 (C).
6. A clear plate serves as a floor of the reservoir. To make it functional, a window was created in the reservoir's floor Fig. 2 (E) and relined it a soft relining material (viscogel) Fig. 2 (F). The tongue will press on soft liner palatal roof during deglutition and will result in flow of artificial salivary substitute from the hole Fig. 4.
7. This floor was attached to the palatal surface of denture with transparent auto-polymerizing acrylic resin (DPI) Fig. 2 (G) to prepare a hollow cavity for salivary substitute.
8. A 1 mm diameter hole was drilled in the most anterior part of the floor. Note that this will be the lowest point of the reservoir floor.
9. Demonstration was given to the patient how to inject saliva substitute (ICPA Health Products Ltd Wet Mouth) through the hole by using a disposable syringe and needle. A needle with a diameter slightly smaller than that of the hole was selected. Allow the patient to practice this procedure until they are able to inject the saliva substitute easily



**Fig. 1: (A) Intraoral view (B) Final impression with light body addition silicone**

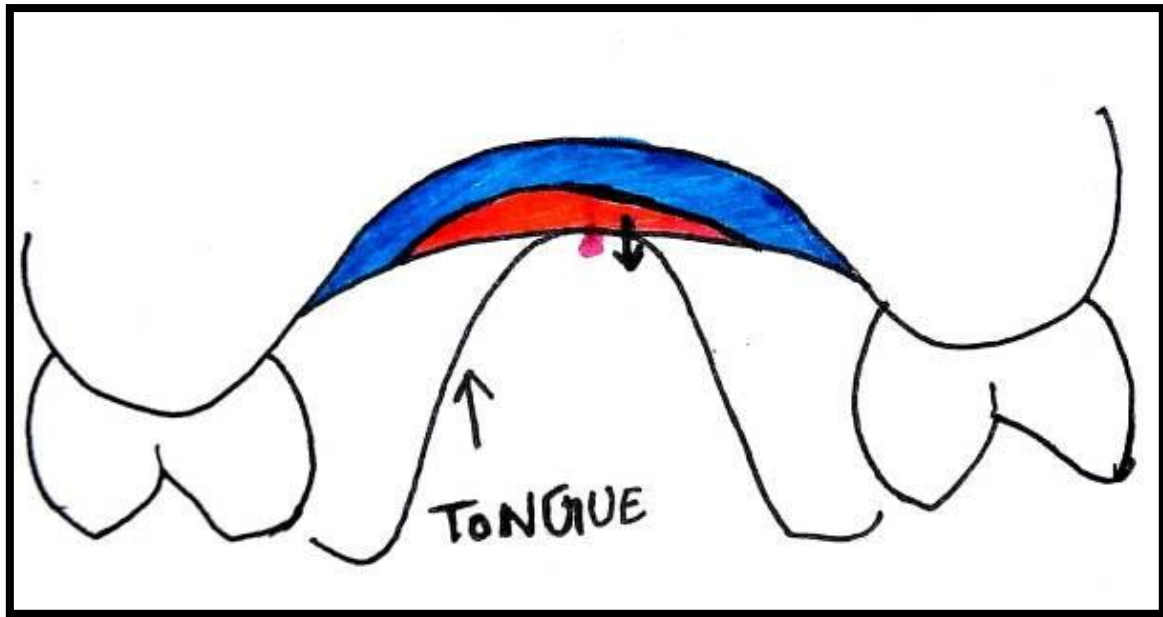


**Fig. 2:** (A) Try-in (B) Wax up of trial denture (C) Sheet of modelling wax adapted on stone index for reservoir floor (D) Reservoir floor of transparent heat cure (E) Window was created (F) Soft reliner filled window (G) Relined transparent heat cure plate fixed on denture with cold cure material (H) Floating upper denture due to hollow cavity (I) Salivary substitute filled in cavity after creating 1mm hole in anterior part of reservoir.



**Fig. 3:** (A) Postinsertion occlusion (B) Smile satisfaction





**Fig. 4: Tongue pressing on soft liner roof during deglutition resulting in flow of artificial saliva from the hole.**

### DISCUSSION

Many patients who undergo treatment for oral cancer receive a course of radiation therapy. The prevalence of post-radiation xerostomia is reported to be 90% <sup>[12]</sup>. Xerostomia creates an unhealthy oral environment and can also cause or exacerbate a painful oral condition. The reservoir denture containing salivary substitute offers clinician an alternative method of treating patients suffering from xerostomia with a slow, sustained, and continuous release of salivary substitute. Artificial saliva is carboxymethyl cellulose-based and mucin based salivary substitutes. A number of artificial salivary substitute available in the market include Wet Mouth, Saliveze, Salivart, Moi-Stir, and Salix.

#### Advantages

1. Simple methodology of fabrication.
2. No extra clinical step required.
3. Cost-effective.
4. Easy to use, clean, and refill the reservoir.
5. Sustained and slow release of salivary substitute.
6. Does not interfere with normal oral functions.
7. Easy visibility of salivary substitute in the chamber.
8. Denture is less bulky

#### Disadvantages

1. Extra Laboratory steps .
2. Patients should manually refill the reservoir

### CONCLUSION

Saliva reservoirs significantly improve the quality of life of xerostomic patients. This article introduces a technique for the fabrication of a functional palatal salivary reservoir in maxillary denture. Although the technique described is simple, easy, and successful, further improvements are required to overcome the loss of resiliency of soft relining material and the need to replace the entire floor of the reservoir.

## **REFERENCES**

- [1]. Brosky, M. E. 2007. The role of saliva in oral health: strategies for prevention and management of xerostomia. *J.Support Oncol.* 5:215–225.
- [2]. Deasy, J. O., V. Moiseenko, L. Marks, K. S. Chao, J. Nam, and A. Eisbruch. 2010. Radiotherapy dose-volume effects on salivary gland function. *Int. J. Radiat. Oncol. Biol. Phys.* 76(Suppl. 3):S58–S63.
- [3]. Rothwell, B. R. 1987. Prevention and treatment of the orofacial complications of radiotherapy. *J. Am. Dent. Assoc.* 114:316–322.
- [4]. *J Prosthet Dent.* 2018. The glossary of prosthodontic terms. *J. Prosthet. Dent.* 94:10–92.
- [5]. Greenberg, M. S., and M. Glick. 2003. *Burket's oral medicine diagnosis & treatment.* 10th ed. Pp. 236–237. BC Decker Inc, New York.
- [6]. Lew, J., and J. A. Smith. 2007. Mucosal graft-vs-host disease. *Oral Dis.* 13:519–529.
- [7]. Vissink, A., E. J. 's- Gravenmade, A. K. Panders, A. Olthof, A. Vermey, M. C. Huisman, et al. 1984. Artificial saliva reservoirs. *J. Prosthet. Dent.* 52:710–715.
- [8]. Zarb, G. A., C. L. Bolender, S. E. Eckert, A. H. Fenton, R.F. Jacob, and R. Mericske-Stern. 2004. *Prosthodontic treatment for edentulous patients.* 12th ed. Pp. 27, 57–58. Mosby, St. Louis.
- [9]. Greenspan D. Xerostomia: diagnosis and management. *Oncology* 1996;10:7-11.
- [10]. International Dental Federation. Working Group 10 of the Commission on Oral Health, Research and Epidemiology (CORE). Saliva: its role in health and disease. *Int Dent J* 1992;42:287-304.
- [11]. Arslan, A., K. Orhan, C. Canpolat, C. Delilbasi, and S. Dural. 2009. Impact of xerostomia on oral complaints in a group of elderly Turkish removable denture wearers. *Arch. Gerontontol. Geriatr.* 49:263–267.
- [12]. Sultana, N., and E. M. Sham. 2011. Xerostomia: an overview. *Int. J. Dent. Clin.* 3:58–61.