



SPLIT MANDIBULAR RESERVOIR DENTURE TO OVERCOME RADIATION-INDUCED XEROSTOMIA: A CASE REPORT

Prosthodontics

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ABSTRACT

Xerostomia, commonly known as dry mouth, is a condition that occurs due to systemic diseases, drug-induced side effects, or radiation therapy to the head and neck region. Reduced retention of removable dentures is a major complication for xerostomia patients. Prosthodontic management of these patients requires special considerations. Various methods have been suggested to address xerostomia, including incorporating reservoirs containing salivary substitutes into dentures. This case report provides a simple technique for creating a reservoir in the mandibular denture for patients with dentulous maxilla, particularly when other treatments have been ineffective. This approach offers effective lubrication for oral tissues, is easy for the patient to maintain, and uses standard denture base materials.

KEYWORDS

xerostomia, radiotherapy, reservoir denture, salivary substitutes.

INTRODUCTION

Xerostomia is the subjective feeling of dryness in the mouth, often referred to as reduced salivary flow. When the flow of saliva decreases to approximately half the normal rate of around 0.3 ml/min, individuals are detected to have “dry mouth”.¹

Etiology of xerostomia are anxiety, Sjogren's syndrome, salivary gland diseases, drug induced side effects, sequelae to head and neck radiation and medical conditions such as diabetes mellitus. Normal oral and oropharyngeal functions including eating, speaking and swallowing will also be difficult. Extreme discomfort in wearing dentures will be seen.^{2,3}

It is necessary to have sufficient amount of saliva between the denture and tissue interface. Surface tension will be lost which will cause denture to lose its attachment to the tissues if amount of saliva is inadequate.⁴ Thereby diminishing the retention of the dentures.^{5,6}

A variety of treatment options are derived based on the etiology. In cases where few treatment modalities have proven unsuccessful, the incorporation of reservoirs containing salivary substitutes into dentures has been proposed. This paper presents a case report where a mandibular reservoir split denture was used successfully in rehabilitating a xerostomic upper partially edentulous and mandibular completely edentulous patient. The denture is designed in two parts: a clear acrylic base with built-in reservoirs for salivary substitutes, and a pink acrylic upper section with denture teeth. This design provides continuous salivary flow and allows for easy reservoir cleaning, using standard materials and easy construction techniques.

Case Report

A 54-year-old female patient presented to the Department of Prosthodontics, K.V.G Dental College, Sullia with chief complaints of dryness of mouth and lack of retention in lower denture leading to discomfort while eating. Her past medical history included Stage I squamous cell carcinoma left tonsillar pillar, for which she had radiation therapy previously. Intraoral inspection disclosed partially edentulous maxillary and completely edentulous mandibular ridges [Fig 1], multiple restored teeth due to caries in maxilla, dryness of tongue, and minimal saliva in the oral cavity. Her physician had already advised salivary stimulant for improving salivation. She had numerous sets of maxillary and mandibular dentures made in recent years but was always unable to wear the lower denture due to lack of retention. Though adjustments were tried to improve lower denture retention finally it was decided to construct new denture.



Fig 1. Intraoral View Of Maxilla And Mandible

Procedure

1. Primary impressions were recorded in irreversible hydrocolloid impression material. After border molding, final impression of lower was made in medium body elastomeric impression material.
2. Jaw relation was recorded with wax occlusal rims fabricated on self-cure acrylic denture base. The vertical height of the lower rim was measured. Accordingly, teeth selection was carried out and size of the reservoir was determined, so that maximum space for the reservoir is gained while maintaining 2 mm thickness of the

- reservoir wall
3. Denture base was fabricated on master cast. According to the predetermined dimensions, putty type of elastomeric material was placed in the center of the denture base and modeling wax (modeling wax, DPI, Mumbai, India) was added at the periphery to create the walls of the reservoir [Fig 2]. Space for reservoir was created by removing putty from the center. Five stainless steel rods (3 mm in length and 2 mm in diameter) were positioned parallel to each other in the wax. The two parts of the reservoir lower denture would be attached to each other using these rods.
 4. Then flasking and dewaxing was carried out as a routine procedure. Heat cure polymerized resin was used for packing the mold space (DPI, Mumbai, India) and after curing a permanent acrylic base was obtained with five stainless steel rods embedded in it and having a reservoir in the center. Thus, the tissue-bearing plate of the two-piece reservoir denture was fabricated [Fig 3].
 5. The lower cast was retrieved from the flask and with the preserved wax occlusal records it was mounted on the articulator. After this, the lower temporary record base was replaced with the permanent clear acrylic base.
 6. Teeth arrangement was carried out on the articulator with putty maintaining the reservoir space [Fig 4]. Then trial dentures were finished and tried in the patient's mouth to check for retention, stability, esthetics, phonetics and comfort.
 7. Flasking followed by dewaxing of the lower trial denture was carried out to obtain base portion of the flask containing permanent denture base and a counter portion containing the teeth [Fig 5].
 8. Aluminum foil was adapted on the denture base for easy separation of the two halves of the mandibular denture [Fig 5]. Packing was carried out with heat cure acrylic resin and processed to obtain the teeth bearing plate of the reservoir denture [Fig 6].
 9. After careful deflasking aluminum foil was removed. The teeth bearing plate of the mandibular denture rested on the base fabricated earlier. Finishing and polishing was carried out with the segments together to ensure a flush smooth finish, without any damage to the edges [Fig 7].
 10. One outlet hole was drilled for the salivary substitute on each side in the retromylohyoid region of the base and were adjusted in size similar to the thickness of a 23-gauge orthodontic wire [Fig 8]. Artificial saliva substitute was then filled in the reservoir space of the lower denture.
 11. The upper partial denture was fabricated conventionally.
 12. Denture insertion was carried out [Fig 9] and post-insertion instructions were given to the patient. She was taught how to open and close the reservoir denture for filling the artificial salivary substitute and cleaning the reservoir space. In addition, fine orthodontic wire was provided to him for cleaning the drainage holes if they get blocked.
 13. Recall appointments were scheduled after 24 h, 1 week, 4 weeks. At recall appointments, good retention was observed and relief from the symptoms of dry mouth and improvement in dietary intake was reported by patient.



Fig 2: Modeling Wax Added At The Periphery Of Putty Type Of Elastomeric Material To Create The Walls Of The Reservoir

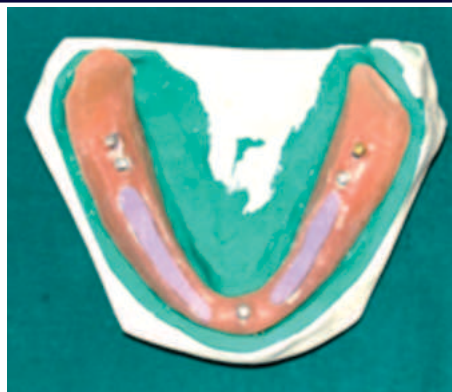


Fig 3: Tissue Bearing Plate Of The Two Pieces Reservoir Denture Obtained After Acrylization



Fig 4: Teeth Arrangement Done With Permanent Base On The Articulator



Fig 5: Counter Portions Containing The Teeth After Dewaxing And Aluminium Foil Covering Permanent Denture Base



Fig 6: Teeth Bearing Plate of the Reservoir



Fig 7: Final Denture Finished and Polish



Fig 8: Outlet Hole was Drilled for the Salivary Substitute



Fig 9: Insertion Done

DISCUSSION

Adhesion, cohesion, interfacial surface tension contribute to retention of complete denture and saliva plays an important role for these factors to be effective. This has to be considered in rehabilitation of edentulous patient with xerostomia. Xerostomia is seen commonly in various therapeutic drugs, decreased mastication, systemic factors like Sjogren's syndrome, water/metabolite loss due to vomiting and radiotherapy as in the present case. To overcome the problems of xerostomia in an edentulous patient, along with other measures use of reservoir denture is advocated. Literature has described different methods for incorporating salivary reservoir in complete and partial dentures.

Salivary reservoirs in the maxillary denture have following advantages over a reservoir in the mandibular denture: (1) Larger reservoir size, (2) provides flow of saliva to the whole mouth, unlike mandibular reservoir where flow is restricted to the floor of the mouth, (3) fluid and food in the floor of the mouth do not block outlet holes.⁷

Some literature suggests that mandibular dentures are beneficial as reservoir dentures because they allow for a straightforward gravity feed system, which can directly deliver the wetting agent to the mucosa.²

In this case reservoir in maxillary partial denture will lead to increase in weight, which may affect its retention and stability. So, design for the mandibular reservoir denture was suggested.

Instead of magnets or Lego blocks⁸ here stainless-steel metal rods are used to connect upper and lower part of mandibular denture. In the methods described in the literature reservoir space was made after acrylization, which may result in rough internal surface as it cannot be polished so easily,^{5,8,9} whereas in this case space was created before acrylization by blocking the area with putty material, which resulted in the smooth surface.

Though the technique used here is simple it cannot be used in cases with severe undercuts, where duplication of master cast will be required.

CONCLUSION

In summary, this paper introduces a method for fabricating split mandibular dentures with a salivary reservoir. Xerostomia patients are a distinct group where prosthodontic treatment faces unique challenges. Effective treatment depends on understanding the issues, taking preventive measures, and applying prosthodontic skills.

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