

Prosthetic Rehabilitation of an Edentulous Patient with Xerostomia: A Case Report

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Abstract

Xerostomia is a frequently encountered condition, particularly among patients who have undergone head and neck radiotherapy, chemotherapy, or are on long-term medication for systemic conditions such as diabetes or autoimmune disorders. It results in significantly diminished salivary flow, leading to various functional and psychological difficulties, especially in edentulous individuals. The most common complaints include dryness of the mouth, painful mucosa, halitosis, altered taste perception, difficulty in speech and swallowing, and compromised retention and stability of complete dentures. This poses a considerable challenge in prosthodontic rehabilitation. Management of xerostomia includes the use of salivary stimulants, substitutes, pharmacotherapy (e.g., pilocarpine, cevimeline), electrostimulation, and lifestyle modifications. When conservative measures offer limited relief, prosthetic interventions such as complete dentures incorporating a salivary reservoir may serve as an effective palliative measure. These reservoirs act as an artificial source of lubrication to improve the patient's oral comfort and denture functionality. This case report describes the prosthodontic management of a 55-year-old female xerostomic patient using a modified split maxillary complete denture with an incorporated salivary reservoir. The innovation aimed to restore her oral function while minimizing discomfort, thereby enhancing her speech, comfort, and quality of life. This approach highlights the interdisciplinary collaboration necessary in oncology and prosthodontics to address the functional impairments caused by post-radiotherapy complications.

Keywords: Artificial Saliva, Complete Denture, Radiation-induced Dry Mouth, Salivary Reservoir, Split Denture, Xerostomia.

Introduction

Xerostomia, commonly known as dry mouth, is a subjective sensation of oral dryness that can significantly impair a patient's quality of life. It is a prevalent condition, especially among the elderly, due to age-related physiological changes, polypharmacy, and systemic diseases (1). While it can affect individuals with natural dentition, its implications are far more pronounced in edentulous patients who rely on complete dentures for mastication, speech, and esthetics (2). Saliva plays a pivotal role in denture retention by providing adhesion, cohesion, and lubrication; its deficiency results in compromised prosthesis function and increased patient discomfort (3).

The etiology of xerostomia is multifactorial. Common causes include side effects of medications such as antihypertensives, antidepressants, anticholinergics, and antihistamines (4). Other etiologies include autoimmune diseases like Sjögren's syndrome, poorly controlled diabetes, dehydration, and the adverse effects of radiation

therapy in head and neck cancer patients (5). The prevalence of xerostomia among the elderly population ranges from 10% to 40%, depending on diagnostic criteria and population studies (6). This high incidence necessitates tailored prosthodontic approaches for effective oral rehabilitation.

Patients with xerostomia often present with burning sensations, altered taste, mucosal soreness, and difficulty in wearing dentures. Moreover, the risk of oral candidiasis and denture-induced stomatitis is markedly increased due to the compromised salivary defence mechanism (7). Therefore, conventional denture designs may be insufficient for this subset of patients. Modifications such as salivary reservoirs have been explored to improve denture function and patient comfort (8).

The role of prosthodontists is critical in managing xerostomic patients. A thorough evaluation of salivary gland function, patient history, and systemic health must precede any prosthetic

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intervention (9). Diagnostic tools such as sialometry and sialography, along with patient-reported outcome measures, help in determining the severity of the condition and planning suitable rehabilitation strategies (10-14).

This case report presents a comprehensive prosthodontic management of an edentulous patient with xerostomia. It highlights the clinical technique, challenges faced, and the therapeutic potential of a maxillary salivary reservoir denture in enhancing oral function, comfort, and quality of life.

Case Report

A 55-year-old female school teacher presented to the prosthodontics department with the chief complaint of dryness in the mouth and difficulty in speech while using her existing dentures. She had a history of squamous cell carcinoma involving the left cervical lymph nodes and underwent surgical excision, chemotherapy, and radiotherapy approximately eight months prior to presentation.

During the extraoral examination, no gross abnormalities were observed. Intraoral examination revealed complete edentulism in both arches, a dry and erythematous mucosa, and reduced salivary pooling. The interarch space was adequate for prosthetic fabrication. Her current complete denture was ill-fitting and exacerbated her discomfort due to the dry oral environment.

Salivary flow was assessed and found to be severely diminished, confirming the diagnosis of radiation-induced xerostomia. The patient was educated about the condition and various management strategies. After discussing all options, it was decided to fabricate a maxillary complete denture with a salivary reservoir to intermittently dispense artificial saliva during functional activities. Written informed consent was obtained.

Methodology

A transparent heat-polymerized acrylic resin baseplate was fabricated on the maxillary master cast with clearly demarcated finish lines. Jaw relations were recorded, and teeth were arranged on a semi-adjustable articulator to simulate functional occlusion. To create the salivary reservoir, the prosthesis was designed as a two-piece split denture. The procedure for fabrication of a denture with a salivary reservoir is described in Figure 1.

A putty index of the maxillary waxed-up denture was made before dewaxing. The acrylic teeth were removed, hollowed at the basal surfaces, cleaned, and repositioned into the index (Figure 2A). Modeling wax was carefully adapted on the inner surface of the indexed teeth to create the lid segment. After the wax cooled and hardened, it was seated back on the record base to verify occlusion (Figure 2B).

The wax lid segment was trimmed to fit flush with the base along the finish line and was processed separately using heat-cure acrylic resin (Figure 2C). A small circular depression was prepared in the palatal area over the incisive papilla to accommodate a plastic bead mounted with a 22-gauge stainless steel wire. This bead served as a rotatable valve that could be manipulated by the patient's tongue to release the artificial saliva.

A small refill port was created on the buccal flange near the second molar area at a 45-degree angle using a stainless-steel bur (Figure 2D). The reservoir could hold approximately 5 mL of salivary substitute, which was refilled by the patient using a 5 mL syringe. The patient was trained in proper loading, usage, and hygiene maintenance of the prosthesis.



Figure 1: Procedure for Fabrication of Denture with Salivary Reservoir

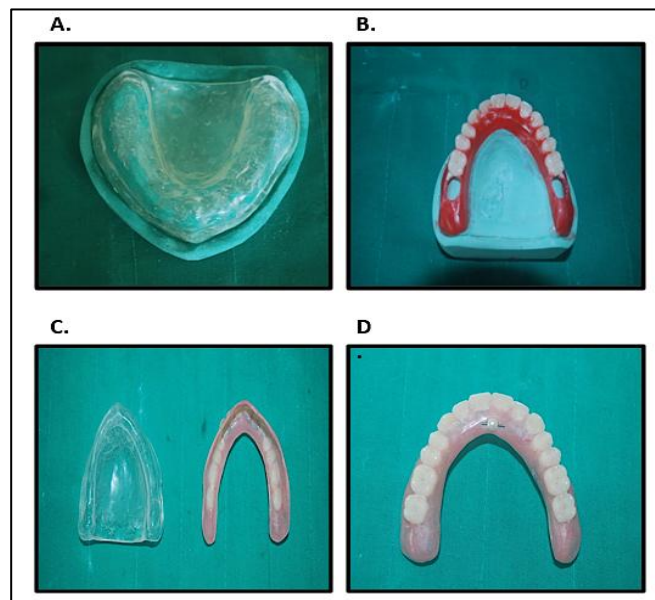


Figure 2: Fabrication of Denture with Salivary Reservoir: A. Transparent Heat-Polymerized Acrylic Resin Denture Base Fabricated on the Maxillary Master Cast, B. Arrangement of Artificial Teeth on the Maxillary Denture Base, C. Transparent Acrylic Baseplate (Left) And Maxillary Waxed Denture with Arranged Artificial Teeth (Right), D. Maxillary Denture with Incorporated Salivary Reservoir Valve

Results and Discussion

Xerostomia, or dry mouth, presents a unique set of challenges in prosthodontic rehabilitation, especially in completely edentulous patients. The condition, often associated with systemic diseases, medication side effects, or as a sequela of radiation therapy, significantly impacts oral health and the overall quality of life. The lack of adequate salivary flow compromises denture retention, stability, comfort, and increases the risk for mucosal irritation, candidiasis, and impaired mastication.

The literature provides valuable insight into the prosthodontic management of xerostomia. There are reports highlighting the limitations of conventional complete dentures in xerostomic patients and proposed modifications like the incorporation of salivary reservoirs to enhance prosthesis function and comfort (11). A case was reported, where a salivary reservoir incorporated into the maxillary denture improved the patient's comfort and reduced mucosal irritation (12). Similarly, a maxillary salivary reservoir denture was designed using a custom lid and resilient liner, enhancing both aesthetics and function (13).

A simplified palatal reservoir system using thermoplastic sheet, improving retention without complicating the fabrication process was also introduced (14). A case with radiation-induced xerostomia, rehabilitated using a modified salivary reservoir denture with a controlled flow rate, showing significant patient satisfaction and adaptation was also presented (15). A report described innovative approaches to salivary reservoir designs using biocompatible polymers and ergonomic contours, ensuring better patient compliance and hygiene maintenance (16).

A comparative study on xerostomic patients was conducted using conventional dentures versus salivary reservoir dentures, finding a marked improvement in satisfaction and oral comfort in the latter group (17). A report showcasing a clinical case where a customized palatal reservoir enhanced denture function, especially in terms of mucosal lubrication and speech (18). It was also emphasized that, the integration of salivary stimulants or substitutes within the prosthesis for dual therapeutic and mechanical action (19).

A case series was presented that demonstrating how different palatal reservoir configurations can be tailored based on individual salivary deficiency patterns and anatomical variations (20).

A systematic review established a strong correlation between improved oral health-related quality of life and prosthetic adaptations in xerostomic patients (21). A study highlighted the psychological benefits of such rehabilitations, reporting reduced anxiety and improved patient confidence with functional prostheses (22).

Innovative prosthodontic designs are imperative for comprehensive rehabilitation, especially when palliative pharmacologic management is insufficient has been studied (23). Future research should focus on biocompatible, moisture-retentive materials that can integrate seamlessly with oral mucosa in xerostomic conditions (24).

The clinical significance of this case lies in demonstrating a practical and cost-effective method to improve denture performance in xerostomic patients, significantly enhancing patient compliance, comfort, and oral function. Incorporating salivary reservoirs provides not only mechanical relief but also contributes to better mucosal health and speech (25, 26).

However, certain limitations persist. Reservoirs may require periodic refilling, and maintaining hygiene in the reservoir zone could be challenging. Material wear, leakage, and patient adaptability may also vary. Further studies focusing on long-term outcomes and patient-reported metrics can help optimize designs and ensure broader clinical applicability.

Conclusion

Prosthetic rehabilitation of edentulous patients with xerostomia poses unique clinical challenges, primarily due to compromised retention, mucosal discomfort, and increased risk of infections. This case report illustrates that incorporating a salivary reservoir into a maxillary denture can significantly enhance comfort, function, and overall patient satisfaction. By customizing the prosthesis to meet the specific physiological needs of xerostomic patients, clinicians can provide a more effective and holistic treatment approach. While such interventions may require meticulous planning and patient education for maintenance, their impact on oral health-related quality of life is substantial. Continued innovations in materials and design, along with further longitudinal studies, are essential to refine such prosthetic solutions for broader clinical application.

Abbreviations

None.

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Author Contributions

Aparna Sooraj: involved in diagnosis, treatment planning, clinical procedures, manuscript writing, literature review and final approval of the manuscript, Abdul Razak and Athira Krishna K: review the manuscript.

Conflict of Interest

The authors declare there is no conflict of interest.

Data Availability

The data are available from the corresponding author on a reasonable request.

Declaration of Generative AI and AI Assisted Technologies in the Writing Process

AI-assisted technology was used only for grammar correction and language refinement during preparation of the manuscript. The final content and scientific accuracy were reviewed and approved by the author.

Ethics Approval

Ethical approval was not required for this case report. Informed consent was obtained from the patient for treatment and publication of clinical details and photographs.

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