

Prosthetic Rehabilitation of a Patient with Xerostomia Following Radiotherapy: A Case Report

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Article History	Abstract
Received: 06 June 2023 Revised: 05 Sept 2023 Accepted: 13 Dec 2023 CC License CC-BY-NC-SA 4.0	<i>Xerostomia, characterized by a subjective feeling of dryness in the mouth has profound consequences on oral health including dental caries, oral discomfort, and a diminished overall quality of life. The absence or alteration of saliva can have profound consequences, manifesting as dental caries, oral discomfort, and a diminished overall quality of life. The present case report details a case of a reservoir denture, showcasing successful outcomes in the innovative management of xerostomia. By describing an alternative technique for denture fabrication, the present case report focuses on the construction of a mandibular reservoir denture</i> Keywords: Salivary Reservoir, Xerostomia, Radical Resection; Carcinoma; Split Denture

1. Introduction

Xerostomia, characterized by a subjective feeling of dryness in the mouth, becomes evident when the salivary flow decreases to approximately 0.3 ml/min.[1] The multifaceted etiology of xerostomia includes factors such as stress, anxiety, salivary gland diseases, Sjogren's syndrome, drug-induced conditions, radiation to the head and neck, and immunocompromised states like those found in diabetic patients.[2] The absence or alteration of saliva can have profound consequences, manifesting as dental caries, oral discomfort, and a diminished overall quality of life.

The clinical manifestations of xerostomia, ranging from a dry mouth to discomfort in various oral and oropharyngeal functions, significantly impact the daily lives of affected individuals. Edentulous patients commonly report discomfort in wearing complete dentures as a prevalent complaint.[3] While traditional management approaches involve symptomatic relief through medications, sugar-free gums or lozenges, salivary substitutes or stimulants, and soft denture liners or combinations thereof, a paradigm shift is observed in the emerging concept of salivary reservoirs.[4]

The present case report details a case of a reservoir denture, showcasing successful outcomes in the innovative management of xerostomia. By describing an alternative technique for denture fabrication, the present case report focuses on the construction of a mandibular reservoir denture. The approach not only contributes to symptomatic relief but also reflects a proactive stance toward maintaining oral health, aligning with contemporary trends in dental care.

Case Report:

A 62-year-old female patient presented to the Department of Prosthodontics at D.Y. Patil University School of Dentistry in Navi Mumbai, Maharashtra, India, with a chief complaint of missing teeth in both the upper and lower arches, seeking replacement. The patient had a significant medical history, having undergone surgical treatment for throat cancer six years ago, resulting in the resection of the lateral part of the tongue. Furthermore, the patient had been subjected to radiation therapy, leading to xerostomia. On clinical examination, a completely edentulous maxilla and mandible were observed, with a notably dry oral cavity.

Given the patient's unique challenges, a comprehensive treatment plan was devised. Complete dentures were chosen for both the maxillary and mandibular arches. Notably, the mandibular denture was designed as a split complete denture with a salivary reservoir to address the xerostomia resulting from the previous radiation therapy.

The treatment protocol commenced with the fabrication of custom trays following primary impressions made using impression compound on stock trays. These impressions were poured in dental plaster to obtain primary casts (Figure 1). The custom trays were fabricated using auto-polymerizing denture base resins. The split pattern for the mandibular arch was incorporated into the design (Figure 2). Secondary impressions, border molding, and final impressions were performed meticulously, with the final casts serving as the foundation for subsequent procedures.

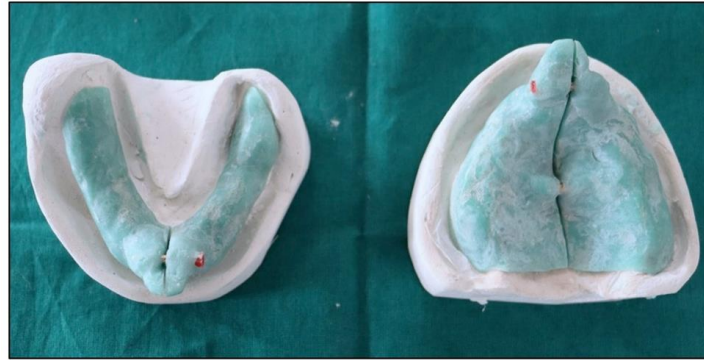


Figure 1: Special trays for the Mandibular and Maxillary Casts

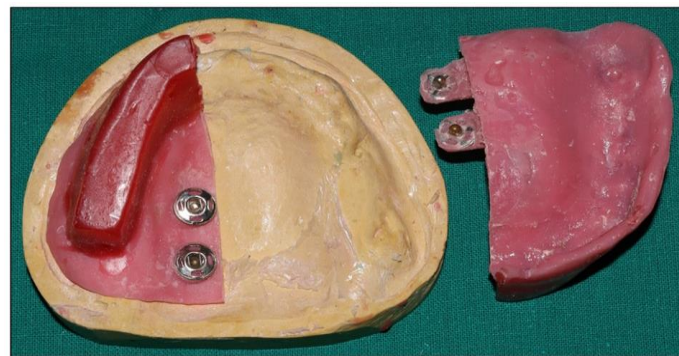


Figure 2: Split Record Base with Wax Rims

The maxillomandibular relationship was recorded with attention to freeway space, and both casts were mounted on an articulator in the standard manner. Teeth arrangement was executed in a class I relationship, followed by a clinical try-in to ensure satisfactory esthetics and optimal vertical and anteroposterior jaw relations (Figure 3). Subsequently, the waxed-up dentures underwent further adjustments until both patient and operator were content with the outcome.

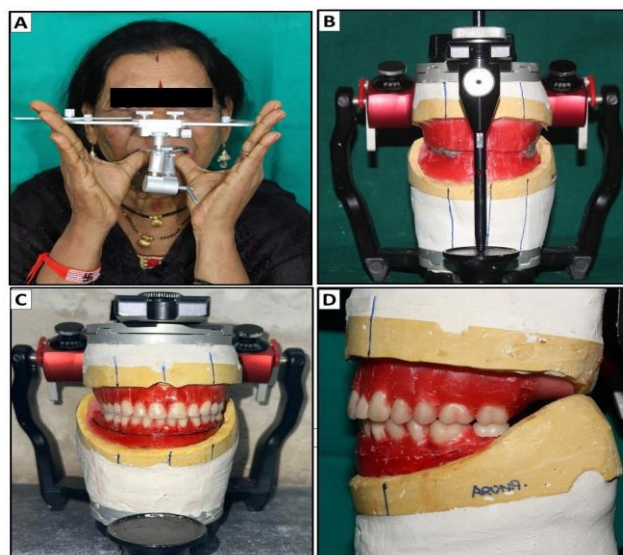


Figure 3: A) Facebow Transfer; B) Centric Mounting; C) Teeth arrangement -frontal view and D) Teeth Arrangement- lateral view

The construction of the clear acrylic mandibular base section involved a series of meticulous steps. The height of the base section was determined, considering various parameters, and Lego blocks were strategically positioned within the wax rim to create space for future reservoir placement. The process involved dewaxing, flasking, resin application, and careful deflasking and polishing to achieve the desired outcomes (Figure 4). Similarly, the upper mandibular section was constructed separately, involving precise articulation and teeth setting. The two segments, upper and lower, were then deflasked and polished together to ensure a seamless fit, avoiding any damage to the edges.

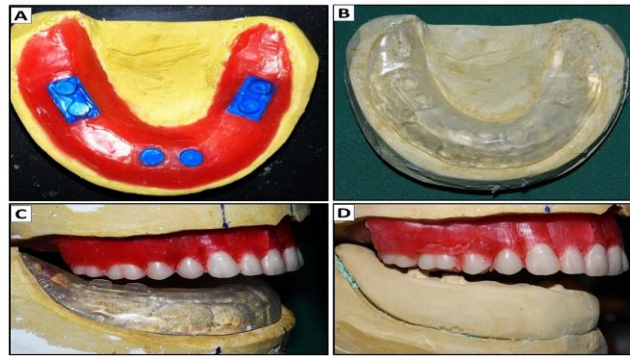


Figure 4: A) Salivary Reservoir Wax Pattern Made with Lego Blocks; B) Acrylisation of the Salivary Reservoir; C) Salivary Reservoir in the Mandible; D) Duplication for the Salivary Reservoir

In the subsequent phase, the dentures were initially issued to the patient without reservoirs, allowing for acclimatization and minor adjustments. Reservoirs were then incorporated into the clear acrylic base, maintaining appropriate thickness for strength. Drainage holes were meticulously created, and water was used to check the efficiency of the reservoirs. The reissued split reservoir denture was provided to the patient (Figure 5) with detailed postoperative cleaning instructions.

The patient, after a few visits for adjustments, comfortably wore the dentures, refilling the reservoirs twice daily. The treatment proved successful, with evident reduction in symptoms of xerostomia. This comprehensive case report demonstrates the intricate steps involved in addressing the prosthodontic needs of a patient with a complex medical history, providing insights for practitioners dealing with similar challenges in clinical practice.

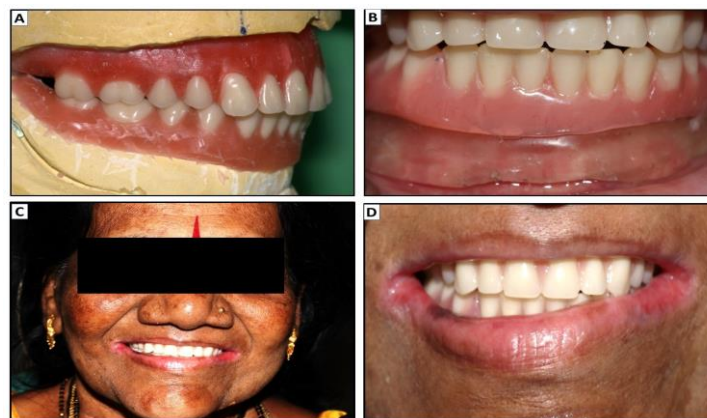


Figure 5: A) Final Teeth Setting; B) Final Denture; C) and D) Post-treatment Smile

Results and Discussion

Two primary strategies for managing radiation-induced xerostomia have been identified which are broadly grouped into preventive measures and therapeutic interventions.^[5] For individuals with mild xerostomia, recommendations include the use of sugar-free gum or salivary gland-stimulating lozenges, while severe cases may benefit from the application of saliva substitutes.^[6] Notably, the split reservoir denture emerges as an innovative alternative, particularly in instances where conventional treatments may not yield success.^[7] This study presents a case of age-related xerostomia in a patient experiencing post-radiation sequelae, highlighting the efficacy of the split denture technique.

The split denture technique offers several advantages compared to its predecessors in managing xerostomia. Notably, it provides convenient access to the reservoirs, facilitating easy maintenance by both patients and healthcare professionals.^[7] The design allows for straightforward cleaning and adjustments of the reservoirs when necessary. The use of clear acrylic for the base section enhances clinician precision in determining the optimal size and positioning for the reservoirs.^[8] Moreover, it allows patients to monitor salivary substitute levels within the chamber, fostering a more engaged and informed approach to their oral health.

From a clinical perspective, the construction stages involved in the split denture technique align with standard procedures and do not necessitate additional chair-side time. However, it is imperative to acknowledge the time-intensive nature of the laboratory phases, demanding precision to ensure accurate and well-fitting segments. Addressing repairs and relines for a split denture adds complexity to the maintenance process, underscoring the need for careful monitoring and intervention when required.

Case selection is a critical consideration in the application of the split denture technique. Introducing reservoirs into the denture compromises structural integrity, emphasizing the importance of selecting cases with adequate vertical dimension and thickness compatible with this technique.^[7,8] Research endeavors should focus on determining the minimum thickness required for reservoir walls to maximize size while preserving denture strength.⁷⁻⁹ Evaluation of reservoir placement should be conducted individually for each case, with consideration for potential anterior placement in instances where posterior space is insufficient.

Furthermore, patient characteristics play a crucial role in the success of the split denture technique. Manual dexterity is imperative for patients to effectively manage the separation and reconnection of the two denture segments.^[10] Additionally, case selection considerations extend to the presence of undercuts, with minimal tissue undercuts facilitating seamless repositioning of the processed denture base.

Expanding the application of the split denture technique to maxillary dentures aligns with earlier research indicating the benefits of incorporating reservoirs into the palatal aspect. Further enhancements to the technique, such as replacing Lego® blocks with precision attachments, offer avenues for future exploration. Although this modification may increase denture size and cost, its potential to enhance long-term reliability warrants consideration and further investigation.

Conclusion

The present case report introduces a pioneering technique for constructing a mandibular denture featuring a saliva reservoir. The importance of meticulous case selection is underscored, emphasizing the need for careful consideration in implementing this approach. The split denture technique represents a promising approach in the multifaceted management of xerostomia, highlighting the need for appropriate preliminary case selection, patient education, and continuous refinement of the clinical procedures. While acknowledging the necessity for further clinical trials to validate and refine the technique, the initial prototype has yielded promising outcomes, showcasing its potential success in addressing xerostomia.

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