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International Journal of Oral Health Dentistry

Journal homepage: www.ijohd.org

Case Report

Salivary reservoir in complete denture patient: A case report

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Abstract

Diabetes mellitus is a metabolic disorder which affects multiple body systems. Xerostomia (dry mouth) is a common complication I of diabetes, especially in elderly patients. Denture wearing is very difficult and uncomfortable in such patients. However, dentures can be modified to include a salivary substitute reservoir to improve comfort.

An elderly female patient with type 1 diabetes mellitus presented with a chief complain of difficulty in chewing and replacement of missing teeth with complete denture prosthesis. Clinical examination and history revealed the presence of xerostomia. To address this, a low cost salivary reservoir was incorporated into the denture without using specialized equipment or attachments.

The reservoir was created by hollowing the palatal vault of the upper denture and sealing it with a custom-made snap on lid. Small holes were created to the lid to allow controlled release of the salivary substitute. The patient reported satisfaction with both the comfort and function of the modified denture.

Keywords: Salivary reservoir, Xerostomia, Diabetes

Received: 11-12-2025; **Accepted:** 19-12-2025; **Available Online:** 02-01-2026

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1. Introduction

Xerostomia is defined as dryness of the mouth caused by a lack of normal salivary secretions.[1] It results from changes in the quantity and composition of saliva. It is a common complication of diabetes, one of the most prevalent endocrine disorders. Xerostomia may or may not be associated with hyposalivation, which is defined as a resting salivary flow rate of less than 0.1 ml/min or a stimulated flow rate of less than 0.7 ml/min.[2] Therefore, xerostomia can also occur in individuals with normal salivary flow rates.[3]

Diabetes Mellitus (DM) is a metabolic disorder having major global health concern.[4] In patients with uncontrolled diabetes, xerostomia often results from dehydration associated with polyuria, polydipsia, autonomic dysfunction, and the use of certain medications.[5] In elderly individuals, xerostomia can also occur as part of the natural aging process, due to salivary gland atrophy and reduced saliva production.[6]

Completely edentulous diabetic patients are often not suitable candidates for implant-supported prostheses. Conventional complete dentures, while often the only available option, can pose difficulties due to the presence of xerostomia. Adequate saliva is essential for successful impression making and denture retention. Without it, dentures can cause discomfort and trauma to the oral tissues when worn on dry mucosa.

To improve comfort and oral function, several management approaches have been used, such as dietary modifications, salivary stimulants, patient counseling, and artificial saliva substitutes. In complete denture prosthodontics, various methods like locks, magnets, and precision attachments have been employed to create salivary reservoirs.[7–9] However, these techniques can be complex, technique-sensitive, and expensive making them less practical for patients in low-income regions. In this article, a maxillary salivary reservoir fabrication has been described which allows controlled release of salivary substitute.

2. Case Report

An elderly female patient aged 74 years reported to the department of prosthodontics with chief complaint of difficulty in chewing food. The patient was suffering from

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https://doi.org/10.18231/j.ijohd.14747.1766746780
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diabetes mellitus (type 1) since last 10 years. Dental history revealed that the patient had been completely edentulous 4 years back. She had been wearing a complete denture for a year, but had to discontinue because of lack of retention and stability. Intraoral examination disclosed well-formed maxillary and mandibular completely edentulous residual alveolar ridges with no other significant negative clinical finding except the entire mucosa was dry. Further questioning revealed that the patient had difficulty in eating food in terms of increased duration of swallowing, dry lips and mouth, dysphagia, halitosis, mucositis and speech difficulty. The diagnosis established was that of complerely edentulous maxillary and mandibular residual alveolar ridges with existing uncontrolled and involuntary xerostomia. Treatment options presented to the patient were fabrication of a complete denture with a custom made low cost salivary reservoir since considering patient's financial condition, she could not afford expensive treatment options like precision attachment designed for salivary reservoir for complete denture prosthesis.

3. Procedure

1. Primary impressions of the maxillary and mandibular edentulous arches were made using irreversible hydrocolloid impression material in perforated stainless steel stock trays designed for completely edentulous arches. Border molding was performed using a low fusing impression compound, followed by final impressions made with zinc oxide eugenol paste.
2. Routine clinical and laboratory procedures for the fabrication of complete dentures with balanced occlusion were carried out up to the trial denture stage. **(Figure 1)** At this stage, the palatal wax on the maxillary trial denture was removed, and the denture base thickness in this region was reduced to less than 2 mm. **(Figure 2)**
3. A snap on type locking mechanism was created by carving the wax from the undersurface of the reservoir borders, forming a ledge that extended on all sides. The maxillary denture was then processed using conventional laboratory procedures that is flasking , counterflasking and packing. **(Figure 3)**
4. The complete denture was then finished and polished. **(Figure 4)**
5. The space created on palatal aspect of denture was underfilled with wax and vaselline was applied on the surface and then lid was fabricated over it with flushing margins with the denture. **(Figure 5)**
6. The corresponding snap on locking mechanism was created by extending the wax above and below the internal ledge formed within the denture. **(Figure 6)**
7. The wax lid is shown. **(Figure 7)**. The wax lid is processed using heat cure acrylic resin. **(Figure 8)** The lid was processed and fabricated using heat cure acrylic resin. **(Figure 9)**
8. The underfilled wax was removed and filled with salt to create space below the lid. The fabricated lid was attached to denture.
9. Later holes were created on lid and salt was removed with saline. **(Figure 10)**

Figure 1: Try in denture

Figure 2: Wax removed in palatal region

Figure 3: Flasking of trial denture

Figure 4: Denture fabricated

Figure 5: Wax added in palatal region to cover salt to give support to wax lid

Figure 6: Wax lid prepared in palatal

Figure 7: Wax lid

Figure 8: Dewaxing

Figure 9: Fabricated palatal lid

Figure 10: Lid joined to denture in palatal region

4. Discussion

Xerostomia, commonly described as the subjective sensation of dry mouth, does not always correlate with a measurable reduction in salivary flow.[2] However, individuals with diabetes, particularly those with poorly controlled glycemic levels, frequently demonstrate reduced salivary secretion[11]. As individuals age, salivary gland function becomes increasingly vulnerable to systemic illnesses, pharmacological agents, and exposure to radiation therapy.[10]

Xerostomia is a well-documented complication of diabetes mellitus. Studies report its prevalence among children and adolescents with type 1 diabetes mellitus to range between 38.5% and 53%.[11] The underlying mechanisms are believed to induce salivary gland parenchymal damage, compromised microcirculation, increased dehydration, and, most significantly, disturbances in glycemic regulation.[6,12]

A significant increase in the salivary concentration of glucose, calcium and urea was observed in diabetic patients.[13]

Prosthodontic rehabilitation in xerostomic patients, particularly those requiring complete dentures, poses considerable challenges for both clinician and patient. The efficacy of denture impressions, as well as the resulting retention and stability, relies heavily on the presence of saliva, which plays a crucial role in maintaining mucosal lubrication. Decreased salivary flow results in a clinically significant oral imbalance that may manifest as increased caries, susceptibility to oral candidosis, altered taste sensation, or a host of other problems.[14] In xerostomic conditions, denture wearing often becomes uncomfortable and traumatic.[15] To address this, various methods have been proposed for integrating salivary reservoirs into complete dentures.

Some designs, such as those incorporating precision attachments or resilient liners, have been criticized for difficulties in maintaining oral hygiene.[16] The technique discussed in this report presents a simplified, cost-effective solution that requires no specialized equipment or components. It employs the principle of a customized prosthesis, which has previously been recognized for its affordability and practicality.[17]

The use of a snap-on lid, enhanced by a sliding lock mechanism as implemented in this case, allows for secure closure and easy access.[18] This design facilitates effective cleaning, as the patient can detach the lid and use a brush to maintain the reservoir's hygiene. Due to the reservoir's low capacity, frequent refilling is necessary. Additionally, the number and diameter of outlet holes must be limited to prevent rapid emptying caused by sudden intraoral suction, which could expel the stored artificial saliva abruptly.

The reservoir can be incorporated into either the maxillary or mandibular denture, depending on clinical considerations. Placement within the maxillary denture is generally preferable, as it does not compromise denture retention or stability; the opening is oriented toward the tongue, which aids in controlled saliva release.[19] In contrast, placing the reservoir in the mandibular denture may reduce stability, particularly when the patient attempts to extract saliva through suction.[20] This issue can be mitigated by ensuring the denture is properly stabilized during use.

Notably, maxillary placement offers additional advantages, such as increased reservoir capacity, more uniform salivary distribution across the oral cavity, and reduced risk of hole obstruction by food particles.[21]

5. Conclusion

Incorporating a salivary reservoir into a complete denture prosthesis is a straightforward technical procedure that can be executed during the fabrication process. This modification significantly enhances patient comfort and improves the overall wearing experience of the prosthesis.

6. Source of Funding

None.

7. Conflict of Interest

None.

8. Acknowledgement

None.

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Cite this article: Bhosale S, Gangurde A, Chauhan M, Jaiswal N, Shaikh S, Harimkar R. Salivary reservoir in complete denture patient: A case report. *Int J Oral Health Dent.* 2025;11(4): 309–313.