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## Case Report

# Management of suction cup induced palatal bone resorption in xerostomia patient with sunken cheek appearance: A therapeutic and esthetic treatment option- A case report

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## ABSTRACT

Salivary reservoir in maxillary denture offers an effective, non-invasive approach in the treatment of edentulous patients afflicted with xerostomia. It is always desirable to have large volume reservoir in order to decrease the inconvenience of repeated refilling, however, increased bulk of palatal reservoir often leads to discomfort in speech, swallowing and acceptance of such prosthesis. In designing of size and shape of reservoir in the present case, large volume was achieved utilizing circular palatal resorption area, and proper shape was ensured by duplication of functional palatal contour. Adequate voluntary wetting of mouth was effected by "swallowing control saliva release" mechanism of the flexible reservoir lid. Sunken cheek appearance was addressed by using an easy, economical, and effective method of detachable cheek plumpers.

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## 1. Introduction

Xerostomia is defined by the glossary of prosthodontic terms as dryness of the mouth due to a lack of normal secretions,<sup>1</sup> and when the flow of saliva decreases to approximately half the normal unstimulated rate of around 0.3 ml/min.<sup>2</sup>

Xerostomia is a symptom and, not a diagnosis or disease.<sup>3</sup> It disrupts the normal homeostasis of the oral cavity, leading to changes in taste, and difficulty in speech and swallowing which, in turn, lead to decreased dietary intake.<sup>4</sup> Saliva acts as a primary defensive factor in oral

cavity,<sup>5</sup> lack of flow enhances caries incidence, gingivitis, oral candidiasis, burning mouth,<sup>6</sup> sore throat, hoarseness of voice.<sup>7</sup> Reduction in salivary flow causes extreme discomfort in wearing dentures.<sup>8</sup> These changes adversely affect the patient's health and overall quality of life.<sup>9</sup>

In edentulous xerostomia mouth rehabilitation, salivary reservoirs are viable alternatives. Various reservoir designs have been discussed in literature by either modifying the palatal region of maxillary dentures<sup>10,11</sup> or creating chambers in the bulky areas.<sup>12,13</sup> However, the task involves continuously delivering the salivary substitute to keep the entire oral cavity in a state of constant wetness, without normal routine being affected. Hence, salivary reservoirs located in maxillary dentures are more beneficial.

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Complete denture treatment not only replaces missing teeth but also restores facial appearance. Dentures with appropriate flange extensions and well positioned teeth adequately support the overlying lips and cheeks. However, in individuals with marked resorption of the alveolar process, conventional dentures fail to provide adequate support, necessitating additional support for the cheeks.<sup>14</sup> Cheek plumper is an essentially non-invasive and economic prosthesis<sup>15</sup> that supports and lifts the cheek to provide necessary support and enhance esthetics.<sup>16</sup>

This case report describes the rehabilitation of edentulous hollow cheek appearance xerostomia patient presented with deep circumferential palatal bone defect caused due to wearing of suction cup disk denture using simple, non-invasive technique by constructing salivary reservoir in maxillary denture with detachable press button cheek plumpers.

**2. Case Report**

A male patient aged 65 years reported to the Department of Prosthodontics, Navodaya Dental College and Hospital, Raichur with the chief complaints of experiencing difficulty in speaking and, eating, and dryness in mouth. He had been wearing dentures for a period of 10 years, which he has discontinued only during the course of the past 6 months due to a loose fit. The patient had a history of smoking about 10-15 bidis per day for two decades with no significant medical history. The patient was conscious about a sunken cheeks appearance and desired a prosthesis that would make his face look pleasant.



**Fig. 1:** Extra oral - Pre treatment



**Fig. 2:** Intra oral - circumferential palatal resorption



**Fig. 3:** Facebow transfer



**Fig. 4:** Palatal contour duplicate cast I with Vacuum sheet



Fig. 5: Reservoir wax pattern with sprue wax.



Fig. 8: Salivary reservoir denture with cheek plumper



Fig. 6: Dewaxed mould



Fig. 9: Press buttons to retain cheekplumpers



Fig. 7: Cast II with block out for flexible lid fabrication.



Fig. 10: Post insertion without cheekplumpers





**Fig. 11:** Extral oral- post insertion

Extraoral examination revealed slumping of lips and cheeks, fissures in the corner of the mouth, and flaccid muscle tone (Figure 1). Intra oral examination of the palate showed a curvilinear bone resorption in the mid palatal region, approximately 4x3 cm in size, which increased the depth of the palatal vault, with cracked tongue and scanty saliva in floor of the mouth. (Figure 2)

Denture examination revealed stained, worn out denture and dislodged suction cup which was attached to the maxillary palatal surface.

### 2.1. Treatment plan

It was decided to rehabilitate the patient with maxillary and mandibular complete dentures with the following modifications:

1. To create a functional form of the palatal surface using tissue conditioner.
2. To incorporate a salivary reservoir in the palatal surface of the maxillary denture, utilizing a deep circular resorbed palatal vault, which is caused by the use of suction disk attached to the previous denture.
3. To fabricate a flexible lid for the reservoir using rim lock adapted thermoplastic sheet.
4. To improve facial aesthetics and elevate sunken cheek appearance, intraoral detachable press button retained cheek plumpers for the maxillary denture.

### 2.2. Procedure – Fabrication of salivary reservoir

1. Palatal contours are recorded at the try-in appointment stage, using tissue conditioning material in the cameo surface by carrying out functional tongue movements

to access tongue space, so that the size of the salivary reservoir does not interfere with patient's activities such as speech and swallowing.

2. The trial denture with its modified palatal contour is duplicated in alginate and poured with dental stone to obtain contour guidance working cast (Cast I).
3. A template of 1-mm thick thermoplastic material is adapted on this cast I, which serves as a guide for salivary reservoir roof. (Figure 4)
4. The tissue conditioning material on the palatal surface of the trial denture is removed. The reservoir walls were built using sprue wax and the lid was made with modeling wax. (Figure 5)
5. The trial denture is waxed-up, invested, and processed in the conventional manner. (Figure 6)
6. The denture is finished, polished and then duplicated using alginate to obtain a working cast II made of dental stone in order to fabricate reservoir lid. (Figure 7)
7. The reservoir lid is fabricated with a 2-mm flexible thermoplastic sheet on the working Cast II. (Figure 8)
8. A 0.8-mm release hole is made on the most dependent portion. This permits the slow release of the salivary substitute.
9. The reservoir lid is snapped to close the reservoir and filled with salivary substitute. The salivary substitute is released when the tongue compresses against the palatal surface.
10. The functionally modulated maxillary salivary reservoir complete denture is ready to be inserted.

### 2.3. Procedure – Fabrication of cheek plumpers

1. Initially, wet cotton rolls were placed and functionally shaped on maxillary buccal flanges. The cotton rolls acted as template for fabrication of wax cheek plumper patterns.
2. Modeling wax was molded and placed over the maxillary right and left buccal flange, which was later layered by mouth temperature flowing wax, so that patterns are functionally molded with patient's cheek and lip movements, which were repeated till the cheeks gained required fullness.
3. Now, cheek plumper wax patterns were separated from the denture. Flasking and dewaxing procedures were finished separately for the cheek plumpers. The resultant mold space was then packed with heat-polymerizing acrylic material and curing procedures were completed. After curing, the cured plumpers were retrieved. Trimming, finishing, and polishing procedures were performed.
4. Metal push button attachments were used to attach cheek plumper with denture base. (Figure 9)

The patient was given post-insertion instructions and also taught to refill the reservoir.

The patient was instructed to use cheek plumpers as per his need.

### 3. Discussion

Although every prosthodontist aims at providing excellent complete denture prosthesis in terms of esthetics, functional efficiency and comfort, consideration for phonetics is too often neglected with greater emphasis placed on the other three components.<sup>17</sup> The tongue contacts different areas of the stomatognathic system while articulating different speech sounds.<sup>18</sup> The production of palato–lingual group of sounds involve the contact between tongue and the palate. An overly thick denture prosthesis in the region of anterior palate hampers appropriate formation of palato–lingual sounds.<sup>19</sup> Allen advocated making the palatal portion as thin as is practical.<sup>20</sup> The three major factors that affect the phonetics among complete denture wearers are palatal contour, positioning of the artificial teeth, and vertical dimension of occlusion.<sup>21</sup> Thus, in our case, consideration for replication of proper palatal contour was carried out by recording functionally modified palatal surface, using tissue conditioner, so that it enhances patient's speech quality and oral habits and ensures the roof of reservoir is not encroaching into tongue space. The material is thicker in the anterior portion and vault of ridge, thinning down to feather edge on the posterior border to make the posterior border of the reservoir discernible to the tongue. Thus, overall thickness of the palate was not affected by this design.

The goal of management of the present edentulous xerostomia patient involves reducing his suffering on account of decreased salivary secretion. It would help the patient to use the denture, and perform normal oral functions comfortably without repeated requirement to refill reservoir and act as source for saliva. The maxillary reservoir denture offers the advantage of wetting the entire mouth uniformly, therefore, in the present case, maxillary salivary reservoir was incorporated utilizing the depth in the palate which is caused as a consequence of use of palatal suction disk denture.

The highlight of this technique is that it allows the physiologic mechanism of salivary release by way of the “swallowing control saliva release” mechanism. As the patient swallows, the tongue contacts the flexible reservoir lid which creates positive pressure inside the reservoir thus pushing the salivary substitute out of the outlets. Thereafter, the pressure is relieved, air is sucked in creating a negative pressure, and the next cycle starts.<sup>22</sup>

In the present case, the sunken cheek appearance was managed by providing adequate cheek support with functionally molded detachable cheek plumper prosthesis, which not only provides the patient with the freedom to wear it whenever required but also allows ease in placement of the

prosthesis.

### 4. Conclusion

Prosthodontists are first-line health care providers who treat such functionally, esthetically, and psychologically compromised patients requiring therapeutic restoration and rehabilitation.

This article reports a simple and innovative technique for the construction of “swallowing control saliva release” mechanism salivary reservoir in the maxillary denture. The existing palatal resorption defect in this case was used as advantage to increase the volume of the reservoir. Xerostomia patients wearing this type of prosthesis would be able to moisten their entire mouth, thus, it will act as an artificial salivary gland.

The issue of sunken cheek appearance, in the present case, was addressed by providing functionally molded, press button retained and detachable cheek plumpers which were fabricated to enhance esthetics.

This type of custom made innovative designed prosthesis should be considered to enhance health and quality of life of such patients.

### 5. Conflicts of Interest

The authors declare that there are no conflicts of interest regarding the publication of this paper.

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