Management of a Completely Edentulous Geriatric Patient with Radiotherapy Induced Xerostomia using a Unique Technique of Fabrication of a Salivary Reservoir Prosthesis

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Abstract:
Geriatric patients commonly presents with variety of clinical conditions leading to reduced salivary flow. Prosthetic management of such patients with history of radiotherapy due to head and neck carcinoma resulting in xerostomia is challenging as the treatment outcome is not only aimed at restoration of lost dentition but also rehabilitation of the patient as a whole. Dry mouth and its consequences significantly affects patient's denture experience, comfort and quality of life. This case report presents management of a completely edentulous patient with post-radiotherapy induced xerostomia employing a simplified yet unique method of fabrication of a complete denture prosthesis with a salivary reservoir component in the maxillary denture to aid in salivary flow.

Keywords: Salivary reservoir, Geriatric dentistry, salivary reservoir prosthesis, Xerostomia

Introduction:

Prosthetic management of a geriatric patient who have undergone radiotherapy due to head and neck carcinoma resulting in xerostomia associated with reduced salivary flow becomes a tedious process as the outcome is not only aimed at restoration of lost dentition but also rehabilitating the patient as a whole. Dry mouth has its own consequences as it significantly affects patient's denture experience, comfort and quality of life. This case report presents management of a completely edentulous

patient with post-radiotherapy induced xerostomia employing a simplified yet unique method of fabrication of a complete denture prosthesis with a salivary reservoir component in the maxillary denture to aid in salivary flow.

Case presentation

A 70 year old female patient with a chief complaint of missing teeth in her upper and lower arch with accompanied dryness in mouth and reduced salivary flow reported for treatment. Patient's past medical history revealed that the patient underwent radiotherapy to treat carcinoma of tongue and had a thyroidectomy surgery five years before resulting in reduced salivary flow. Intra-oral examination revealed completely edentulous maxillary and mandibular arch with notably reduced salivary flow. The treatment plan for the patient included fabrication of conventional removable maxillary and mandibular complete denture with an added salivary reservoir compartment in the maxillary denture. The steps in fabrication of salivary reservoir is as follows: Primary and secondary Impression, Jaw relation recording and Wax try-in procedures are completed following conventional methods of complete denture fabrication. Once the wax try-in is checked for occlusion and esthetics, light body consistency addition silicone impression material is applied on to the palatal surface of trial denture base and is seated back in the patient's mouth. Then palatogram assessment is performed by asking the patient to perform functional tongue movements including speech and swallowing to ensure a contour is created in the palatal surface once the material sets (Figure 1). The trial denture with the recorded palatal contour is then duplicated as a model. Thermoplastic sheet is then adapted on to the model and a template is created (Figure 2). In the trial denture, Inlay wax is used to form the boundaries of the reservoir in the palatal region, height of the reservoir was checked and corrected using the thermoplastic template (Figure 3, 4). The reservoir space is filled with equal amounts of dental plaster and Pumice and this set-up is duplicated (Figure 5). Flasking and processing of denture is performed using regular method of compression molding. Care is employed to preserve the reservoir space intact which was previously filled with combination of Dental plaster and Pumice. Processed denture is then trimmed, polished and tried in the patient's mouth and verified for fit, esthetics and occlusion. On the previously duplicated cast (Figure 6), thermoplastic sheet is adapted and is removed and cut to desired dimension to form the lid for the reservoir. The thermoplastic resin sheet is then attached to the palatal surface of processed denture using auto-polymerizing resin to the elevations created on the reservoir borders to form the lid (Figure 7). A small hole measuring 1mm is made in the posterior aspect of the reservoir lid, it will act as both inlet and outlet. Syringe is then used to inject the measured quantity of the salivary substitute through the relief hole made. The denture is then inserted in the patient mouth. The relief hole is made in such a way that when patient applies pressure on the anterior part of the lid, the salivary substitute is released through the relief hole. Patient were

educated about the regular denture maintenance and methods of using and refilling the reservoir. Additionally, patient is advised to inject and flush commercially available mouth rinse inside the reservoir to render it free from microbes. Patient is recalled periodically to assess maintenance, patient comfort and compliance to instructions.

Discussion:

Xerostomia or dryness of mouth is a common clinical condition observed in geriatric patients especially in those with diabetes mellitus and/or those with history of head and neck radiotherapy.[1] This condition can manifest with or without accompanied reduction in salivary flow. This can be coped up minimally by frequent fluid intake or by modifying dietary habits by including more citrus fruits in the diet. Salivary stimulants can also be used to increase the salivary output, its available in form of sugar free chewing gums or lozenges.[2]In certain scenarios, salivary substitutes have also been used to improve the patient comfort. Rehabilitation of a completely edentulous patient with reduced salivary flow is challenging as saliva plays a key role in impression process in achieving retention for the complete denture. Literatures has reported use of salivary reservoirs as part of different types of prosthesis, Toljanic et al reported one of the earliest cases of use of a salivary reservoir in a maxillary denture whereas Sinclair et al described one of the earliest technique of a mandibular denture with a salivary reservoir.[3,4] Singh et al and Upadhyay et al used a technique comparable to that used in our case of adding a salivary reservoir to palatal aspect of the maxillary complete denture.[5,2] Mendoza et al and Bikash et al employed a technique of fabrication of a split mandibular complete denture design to incorporate a salivary reservoir.[6,7] Arora et al fabricated salivary reservoir in both maxillary complete denture and mandibular cast partial denture.[8] In addition to fabrication of salivary reservoir as a part of conventional maxillary and mandibular dentures, few cases has been reported in literature in which such reservoirs are fabricated as a part of a maxillofacial prosthesis. For example, Costa et al reported a case of fabrication of salivary reservoir along with a cheek plumper prosthesis for a patient with a sunken cheeks to aid in both function and esthetics.[9]Gowda et al rehabilitated an acquired mandibular defect with a mandibular prosthesis and additionally a novel method to incorporate a magnet retained salivary reservoir.[10] Tiwari et al described fabrication of a maxillary hollow obturator with a salivary reservoir component for a patient with an acquired maxillary defect.[11] Patient motivation and cooperation are critical for successful oral rehabilitation more so in cases with use of salivary reservoirs as it involves patients' compliance to instructions of usage and refilling of the reservoir with salivary substitutes and need for meticulous cleaning of dentures and the reservoir require meticulous cleaning.[12]

Conclusion:

Salivary reservoir prosthesis is an adjunct therapy in management of an edentulous patient with reduced salivary flow probably caused due to a variety of metabolic diseases or clinical conditions including radiotherapy. The technique described in this case report is straight forward and can be utilized in diverse clinical scenarios. The salivary substitute filled reservoir allows wetting of oral cavity for a duration of time, which increases patient comfort and thereby contributes in improving their quality of life of the patient.

References:

1. Ben-Aryeh H, Serouya R, Kanter Y, Szargel R, Laufer D. Oral health and salivary composition in diabetic patients. J Diabetes Complications. 1993 Jan-Mar;7(1):57-62.
2. Upadhyay SR, Kumar L, Rao J. Fabrication of a functional palatal saliva reservoir by using a resilient liner during processing of a complete denture. J Prosthet Dent. 2012 Nov;108(5):332-5.
3. Toljanic JA, Zucuskie TG. Use of a palatal reservoir in denture patients with xerostomia. J Prosthet Dent. 1984 Oct;52(4):540-4.
4. Sinclair GF, Frost PM, Walter JD. New design for an artificial saliva reservoir for the mandibular complete denture. J Prosthet Dent. 1996 Mar;75(3):276-80.
5. Manas Singh, Anchal Deep, Khurshid A Mattoo and Roma Goswami. Low volume salivary reservoir in complete denture prosthesis for xerostomia. Journal of Case Reports: Clinical & Medical. 2019; 2(2):134.
6. Mendoza AR, Tomlinson MJ. The split denture: a new technique for artificial saliva reservoirs in mandibular dentures. Aust Dent J. 2003 Sep;48(3):190-4.
7. Bikash P, Seema P. Prosthetic rehabilitation of a xerostomia patient with a mandibular split salivary reservoir denture. Annals and essences of dentistry. 2010 Jun 30;2(3):32–5.
8. Arora V, Kumar D, Legha VS, Kumar KV a. Management of xerostomia patient with salivary reservoir designed in upper complete denture and lower cast partial Denture. J contemp Dent 2014;4(1):56-59.
9. Meena Aras GDC. Cheek plumper with a salivary reservoir: an esthetic and functional treatment option for a xerostomic patient with sunken cheeks. Dentistry. 2015; 05(05).
10. Gowda EM, Bahri R, Singh K, Sahoo NK. Rehabilitation of acquired mandibular defect with two-piece, magnet-retained salivary reservoir. Med J Armed Forces India. 2022 Sep;78(Suppl 1):S308-S311.
11. Ahmad N, Rai M, Khan A, Tiwari AK. Palatal obturator with salivary reservoir- a case report. Ip annals of prosthodontics and restorative dentistry. 2016 Mar 15;1(1):44–6.

Figure Legends:

Figure 1: Palatogram Assessment done to determine the available space for reservoir

Figure 2: Thermoplastic template of the trial denture with palatogram assessment

Figure 3: Template is used the limit the height of the reservoir

Figure 4: Final Wax-up of denture and reservoir borders

Figure 5: Reservoir space filled with mix of pumice and plaster to maintain patency during processing of denture

Figure 6: Duplicated cast of the wax-up with intact reservoir space to be used for lid fabrication

Figure 7: Maxillary complete denture prosthesis with palatal reservoir made of thermoplastic sheet

Figures:

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