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A novel technique of fabrication of an obturator incorporating salivary reservoir with removable lid

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ABSTRACT-
The retention, stability and comfort of wearing denture is greatly influenced by the flow, quantity and consistency of saliva. Xerostomia mainly presents as a medication side effect, secondary to head and neck radiation therapy, and associated with Sjögren syndrome. Various approaches have been concerned with the use of reservoir. However the flow of salivary substitute is very difficult to control. Moreover the frequent cleaning of the denture required to maintain the patency of the reservoir holes poses various challenges to the patient. This article explains a novel technique for the incorporation of a reservoir with removable lid in complete denture obturator to enhance the retention of the prosthesis and thus, improving the comfort of wearing denture and the speech of patient.

I. INTRODUCTION-

Xerostomia refers to the sensation of oral dryness, which can result from diminished saliva production.[1]But, patients may report dry mouth even in the absence of a measurable decrease in saliva quantity.[1]A lack of normal salivary flow may lead to complaints of mouth dryness, oral burning, swallowing difficulty, and loss or decreased taste.[2]

Numerous etiologies have been described, but xerostomia mainly presents as a medication side effect, secondary to head and neck radiation therapy, and associated with Sjögren syndrome. Irrespective of a specific etiology, the patient's primary complaint is dry mouth. The treatment aims to alleviate symptoms, but a complete resolution is not always achieved. Initial management includes patient education, like regular water sipping and avoiding tobacco smoking, and local measures, such as artificial saliva.[3] Pharmacological therapy, mainly with pilocarpine[4], is implemented when local efforts are unsuccessful.

Xerostomia develops in most patients undergoing head and neck radiation therapy for cancer treatment when the major salivary glands are in the radiation path.[3]

II. CASE REPORT-

A 70-year-old male patient presented to the Department of Prosthodontics, Government dental college and hospital Ahmedabad, with chief complaints of dryness of mouth and discomfort while speaking and eating. His past medical history included nasopharangeal carcinoma for which he had had surgical treatment followed by radiation therapy 2 years back. Extraoral examination revealed signs of cheilitis and dry lips. Intraoral inspection disclosed edentulous maxillary and mandibular ridges with oro-nasal communication on one side, areas of inflammation, dryness of tongue, and minimal saliva in the oral cavity. Multivitamin supplementations and use of salivary substitutes (methylcellulose) were advised. General measures included frequent sips of water to overcome the dryness and associated discomfort.

This case report highlights palatogram as an easy clinical technique that helps to correct, often delinquent speech difficulties, pertaining to the palatal contours of complete denture prosthesis. At this stage, fabrication of Maxillary obturator with inbuilt Salivary Reservoir was planned.

Steps-

1- Conventional complete denture stepswere followed till waxed trial denture stage
2- At try-in, palatogram was recorded with tissue conditioner material by asking the patient to perform phonetics. The bulk of tissue conditioner was contoured to functional anatomy by tongue and a customized anterior palate was obtained [Figure 1]. After validating the clarity of sibilant sounds, denture was removed from patient’s mouth.

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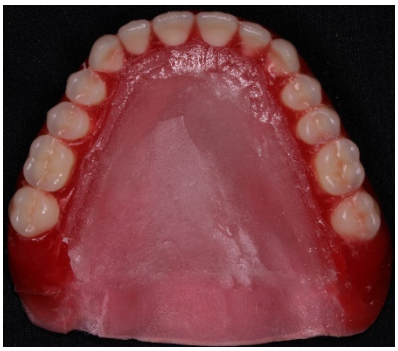

Figure 1- Palatogram record with tissue conditioner

3- The trial denture with its modified palatal contours is duplicated in alginate (Ruthinium Alginate, Ruthinium Dental Products Pvt. Ltd., India) and a working cast is poured in Type III Dental Stone (Goldstone, Asian Chemicals, India).[Figure 2(a)]

Figure 2- a- Duplicate working cast, b- 1mm thick thermoplastic template

4- A template of 1 mm thick thermoplastic material (BIOPLAST®, India) is fabricated on this working cast which serves as a guide for salivary reservoir designing [Figure 2(b)].

5- The tissue conditioning material on the palatal surface of the trial denture is removed. The reservoir walls and lid rim are built with modelling wax [Figure 3]. A slight undercut must be created on the inner aspect and a groove is made on the external surface of the lid rim using a Le Cron carver. These two features facilitate attachment for the flexible lid of the reservoir.

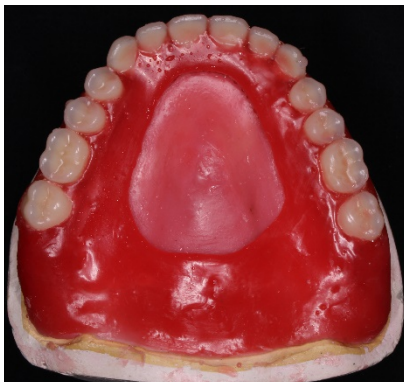

Figure 3- wax up for reservoir

6- Putty spacer was fabricated to ensure the reservoir space after acrylisation of denture

7- The denture is finished and polished [Figure 4] and then duplicated using alginate to obtain a second working cast made of Type III Dental Stone (Goldstone, Asian Chemicals, India).

Figure 4- Finished denture with reservoir space

8- The reservoir lid is fabricated with a 1 mm flexible thermoplastic sheet (BIOPLAST®) on the second working cast of the denture [Figure 5]. The reservoir space was blocked with putty spacer, while the undercut on the inner aspect of the reservoir lid rim must be relieved before fabricating the reservoir lid.

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Figure 5- 2nd working cast with putty spacer and thermoplastic lid

9- A 0.8 mm release hole is made on the most dependent portion using a straight fissure bur. This permits the slow and continuous release of the salivary substitute.

10- The reservoir lid is snapped to close the reservoir and is filled with salivary substitute (methyl cellulose – wet mouth, ICPA) using a calibrated syringe through the release hole (Figure 6). The salivary substitute is released when the tongue creates pressure in the anterior portion of the palate.

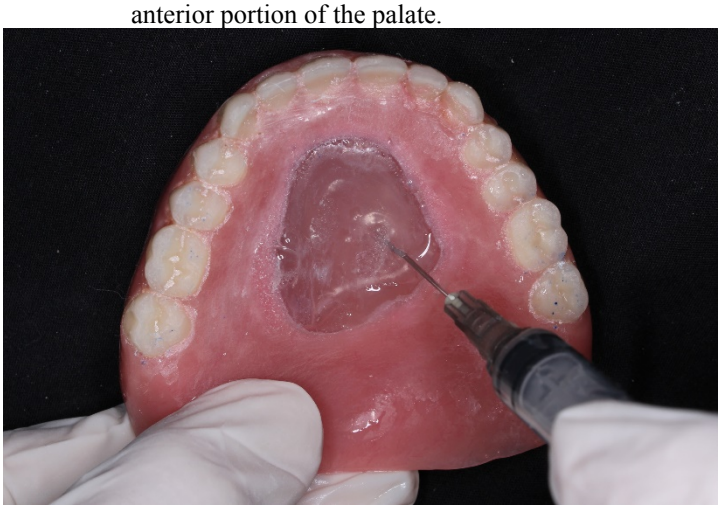

Figure 6- Release of salivary substitute into reservoir through the lid

11- The functional maxillary salivary reservoir obturator is ready to be inserted

III. DISCUSSION-

Complete dentures are poorly tolerated by patients with diminished salivary flow because of the lack of saliva bonding between the interface of the prosthesis and the oral/gingival tissues The reservoir denture containing salivary substitute offers clinician an alternative method of treating patients suffering from xerostomia with a slow, sustained, and continuous release of salivary substitute.(4) Artificial salivary substitutes can be classified into carboxymethyl cellulose based and mucin based salivary substitutes. Commercially available saliva substitutes containing carboxymethyl cellulose are the most commonly used as they are less costly and readily available. A number of artificial salivary substitute available in the market include Wet Mouth, Saliveze, Salivart, Moi Stir, and Salix.

Mendoza and Tomlinson[6] described split denture technique for artificial saliva reservoir in the mandibular denture, Sinclair et al[7]. used cobalt samarium magnets to connect the lower and upper part of the mandibular reservoir denture. Hirvikingas et al.[8] used a Gerber attachment to operate the release mechanism for the salivary substitute in the maxillary reservoir complete denture.

According to Sinclair et al[7] design and construction of the reservoir denture should fulfill three criteria:

1. Maximum space for the reservoir.
2. Minimum adjustments in the finished denture so that a maximally extended reservoir would not be perforated.
3. Provide ease of cleaning and refilling the reservoir.

IV. CONCLUSION-

This article highlights an innovative technique for the fabrication of a palatal salivary reservoir obturator in patients with xerostomia that is easy to use and clean, durable and quite affordable for the patient and also ensures prolonged wetting of oral structures.

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