

Managing the Edentulous Dry Mouth: The Two Part Mandibular Denture

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Received: 14 March 2011 / Accepted: 5 August 2011 / Published online: 12 August 2011
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Abstract Treatment of patients suffering from xerostomia can be a challenge and more so in the completely edentulous. The difficulties encountered can be troublesome and at times may lead to complete failure of the prosthesis. Xerostomia may occur due to a number of reasons. Here is a report of an attempt at the fabrication of complete denture in one such case. The technique involves incorporation of a salivary reservoir in the denture in which a salivary substitute is added. A case report is hereby presented illustrating the technique.

Keywords Xerostomia · Artificial saliva · Two part mandibular denture

Introduction

At times the end result of many acute and chronic diseases that involve the body is a persistent xerostomia that can vary from an uncomfortable to a debilitating condition for the patient [1]. Unfortunately the rehabilitation may be neglected while attention is focused on treatment of the disease [1]. Xerostomia is defined as dry mouth resulting from reduced or absent salivary flow. It is also called as dry mouth and most commonly occurs due to Sjogren's

syndrome, endocrine disorders, as a side effect of cancer treatment (radiation as well as chemotherapy) and medications (antidepressants, tranquilizers, diuretics and antihistamines) [2]. Saliva is reduced in volume and altered in consistency. The Saliva produced is more mucinous and acidic, and it may distribute less easily throughout the mouth. Xerostomia is often a contributing factor for both minor and serious health problems. It can affect nutrition, dental and psychological health. Some common problems associated with xerostomia include a constant sore throat, difficulty in speaking and swallowing, hoarseness in voice [3]. If left untreated, xerostomia decreases the oral pH and significantly increases the development of plaque and dental caries [5]. Oral candidiosis is one of the most common oral infections seen in association with Xerostomia [5]. It also leads to dysgeusia (disturbed sensation of taste) [4]. Dentures which would ordinarily rehabilitate the edentulous patients are often poorly tolerated in such patients. Saliva acts as a thin film between the dentures and the oral mucosa and its absence may cause decreased retention as well as increased chances of inflammation and ulceration in the oral cavity. Here we report a case of fabrication of complete denture in one such case. The technique involves incorporation of a salivary reservoir in the denture in which a salivary substitute is added.

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Case Report

History Taking and Examination

A 65 year old male patient reported to the Department of Prosthodontics, Crown and Bridge, with the complaint of missing teeth and sought replacement (Fig. 1). On thorough elicitation of the history it was brought to our notice



Fig. 1 Preoperative photograph of the patient

that the patient suffered from cancer of vocal cord about 4 years back. He was successfully operated for the same and radiation therapy was used during the treatment. The patient also reported the frequent occurrence of oral ulcers and pain in swallowing. The patient complained of discomfort while wearing dentures. On examination, the erythema and inflammation could be well appreciated in the oral cavity. The history and examination pointed towards a radiation induced xerostomia. After discussion and planning, it was decided that the patient should be given a denture with artificial salivary substitute so as to aid him in his daily oral activities. A salivary reservoir was to be created in the denture to contain the salivary substitute. The mandibular denture would be made in two parts, i.e., upper and lower; the upper part containing teeth and lower part containing the salivary reservoir. The patient was informed about the treatment plan and his consent was taken.

Denture Construction

- (a) The upper denture was made in the conventional manner.
- (b) The lower denture was fabricated in two parts, the upper dentate part bearing denture teeth and lower part bearing the salivary reservoirs.
- (c) Conventional steps were followed in the making of the upper denture. The normal procedure of denture construction was followed till the secondary impression stage.
- (d) The master casts obtained were duplicated in agar-agar.
- (e) The second pair of master casts was kept aside for later use.
- (f) Jaw relations were recorded and mounted on a Hanau semiadjustable articulator after face bow transfer. Using the same vertical dimension the second set of casts was mounted as well.

- (g) The two different mountings were numbered one and two.
- (h) Teeth arrangement was done on the first set of mountings (Fig. 2).
- (i) Shorter teeth were used in the lower arch to allow a deeper area for the future placement of reservoirs. Try in was done in the usual manner.
- (j) On the 2nd set of mounting, the lower wax rim was reduced in height so as to create space for lower teeth.
- (k) Interlockings were created in the lower wax rim by cutting out wax (Fig. 3).
- (l) This reduced lower wax rim was acrylised in clear acrylic. This clear acrylic part was to serve as the lower half of the two part mandibular denture (Fig. 4).
- (m) The clear acrylic part was duplicated in stone.
- (n) A wax bite was taken between the upper waxed denture and clear acrylic part. This was used to mount the duplicated stone cast.
- (o) Teeth arrangement was done again on the stone cast of the lower half (Fig. 5).
- (p) The upper part was processed after completion of teeth arrangement and acrylised using pink acrylic.
- (q) This served as the upper half of two part mandibular denture.
- (r) The two halves were fitted into each other and tested for retention.
- (s) The interlockings created in the clear acrylic part will help in holding the two parts together. Reservoirs were created in a rectangular manner in premolar to molar region by using straight fissure burs to accommodate around 10 ml of salivary substitute in each of the reservoirs and were approximately 10 mm in length, 5 mm in breadth and 5 mm in depth. Then holes were drilled on lingual aspect at the base of the reservoirs for evacuation of salivary substitute.
- (t) Artificial saliva was prepared in association with department of biochemistry(J.N.Medical College Belgaum)



Fig. 2 Teeth arrangement done for the 1st set of mountings



Fig. 3 Interlockings created in the lower wax rim of 2nd mounting



Fig. 4 Wax rim tried with the upper wax up dentures



Fig. 5 Teeth arrangement done with stone cast of clear acrylic part

and filled in the reservoirs with the aid of a syringe (Figs. 6, 7).

(u) Patient was instructed about the refilling of the reservoirs and about the care of the dentures (Fig. 8).

Composition of Artificial Saliva used

- (1) Sodium carboxymethylcellulose 10 g/l
- (2) Sorbitol 29.95 g/l
- (3) Potassium chloride 0.62 g/l
- (4) Sodium chloride 0.87 g/l
- (5) Magnesium chloride 0.06 g/l
- (6) Calcium chloride 0.17 g/l



Fig. 6 Salivary reservoirs created in the lower denture; filled with colored water here



Fig. 7 Reservoirs as seen with as the dentate part of the denture, interlockings seen clearly



Fig. 8 Post insertion photograph

- (7) Di-potassium hydrogen orthophosphate 0.80 g/l
- (8) Potassium di-hydrogen orthophosphate 0.30 g/l
- (9) Sodium fluoride 0.0044 g/l
- (10) Methyl p-hydroxybenzoate 1.00 g/l
- (11) Spirit of lemon 5 ml g/l

Discussion

Reduced salivary flow is common in the elderly, and is associated with a variety of factors like therapeutic head and neck irradiation, Sjogren's syndrome, HIV, diabetes, renal failure, and pharmacotherapy. Oral manifestations of hyposalivation typically include glossitis, mucositis, angular cheilosis, dysgeusia, difficulty in chewing and swallowing, and an increased incidence of caries. Repeated failure of dental restorations due to recurrent caries, an increased prevalence of tooth wear, early tooth loss, and poor tolerance of dentures are some of the major dental problems reported by such patients. Prosthodontic therapy for this unique patient group is challenging due to the limited choice of abutments, loss of vertical dimension, and poor occlusion [6].

Depending upon the cause, variety of treatment options is available. In medication induced Xerostomia, dosage, timing, or a change in medication may reduce the severity of the problem. In such cases, measurement of a patient's non stimulated salivary flow rates before and after altering their medication may be useful in gauging the success of treatment. Gustatory stimulation of the salivary glands by mastication of sugar free chewing gums or lozenges is also helpful. In severe Xerostomia cases, saliva substitutes or salivary stimulants may be used. To minimize patient discomfort, soft denture liners can also be used. Often, a combination of treatments may be required [7].

Saliva substitutes containing thickening agents for longer relief and increased moistening and lubrication of the oral surfaces have been developed. These are available as solutions, sprays or gels and have multiple contents such as carboxymethylcellulose, electrolytes and flavoring agents. e.g, wet mouth (ICPA Health Products Ltd), aqwet (Cipla Ltd). However, the main problem is to deliver this substitute constantly into patient's mouth without affecting his normal routine. Where all treatment modalities have proven unsuccessful, the incorporation of artificial salivary reservoir in dentures has been proposed in such cases [7].

The present case involved fabrication of mandibular denture in two parts. The lower part consisting of reservoirs

and the upper dentate part bearing the denture teeth. The two parts were then interlocked. The lower ridge height was kept in mind so that it was sufficient enough for the placement of the denture and also the interocclusal distance was adequate for placement of teeth. The salivary reservoir could not be placed in the upper denture as the depth of reservoir would be too less and a very small amount of saliva could be filled, leading to constant refilling.

The patient was called for recall checkup after 15 days and every month thereafter and the treatment was found to be satisfactory.

The advantage of this split denture technique over previous reservoir dentures lies in the ready access to the reservoirs, both by the patient and for professional attention. It allows easy cleaning and adjustment of the reservoirs as needed. The use of clear acrylic for the base section permits the clinician to determine the best size and position for placement of the reservoirs. It also enables the patient to clearly visualize the levels of saliva substitute within the chamber. The advantage of the present method was utilization of routine materials during construction.

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