



Prosthetic Management of an Irradiated Edentulous Hemi-Mandibulectomy Patient by Providing A Twin Occlusion and Salivary Reservoir – A Clinical Report.

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(Received: 14 April 2024

Revised: 01 May 2024

Accepted: 18 June 2024)

KEYWORDS

Xerostomia, Twin occlusion, Salivary reservoir, Oral Squamous Cell Carcinoma, Mandibular resection.

ABSTRACT:

The prosthodontic rehabilitation of edentulous patients with acquired mandibular defects is one of the most challenging procedures confronting the prosthodontist. Tumors in and around the mandible usually require surgical removal and extensive resection of the bone. Loss of continuity of the mandible destroys the balance of the lower face leading to altered mandibular movements, decreased masticatory function and deviation of the residual segment toward the surgical site and loss of occlusion on the unresected side. The abnormal profile and position of the mandible may prevent ideal placement of the denture teeth.

Since many patients would have received radiation therapy either prior to or after surgery, xerostomia is one of the major complications in these patients causing chronic oral discomfort and functional problems. Together these conditions can impair the physiological and psychological well-being of the patient.

This clinical report describes the prosthodontic rehabilitation of an irradiated edentulous hemi-mandibulectomy patient, who had a history of carcinoma in the left side of the mandible, using two rows of non-anatomic teeth on the unresected side in monoplane occlusion, providing a broader occlusal table and improved masticatory efficiency, along with a salivary reservoir incorporated into the maxillary denture.

Introduction:

Surgical resection of tumor often necessitates partial mandibular resection, with or without resection of the floor of the mouth. Oral rehabilitation of the edentulous patient who has a partially resected mandible is one of the most challenging procedures confronting the maxillofacial prosthodontist.¹ The extent of surgery and the effects of radiation therapy determine the amount of rehabilitation needed for a given patient. Post-surgery patient presents with an anatomical defect of mandible, deviation of the resected mandible toward the defective site, scar tissue formation, microstomia, limited coordinative ability, limited posterior throat form, which usually results in severe limitations on speech, mastication, and swallowing.

With only one half or two thirds of the mandible remaining, stability, support and retention of the mandibular denture are compromised. The situation becomes further complicated because of the therapeutic radiation which results in atrophic oral mucosa and reduced salivary output. The thick mucinous nature of the saliva that remains after therapeutic levels of radiation, impairs retention and compromises lubrication of the denture-mucosal interface. All these functional and esthetic problems affect the psychological well-being as well as quality of life of the patient. The treatment option should be selected carefully considering unfavorable, anatomical and physiological limitations when rehabilitating completely edentulous patients with resected mandibles. The basic objectives are to control



and stabilize the altered muscle pull which is causing the mandibular deviation, to achieve proper occlusion, and treating xerostomia. Palatal ramp on the maxillary denture was designed to achieve optimal function.¹ Two rows of maxillary posterior teeth on the unresected side were arranged to obtain broad occlusal table.² But very few cases has been reported in literature utilizing this method.^{3,4}

Regular use of artificial saliva or saliva substitute can increase retention and stability of the denture as well as comfort level of the patient. Salivary reservoir can deliver artificial saliva into the oral cavity from a hollow prosthesis constantly into patient's mouth without affecting his normal routine. Salivary reservoir in upper denture has been shown to control the xerostomia.⁵ While Implant-supported overdentures have the advantage of osseointegration, which can enhance retention and stability of the denture in a patient with xerostomia, the prognosis of implant is questionable when quality, quantity and location of the available irradiated bone is not favorable.⁶ Clinician must consider the above parameters and also the financial affordability of the patient before selecting any treatment option.

This case report describes rehabilitation of one of such cases with simple but unconventional complete denture with the maxillary denture having twin rows of teeth and an incorporated salivary reservoir.

Case Report:

A 55-year-old patient reported to the Department of Prosthodontics and Crown & Bridge, Dr. Ahmed Dental College and Hospital for rehabilitation of his edentulous mouth. The chief complaint was difficulty in chewing food and facial disfigurement. He was diagnosed with squamous cell carcinoma on the left side of the mandible one year back, for which he had undergone resection of a part of the mandible followed by radiotherapy. No surgical reconstruction was attempted. On examination he was having an asymmetrical face, deviation of the mandible towards left side, and convex profile. (Figure - 1) Intraoral examination showed completely edentulous maxillary and mandibular arches. The mandibular ridge was available till canine area on the left side, posteriorly only a part ramus was present behind the third molar region.



Figure 1 - Extra-oral photograph showing deviated mandible and facial disfigurement.

Impression making:

Primary impression was recorded with perforated stock tray and alginate impression material. Custom trays were fabricated on primary cast. Border molding was done

using green stick impression compound and then the final impression was recorded with Zinc Oxide Eugenol impression paste. Record bases for the jaw relation were prepared on a stone master cast. (Figure - 2)



Figure 2 - Border moulding and maxillary and mandibular final impression made.

Jaw Relation:

The patient's tactile sense or sense of comfort was used to assess the vertical dimension of occlusion. The patient was instructed to move his mandible as far as possible to the unaffected side and then gently close his mandible to record a functional maxillomandibular relationship.

Teeth arrangement:

The casts were then mounted on an articulator. Teeth arrangements were done using zero-degree posterior teeth for the purpose of stability. Two rows of maxillary posterior teeth were arranged on the unaffected side. First row of teeth was arranged as per the anatomic guideline of the contour of the patients ridge and the second set was arranged palatal to the first row. A wax trial was done in the mouth and was checked for esthetics, phonetics, vertical dimension and occlusion. (Figure 3 and Figure 4)



Figure 3 - Two rows of maxillary posterior teeth arranged on the unaffected side.



Figure 4 - First row of teeth arranged as per the anatomic guideline of the contour of the patient's ridge. Second row of teeth arranged palatal to the first row which intercusated with the mandibular teeth.

Fabrication of Salivary reservoir:

Before processing of the denture, a trough measuring around 1.5 mm in depth was prepared on the cameo

surface of the palatal area of the trial denture using modelling wax. (Figure – 5) The trough was away from the teeth bearing area and the posterior palatal seal area. The dentures were then acrylized with heat polymerized



resin. For the fabrication of the salivary reservoir, addition silicone putty was mixed and placed inside the trough and the denture placed in patient's mouth. (Figure – 6) The patient was asked to do all functional tongue movements so as the putty is molded accordingly, which was later removed from the trough. A lid was prepared with auto-

polymerising resin using sprinkle-on method over the molded surface of putty. This lid was then polished and adapted over the trough and sealed with auto-polymerising resin. Three small holes were made on the lid for insertion and secretion of the artificial saliva. (Figure – 7)



Figure 5 - Fabrication of trough on the cameo surface of the palatal area of the trial denture.



Figure 6 - Putty moulded according to the functional tongue movements of patient.



Figure 7 – Processed acrylic lid for the salivary reservoir.

After proper finishing and polishing, dentures were inserted into the patient's mouth and evaluated for esthetics and function. Minor adjustments were done on the dentures and it was again polished. Finally, there was freedom of mandibular movement without any interferences, as well as broad and long occlusal contact.

Denture insertion and delivery:

The patient was given post insertion instructions and was motivated to make efforts to learn to adapt to the new dentures. Simple exercises were suggested to the patient such as repeated opening and closing of mandible. The patient was followed up for two years after the insertion of the denture. (Figure – 8)



Figure 8 - Extra-oral photograph after denture delivery.

Discussion:

Oral cancer is the sixth most common type of cancer in India and oral squamous cell carcinoma (OSCC) dominates all the oral cancer cases with potentially malignant disorders. Oral rehabilitation of a patient who has a partially resected mandible is one of the most challenging procedures confronting the maxillofacial prosthodontist. Surgical resection of tumor often includes a partial mandibular resection, partial glossectomy, resection of the floor of the mouth and radical neck dissection. The situation becomes further complicated because of the therapeutic radiation which results in atrophic oral mucosa and reduced salivary output. The extent of surgery and the effects of radiation therapy determine the amount of rehabilitation needed by a given patient.

Literature review advocates fabrication of guide flange or palatal ramp prosthesis for such patients to prevent deviation of the mandible and to improve masticatory function and aesthetics. Since a considerable period of time had elapsed after the surgical procedure, scar tissue formation has occurred and guidance prosthesis was not possible. Apart from this, guide flange therapy is mostly successful in patients where resection involves only bony structures with minimal sacrifice of tongue, floor of the mouth, and adjacent soft tissue. Rosenthal had described a technique employing a second row of maxillary posterior teeth on the untreated side of the maxillary denture. The teeth slide over one another, down the incline formed by the second row of teeth, and into a functional occlusal position.²

In cases of severe xerostomia, salivary substitutes can be used and if the xerostomia patient is edentulous, then reservoir space for artificial salivary substitute can be created in partial as well as complete upper or lower

dentures. The methods advocated so far for incorporating reservoir space is simple and effective and provides long term comfort to the patient. This article highlights the functional rehabilitation of a hemi-mandibulectomy patient who has undergone resection without reconstruction followed by radiotherapy with a denture having twin occlusion and a salivary reservoir incorporated within it.^{7,8,9,10}

Conclusion:

This article highlights the functional rehabilitation of hemi-mandibulectomy patient who has undergone resection without reconstruction. Hence, we fabricated a conventional maxillary removable partial prosthesis with two rows of teeth-twinning occlusion. Two rows of teeth were arranged because the patient could not close in proper intercuspation and hence could not masticate. The palatal row of teeth intercuspated with the remaining mandibular teeth and the buccal row of teeth supported the cheeks.¹¹ After insertion of the prosthesis the patient could intercuspate with mandibular teeth properly due to twin maxillary occlusal table. The patient was kept on 6 months recall.

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