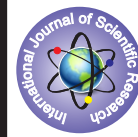


REHABILITATION OF AN EDENTULOUS SEGMENTAL MARGINAL MANDIBULECTOMY PATIENT USING NEUTRAL ZONE TECHNIQUE- A CASE REPORT.



Dental Science

KEYWORDS: edentulous patient; marginal mandibulectomy; neutral zone technique

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ABSTRACT

Rehabilitation using complete denture for an edentulous patient with mandibular defect is an immensely challenging and demanding venture for a prosthodontist, the reason is being a compromised stability and difficulty in retention of prosthesis in this situation. Size and position of denture teeth and the contours of polished surface are very crucial in denture stability when the prostheses are subjected to destabilizing forces from the tongue, lips and cheeks. These destabilizing forces can be eliminated using the concept of neutral zone. In this clinical report, a 60 year old completely edentulous male patient with partial resection of the mandible due to squamous cell carcinoma has been rehabilitated using neutral zone technique. Dentures with improved stability and esthetics were then provided for the patient as they have been constructed in harmony with surrounding oral structures.

INTRODUCTION

Malignant tumors associated with mandible and adjacent structures necessitate surgical removal of the lesion and extensive resection of bone. Surgical treatment of oral cancer may lead to significant disability, including facial deformity, loss of hard and soft tissue, and impaired function of speech, swallowing, and mastication¹. Depending on extent of resection, mandibular defects are grossly divided into segmental mandibulectomy, marginal mandibulectomy and hemimandibulectomy defects. Marginal mandibulectomies involve resections of the mandibular body with overlying soft tissues while maintaining the inferior cortex of the mandible and its continuity².

Mandibular defects are more difficult to restore and rehabilitate because of deficient denture bearing area as compared to maxilla. The radical alveolectomy also presents with other challenges to rehabilitation like loss of vertical ridge height and vestibular depth. This can cause a reduction in stability of soft-tissue supported prostheses as well as the loss of load bearing tissues available for support^{2,5}. Without preprosthetic reconstructive surgery, denture fabrication for mandibulectomy patients becomes extremely difficult. After reconstructive surgery, implant-assisted overdentures may improve denture retention and stability, but some patients cannot afford this treatment⁶. Thus conventional denture is the available treatment modality. At the same time, maximum stability of the denture must be accomplished by a functional impression procedure and by eliminating the lateral and horizontal forces caused by the functional movements of lip, cheek and tongue. This can be accomplished by utilizing the concept of neutral zone. Present case report describes the prosthodontic rehabilitation of a patient who had undergone marginal mandibulectomy of left side in which neutral zone technique has been employed.

CASE REPORT

A 60 year old male patient was referred from regional cancer centre Thiruvananthapuram, to the department of prosthodontics for the replacement of missing teeth (Fig. 1). History revealed that he had squamous cell carcinoma of the left side of mandible and left lateral border of tongue. Wide excision of the lesion was performed involving marginal mandibulectomy of the affected side, partial glossectomy and modified radical neck dissection. This was followed by radiotherapy. But later on all his natural teeth were affected by radiation caries and got extracted.

Extraoral examination revealed facial asymmetry and lower lip was

unsupported. On intraoral examination, both the maxillary and mandibular arch were edentulous and the alveolar ridge was present only till the premolar region on left side in the mandible with obliteration of vestibular space (Fig 2). The ideal treatment option was surgical reconstruction of the defect and implant assisted overdenture. But the patient was not willing for the same because of the financial constraints and fear of surgery. Thus it was decided to fabricate a conventional complete denture using neutral zone technique.

Clinical procedures

Preliminary impressions were made using impression compound for the maxillary arch and irreversible hydrocolloid material alginate for the mandibular arch. Custom trays were fabricated using autopolymerizing poly methyl methacrylate acrylic resin material. Peripheral tracing was done followed by final impression with zinc oxide eugenol impression paste in the maxilla and elastomeric impression material, polyvinyl siloxane in the mandible. (Fig 3). Permanent denture base were made and occlusal rims were then fabricated using modeling wax, followed by jaw relation and mounting on articulator. With autopolymerizing acrylic resin, two rectangular blocks were then made in the first molar region at established vertical dimension of occlusion and the remaining modeling wax was removed from the lower occlusal rim. Retentive loops made of 23G stainless steel wire were then attached at the anterior and posterior region of lower permanent denture base using autopolymerizing acrylic resin.

Impression compound and green stick compound were softened and kneaded together at a ratio of 1:1. This homogenous mass was then placed on the lower permanent denture base and was placed in the patient's mouth. The patient was asked to perform movements which included talking, swallowing, whistling, pursing the lips, pronouncing the vowels, etc to record the neutral zone (Fig. 4). The stability of permanent denture base was properly ensured while doing all these functional movements.

After 5- 10 minutes, the set impression was removed from the mouth and the impression of the denture space was then placed over the master casts and index were made using Type IV dental stone after proper beading and boxing (Fig 5). Once the dental stone was set the matrices were removed from the cast. Admixed compound material was then removed from the mandibular permanent denture base and modeling wax was poured in to this space using dental stone matrices. Neutral zone limits the labial and buccal positions of

anterior and posterior mandibular teeth, respectively. The mandibular teeth were arranged first and it was ensured that the teeth were positioned within the neutral zone and to the proper height of occlusal plane. The maxillary teeth were then arranged in accordance to the lower teeth, following basic esthetic principles. After tooth arrangement and festooning, the index was repositioned and used to verify the position of denture teeth and polished surface (Fig. 6). The try-in was done and the denture stability during speech and eccentric jaw movement were evaluated and was processed with the conventional technique.

The finished denture was inserted in patient's mouth and adjusted for occlusal discrepancies (Fig 7). Dentures with improved stability and esthetics were then provided for the patient as they have been constructed in harmony with surrounding oral structures. The patient was given routine post insertion instructions and was motivated to make efforts to learn to adapt to the dentures. Also advised to avoid chewing with the affected side. Initially, patient expressed pain with the lower denture especially in the resected side and minor occlusal discrepancies were adjusted. A regular follow up was done for a period of six months and within few weeks, the patient expressed satisfaction in mastication and phonetics and esthetics (Fig.8).

DISCUSSION

Based on the nature of resection, Cantor and Curtis (1971) have classified mandibular defect into:

- Class I Radical alvelectomy with preservation of mandibular continuity
- Class II Lateral resection of the mandible distal to the cuspid
- Class III Lateral resection of the mandible and maxilla
- Class IV Lateral bone graft surgical reconstruction
- Class V Anterior bone graft surgical reconstruction
- Class VI Resection of the anterior portion of the mandible without reconstructive surgery to unite the lateral fragments

The mandibular defect in the present case report belong to the Class I of Cantor and Curtis classification. The rehabilitation of mandibular defect in edentulous patients will be very difficult than that of dentulous because of limited coverage and retention, grossly impaired relation of the mandible to the maxilla and limited movement of the mandible⁸.

Oral functions, such as speech, mastication, swallowing, smiling, and laughing, involve the synergistic actions of the tongue, lips, cheeks, and floor of the mouth that are very complex and highly individual. Neuromuscular control is the key for the stability of dentures. Size and position of denture teeth and the contours of polished surface play a crucial role in denture's stability as they are subjected to destabilizing forces from the tongue, lips and cheeks if they interfere with the function of oral structures.

In patients with unfavorable edentulous tissue support as in mandibulectomy cases, the neutral zone impression technique should be used to register the soft tissue contour and the denture polished surface. Neutral zone is the area in the mouth where the forces of the tongue pressing outward are neutralized by the forces of cheeks and lips pressing inward during function⁹. It was first described by Wilfred Fish who reported the influence of the polished surfaces on retention and stability of complete dentures in 1931. He stated that the polishing surface contour should conform to the shape of the tongue, lips, and cheeks. These tissues, in function or at rest, would exert an elastic pressure on the dentures, and retain them in place rather than dislodge those¹⁰. The internal and external surfaces of the denture greatly affect and influence the stability of the dentures, and help determining the peripheral borders, tooth position, and external contours of the dentures. Retention and stability of dentures are improved, especially in the compromised situations as described in the report. When patients cannot undergo an implant overdenture therapy, this article provides an alternative, time-saving, and relatively simple way to obtain a favourable result.

CONCLUSION

Thus the rehabilitation of patients with mandibular defects, especially if edentulous is challenging. Neutral zone technique as employed in this case report is definitely an alternate technique to pre-prosthetic surgery and implant assisted overdenture. It is non invasive, less time consuming and cost effective and provides adequate retention and stability for the denture.



Figure 1. Preoperative view of the patient



Figure 2. Mandibular defect with obliteration of vestibular space



Figure 3. Mandibular final impression

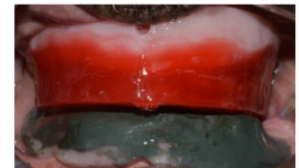


Figure 4. Recording of neutral zone impression



Figure 5. Indexing of neutral zone



Figure 6. Position of teeth analyzed using index



Figure 7. Final prosthesis



Figure 8. Post operative view

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