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CASE REPORT

Guiding Flange Prosthesis for a Patient with a Hemi-Mandibulectomy Defect: A clinical report.

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ABSTRACT

Rehabilitation of patients with maxillofacial defects is a difficult task. The denture fabrication for such a patient becomes extremely difficult due to the unavailability of attached keratinized supporting tissues. Pre-prosthetic plastic reconstructive surgery with or without implant therapy may improve denture retention and stability. But this treatment option sometimes cannot be accomplished because of the complexity of surgical reconstruction and the patient's unwillingness to undergo further surgical interventions. Prosthetic rehabilitation alone, without plastic-surgical reconstruction for an edentulous patient who has undergone segmental mandibulectomy, is a challenging task.

Key Words: hemimandibulectomy defect, overdenture, guiding flange

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Introduction

Neoplasms which are associated directly or indirectly with the mandible usually require surgical removal of the lesion and extensive resection of the bone [1],[2]. Smaller lesions which are removed without discontinuity of the bone are relatively simple, to restore with a prosthesis. Larger lesions that extend into the floor of the mouth may be more difficult to restore with a prosthesis, even though the continuity of the mandible is maintained.[3] Success of the edentulous mandibular resection prosthesis is related directly to the amount of the remaining bone and soft tissue.[4],[5],[6],[7].Segmental mandibulectomy results in special physiological and aesthetic problems[8]. Frequently, the edentulous mandible requires reconstructive plastic surgery to create a buccal or lingual sulcus depth to provide a favourable attached tissue foundation for an acceptable mandibular denture.[10] After reconstructive surgery, implant-assisted overdentures may improve denture retention and stability. Most of the patients with malignant neoplasms also undergo radiotherapy after resection surgery to limit the metastasis. Radiotherapy complications worsen the success of reconstructive surgical intervention as well as implant therapy. [11],[12] At the same time, patients also become reluctant to undergo multiple surgical interventions. Some patients cannot afford such treatment. Without preprosthetic reconstructive surgery, denture fabrication for mandibulectomy

patients becomes extremely difficult. An associated complication of the hemimandibulectomy resection is the deviation of the mandible to the resected side.

History

A 69-year-old, man was referred to the Department of Prosthodontics in our dental hospital with the chief complaint of difficulty in eating and speaking. The patient gave a history of a tobacco smoking habit since 25 years. He was diagnosed with squamous cell carcinoma of the left buccal mucosa about 2 years back. His medical history revealed that he had undergone segmental mandibulectomy in the left posterior region, partial glossectomy, and modified radical neck dissection 18 months back. The resultant defect was reconstructed with free fibular autogenous bone graft. The patient received a postoperative course of total 7200 cGy external beam radiation for 6 months to limit neck metastasis. Intraoral examination revealed thick, freely movable soft tissue with scar formation, the loss of the alveolar ridge and the obliteration of the buccal and the lingual sulcus in the entire left half of the mandibular region [Table/fig 1] . The patient was edentulous, except for the mandibular right lateral incisor and canine which remained, but with poor periodontal support and grade I mobility. There was a completely edentulous alveolar ridge present on the right half of the mandible. The scarring of the tissue after surgery caused severe deviation of the mandible to the resected side. The patient complained of inability to eat and wanted restoration of the missing teeth. Rehabilitation was planned with fabrication of a tooth supported overdenture to aid in retention and stability of the denture on the resected mandible and a conventional complete denture with a guiding flange attached to the maxillary denture to guide the closure of mandible into proper occlusion on the non-resected side.

(Table/Fig 1)Partially Resected Mandible With Remaining Right Lateral Incisor And Canine

Technique

Due to resection of the left side of the mandible, closing the jaws in proper occlusion and mastication was extremely difficult due to the deviation of the mandible to the resected side. The complete denture treatment described in this report indicated that a guiding flange attached to the opposing denture could significantly improve the patient's control and closure of the jaws and thereby, greatly improve occlusion and mastication.

Root canal treatment of the mandibular right lateral incisor and canine were carried out after proper scaling and root planning. The teeth were prepared to receive a cast post and a metal coping [Table/Fig 2]. The improvement of the crown to root ratio greatly decreased the mobility of the teeth and helped to maintain the remaining bone height, which was very necessary to provide retention and stability for the denture, especially after the resection. A sectional elastomeric impression was made to make a die foe fabrication of the metal posts with copings on the prepared teeth [Table/Fig 3] . The cast metal copings with the posts were cemented with GIC [Table/Fig 4] . The glass ionomer cement provides the advantage of fluoride release and thereby, gives protection against carries. The patient was called for the impressions, 24 hrs after the cementation. The primary impression for the edentulous maxilla was made in medium fusing impression compound (Y-Dents impression compound; MDM Corporation, New Delhi, India), with the help of stock edentulous tray, from which the primary cast

was made [Table/Fig 5]. The custom tray was fabricated, carefully border molded and the final impression was made with Zinc oxide eugenol paste (DPI Impression paste, Dental products of India, Mumbai, India). Mandibular diagnostic impressions were made in irreversible hydrocolloid material (Dentalgin; Prime dental products, Mumbai, India). Mandibular custom tray was fabricated with autopolymerizing acrylic resin (DPI Cold Cure; Dental products of India, Mumbai, India). The trays were carefully border molded and then, the final mandibular impression was made with elastomeric impression. The impressions were poured with type III gypsum material (Kalstone; Kalabhai Karson Pvt. Ltd., Mumbai, India) to make the final cast. The final maxillary and mandibular casts were obtained and the wax rims were prepared. The position of the mandibular record base was evaluated and modified in the mouth until stability during functional movements was achieved. The shape of the wax rim was modified using the neutral-zone technique [14,[15].Orientation jaw relation was recorded and transferred to the semi adjustable articulator (Hanau H2; Teledyne Technologies, Los Angeles, Calif) [Table/Fig 6] . Vertical and horizontal jaw relations were recorded and transferred to the articulator and the mandibular cast was mounted on the articulator. The deviation of the mandible made it difficult to record the horizontal relation, nevertheless, the mandible was guided to proper relation with the maxilla and the relation was sealed and transferred onto the articulator. The semi-adjustable articulator was used to simulate opening/closing arc of the mandible onto the articulator and to achieve the balanced occlusion, only on the right eccentric movements. However, it was important to maintain the same relation after insertion, but the mandibular deviation was a problem and thereby, it was decided to fabricate a guiding flange attached to the maxillary denture, which would guide the mandibular denture into occlusion and prevent mandibular deviation. The mandibular path into proper occlusion was recorded in wax, which was extended from the palatal surface of the maxillary trial denture base. The wax was softened and the patient was guided to slowly close into proper occlusion[Table/Fig 7] . This was repeated for a few times till it was confirmed that the wax guided the patient to properly close the mandible into proper relation on the non-resected side without any deviation to the resected side without assistance. The occlusion was checked in the patient's mouth [Table/Fig 8] . Proper closure was confirmed with the coinciding of the maxillary and mandibular midlines [Table/Fig 9] (Fig-9). Anatomic acrylic resin denture teeth (Acryrock; Ruthinium, Badia Polesine, Italy) were arranged and it was decided to try and arrange teeth on the resected side, also to help in balancing the tooth contacts on the non resected side. But during the try-in, it was evident that the patient was uncomfortable with the tooth contacts on the resected side and though he was instructed not to bite on the teeth on the left side (resected side), he was not able to control the movements of the mandible and could damage the tissues covering the defect. As limited denture supporting area was available on the defect side, the teeth were arranged only upto the second premolar. The trial dentures were tried in the patient's mouth and were evaluated for denture stability during speech and eccentric jaw movements. The dentures were processed in heat polymerizing acrylic resin (Lucitone 199, Dentsply Intl) according to the conventional technique[Table/Fig 10] [16]. The efficacy of the guiding flange to guide the closure of the mandible into proper occlusion was evaluated (Fig-11) [Table/Fig 10] . During insertion to improve the tissue contact situation, resilient liner (PermaSoft Denture Liner; Dentsply Austenal, York PA) was used to reline the mandibular denture by keeping the mandible into the maximum intercuspation position (Fig-12,13) [Table/Fig 10]. The sealer was applied once over the polymerized surface of the resilient liner, which prevents water sorption by the liner and helps in maintaining the softness for a longer period of time [17]. The

dentures were checked in the patient's mouth for function, phonetics, aesthetics and comfort and instructions were given for proper denture care and maintenance. The patient was recalled after 3 days. After fifteen days of denture delivery, the patient was allowed to eat soft diet only from the right side. The patient's satisfaction level was evaluated, after one month of denture use, according to the method described by Loney et al [18]. The patient was asked to rate his comfort in terms of a percentage where he had indicated about 90 percent of satisfactory level. He was pleased with the improved masticatory and aesthetic outcome. He was followed further at a regular interval of 2 months, for the first 1 year, to examine his adaptability to the denture and his satisfaction level.

The peripheral borders, tooth position and external contours of the dentures greatly affect and influence the stability of the dentures. The forces developed through muscular contraction during mastication, speaking and swallowing are directed against the dentures. Proper border extension of the denture, correct denture polishing surface contours and balancing occlusal contacts should be achieved for denture retention and stability.

(Table/Fig 2) Teeth Prepared To Receive Post And Coping Restoration For Overdenture Support

(Table/Fig 3)Elastomeric Impressions Of The Prepared Teeth

(Table/Fig 4) Posts With Copings Cemented

(Table/Fig 5) Primary Impressions Made

(Table/Fig 6) Facebow Relation Recorded

(Table/Fig 7) Guiding Flange Molded In Patient's Mouth In Modelling Wax

(Table/Fig 8) Occlusion Checked In Patient's Mouth

(Table/Fig 9) Efficacy Of The Guiding Flange Checked In Patient's Mouth

(Table/Fig 10) Dentures Inserted In Patient's Mouth

(Table/Fig 11) Guding Flange Guiding The Mandible To Closure

(Table/Fig 12) Occlusion On Resected Side

(Table/Fig 13) Occlusion On The Non-Resected Side

Discussion

With the loss of the buccal and lingual sulcus and the presence of scar tissue, denture stability was extremely difficult to achieve in this case. Moreover, the mandibular deviation to the resected side is a hindrance in obtaining denture stability and occlusion. In this case, the deviation was controlled by the addition of a guiding flange [23] to the maxillary denture, which significantly improved the patient acceptance and denture stability and provided proper occlusal contacts. Displacement of the scar by the denture base also needed to be avoided. However, to achieve denture stability, proper border extension of the denture and correct denture polishing surface contours were harnessed. In patients with unfavourable edentulous tissue support, the neutral zone impression technique is recommended to register the soft tissue contour and the denture polished surface [14],[19]. The soft tissues that form the internal and external surfaces of the denture greatly affect and influence the stability of the dentures, and help in determining the peripheral borders, tooth position, and the external contours of the dentures [15]. The forces developed through muscular contraction during mastication, speaking and swallowing are directed against the dentures [20] These either helps to stabilize or dislodge them [21] The conventional treatment plan for complete dentures described in this report indicated that though the denture bearing tissues were unfavourable; the polished surface, occlusal surface and tissue surface were carefully modified to give a favourable denture stability. The occlusion could easily be adjusted in the mouth when the base was stable and the jaw closure performance was correct. The patient was instructed to chew only on the non-resected side, to avoid denture instability [22]. It may be necessary to accept an occlusion that is not bilaterally balanced in eccentric occluding positions for an edentulous resected maxilla or mandible [24]. In this patient, the occlusal table on resected side was upto the second premolar, just to establish the cross arch stability and balance in the right lateral excursive movements. The patient was instructed to avoid chewing from the left (resected/defect) side.

Changes in tissues beneath a maxillofacial prosthesis may be more rapid than in those beneath an ordinary complete prosthesis. Therefore, the occlusion and base adaptation was reevaluated frequently [24]. Denture base adaptation was maintained by changing the resilient liner every year.

Conclusion

Prosthetic rehabilitation alone, without plastic-surgical reconstruction for an edentulous patient who has undergone segmental mandibulectomy, is a challenging task. The denture bearing tissues were unfavourable and there was a problem with the deviation of the mandible to the resected side. Simple use of the guiding flange and the neutral zone concept can help in achieving a satisfactory prosthesis for such patients. Application of conventional prosthodontic principles, along with patient cooperation, can achieve long term success of the prostheses and predictable patient satisfaction in such complex cases.

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