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RESEARCH ARTICLE

PALATAL RAMP PROSTHESIS FOR A SEGMENTAL HEMIMANDIBULECTOMY WITH SEVERE DEVIATION

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ABSTRACT

Neoplastic lesions of the oral cavity often requires surgical treatment involving resection of the the mandible, floor of the mouth, tongue and also the palate depending upon the extent of lesion. These cases, often lead to mandibular deviation. Which occurs due to loss of continuity of mandible and its related muscles. Altered muscle function will clinically result in functional compromise, facial asymmetry causing significant esthetic deformities ultimately leading to psychological breakdown. Rehabilitation of these patients who has undergone segmental resection of the mandible poses a considerable challenge to the prosthodontist when there is without osseous reconstruction. This case report describes a successful treatment modality for treating patients with severe mandibular deviation (mandibulectomy), providing a vertical stop to resected segment.

INTRODUCTION

Mandibulectomy or mandibular resection, is the surgical removal of a portion or all of the mandible and the related soft tissues (The Glossary of Prosthodontic Terms, 2017). Mandibular resection leads to altered mandibular movements, disfigurement, difficult in swallowing, impaired speech and articulation, and deviation of the mandible towards the resected site (Narendra, 2016). Although restoring mandibular continuity through osseous grafting would be the best option, sometimes the mandible cannot be repositioned because of surgical limitations. So, prosthodontic considerations for oral rehabilitation after a mandibulectomy is a viable treatment option. But, it poses challenge for prosthodontist. The basic objective of rehabilitation of such patients is to stabilize the remaining musculature by bringing the residual mandible in acceptable relationship with maxilla (Singh). Mainly the deviation of mandible is due to the action of suprahyoid muscles and uncompensated influence of contralateral internal pterygoid.

This problem is further compounded by the absence of muscles on the surgical side as masseter on the non-defect side serves to rotate the mandible, and is not balanced unilaterally by the medial pterygoid. This muscular imbalance leads to frontal plane rotation, which as the name indicates is rotation of mandible in frontal plane. This rotation is due to the imbalance of muscular forces and discontinuity of mandible, and results in movement of teeth away from the maxillary dentition on the ipsilateral side of the defect after the contact is made on the non defect side. The severity of mandibular deviation is dependent on many variables, such as amount of soft and hard tissue resection, method of closure, type of reconstruction, status of dentition etc (Beumer). This article has presented a case report of a patient who has undergone mandibulectomy and reported with sever mandibular deviation towards resected site. So the treatment involved rehabilitation of existing clinical condition, considering deviation and functions of the patient.

Case Report

A 55 year old male patient reported to Department of Prosthodontics and Crown & Bridge, Sharad Pawar Dental

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College, Wardha, India. Clinical history and examination revealed that he had been operated for squamous cell carcinoma of mandible 1 year back. (Figure 1 a, b) The segmental resection included condyle, ramus, and body of the mandible crossing midline. Therefore after mandibulectomy the classification was considered as Class III as per Cantor and Curtis classification systems. (Figure 2a) There was no history of osseous reconstruction on resected site. After surgery patient had undergone radiation therapy for one month. Intraorally three mandibular molar teeth were remaining on resected site and Maxillary arch presented with missing first and second molar in second quadrant (kennedy's class II situation) (Figure 2 a b).

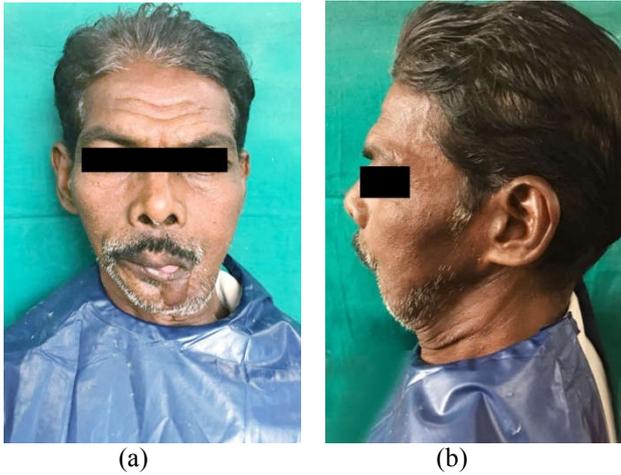
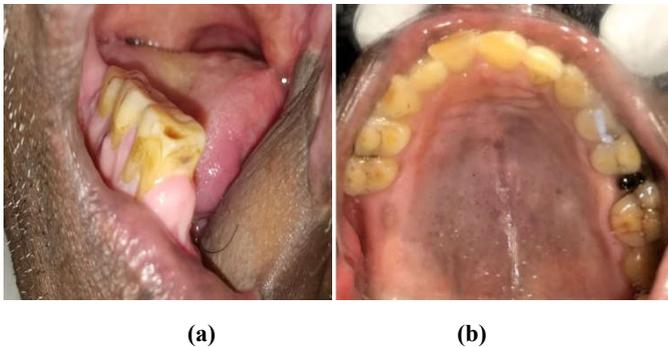


Figure 1 a – extra-oral front profile photograph
b – extraoral lateral profile photograph



(Figure 2 a- Cantor and Curtis Class III classification systems and remaining mandibular molar teeth on resected site
b- Maxillary arch presented with missing first and second molar in second quadrant (kennedy's class II situation)



Figure 3. Primary impressions of dentulous maxillary and mandibular arch



Figure 4. Maxillary and mandibular casts



Figure 5. Temporary record bases over a casts



Figure 6. Maxillomandibular relationship

The deviation of the edentulous segment of mandible toward the resected left side was significant. This was based upon the finding that at the rest position of the mandible, the remaining dentate segment of mandible was positioned approximately beneath and crossing the maxillary mid-palatine raphe. So, the treatment formulated as the prosthesis involving additional row of teeth next to buccal side of mandibular prosthesis and additional palatal ramp over maxillary prosthesis. Treatment phase was initiated with making primary impressions of both dentulous maxillary and mandibular arch (Figure 3) using irreversible hydrocolloid impression material (ALGIN-GUM ALGINATE IMPRESSION MATERIAL) the casts were poured using Type III dental stone (Figure 4). Temporary record bases were fabricated over a cast on mandibular segment leaving dentulous area and on maxillary arch with retentive loops (Figure 5). Both the baseplates were checked intraorally and marked for repeated opening and closing jaw movements, accordingly wax was adapted over palatal surface of maxillary baseplate and buccal surface of mandibular baseplate.



Figure 7. Maxillomandibular relationship followed by face bow transfer



Figure 8a. Face bow transfer on articulator



Figure 8b. Mounting of maxillomandibular jaw relation records



**Figure 9a. Waxed up maxillary denture
b. waxed up mandibular denture**



(a) (b)



(c)

Figure 10a. Palatal ramp prosthesis in occlusion view b – palatal ramp prosthesis in occlusion – lateral view c- segmental mandibular prosthesis in occlusion

With the repeated opening and closing movements of jaw maxillomandibular relationship was recorded (Figure 6) followed by face bow transfer (Figure 7) and same relation was transferred to articulator (Figure 8a b) Non-anatomic teeth were used for teeth arrangement. The try in was performed (Figure 9a b) and once the tryin was found satisfactory both by clinician and patient it was then processed. After that prosthesis was delivered to patient (Figure 10a b c d) and recalled for routine follow up after 15 days. Then on follow up appointment, it was observed that patient was not comfortable with the mandibular prosthesis, so after first follow up, only maxillary prosthesis having palatal ramp was delivered. After which improvement in patients comfort was noticed in next three follow up visits for each 1 month interval.

DISCUSSION

Rehabilitation of patients who have undergone surgical resection of the mandible is complex and challenging. Prognosis is significantly improved when reconstruction is done with a vascularized free fibular or iliac flap followed by a dental implant supported prosthesis. When reconstruction is not done, the aim of prosthetic rehabilitation is to first correct the deviation of the mandible toward the resected side (Hindoch, 2016). But, deviation after hemimandibulectomy is difficult to correct after the healing phase of six to eight weeks due to scar contracture and the muscles adapting to this cicatricial tissue (Taylor). So, modification in treatment is required with existing clinical conditions. In present case report, patient reported one year after surgery with severe deviation crossing the midpalatine raphe also the patient was not able to make any protrusive or repeatable lateral

movements of his mandible. This is to be expected in such patients and may be attributed to the unilateral action of the mylohyoid muscle found after segmental resection (Beumer). Thus, treatment formulated for the patient involved palatal ramp with non anatomic teeth for providing vertical stop to resected segment of the mandible. Palatal ramp prosthesis is based on the principle of inclined plane, and guides the mandibular teeth into occlusion, it is also termed as Maxillary inclined plane prosthesis, which provides an occlusal table which slopes occlusally towards the midline on the palatal aspect of nondefect side. The movement is functionally generated and recorded. When mandible is closed it slopes progressively in supero-lateral direction towards the occlusion (Schneider, 1986). Usually this situation causes difficulty in recording maxillomandibular relationship. Facebow recording was necessary in this case as it was difficult to orient the maxilla and mandible with obtained relation. Also, monoplane teeth were selected over anatomic teeth because, it reduces forces on the weaker mandibular foundation and to provide greater freedom for the mandible to move despite decreased neuromuscular function (Beumer). Finally, patient adaptability comfort is a critical factor in a successful prognosis particularly in such situations. The patient was positive towards the treatment and willing to adapt to the demands of the prosthesis with complete cooperation. Both speech and mastication have been restored to a greater degree with the prosthesis.

Conclusion

The severity of mandibular deviation after hemimandibulectomy affects the prognosis of final prosthesis. So, the rehabilitation of lost structure in harmony with surrounding structure poses a great challenge for prosthodontist.

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