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Case Report

Management of hemi-mandibulectomy patient with prosthetic devices

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ABSTRACT

Introduction: The success in rehabilitating a patient with hemi-mandibulectomy depends upon the nature and extent of the surgical defect, treatment plan, type of prosthesis, and patient co-operation. The management becomes more challenging when the prosthetic reconstruction has been delayed. The scar tissue forms and the soft tissue becomes stiff, causing severe deviation in the mandible towards the resected side.

Case characteristics: This case report presents a 58year old male patient who underwent a mandibular resection surgery after he was diagnosed with buccal mucosa carcinoma. The patient had mandibular deviation and deranged occlusion making his speech, mastication and esthetics compromised.

Outcome: The patient was provided with a cast guide flange prosthesis in the beginning as a training device to prevent the scar contracture and increase the mandibular movement towards healthy side to increase the intercuspation. After few months of training, when the deviation was reduced, flexible maxillary and mandibular partial dentures were fabricated with double occlusion in the maxillary denture to increase the masticatory efficiency of the patient.

Discussion: This case report attempts to formulate a treatment plan whereby the patient's discomfort could be minimized. The treatment starts with the fabrication of a removable guide flange as a physical therapy device to reduce the mandibular deviation followed by provision of a maxillary denture with double occlusion to obtain maximum intercuspation.

Conclusion: The mandibulectomy patient is difficult to manage because a prosthodontist is limited in his ability to provide a reasonable and practical prosthesis. However, if the patients recognize the limitations of their rehabilitation, they would be more appreciative of the prosthodontic therapy that enhances their rehabilitative progress.

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1. Introduction

Oral diseases are widespread all over the world and it negatively affects the quality of life of people. It affects various anatomic regions of the oral cavity, making the functions like chewing, swallowing, speech, and oral competence difficult. These diseases include ameloblastoma, salivary gland tumors, osteoradionecrosis of jaws, oropharyngeal carcinomas, trauma, and so on. The

most frequent carcinomas in the head and neck area are squamous cell carcinomas of the oral cavity.^{1,2}

Different prosthetic options have been proposed by various authors to rehabilitate patients with hemi-mandibulectomy depending on the existing clinical status. Mathew and Thomas³ proposed the use of a Guiding Flange prosthesis, Swoope⁴ proposed Palatal Ramp, and Rosenthal⁵ introduced the concept of using a twin occlusion prosthesis. Bahri⁶ et al. used maxillomandibular fixation screws with orthodontic elastics to enhance the actions of guide flange prosthesis. On the other hand, the use of

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implant-supported prosthesis would be a great option, but care should be taken when grafting is done because the patients suffering from carcinomas undergo radiotherapy which can cause osteoradionecrosis of the graft material.

When a part of mandible is resected, the movements of mandible in the functional range and occlusal proprioception differ from that of normal mandible, the residual mandibular segment, retrude and deviate towards the surgical defect side. The entire envelope of motion occurs on the defect side. The normal hinge movement in the sagittal plane is lost and the guide flange prosthesis helps to redevelop normal hinge movement.

Once an acceptable jaw relation is achieved, the patient can be asked to discontinue the use of the prosthesis.

This article has dealt with Cantor and Curtis⁷ Type II hemi-mandibulectomy defect in which early reconstruction was not performed and this resulted in scar formation, leading to stiffening of the tissues making prosthetic rehabilitation difficult.

The framework was designed following the basic cast partial design principles, ensuring uniform stress distribution over a large area with a rigid major connector for cross arch stabilization. The direct and the indirect retention was planned as per the basic designing principles, to minimize dislodgement of the prosthesis and protect the abutment teeth from detrimental forces.

2. Case Description

A 58-year-old male patient was referred to the Department of Prosthodontics about 4-5 months after right segmental mandibulectomy (Figure 1).

The patient was diagnosed with squamous cell carcinoma of right buccal mucosa.

Radiographic examination revealed the carcinoma had infiltrated the bone which was extending from the second premolar region to the ramus of the mandible and the patient was recommended to undergo segmental mandibulectomy.

In this procedure the segment of mandible affected was excised resulting in a discontinuity defect. The defect created by surgery was repaired to some extent with a skin graft.

Intra oral examination revealed missing teeth and defect extending from canine to retromolar area on the right side. Tongue movements were restricted, more on the surgical side. The tongue appeared dry and smooth. There was no bleeding on probing, no mobility or caries associated with the remaining natural teeth. Xerostomia was evident and gingival mucosa was friable. On both arches, the surviving teeth were found to be periodontally weak but no mobility was evident (Figure 2).

Post-surgical panoramic radiograph revealed discontinuity of the mandible distal to right lateral incisor (Figure 3).

Extraoral examination revealed restricted mouth opening and mandibular deviation towards the resected side. Patient complained of difficulty in mastication and speech. Since patient had severe deviation, definitive mandibular guiding flange prosthesis was planned.



Figure 1: Extra-oral view of patient



Figure 2: Intra-oral view of the patient



Figure 3: Post-surgical panoramic radiograph

2.1. Clinical procedure

For the fabrication of mandibular guiding flange prosthesis, the mandibular cast was surveyed (Figure 4) and cast partial denture was planned.

Embrasure clasp was given between first and second molar. Cingulum rest seat was prepared on the canine. Gingivally approaching clasp was planned on the lateral incisor of the resected side with incisal rest (Figure 5).

Mouth preparation was done and secondary impression was made. The master cast was obtained, block out was done and the cast was duplicated.

On the duplicated cast, pattern fabrication was done using light curable pattern resin. Pattern was made with retentive loops attached on the left side to retain the acrylic resin flange (Figure 6).

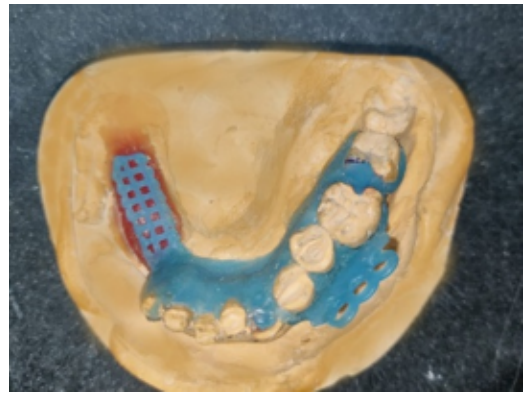


Figure 6: Pattern resin adapted

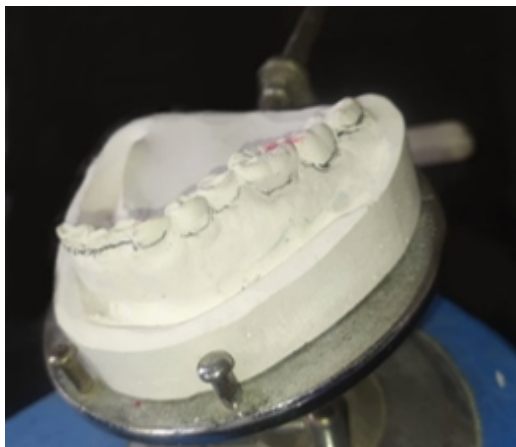


Figure 4: Cast surveying



Figure 7: Prosthesis made with three teeth on the affected side



Figure 5: CPS designing

The pattern was cured in the light curing unit, invested in phosphate bonded investment material and then casting was done.

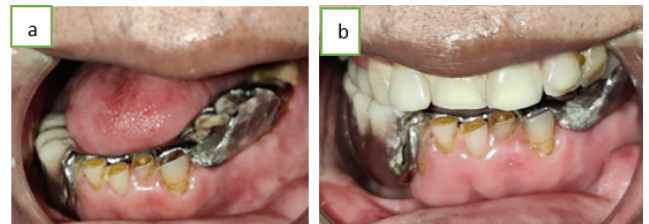


Figure 8: a,b: Intra-oral view of the prosthesis

The cast metal pattern trial was done in patient's mouth and bite registration was done. Teeth was set on the denture base and after final try-in the denture was acrylised (Figure 7).

Patient was trained to wear the denture and close his mouth using the guiding provided in the prosthesis (Figure 8).

The patient was asked to continue wearing the denture for 6 months.

After 6 months, the patient's mandibular deviation was considerably reduced.

At this stage, flexible maxillary partial denture with double occlusion and mandibular partial denture was

fabricated to meet patient's masticatory need. Flexible denture was chosen for ease of insertion of maxillary denture in patient's limited mouth opening.

Intraorally, the patient had maxillary Kennedy class III mod I partially edentulous arch and mandibular defect can be classified to Cantor and Curtis Type II defect in which the mandible was removed distally from the canine region on the right side.

For partial denture with double occlusion, impressions were made and maxillary and mandibular casts were obtained. Then, patient's bite was registered by instructing the patient to close the mandible to a functional posture that is specific to the unilateral closure pattern and then the casts were mounted on articulator (Figure 9).

Along with the missing teeth in maxillary arch an additional row of teeth were set, opposing the mandibular teeth (Figure 10).



Figure 9: Teeth setting done in an additional row, occluding to the teeth in deviated mandible

For mandible, flexible denture with two teeth in the resected region for minimum cantilever was fabricated (Figure 10).

On closing mouth, patient could occlude his mandibular teeth to the teeth in the palatal row of maxillary denture (Figures 11 and 12).

3. Discussion

The rehabilitation of mandibular defect is challenging because in addition to the loss of anatomical structures, there is a loss of proprioception which leads to the absence of sensation of muscles of mastication and occlusion.



Figure 10: Acrylics maxillary and mandibular partial dentures



Figure 11: Maxillary denture in place showing double row of teeth



Figure 12: Intra-oral view showing occlusion on additional row of maxillary teeth

Hence, the purpose of this report was to present a prosthetic treatment plan whereby, the mandibular deviation could be reduced and a maximum of functioning could be attained within the limitations.

Guide flange helps in such cases to prevent deviation of the mandible, improve masticatory function and esthetics.

The guide-flange prosthesis mechanically maintains the residual mandible in position for vertical chewing strokes, but little or no lateral or cyclic movements should be anticipated.

This device is used as a training prosthesis, and it needs to be sturdy to withstand the stress exerted by the contracture, therefore in the present case the guide flange prosthesis is chosen to be made of cast metal.

In the present case, the guide flange was used for a period of 6 months until the patient experienced considerable decrease in deviation.

Definitive treatment involved fabrication of a maxillary partial denture with two rows of teeth. The arrangement helped in better intercuspation and thus improved mastication. The palatal row of teeth provided favorable occlusal relationship, and the buccal row of teeth supported the cheeks.⁸

Guide flange prosthesis is most common treatment modality. However, in cases where deviation is massive, providing twin occlusion rehabilitates the patient functionally.

There are certain limitations in the presented case. A cast partial denture could be planned for the definitive prosthesis with double occlusion which would enhance mechanical properties and strengthen the denture but due to limited mouth opening and larger size of the maxillary denture a flexible denture was given. Also, the flexible denture is more patient friendly, cost-effective, a reversible treatment modality, and lightweight to withstand the force of gravitation.

The use of implant-supported prosthesis would be a great option, but because the patient underwent radiotherapy there is a risk of osteoradionecrosis. The use of fixed osseointegrated prosthesis could be considered only after thorough medical clearance.

4. Conclusion

Considerable deviation could be avoided if the defect is immediately reconstructed or an interim guide flange should be provided after the surgery. Once the deviation is reduced, occlusion could be brought back in complete harmony and the prognosis of the treatment could significantly improve. It is very important for prosthodontists to make the patient

understand the limitations of the prosthetic devices. Once the patient understands the condition and limitations, they can cope better with the situation and tend to adjust well with the prosthesis.

5. Source of Funding

None.

6. Conflict of Interest

None.

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