CASE REPORT


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KEYWORDS
Hemimandibulectomy, edentulous ridges, mandibular deviation, maxillary guiding flange

ABSTRACT
Prosthetic rehabilitation of hemimandibulectomy patients is usually a great challenge for prosthodontist. Due to deviation of mandible towards the resected side, these patients often encounter problems with aesthetics and function, especially in completely edentulous cases. In these patients, retention and stability of the prosthesis will be compromised due to poor bony support. This article describes the rehabilitation of a completely edentulous patient who underwent right-side hemimandibulectomy, with the help of palatally positioned maxillary guidance flange prosthesis.

INTRODUCTION
Neoplastic lesions of the oral cavity are treated mostly by surgical intervention, which often necessitates resection of the oral soft and hard tissues. In some cases, chemotherapy and radiation therapy are used as an adjunct to surgical intervention. These treatment options often result in a defect or collapse of the entire orofacial complex which poses a great challenge in prosthetic rehabilitation of patients with maxillofacial defects, especially who have undergone a hemi/complete mandibular resection. These acquired mandibular defects occur mainly due to malignancies, trauma or other pathologies like cystic lesions, which result in loss of aesthetics, function and have a huge psychological impact on patient.¹

The most significant difficulties encountered in hemimandibulectomy patients are deviation of the mandible towards the resected side, leading to facial disfigurement, altered muscle function, difficulty in mastication, swallowing and speech thus compromising the prognosis of the prosthetic rehabilitation to a great extent.²

These patients are usually rehabilitated with surgical protocols such as reconstruction plates, bone grafts, free flaps, and so on. The goals of the mandibular reconstruction after resection are to restore form, function and reduce the severity of deviation thus improving the aesthetics. Many a times due to health or economic reasons, these reconstructive procedures are not performed. In such patients, it is difficult to retain mandibular movements and may never achieve proper maxillomandibular relationship for optimum mastication and appearance.³

This article describes a case of prosthetic management using a palatally positioned maxillary guidance flange in a completely edentulous patient who had undergone hemimandibulectomy.

CASE REPORT
A 60-year-old female patient reported to the Department of Prosthodontics, Sri Hasanamba Dental College and Hospital, Hassan, Karnataka, complaining of difficulty in chewing food and pain in the left auricular region for the past 3 months. Pain was sudden in onset, induced
during mouth opening and gradually relieved on closing the mouth. She gave a history of surgical removal of right half of the mandible 15 years ago at another hospital due to unknown reason, followed by radiotherapy. She also gave a history of quid chewing habit which she had stopped 15 years ago.

On general physical examination, patient was poorly nourished and built. Icterus was observed. Blood investigations revealed that the patient was anaemic. Extra-oral examination showed an asymmetrical face, convex profile, lower facial deformity with sunken cheeks and reduced lower facial height. Patient's speech was slurred. There was deviation of mandible towards the right side of the patient (Fig. 1). On palpation, left temperomandibular joint (TMJ) was tender and crepitus heard over left TMJ on auscultation.

Fig. 1 Pre-operative extra-oral view.

Intra-oral examination revealed completely edentulous maxillary arch and mandibular edentulous arch with resection of the right side of the mandible, posterior to the canine region along with the ramus, coronoid process and condyle (Fig. 2). Resorbed mandibular ridge on left side with thick freely movable soft tissue was noticed. Loss of alveolar ridge in the right side of the mandible from canine to posterior region was also observed. The resected area was not reconstructed with any of the reconstructive procedures. There was rotation of the mandible towards the right side while opening the mouth, leading to TMJ dislocation on the left side.

Fig. 2 Pre-operative intra-oral view.

Orthopantomogram (OPG) revealed right mandibular discontinuity distal to canine, involving ramus, coronoid process and condyle. Sclerosis of left condyle with erosion of lateral aspect, obturation of left glenoid fossa, hyperplasia of left coronoid process and condylar surface irregularity were also observed (Fig. 3). According to Cantor and Curtis's classification, patient had class II type of resection, that is unilateral discontinuity of edentulous mandibular defect on the right side.

Fig. 3 Orthopantomogram.

Treatment plan included maxillary and mandibular denture prosthesis with palatal guiding flange on maxillary complete denture to reduce right lateral shift of the mandible.

Procedure

- Primary impressions were made using medium-fusing impression compound (Pinnacle, DPI, India) with non-perforated edentulous stock metal trays (Fig. 4). The principle of broad tissue coverage within physiologic limit was utilized while making impressions.

Fig. 4 Primary impressions.
Primary casts were poured in Type II dental plaster (Camel brand, Neelkanth dentico super, India). The relief was provided for maxillary arch by adapting spacer using modelling wax (Golden dental products, India) according to Sharry’s design. No spacer was given for the highly resorbed mandibular ridge as admix technique was planned (Fig. 5). Custom trays were fabricated using autopolymerizing poly methyl methacrylate (PMMA) resin (RR cold cure, DPI, India) over the primary casts. The mandibular custom tray was designed such that it extended from left retromolar pad area till the right canine region where bone was available to support the prosthesis.

Border molding of the maxillary arch was performed using low-fusing green stick modelling compound in a conventional manner. Admix technique with 30% medium-fusing impression compound and 70% low-fusing greenstick compound (Pinnacle tracing sticks, DPI, India) was utilized for mandibular ridge. Final impressions were recorded using light body vinyl polysiloxane (Aquasil, Dentsply, India) for both maxillary and mandibular arches (Fig. 6).

Master casts were poured with Type III dental stone (Gemstone, Shruti, India). Temporary record bases were fabricated over these casts using autopolymerizing PMMA resin.

Occlusal vertical dimension was established using physiologic techniques (Phonetics, closest speaking space and swallowing methods).

Jaw relations were recorded in two parts. The first part consisted of recording centric relation according to patient’s most advantageous occluding position. Second part consisted of guiding the mandible by fabricating a maxillary palatal guide flange to compensate the deviation of the mandible towards the resected side, providing least strain or pain to the TMJ and associated muscles.

For the first part, centric occlusal registration was obtained with occlusal rims by manipulating the mandible into most advantageous occluding position that was within the reach of the patient without compensating the deviation of the mandible.

Jaw relation records were transferred to a mean value articulator (Niyazan, India) (Fig. 7).
- Non-anatomic teeth (Premadent, India) were used, so that the mandible was free to move in lateral direction.
- Teeth were positioned in the maxillary arch according to the contours of the occlusal rim and wax up was done. At this stage, mandibular teeth were not positioned.
- Now, the maxillary waxed up denture was tried intra-orally and evaluated for aesthetics and phonetics.
- The maxillary palatal guide flange was fabricated using modelling wax secured with sticky wax (Model cement, DPI, India) to the denture base, palatal to the maxillary teeth on the non-defect side which sloped occlusally away from the maxillary teeth on the left side extending inferiorly into the lingual vestibule between the lateral borders of the tongue and lingual surface of the mandibular wax occlusal rim (Fig. 8). This guiding flange helped the mandible to occlude in centric relation with least strain to the TMJ, and it successfully reduced the deviation of the unresected mandible towards the resected side. Care was taken not to impinge the lingual mucosa of the mandible throughout the opening and closing movements.
- Jaw relations were recorded again by guiding the mandible to the most favourable position (Fig. 9).

**Fig. 8** Maxillary palatal guide flange prepared in wax.

**Fig. 9** Re-recording jaw relations using maxillary trial denture with palatal guide flange.
- Mandibular occlusal rim was remounted according to the newly obtained guided mandibular records (Fig. 10), mandibular teeth were arranged from left second molar to right lateral incisor on to the available mandibular ridge. Mandibular pre-molars and molars were arranged slightly buccal to the crest of the ridge, providing maximum occlusion with the maxillary teeth on the unresected side (Fig. 11).

**Fig. 10** Re-articulated mandibular cast in the newly recorded centric relation.
Mandibular teeth arrangement was waxed up and both maxillary and mandibular dentures were tried intra-orally (Fig. 12). Initially, patient was guided by the operator to occlude the teeth with guide flange prosthesis. Later, she was trained to open and close the mouth several times to guide the mandible by herself to the left side, so as to achieve optimal occlusion on the unaffected side by compensating the deviation of mandible towards the right side. Any interference in the movements was checked and corrected.

Dentures were processed using heat polymerizing PMMA (Acralyn-H, Asian Acrylates, India). Processed dentures were retrieved, finished and polished in conventional manner. The dentures were evaluated intra-orally, checking for phonetics, aesthetics and occlusion. Necessary occlusal adjustments were then carried out (Figs. 14 and 15).

The occluding surface of maxillary palatal guiding flange was relined using light body vinyl polysiloxane impression material (Fig. 13). The amount of deviation corrected using guide flange was obvious when compared with the previous occlusal records.

Patient was advised to open and close the mandible repeatedly to guide the mandible by herself to the left side.
Post-insertion instructions were given. Patient was encouraged to make efforts for learning and adapting the new dentures.

Patient was advised to use the dentures with regular follow-up visits. One week, two weeks, one month, three months’ follow-up visits revealed that patient was functionally and psychologically satisfied (Fig. 16).

**DISCUSSION**

The rehabilitation of patients after hemimandibulectomy is a challenge for prosthodontists. Surgical excision of mandible causes deviation of the remaining unilateral mandible towards the resected side with loss of occlusion, affecting mastication and aesthetics.

Dentulous patients can be trained to achieve possible maxillamandibular relationship with the help of appliances/prosthesis. Hence, retention and stability will not be compromised as much because of the presence of remaining supporting structures. However, these appliances cannot be advised for completely edentulous patients. These patients most of the times never achieve adequate maxillamandibular relationship which affects the retention and stability of the prosthesis, leading to difficulty in mastication and achieving proper aesthetics.

The present case report illustrates an effective method of rehabilitating completely edentulous patient who has undergone hemimandibulectomy, with maxillary guide flange prosthesis.

The procedure starts with impression making which should follow the objectives of impression making, same as in conventional dentures that is to establish retention, provide support and stability, create aesthetics and preserve the remaining tissues. Retention and stability in the mandibular denture was achieved by obtaining close adaptation of the prosthesis with the tissue bearing surface and by extending the periphery of the denture on the non-resected side of the mandible to the maximum extent of impression making compatible with functional and anatomical limitations by using admix technique.

In some patients, peripheral seal of the maxillary denture may be difficult to achieve due to the deviation of the mandible, coronoid process and ramus due to close apposition to the maxillary tuberosity area on the non-resected side which will cause deviation of the mandible towards that side. The jaw relations will be difficult to establish in such patients because of mandibular retrusion, deviation to the resected side, poor neuromuscular co-ordination and the absence of proprioceptive impulses from the teeth.

In this case, jaw relations were recorded in two parts. The first part consisted of recording centric relation according to patient’s most advantageous occluding position. Second part consisted of guiding the mandible by fabricating a maxillary palatal guide flange to compensate the deviation of the mandible towards the resected side providing least strain or pain to the TMJ and associated muscles. Clinician should manipulate the mandible and place it in the most advantageous position that is within the reach of the patient to compensate this deviation.

Some authors have suggested the use of ramps on the maxillary arch and the use of twin rows of non-anatomic teeth on the non-resected side of the maxillary denture so as to provide freedom in the movement of the mandible at the established vertical dimension for the edentulous patients. In this present case, after maxillary teeth arrangement, a guide flange was fabricated extending from the palatal side of the maxillary denture on the non-resected side to the lingual surface of the mandibular occlusal rim. The amount of deviation corrected using the guidance flange in the mandibular anteriors after the incorporation of guidance flange was almost 9 mm.

The factors that have to be considered while giving a guidance therapy are (1) timing of rehabilitation—the results are better if the guidance therapy is initiated at an early stage, (2) whether the guidance therapy should be
given for the maxilla or mandible—accordingly a guidance ramp or flange is to be given respectively, (3) it is only an interim treatment to correct the deviation as much as possible, and occlusion is the primary determinant. Several prosthesis have been used to reduce or eliminate mandibular deviation like inter-maxillary fixation, cast metal mandibular resection restoration, acrylic guidance flange, cast metal guidance flange prosthesis, guidance ramp in the maxillary, crowns with a maxillary prosthesis to guide hemimandible, functionally moulded palatal ramp, twin occlusal table in the maxillary arch, and so on. A mandibular guidance flange can be used when the mandible can be positioned in an un-interrupted way, especially in dentulous patients, whereas if some resistance is encountered in positioning the mandible, a maxillary guidance flange in acrylic is suggested, as acrylic can be adjusted when any interference occurs. A cast metal guidance flange allows only minimal adjustments but an advantage of acrylic guidance flange is that it allows for better adjustments.

The advantages of guidance prosthesis are (1) it helps to guide the mandible to occlude with the opposing maxilla in the most advantageous position, (2) helps to compensate mandibular deviation, (3) improves functions like mastication and speech, (4) easy to fabricate, (5) economical and (6) good patient acceptance.

Usually, implant-retained prosthesis can adequately rehabilitate oral functions of such completely edentulous patients so that they can lead a healthy and better life. Even though implant-retained prosthesis was the best treatment option for this patient which would have achieved better retention and stability, the maxillary guidance prosthesis with mandibular partial denture was planned due to poor health condition of the patient for undergoing repeated surgical procedures and in addition, patient could not bear financial burden of costlier implant-retained prosthesis.

Guidance therapy improves form and function of the mandibulectomy patients. It helps the mandible to adapt according to neuromuscular co-ordination for correcting the deviation of mandible.

Earlier the guidance therapy is initiated in the course of treatment; the more successful is the patient’s occlusal relationship. An ideal result is achieved when the patient can repeatedly approximate both the dentures in a near proper occlusion. For the present patient, it was advised to open and close the mandible repeatedly to guide the mandible by herself to the left side after proper guidance by the operator. Many patients require continuous support and encouragement, not merely to achieve a good mastication and aesthetics but to boost up their self-confidence too. Along with the prosthetic rehabilitation, muscle exercises and recall visits are essential in these patients, as it helps in improving neuromuscular co-ordination which ultimately improves mastication and aesthetics.

CONCLUSION

Mandibular resection often results in aesthetic and functional deficits, occlusal disabilities and most importantly psychosocial impairment to the patient. Prosthetic prognosis of rehabilitation of such patient is quite variable. The guiding flange effectively modifies and corrects the deviated mandible in such scenarios. Hence, fabrication of maxillary guide flange prosthesis and a mandibular removable denture were done in this case to enhance the stability of the denture, thus improving masticatory efficiency as well as aesthetics in a completely edentulous patient.

Conflicts of Interest

The authors declare no conflicts of interest.

REFERENCES

