Rehabilitation of a Hemimandibulectomy Patient with a Guiding Flange Prosthesis

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ABSTRACT:
The mandible is a single bone that creates the peripheral boundaries of the floor of the oral cavity. Loss of the continuity of the mandible destroys the balance and the symmetry of mandibular function, leading to altered mandibular movements and deviation of the residual fragment towards the surgical side. This clinical report gives a review of mandibular defects and describes the fabrication of acrylic Guiding Flange Prosthesis. In the following case an acrylic Guiding Flange Prosthesis was given to a patient who underwent a hemi section of the mandible, of the treatment for Ameloblastoma.

Key words: Guiding Flange Prosthesis, hemimandibulectomy, Ameloblastoma, Deviation of the mandible.

INTRODUCTION:
The management of tumors associated with the tongue, mandible, and adjacent structures represents a difficult challenge for a surgeon, radiologist to control the primary disease, and to the Prosthodontist for rehabilitation following treatment. Mandible is the most common site for intraoral tumors which often requires the resection of large portions of the mandible. Disabilities resulting from such resections include impaired speech, difficulty in swallowing and deviation of mandible during functional movements and severe cosmetic disfigurement. Surgical reconstruction of mandibular discontinuity defects involves placing autogenous graft, allogeneic graft, xenograft, or alloplastic implants such as titanium, vitallium, stainless steel, silicone, and plastics.
Prosthetic rehabilitation of mandibular discontinuity defects aims in restoration of mastication within the unique movement capabilities of the residual function in the mandible. The literature shows the varying designs of Guiding Flange Prostheses that can be mandibular based or palatal based, it may be anchored to natural teeth or the denture flange. These have been employed to reduce or minimize mandibular deviation. Robinson et al. in 1964 stated that fabrication of a provisional Guiding Flange Prostheses facilitates the fabrication of a definitive restoration. The design of framework of Guiding Flange Prostheses should be decided by basic prosthodontic design. The following case report presents one such case of hemimandibulectomy which has been rehabilitated using a mandibular Guiding Flange Prosthesis.

CASE REPORT:

A 64 year old male patient who underwent hemi-mandibulectomy due to Ameloblastoma 1 year back reported for prosthetic rehabilitation. The patient had undergone hemi-mandibulectomy involving the left condyle to the left parasymphyseal region and the resultant defect was reconstructed using Titanium plate. The Titanium plate had failed within 2 months following which it was removed and a pedicle graft was placed in the defect.

A post-surgical panoramic radiograph revealed radiolucency from the left neck of the condyle to the left parasymphyseal region. Clinical examination revealed severe deviation of the mandible towards the resected site with lack of proper contact between maxillary and mandibular teeth [Figure 1]. The intraoral examination showed thick, freely movable soft tissues with scar formation, loss of alveolar ridge and obliteration of buccal and lingual sulci in the left half of mandibular region (distal to left lateral incisor). Deviation of mandible was observed towards the side of defect which was about 10 - 12 mm from midline on 40 mm of mouth opening due to the action of the right mandibular depressor muscles which were normal[Figure 1]. The patient was not able to achieve an appropriate mediolateral position of the mandible and was unable to repeat this position consistently for adequate mastication. On the basis of clinical and radiographic examination the patient was classified as Class III Mandibular defect according to Cantor and Curtis classification of mandibular defects. Based on the clinical situation, a palatal based guiding prosthesis was planned.

Two sets of the maxillary and mandibular preliminary impressions were recorded using stainless steel stock trays with irreversible hydrocolloid impression material. The mandibular stock tray was modified by trimming the buccal flanges to make the mandibular impression. The impressions were poured with Type III gypsum material and casts were retrieved.

The maxillomandibular relations were recorded using wax bite to measure the deviation of the mandible accurately. The maxillomandibular relations were transferred on to the articulator. Another set of casts were mounted on articulator with maximum intercuspation between the Maxillary and Mandibular teeth. A single thickness modeling wax was adapted on the maxillary cast covering the entire hard palate up to the occlusal surfaces of the right posterior teeth and subsequently acrylized using heat-polymerized clear acrylic resin to make the maxillary stabilization plate. The palatal flange was waxed-up with modeling wax around the wire substructure and subsequently acrylized with clear heat-polymerized acrylic resin to make the Guiding Flange Prosthesis. The Guiding Flange Prosthesis and the maxillary stabilization plate were finished using No.120 grit sandpaper and polished with lathe buff [Figure 2].

The Guiding Flange Prosthesis was tried in the patient’s mouth and the initial stability and retention was checked. The inclination of the guide-flange was adjusted by selectively trimming the teeth-contacting surface & adding the auto-polymerizing clear acrylic resin where ever required [Figure 3]. Thus the smooth gliding flange surface was developed intraorally to guide the mandible in to a definite closing point in occlusion [Figure 4]. Care was taken to preserve the lingual-surface indentations of the opposing maxillary teeth which were guiding the mandible in a final definite closing point during mastication. The flange height was adjusted in such a way that it guided the mandible from large opening position to the maximum intercuspation in a smooth path [Figure 6].
Figure 1: Frontal view of the defect Prosthesis

Figure 2: Palatal Guiding Flange

Figure 3: Frontal view prosthesis in function function

Figure 4: Lateral view of prosthesis in

Figure 5: Pre-operative view

Figure 6: Post-operative view
modifying the prosthesis the patient was trained to use the prosthesis, and post-insertion instructions were given. The patient was followed up at the regular interval of two months for next one year.

**DISCUSSION:**

This clinical report illustrates the prosthetic management of a patient who underwent mandibular resection due to surgery for Ameloblastoma [Figure 5]. Since a considerable period of time had elapsed after the surgical procedure, guidance procedure was much more difficult for the patient. The literature shows various types of cast metal guidance prostheses which are effective in managing the mandibular deviation\(^5\). But such appliances are complex, the technique is sensitive and expensive and they require a greater number of patient visits. The acrylic guide flange prosthesis which is presented here is a simple and cost effective method for managing the mandibular deviation. The number of patient visits is also less as compared to the cast metal guidance prosthesis. The other advantage is its ease of adjustability.

The earlier the mandibular guidance therapy is initiated in the course of treatment the more successful the patients definitive occlusal relationship restoration\(^2, 3\). A guidance plane with a palatal acrylic flange of sufficient size and shape was useful in guiding the mandible to a correct occlusal position. With most mandibulectomy patients the primary determinant usually is related to occlusion. In many mandibulectomy patients it may not be possible to design a framework since the location of the fulcrum line is not easily determined making it more difficult to predict movement patterns of the prosthesis during function.

The patient in this clinical report retained all his teeth, except those on the defect site. The retentive components were modified and incorporated into the prosthesis as a wire substructure. Because of amount of force which can be generated by the flange against the maxillary teeth the maxillary stabilizing plate was provided to resist their palatal orthodontic movement. The retentive components of the maxillary stabilization plate were also kept distal to the canines to minimize the display during functions. Though the lingual flange of the guiding flange prosthesis was short in length, it was sufficient to stabilize the guiding flange prosthesis as the deviation force was lesser than the stability of the guiding flange prosthesis. The palatal flange can be extended as long as possible to improve the stability of the appliance as esthetics and comfort permits.

The guiding flange prosthesis can be regarded as a training prosthesis. If the patient can successfully repeat the mediolateral position, the use of the prosthesis can often be discontinued.\(^2\) Some patients, however, may continue indefinitely with a guide flange, and the stress generated to the remaining teeth must then be carefully monitored. The main purpose is to re-educate the mandibular muscles to re-establish an acceptable occlusal relationship for the residual hemimandible, so that the patient can control the opening and closing of the mandibular movements adequately and repeatedly. This is the beginning of an accomplished prosthetic rehabilitation by using a removable prosthesis, by which a stable occlusion can achieved.

**REFERENCES:**