Maxillary palatal ramp prosthesis: A prosthodontic solution to manage mandibular deviation following surgery

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Abstract
Mandibular resection following surgical treatment for neoplastic lesions of the oral cavity leads to numerous complications including altered mandibular movements, disfigurement, difficult in swallowing, impaired speech and articulation, and deviation of the mandible towards the resected site. Various prosthetic methods are employed to reduce or minimize mandibular deviation and improve and restore the lost functions and esthetic, like maxillomandibular fixation, implant supported prosthesis, removable mandibular guide flange prosthesis, and palatal based guidance restoration. This clinical report describes the rehabilitation of a patient following segmental mandibullectomy using palatal ramp prosthesis.

Keywords: Mandibular resection mandibular deviation and guidance prosthesis, mandibulectomy, palatal ramp

Introduction
Surgical treatment for neoplastic lesions of the oral cavity often requires resection involving the mandible, floor of the mouth, tongue and also the palate. Loss of mandibular continuity in consequence of surgical treatment leads to mandibular deviation and altered muscle function. It clinically results in facial asymmetry and malocclusion. The extent of deviation depends on the location and extension of the resection, the amount of soft tissue and innervations involvement and the presence of remaining natural teeth.

A corrective device known as “guide flange prosthesis” is indicated to limit that clinical manifestation. It can be applied either immediate postoperatively as intermaxillary fixation or within 7–10 days after the resection as removable device, for restoring mandibular function. The earlier the guidance therapy is initiated in the course of treatment, the more successful is the patient’s definitive occlusal relationship. Delays in the initiation due to extensive tissue loss, tight wound closure and other postsurgical morbidities, may result in an inability to achieve normal maxilla-mandibular relationships. It has been reported that fabrication of a provisional guide plane facilitates the fabrication of a definitive restoration.

This mandibular deviation is mainly due to uncompensated influence of contralateral musculature particularly the internal pterygoid muscle and pull from the contraction of cicatrical tissue on resected side. Uncoordinated masticatory movements due to deviated path of closure may result in eccentric occlusion, a disoriented masticatory cycle, facial disfigurement, distorted speech, dental or soft tissue trauma. Several modalities to return the mandible to optimum maxilla-mandibular relationship have been described. These include intermaxillary fixation, vacuum formed PVC splints, mandibular guidance prostheses and a widened maxillary occlusal table using a double row of teeth. A mandibular guidance prosthesis can be defined as a maxillofacial prosthesis used to maintain a functional position for the jaws (maxillae and mandible), improve speech and deglutition following trauma or/and surgery to the mandible or/and adjacent structures.

Case Report
A 29-year-old male patient Shohaib Aktar reported to the Department of Prosthetic Dentistry, Dr R Ahmed Dental College and Hospital, Kolkata, complaining of inability to grind food, dryness of the mouth and disfigured facial appearance following mandibular resection. Patient had undergone segmental mandibullectomy following squamous cell carcinoma of mandible. No intermaxillary fixation was
applied at surgical time. Extra oral examination revealed deviation of residual mandible towards right side and loss of functional occlusion on left side with predominant facial defect on right infraauricular region. Intraoral examination reveals missing 25, 26, 27, 28, 35, 36, 37, 38. Cervical dark brown discoloration is seen on the remaining teeth [Figure 1].

**Clinical Procedures**

Primary maxillary and mandibular impressions were made with alginate and poured with dental stone. Both the cast are mounted using bite registration record. After mounting of the mandibular cast it was observed that the buccal surface of the mandibular teeth were almost 8 mm lingual to the palatal surface of the maxillary palatal cusps [Figure 1]. Modeling wax was added to cover the palate. On this, additional wax was added on the left side of the prosthesis towards the palatal surface. The thickness of the wax was determined by the position of the mandibular teeth. C Clasp is placed on the 24 for retention. The whole pattern was invested, dewaxing done and heat cure acrylic was packed and processed. The patient was recalled and the maxillary prosthesis was inserted and checked for retention and stability. The prosthesis is then modified to act as guidance prosthesis by the addition of self-cure acrylic resin to form a ramp or guide plane palatal to the maxillary teeth opposing the nonresected portion of the mandible [Figure 2]. The ramp directs mandibular teeth into intercuspal position on closing. With the aid the patient can achieve consistent closure to an intercuspal position [Figure 3]. The prosthesis was inserted and patient was given instruction regarding the maintenance of the prosthesis and was put on a regular follow-up.

**Discussion**

Rehabilitation is an essential phase of cancer care and should be considered from the time of diagnosis in a complete and comprehensive treatment plan. The primary objective is restoration of function and appearance. The most important objective is to re-educate the mandibular muscles to re-establish an acceptable occlusal relationship (physiotherapeutic function) for residual hemimandible, so that the patient could control adequately and repeatedly opening and closing mandibular movements.[3] The guide flange provided a mechanical system which prevented the mandible from turning towards the resected side. For better results, prosthetic management can be combined with an exercise program, which can be started 2 weeks after surgery. The presence of teeth in both the arches is important for effective guidance and reprogramming of mandibular movements.[6] The patient in this clinical report retained all his teeth, except those on the defect site. Therefore, the patient had a better proprioceptive sense and was able to achieve the functional position after insertion of prosthesis. Guidance prosthesis served as a training appliance till a cast partial denture can be fabricated for the patient. Within 3 weeks, the mandible was guided to the correct occlusal position. This prosthesis helped the patient to get accustomed to close the mandible into the correct intercuspal position without the use of any external aid [Figure 3].

The success of mandibular guidance therapy varies and depends upon the nature of the surgical defect, early
initiation of guidance therapy, patient co-operation, and other factors. This therapy is most successful in patients for whom the resection involves only bony structures, with minimal sacrifice of tongue, floor of the mouth, and adjacent soft tissues.\[1\] The literature shows various types of cast metal guidance prostheses which are effective in managing the mandibular deviation.\[3,6\] But such appliances are complex; the technique is sensitive and costly and requires many patient visits. The acrylic guide flange prosthesis presented here is 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.\[1,2\]

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