

AN INNOVATIVE AND STIPULATE PROSTHETIC MANAGEMENT FOLLOWING  
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**ABSTRACT**

Oral neoplastic lesions when treated surgically often requires resection involving the mandible, floor of the mouth, tongue and also the palate. Once the mandibular resection is performed it leads to altered mandibular movements, disfigurement, difficulty in swallowing, impaired speech and deviation of the mandible towards the resected site. Numerous prosthetic procedures like maxillomandibular fixation, implant supported prosthesis, removable mandibular guide flange prosthesis and palatal based guidance restoration have been implied to reduce or minimize deviation and improve function. Managing patients who require mandibular resection without bony reconstruction is complex. This article describes the prosthetic management of a patient following segmental mandibular resection.

**KEYWORDS:** Maxillomandibular fixation, implant supported prosthesis.**INTRODUCTION*****Mandibular discontinuity***

Mandibular discontinuity leads to impairment and destruction of the balance and symmetry of mandibular functions, which leads to mandibular altered movements and deviation of the residual fragments towards the surgical site. Generally, patients suffering extensive soft tissue loss as a consequence of tight wound closure, radiation therapy and those requiring a classical neck dissection display the most severe mandibular deviation and dysfunction.<sup>[1]</sup> On contrary mandibular resections resulting in little soft tissue loss have lesser mandibular deviation mandibular discontinuity as a result of surgical treatment leads to mandibular deviation and altered muscle function. Clinically this result in facial asymmetry and malocclusion.<sup>3</sup> there is deviation of the residual mandible medially and superiorly. Amount of deviation is determined by the location and extension of the resection, the amount of soft tissue and innervations involvement and the presence of remaining natural teeth. A classification of mandibular defects has been described by Cantor and Curtis.<sup>[2]</sup> Although the classification system is suggested primarily for edentulous patients, it

is also applicable to partially edentulous patients. This system classifies defects based on remaining structures.

**Problems due to Mandibular Discontinuity<sup>[3]</sup>**

1. Difficulty in swallowing- due to sensory and motor deficits and also loss of bone and muscle attachments of the floor of the mouth; the bolus manipulation by the tongue is compromised
2. Difficulty in speech- due to compromised tongue control.
3. Drooling of saliva- As a result of inability to achieve a lip seal, poor tongue control and associated motor and sensory deficits.
4. Disfigurement- mandibular movements are uncoordinated due to mandibular deviation as a result of improper muscle pull and associated sensory deficit ultimately leading to cosmetic disfigurement.

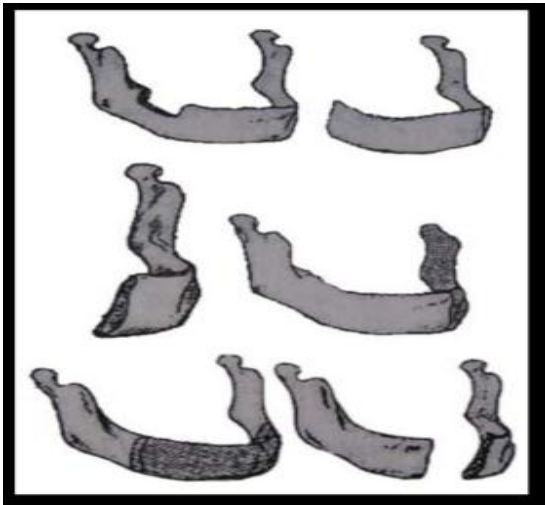
**Factors Causing Mandibular Deviation<sup>[4-6]</sup>**

Following surgical resection the remaining mandibular segment is often retruded and deviated to the surgical side at rest. Upon opening, the deviation increases leading to an angular path of opening and closure. Absence of muscles of mastication on the surgical side

causes rotation of the mandible on closure as a result of imbalance in the pull of these muscles. There are several unfavorable physical limitations when rehabilitating completely edentulous patients with resected mandible.<sup>[4,6]</sup> This include resected skin grafts, scar tissue and deviation of the resected mandibles, limited coordinative ability, resorbed ridges and limited posterior throat form due to obliteration by the grafts. Other factors include:

- Loss of mandibular continuity
- Loss of muscular attachment
- Loss of counter lateral forces
- Loss of soft tissue and tight wound closure
- Loss of proprioception for occlusion
- Scar contracture
- Radiation therapy
- Radicular neck dissection.

One of the basic objectives in rehabilitation is to retrain the muscles for mandibular denture control and repeated occlusal approximation.



**Fig 1.a-f: Cantor and Curtis Classification**

#### **Cantor and Curtis Classification<sup>[7]</sup>**

Class I: Mandibular resection involving alveolar defect with preservation of mandibular continuity (Fig. 1a).

Class II: Resection defects involve loss of mandibular continuity distal to the canine area (Fig. 1b).

Class III: Resection defect involves loss up to the mandibular midline region. (Fig. 1c)

Class IV: Resection defect involves the lateral aspect of the mandible, but are augmented to maintain pseudo articulation of bone and soft tissues in the region of the ascending ramus. (Fig. 1d)

Class V: Resection defect involves the symphysis and parasymphysis region only, augmented to preserve bilateral temporomandibular articulations. (Fig. 1e)

Class VI: Similar to class V, except that the mandibular continuity is not restored. (Fig. 1f).

Robinson et al. (1964)<sup>[8]</sup> stated that fabrication of a provisional guide plane facilitates the fabrication of a definitive restoration. Implant supported fixed prosthesis

can be an optional treatment modality for functional and esthetic rehabilitation 4. Intermaxillary fixation and as a guiding appliance for edentulous patient following hemisection of the mandible using a two piece gunning splint have been reported.<sup>[9]</sup> Mandibular resection prosthesis should be provided to restore the mastication within the unique movement capabilities of the residual function in the mandible. A common feature among all removable resection prosthesis is that all framework designs should be detected by basic prosthodontic design. These include broad stress distribution, cross arch stabilization using a rigid major connector stabilizing and retaining components at locations within the arch to minimize dislodgement and replacement of tooth position that optimize prosthesis. Stability and functional needs modification to these principles are determined on an evidence basis and greatly influenced by unique residual tissue characteristics and mandibular movement dynamics.<sup>[10,11]</sup>

#### **MANDIBULAR GUIDANCE PROSTHESIS**

If the continuity of the mandible can be restored with a bone graft, metal plates or a combination of both methods, most of the problems of the discontinuity can be resolved. However for some patients who do not desire reconstruction, or who are medically compromised, mandibular guidance therapy can be instituted to retrain the patient's neuromuscular system to provide an acceptable maxillo-mandibular relationship of the residual portion of the mandible which permits occlusion of the remaining natural teeth. The proprioceptive influence of the remaining teeth in the maxilla and the residual mandibular segment can greatly facilitate training of the patient to attain repeatable intercuspal position. This can be achieved by the use of various guidance prosthetics.

The guidance prosthesis may be broadly divided into two types:

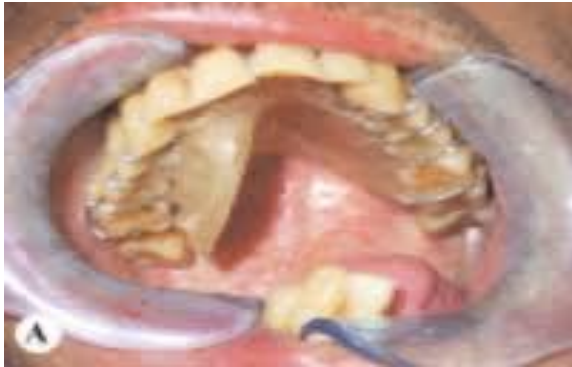
1. Palatal based guidance prosthesis
2. Mandibular based guidance prosthesis

1) **Palatal based guidance prosthesis** which includes Maxillary inclined plane prosthesis Positioning prosthesis with palatal flange, widened maxillary occlusal table.



**Fig: 2 Palatal based guidance prosthesis**

- 2) **Mandibular based guidance prosthesis** which includes Mandibular lateral/ oblique guide flange prosthesis.



**Fig: 3 Mandibular based guidance prosthesis**

**A. Maxillary inclined plane prosthesis**

This prosthesis is fabricated from a functionally generated occlusal record and provides an occlusal table palatal to the maxillary teeth on the non-defect side which slopes occlusally away from the natural teeth. Because the residual mandible is deviated medially, mandibular closure results in the progressive sliding of the remaining mandibular teeth up the incline in a superior and lateral direction until the occlusal contact is reached.



**Fig: 4 Maxillary inclined plane prosthesis**

**B. Positioning prosthesis with palatal flange**

Patients who are able to use their presurgical intercuspal position after mandibular resection often complain of inability to prevent the mandible from deviating towards the defect side during sleep. On awakening they have difficulty reestablishing normal occlusal contact. Also muscle pain and temporo-mandibular discomfort are common complaints. To minimize nocturnal deviation of residual mandible, a positioning prosthesis can be made by extending a palatal flange inferiorly into the lingual vestibule between the lateral border of the tongue and the lingual surface of the mandible. This flange can be formed in the mouth with autopolymerizing acrylic resin. The palatal extension should be sufficient enough to prevent medial deviation of unresected mandible even when the mouth is open. The flange should contact only the lingual surfaces of mandibular teeth and it should not

impinge on the lingual mucosa of the mandible throughout the opening and closing movements. Only the lingual surfaces of the mandibular teeth should contact the flange.



**Fig 5. Mandibular lateral guide flange prosthesis**

**A. Mandibular lateral guide flange prosthesis**

The guide flange is attached to a cast mandibular removable partial denture. The guidance flange can be either molded in wax at the try-in stage and processed in clear acrylic resin or a heavy wire loop may be used. The guide flange is extended into the maxillary muco-buccal fold superiorly and diagonally on the non defect side without impinging on the muco-buccal fold. This extension functions against the maxillary posterior teeth and mechanically maintains the residual mandible in position for vertical chewing stroke with little or no lateral movement thereby diminishing the degree of mandibular deviation



**Fig 6: Mandibular lateral/ oblique guide flange prosthesis**

**B. Mandibular lateral/ oblique guide flange prosthesis**

Deviation of the mandible prevented by Mandibular lateral/ oblique guide flange prosthesis. Use of guidance prosthesis consisting of both maxillary and mandibular cast removable partial denture that engage with each other by some mechanism has also been mentioned in literature. Nesrin Sahin et al have described the fabrication of cast metal guidance flange prostheses. It consists of maxillary and mandibular removable partial dentures each having buccal guidance flanges on the non defect side which engages with each other during function. Also supporting flanges are fabricated on the defect side of both the maxillary and mandibular

frameworks to assist in controlling mandibular deviation and coordinate masticatory movements. Chalian et al have described the fabrication of a guide flange prosthesis which consists of maxillary and mandibular castremovable partial denture. The frameworks are designed to be in contact during function and to limit mandibular deviation. A lower inverted u shaped flange slides against an upper horizontal bar on the non-defect side. Mastication is limited to vertical movement.

### 3. A widened maxillary occlusal table

Patients who cannot attain the ideal mediolateral position of the remaining segment and an acceptable occlusal contact of the teeth, in spite of the use of various guidance prostheses, a palatal ramp or a widened maxillary occlusal table using double row of teeth may be used. This can provide a surface against which the natural or artificial teeth of the residual mandible can occlude to facilitate mastication.



Fig 7: A widened maxillary occlusal table

### Treatment strategies to Reduce Postsurgical Deviation

1. Postsurgical exercises following first week of surgery.
2. Postsurgical immediate intermaxillary fixation immediately following surgery and maintained for 5 to 7 weeks.
3. After marking the area of planned surgical excision on a working cast, mandibular guidance prostheses to be fabricated before surgical excision.

### DISCUSSION

This clinical report illustrates the prosthetic management of a patient who underwent mandibular resection. Since a considerable period of time had elapsed after the surgical procedure, guidance procedure was much more difficult for the patient. The earlier the mandibular guidance therapy is initiated in the course of treatment the more successful the patients definitive occlusal relationship restoration. It has been reported that fabrication of a provisional guide plane facilitates the fabrication of a definitive restoration. 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 these patients definitive partial denture restoration are deferred until acceptable maxillomandibular relationship are obtained or an end point in mandibular guidance therapy has reached. An implant supported fixed prosthesis or a removable cast partial denture are the two main treatment options to restore partially edentulous arches in patients who had undergone mandibular resection. Implant supported prosthesis was not considered since no bone graft was used. Many mandibulectomy patients are not dependent on this prosthesis for oral function. 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.

### CONCLUSION

Currently, most lateral segmental mandibulectomy are also reconstructed surgically. When the mandible is not stabilized following resection and discontinuity defect results mandibular resection prosthesis should be provided to restore mastication within the unique movement capabilities of the residual functioning mandible. Because mandibular guidance therapy is most successful in patients whose resection involve only bony structures with minimal loss of soft tissue and no radical neck dissection or radiation therapy, the patients who are treated for ameloblastoma are ideal candidates for the use of a mandibular guidance therapy. For better results, the prosthetic management should be combined with an exercise program. Clinical observation found that the percentage of deviation corrected (efficacy of guiding flange prosthesis) is inversely proportional to the time elapsed between surgery and placement of prosthesis and amount of initial deviation.

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