



Prosthetic Management Following Mandibular Resection - A Case Report

Ravinder Narwal^{1*}, Renuka², Anuradha Sharma³ and Ankit Gaur⁴

¹Director and Owner, Family Dental Care, Karnal, Haryana, India

²PG Student, Orthodontics, AIIMS, Jodhpur, India

³Director and Owner, Gaur's Multispeciality Dental Care, Karnal, Haryana, India

⁴Dental Surgeon, University Health Center, Kurukshetra University, Kurukshetra Haryana, India

*Corresponding Author: Ravinder Narwal, Director and Owner, Family Dental Care, Karnal, Haryana, India.

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Abstract

Mandibular resection leads to altered mandibular movements, disfigurement, difficult in swallowing, impaired speech and articulation, and deviation of the mandible towards the resected site. Numerous prosthetic methods employed to reduce or minimize deviation and improve function include maxillomandibular fixation, implant supported prosthesis, removable mandibular guide flange prosthesis, and palatal based guidance restoration. Management of patients who require mandibular resection without bony reconstruction is difficult. This article describes the prosthetic management of a patient following segmental mandibular resection.

Keywords: Flange Prosthesis; Mandibular Defects; Mandibular Resection

Introduction

The mandible is a 'U' shaped bone attached to the base of the skull at the TMJ. Mandibular deviation due to loss of mandibular bone continuity is a common consequence of surgical treatment resulting most commonly due to an imbalance in the muscular pull on the right and left sides of the mandible. The related altered muscle function will clinically result in facial asymmetry and malocclusion [1]. The residual mandible deviates medially and superiorly, and it will be more or less evident depending on the location and extent of the resection, the amount of soft tissue remaining, amount of neural tissues involved, the presence of remaining natural teeth (the mandibular erroneous movement is more evident in edentulous patients than in dentulous patients who have a normal intermaxillary relationship). A corrective device named 'guide flange prosthesis' is indicated to limit this clinical manifestation. The basic rehabilitation objective is to train the mandibular muscles and to re-establish an acceptable occlusal relationship so that the patient can adequately control opening and closing mandibular movements. This article describes the fabrication of palatal ramp type guidance appliance with supporting flanges for a patient following a segmental mandibulectomy. 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 re-establishing normal occlusal contact. Also muscle pain

and temporomandibular 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.

Classification of Mandibular Defects

According to Cantor and Curtis (1971) [2]:

- Class 1: Radical alveolectomy with preservation of mandibular continuity.
- Class 2: Lateral resection of mandible distal to cuspid.
- Class 3: Lateral resection of the mandible to the midline.
- Class 4: Lateral bone graft surgical reconstruction.
- Class 5: Anterior bone graft surgical reconstruction.
- Class 6: Resection of anterior portion of the mandible without reconstructive surgery to unite lateral fragments.

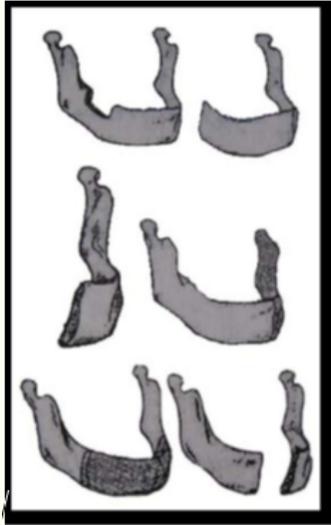


Figure 1: Cantor and Curtis classification of mandibular defects.

Clinical Report

A 63-year-old patient was referred to the Division of Prosthodontics from the Department of Oncosurgery for correction of de-ranged occlusion 2 weeks postoperatively. On eliciting the history, the patient had undergone hemi-mandibulectomy for squamous cell carcinoma of right side of the mandible. On examination, it was found there was a deviation of 15 mm of the mandible toward the left side from the midline. The area starting from the left lower cuspid upto the right condyle was excised. The remaining dentition was sound with a total of 21 teeth present. Oral hygiene was poor with an inflamed gingiva and the right buccal mucosa showed a healing soft tissue graft. The associated problems included difficulty in speech, swallowing and mastication, disfigurement of face, drooling of saliva and halitosis. The treatment plan was divided primarily to improve the oral hygiene and fabricate a guide flange prosthesis in the first phase for correction of the mandibular deviation and to improve function.

Following this the midline of the lower third of the face was marked using an indelible pencil on both the maxilla and the mandible and impressions were made using irreversible hydrocolloid impression material (Dentalgin; Prime Dental Products, Mumbai, India). Interocclusal bite registration material was used to record the patient's existing occlusion. The casts were poured with type III gypsum material (Kalstone; Kalabhai Karson, Mumbai) and mounted on an articulator and the casts sealed with the teeth in maximum intercuspation. An Adams clasp was made over the right first maxillary molar and left maxillary first premolar to enhance retention. Modeling wax was used to stabilize the wire. A layer of separating medium was applied on the surface of the cast followed by addition of autopolymerizing resin (DPI clear; Dental Products of India,

Mumbai) of sufficient thickness on the left maxillary buccal and mandibular lingual region. Care was taken to ensure that the material did not extend over the occlusal surfaces and also to ensure that the articulator was closed tightly with the casts in occlusion during the setting of the material. Once the material was set, the prosthesis is removed, finished and polished before evaluating its fit in the patient's mouth. The patient is then trained to insert the mandibular guiding prosthesis. The midline is once again assessed to check that it coincides (Figure 7 and 8). The patient is instructed to wear the prosthesis continuously except while having food. Four months post-insertion, the patient was able to effectively close his mandible into maximum intercuspation without the use of the guide flange.



Figure 2 and 3: Preoperative view.

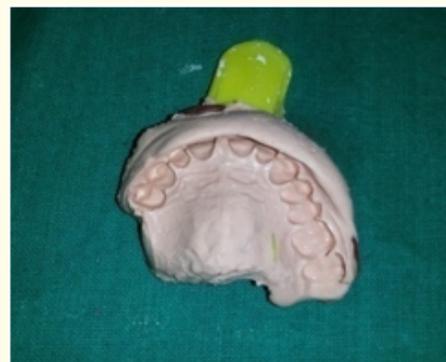


Figure 4: Impression.



Figure 5: Bite registration.



Figure 6: Wire Bending.



Figure 7 and 8: Intra oral view with appliance.



Figure 9 and 10: Postoperative extra oral view.

Discussion

There are no as such types of appliances that will serve for every hemimandibulectomy patient, but it will be depend on postoperative findings, but the basic design will remain same. There are different materials are available for fabrication of palatal ramp [3]. Using of light cure tray material is much easier and faster method for fabrication of the maxillary palatal ramp guiding prosthesis. Palatal ramp is used as training type of prosthesis. If the patient closes jaws in proper occlusion, prosthesis can often discontinue.

No articulator can reproduce the hemimandibular movements, therefore functional occlusal relation should be recorded and this relation might change at a later date, if mandibular control ability improves or drifters. Using only one guide flange prosthetic device as that proposed in this work permits to re-educate mandibular muscles and use the same to eat. In this way, patients are not obliged to use one device for the physiotherapy step and a second device to eat.

Etiology of Mandibular Defects

- Congenital: Incomplete formation, incomplete ossification.
- Developmental: Trauma during delivery, TMJ ankylosis
- Acquired: Surgical intervention of benign tumors like Ameloblastoma or malignant tumors like squamous cell carcinoma.
- Trauma

Problems due to Mandibular Discontinuity [3]

- **Difficulty in speech:** Due to poor tongue control.
- **Droling of saliva:** As a result of inability to achieve a lip seal, poor tongue control and associated motor and sensory deficits.
- **Difficulty in swallowing:** As bolus manipulation by the tongue is compromised due to sensory and motor deficits and also loss of bone and muscle attachments of the floor of the mouth.
- **Mandibular movements:** Difficult and uncoordinated due to mandibular deviation as a result of improper muscle pull and associated sensory deficit.
- **Cosmetic disfigurement:** Due to mandibular deviation along with associated soft tissue and bony defects.

Factors Causing Mandibular Deviation

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 [4-6]. 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.

Modalities to Reduce Postsurgical Deviation [7-10]

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

Types of Guide Flange Prostheses

1. Based on the material: Metallic or polymethyl methacrylate resin.
2. Based on the jaw over which it is fabricated: Maxillary or mandibular.

Advantages of Acrylic Resin Prosthesis

- Easy to fabricate
- Can be adjusted
- Better retention
- Easy to maintain.

Duration of use of the Appliance

The appliance can be used, as early as a week after surgery up to 1 year depending upon the severity of deviation. Though osseointegrated dental implants is a solution for replacing the missing teeth for reconstructed mandibulectomy patients, the clinicians must wait for extensive period of time for completion of healing and acceptance of the osseous graft. During this initial healing period early prosthodontic intervention by mandibular guide flange and maxillary stabilization prosthesis serve the purpose of reducing the mandibular deviation, preventing extrusion of the maxillary teeth and improving the masticatory efficiency.

Conclusion

Palatal guiding ramp prosthesis used as training type of prosthesis and if the patient repeats the mediolateral position successful; the palatal guiding ramp prosthesis can often be discontinued. Functionally molded palatal guiding ramp is an effective means to assist post resection and post radiation physiotherapy. Compare to other technique use of light cure resin is very easy and faster technique. More success is achieved when it is combined with manual exercise program. For patients following mandibular resection, restoration of function is usually not possible and prolonged disfigurement is inevitable but using a guide flange initially followed by prosthetic rehabilitation, function can be restored to normal physiological limits with little disfigurement. 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.

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