

Guide the Mandible Back Home: Guide Flange Prosthesis

Anup Gopi, NK Singla, Dinesh Kumar Saini, Virender Singh Legha

ABSTRACT

Following mandibular resection, restoration of function is usually not possible and prolonged disfigurement is inevitable. By the use of a guide flange initially followed by prosthetic rehabilitation, function can be restored to normal physiological limits with little disfigurement. 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. During the initial healing period following mandibular resection early prosthodontic intervention by mandibular guide flange and maxillary stabilization prosthesis serve the purpose of reducing the mandibular deviation, preventing extrusion of teeth and improving the masticatory efficiency. This article describes the initial prosthodontic rehabilitation of two cases with two different types of 'Guide flange prosthesis'.

Keywords: Mandibulectomy, Mandibular discontinuity, Muscle training, Palatal ramp, Flange prosthesis, Guide flange prosthesis.

How to cite this article: Gopi A, Singla NK, Saini DK, Legha VS. Guide the Mandible Back Home: Guide Flange Prosthesis. *J Orofac Res* 2013;3(4):290-293.

Source of support: Nil

Conflict of interest: None declared

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.

CASE REPORTS

Case 1

A 63-year-old patient was referred to the Division of Prosthodontics from the Department of Oncosurgery for correction of deranged occlusion 2 weeks postoperatively. On eliciting the history, the patient had undergone hemimandibulectomy for squamous cell carcinoma of right side of the mandible. On examination, the mouth opening was restricted to about 25 mm with gross asymmetry of the face. There was a deviation of 15 mm of the mandible toward the right side from the midline. The area starting from the right lower bicuspid upto the right condyle was excised. The remaining dentition was sound with a total of 27 teeth present. Oral hygiene was poor with an inflamed gingiva and the right buccal mucosa showed a healing soft tissue graft. The occlusion was completely deranged with the left lower cuspid occluding in between the upper central incisors (Fig. 1). The associated problems included difficulty in

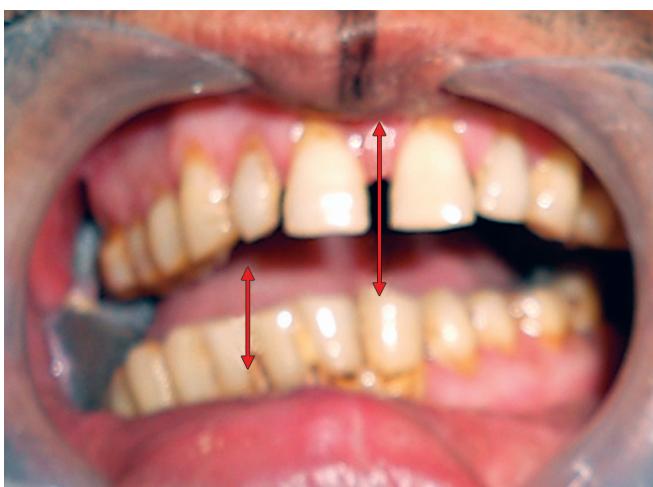


Fig. 1: Preoperative photograph

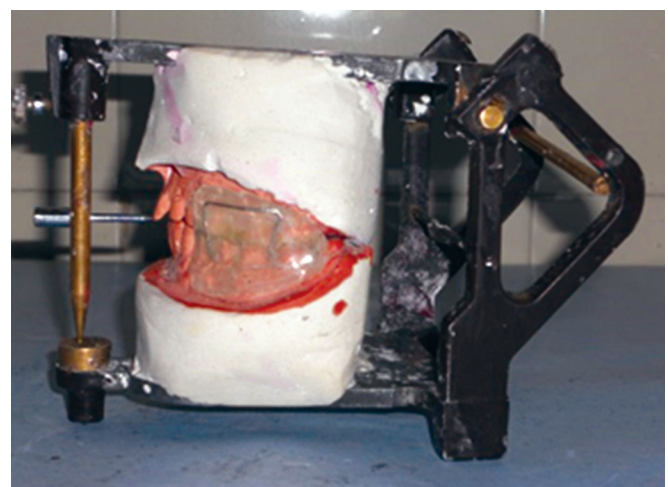


Fig. 2: Guide flange prosthesis over articulated casts

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.

Firstly, a cork screw was provided for a week with necessary instructions to improve mouth opening. 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. A 19 gauge stainless steel wire was then adapted extending from the lingual surface of 35 and 36 interdentally extending occlusally up to the buccal surface of 25 and 26 forming a loop. An additional Adams clasp was made over the left mandibular molar 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 (Fig. 2). 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 portion of the prosthesis and to slowly close as the extension of the prosthesis into the maxillary buccal region or the buccal flange guides the mandible into complete occlusion. The midline is once again assessed to check that it coincides (Fig. 3). 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 (Fig. 4).

Case 2

A 35-year-old male reported with a chief complaint of difficulty in speech and swallowing due to deviated lower jaw since a month. On eliciting the history the patient had undergone hemimandibulectomy for ameloblastoma of the right side of the mandible, distal to the cuspids a month ago. On examination, there was gross asymmetry of the lower third of the face, restricted mouth opening of about 22 mm and deviation of the mandible to the right side by about 10 mm (Fig. 5). Once again the treatment plan was



Fig. 3: Prosthesis *in situ* with correction of deviation

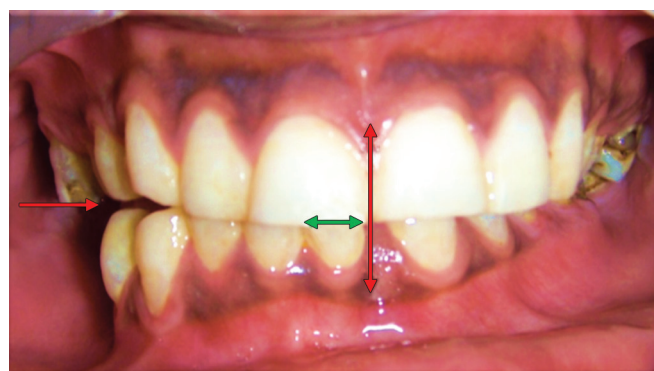


Fig. 5: Preoperative photograph



Fig. 4: Four months postoperative without prosthesis



Fig. 6: Guide flange prosthesis with palatal ramp

divided primarily to fabricate guide flange prosthesis in the first phase to correct the mandibular deviation and improve function followed by replacement of missing teeth in the second phase. Following the improvement in mouth opening, midline of the lower third of the face was marked using an indelible pencil and impressions were made using irreversible hydrocolloid impression material. Jaw relation was recorded and the casts were mounted on an articulator.

Wax up for a palatal plate was done on the maxillary cast with a pinhead clasp and an Adams clasp on either sides for retention and processed in heat cure polymethyl methacrylate (DPI; Dental Products of India, Mumbai). A ramp like extension was then given on the palatal aspect of the left side of the acrylic plate using modeling wax at an inclined plane. The patient's mandible was then slowly guided into maximum intercuspation. As the mandible slides into maximum intercuspation it leaves a definite pathway or trail on the palatal ramp. The recorded pathways in the wax were refined after reheating of wax and again re-recorded until a definite pathway is obtained. The palatal plate along with the wax ramp was carefully removed, flaked and processed using heat cure acrylic resin (DPI; Dental Products of India, Mumbai). The prosthesis was then finished and polished before evaluating its fit in the patients mouth (Fig. 6). The patient was then trained to insert the palatal guiding prosthesis and to slowly close as the palatal extension of the prosthesis guides the mandible into complete occlusion (Fig. 7). The midline was once again assessed to check that it coincides (Fig. 8). A necessary instruction was then given to the patient regarding the maintenance of the prosthesis.

DISCUSSION

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.

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.

Problems due to Mandibular Discontinuity³

Difficulty in speech: Due to poor tongue control.

Drizzling 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

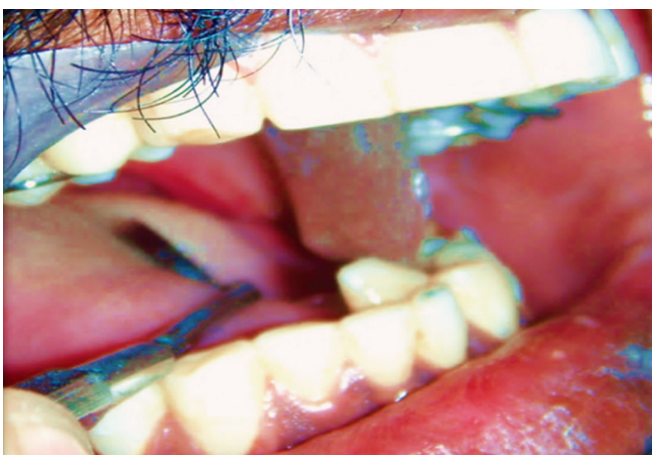


Fig. 7: Prosthesis *in situ*



Fig. 8: Postoperative photograph

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 Deviation⁷⁻¹⁰

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

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.

REFERENCES

1. Beumer J, Curtis T, Firtell D, editors. Maxillofacial rehabilitation. St Louis: Mosby 1979;90-169.
2. Cantor R, Curtis TA. Prosthetic management of edentulous mandibulectomy patients. Part I. Anatomic, physiologic and psychologic consideration. J Prosthet Dent 1971;25:446-457.
3. Schneider RL, Taylor TO. Mandibular resection guidance prosthesis: a literature review. J Prosthet Dent 1986;55:84-86.
4. Swoope CC. Prosthetic management of resected edentulous mandible. J Prosthet Dent 1969;21:197-202.
5. Scaaf NG. Oral construction for edentulous patients after partial mandibulectomies. J Prosthet Dent 1976;36:292-297.
6. Cantor R, Curtis TA. Prosthetic management of edentulous mandibulectomy patients: Part II, Clinical procedures. J Prosthet Dent 1971;25:546-555.
7. Martin JW, Shupe RJ, Jacob EF, King GE. Mandibular positioning prosthesis for the partially resected mandibulectomy patient. J Prosthet Dent 1976;35:202.
8. Shafer WG, Hine MK, Levy BM, Tomich CE. A textbook of oral pathology. 4th ed Philadelphia: WB Saunders 1993;2:86-229.
9. Taylor TD. Diagnostic considerations for prosthodontic rehabilitation of the mandibulectomy patient. Clinical Maxillofacial Prosthetics. Chicago: Quintessence Publishing 2000;3:155-170.
10. Olson ML, Shedd DP. Disability and rehabilitation in head and neck cancer patients after treatment. Head Neck Surg 1978;1: 52-58.

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Journal of Orofacial Research

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