

## POST RESECTION PHYSIOTHERAPY AND REHABILITATION; USING FUNCTIONALLY MOULDED MAXILLARY GUIDE RAMP

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### ABSTRACT

Often the loss of the continuity of the mandible hampers the balance and the symmetry of mandibular function, leading to altered mandibular movements and deviation of the residual fragment towards the surgical side. Successful intercuspal position with the antagonist in the remainder arch was accomplished through the use of functionally moulded palatal guidance appliance in a patient who underwent hemisection and postsurgical radiation of the mandible, subsequent to treatment for a squamous cell carcinoma of right side of the ramus of mandible. This article describes the fabrication and function of a maxillary palatally positioned, functionally moulded guide flange to assist post resection physiotherapy and rehabilitation.

**KEY WORDS:** : Hemimandibulectomy, Guide flange, post resection physiotherapy, rehabilitation.

### INTRODUCTION

Malignant tumors of oral cavity can cause more destruction to innumerable adjacent tissues as compared to any other parts of the body. The surgical management for neoplastic lesions of the oral cavity often requires resection involving several anatomical structures such as mandible, floor of the mouth, tongue, and palate etc. In hemimandibulectomy cases mandibular deviation occurs due to loss of continuity of mandible, the related altered muscle function will clinically result in facial asymmetry causing significant esthetic deformities, functional compromise, and psychological sequel.<sup>(1)</sup>

The residual mandible deviates medially and inferiorly, the amount of deviation will be more or less evident depending on the location and extent of the resection, the remaining amount of soft tissue, nerve innervation involvement and the presence of remaining natural teeth <sup>(2,3)</sup>

When Mandibular continuity is lost in segmental mandibulectomy, masticatory function is compromised because of muscular imbalance that results from unilateral muscles removed, loss of grinding table due to teeth lost, altered maxilomandibular relation, and decreased teeth to teeth contact which results in significant decrease in occlusal force.<sup>4,5,6</sup> The rehabilitation objective in mandibulectomy cases is to re-educate mandibular muscles to re-establish an acceptable occlusal relationship for residual hemimandible,<sup>(7)</sup> so that patient could control opening and closing mandibular movements and minimize the scar formation that will make deviation more sever and less favorable for the prosthetic intervention<sup>(8)</sup>.

Early corrective Mandibular moment therapy like stretching excersies consisting of patient grasping the chin and moving the mandible away from surgical side. It can be started two weeks postsurgically and carried upto 6-8 weeks during post operative healing period, then definitive prosthetic rehabilitation can be taken up. A review of the literature shows varying basic design of prosthesis used, that can be mandibular-based or palatally-based anchored on natural teeth or denture flange. <sup>(2) (3) (7) (9)</sup>

The mandibular guide flange device for hemimandibulectomy patients presenting good natural teeth on the residual mandible fits generally over that teeth (base-plaque) and has a guide plane (flange splint) extending into the maxillary buccal vestibule, and which rides on the buccal surfaces of several of the maxillary teeth: this is the mechanical system preventing the mandible from turning toward the resected side. <sup>(9) (10)</sup>. Normally, patients can use a guide flange device all the day except while eating. The purpose of this article is to describe a new therapeutic possibility for the prosthetic management of hemimandibulectomy patients, that foresees using only one device for both corrective mandibular movement therapy and masticatory function. This sort of device permits to use the same prosthesis both for eating and for mechanical correction of mandibular deviation.

### Case Report

A 59-year-old male patient came for Dental Prosthesis Service to the Department of prosthodontics Navodaya dental college complaining of inability to grind food,



Fig.1: Extra oral view without prosthesis



Fig.2: Medial deviation of mandibular teeth

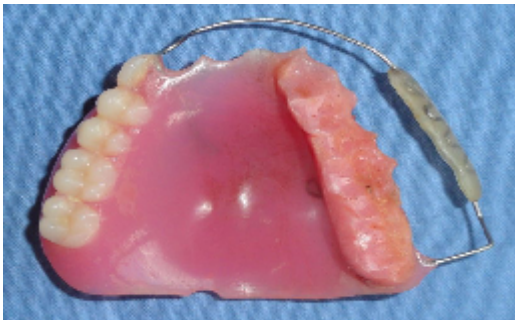


Fig.3:Occlusal view of functionally moulded palatal ramp

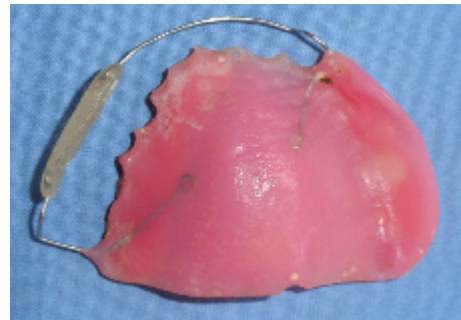


Fig.4: - Wrap around retainer with buccal acrylic shield



Fig.5: Prosthesis in oral cavity



Fig.6: - Functional occlusion with prosthesis



Fig.7: - Extra oral view with prosthesis

dryness of the mouth and disfigured facial appearance as outcome of right mandibular hemimandibulectomy. Patient had history of squamous cell carcinoma of right ramus of the mandible, which was treated by surgical hemimandibulectomy followed by radiotherapy and chemotherapy. 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. (Fig. 1) Intraoral examination reveals missing (FDI notation followed) 13,14,15,16,17,31,41,42,43,44,45,46,47. Cervical dark brown discoloration with remaining teeth.( Fig.2)

**Clinical procedure**

Primary maxillary and mandibular impressions were made with alginate which was later poured with dental stone. The maxillary cast was mounted on a semi adjustable articulator with a face bow. The mandibular cast was mounted with an interocclusal record that was made of bite registration wax.(sai Dental corporation). After mounting of the mandibular cast it was observed that the buccal surface of the mandibular teeth were almost 6mm lingual to the palatal surface of the maxillary palatal cusps. (Fig. 2). 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. A trial of the wax pattern replacing maxillary right missing teeth was done on the patient. During the trial procedure wax was added on the ramp till there were indentations formed on the wax pattern by the buccal cusps of the mandibular posterior teeth. Wraparound labial bow was fabricated from distal of 12 to distal of 27 using 19 gauge stainless steel round wrought wire, with buccal supporting acrylic shield on left maxillary sulcus. (Fig. 3 and Fig.4)

The whole pattern was invested, dewaxing done and heat cure acrylic was packed and processed. The patient was recalled and the prosthesis was inserted and checked for retention and stability. After the prosthesis was inserted, the mandible started to close towards more buccal position.(Fig 5 and Fig 6)The patient was given instruction regarding the maintenance of the prosthesis and was put on a regular followup . During subsequent visits by the patient the angulations of the ramp was increased by adding self cure acrylic on palatal slope of the ramp. This procedure allowed the further movement the mandible buccally to effect the occlusion.

**Discussion**

Segmental mandibulectomy as surgical treatment for squamous cell carcinoma results in deviation of the

remaining mandibular segment toward the defect and rotation of the mandibular occlusal plane inferiorly. Mandibular deviation occurs primarily because of the loss of the tissue responsible for the movements.<sup>11</sup>

Loss of continuity also results in vertical rotation of the residual Mandibular fragment in inferior direction. Rotation is caused by the pull of the suprahyoid musculature on the residual mandibular fragment causing inferior displacement and rotation around the fulcrum of the remaining condyle. Gravity, loss of anchorage, loss of temporomandibular ligaments allows the mandible to fall vertically away from the normal position.<sup>6,11</sup>

The final outcome of the surgery are facial disfigurement , loss of occlusal contact, loss of lip contact. The associated problems are, decreased mouth opening difficulty in mastication, functional limitation of the tongue such as speech impairment, food bolus control, loss of taste sensation and lack of adaptability to prosthesis.<sup>5</sup> The guide ramp serves as a prosthesis to minimize radiation scarring of the healed tissues. Stretching of the tissues during healing minimizes the amount of scarring within the area . With scars there is a tendency to contract which in turn pulls the remaining mandible more and more towards the defect side, It is important that the angulation of the guide ramp be increased with time, this allows the mandible to come to a more favourable position.<sup>6,7</sup>

The basic design of the guide flange prostheses will depend greatly on post-operative findings, as there are no type of appliances that will serve for every patient. However there are fundamental principles for the construction of a functional appliance:Every patient should maintain functional occlusion for mastication, and this may be accomplished by a guide plane.<sup>(10)</sup>

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 differs.<sup>(7)</sup>

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.

The prosthetic device proposed was:

- Functional, as desirable occlusion can be reestablished.
- Esthetic, as Mandibular deviation can be corrected.
- Comfortable to wear, as cross arch support was derived.
- Easy to make, repair and better hygiene maintenance.

**CONCLUSION**

Maxillary palatally positioned functionally moulded guide ramp is an effective means of preventing excessive scarring and wound contracture. The purpose of the ramp is to assist post resection and post radiation physiotherapy. The ramp can be used as a definitive prosthesis if there is a need to bring the remaining mandible to occlusion. Patient was satisfied with the way the mandible could occlude after wearing the prosthesis. For better results, the prosthetic management should be combined with an manual exercise program.

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