

Treatment outcome with guiding flange prosthesis in hemimandibulectomy patients: Case series of three patients

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ABSTRACT

There are various indications that may necessitate partial or complete resection of the mandible, from trauma to congenital deformities. However, the most prevalent indication that requires surgical resection of the mandible along with the involved adjacent oral structures is the presence of a locally aggressive neoplastic growth. The resultant continuity defect leads to an alteration in the range and direction of mandibular movement, impedes clear articulation of syllables and cosmetic disfigurement. The role of a prosthodontist is paramount in bringing about the restoration of the esthetic and functional dysfunction. This article discusses a series of hemimandibulectomy cases wherein mandibular deviation was successfully corrected using guide-flange prosthesis.

Keywords: Deviation, guiding ramp, maxillomandibular, mediolateral

Clinical Significance: The use of guide-flange prosthesis in patients who had undergone mandibular resection helps in attaining a correct intercuspal position which improves masticatory function as well as facial asymmetry.

INTRODUCTION

One of the primary bones constituting the face is the mandible which serves a host of functions. Its intimate articulation with the temporal bone and coordinated movement facilitates some of the basic yet important oral functions. The loss of continuity in the lower jaw following surgical excision significantly impairs the psychological well-being and health-related quality of life of the patient.^[1,2] Derangement in the defined path of the closure of the mandible results in deviation of the mandible toward the resected site.^[3,4] This markedly alters the normal maxillomandibular relationship making it difficult for the patient to eat, speak, or swallow. The loss of tissue and discontinuity affects facial symmetry and balance.^[5,6] Mandibular guide-flange is an interim prosthesis that aids in mediolateral repositioning

of the residual mandible.^[7,8] Palatally placed guide-flange is a form of guidance prosthesis which is indicated when the extent of derangement prevents the residual mandibular segment to be manipulated into an acceptable occlusal contact. Maxillary guidance ramps are easier to adjust in comparison to mandibular guidance prosthesis. In such cases, the prime objective of the prosthodontist is to retrain the musculature and establish an appropriate maxillomandibular relationship.^[9,10] It has been observed clinically that some patients are capable of repositioning the mandible into an acceptable mediolateral position. However,

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Figure 1: Extraoral view of the deviated mandible



Figure 2: Palatal ramp attached to the maxillary framework



Figure 3: Cast partial denture for the resected segment



Figure 4: Midline symmetry, occlusion, and esthetic achieved with the final prostheses

the ability to maintain and/or repeat the desired position is variably reduced.^[11,12]

CASE REPORT

In the following case series, three patients, all of who had undergone hemimandibulectomy were rehabilitated with guide-flange prosthesis (GFP) within a span of 1 year following surgical excision. Written informed consent was obtained from the patients for publication of this report and accompanying images.

Patient 1

A 42-year-old male reported to the Department of Prosthodontics at Saraswati Dental College in Lucknow, Uttar Pradesh, with a unilateral mandibular defect. The primary complaints included disfigurement, impaired speech, and mastication [Figure 1]. A detailed patient history revealed that mandibular excision was done due to the presence of ameloblastoma involving the left side of the lower jaw. The surgical procedure was not immediately followed by any reconstructive procedure. Marked deviation of the mandible toward the resected side prevented proper contact between the remaining opposing teeth. Because the patient had lost all the molars on the left upper quadrant, a palatal ramp on

the maxillary cast removable denture was designed to stop the mandibular deviation. A mandibular cast partial denture was fabricated to replace the lower anterior teeth and the premolar on the resected side for esthetic reasons.

After a thorough oral prophylaxis, rest seats were prepared on the strategic abutments. Primary impressions were made using irreversible hydrocolloid impression material (Zelgan 2002; Dentsply, Bengaluru, India) and poured in Type III dental stone (Dentstone; Pankaj Industries, Mumbai, India). Custom-made trays were constructed from auto-polymerizing acrylic resin according to a predetermined outline on the stone model. Secondary impressions were made from polyvinyl siloxane (Xantopren M mucosa; Heraeus Kulzer, Hanau, Germany) to develop definitive casts on which the cast frameworks would be designed. The definitive cast was then examined to reevaluate the path of insertion, after which the frameworks were waxed on the refractory cast. U-shape loop was waxed in the maxillary pattern to retain the acrylic palatal ramp. The patterns were cast in base-metal alloy, finished, polished, and evaluated intraorally. The mandible was guided toward the unresected side until the maximum intercuspation was assured on the remaining viable teeth. The mandibular pathways were registered on the maxillary ramp by the help of mouth temperature wax which was secured by the retentive loops on the maxillary framework. Occlusal

relationships were secured and mounted in a semi-adjustable articulator. Teeth position and occlusion were checked, and necessary corrections were made before processing the maxillary ramp and the lower dentures from heat-polymerizing acrylic resin using conventional laboratory procedures (Lucitone 199; Dentsply, Austenal, NY, USA) [Figure 2]. The mandibular prosthesis was retained using extracoronal cast circumferential clasps on premolars and molars on the unresected side [Figure 3]. The heat processed maxillary ramp was smoothed to reduce the possibility of trauma to the mucosa and thus improve tolerance of the prosthesis [Figure 4].

Patient 2

A 27-year-old male was referred to the Department of Prosthodontics for prosthetic rehabilitation. The patient had a dental history of left mandibular resection owing to squamous cell carcinoma of the mandible. His chief complaint was diminished ability to chew and disfigurement caused by the surgical resection. Clinical examination revealed the mandibular defect extending from the left second premolar upto the condyle. The deviation of the mandible was observed toward the resected side (about 6–8 mm from midline on 21 mm of mouth opening), on opening due to the effect of the normal left mandibular depressor muscles' action [Figure 5]. The patient was able to achieve an appropriate mediolateral position of the mandible under operator guidance, but was unable to repeat this position consistently for adequate mastication. The defect was classified according to Cantor and Curtis as a Class II defect. The treatment objectives were to correct the mandibular deviation.

Occlusal rest seats were planned and prepared intraorally using a triangular configuration. Final impressions were made with addition silicone for the mandibular removable framework. Definitive casts were obtained by pouring with Type IV dental stone, which were surveyed and removable partial denture was designed. The framework was designed with the intention of engaging many of the remaining teeth to obtain additional retention essential for guidance and adequate support. Retentive loops were waxed into the wax pattern to extend along the buccal-surface of the premolar and molar on the nondefect side. The pattern was casted, finished, polished, and tried in the patient mouth. Soft modeling wax was adopted into the buccal loop which was extended up to the buccal vestibule. The patient's mandible was guided toward the unresected side until the maximum intercuspation achieved. The imprints of the mandibular pathways were recorded on the tissue side of the soft modeling wax. The frame along with the wax buccal flange was retrieved and processed with the heat cure acrylic resin.

The cured guiding flange was then trimmed, finished, polished, and delivered to the patient. Care was taken to preserve the buccal surface indentations of the opposing maxillary teeth which were guiding the mandible in a final definite closing point during mastication [Figure 6]. The flange height was adjusted in such a way that it guided the mandible from large opening position (in practical limits of the height of the buccal vestibule) to the maximum intercuspation in a smooth and unhindered path and not to cause any trauma to the supporting tissues [Figure 7]. The



Figure 5: Marked deviation toward the left side



Figure 6: Prosthesis *in-situ* with good retention and stability



Figure 7: Final closure with the guiding flange

prosthesis was delivered, and postinsertion instructions were given. The patient was followed up at the regular interval of 2 months for the next 1 year. The patient was pleased with the overall performance of the prosthesis and successfully speaks and masticates without clinically significant deviation.

Patient 3

A 32-year-old patient reported to the Department of Prosthodontics at Saraswati Dental College in Lucknow, Uttar Pradesh, with a primary complaint of unacceptable facial esthetics and function. Left side of the mandible was surgically resected owing to squamous cell carcinoma, resulting in derangement of the remaining mandibular segment [Figure 8]. On the basis of the intra- and extra-oral clinical findings along with financial constraints of the patient, an acrylic mandibular guide-flange was fabricated.

Primary maxillary and mandibular impressions were made using irreversible hydrocolloid material and casts poured using Type III dental stone. The casts obtained were mounted on an articulator in maximum intercuspation. A 19 gauge stainless steel wire was adapted in the form of a series of loops extending from the buccal surfaces of maxillary and mandibular left first premolar to the first molar. The retentive arms engaged the lingual surfaces of the left mandibular first premolar and first molar. Auto-polymerizing resin of adequate thickness was added over the prepared framework following the application of separating medium. Finishing and polishing of the prosthesis was done prior to insertion in the patient's mouth [Figure 9]. The GFP was tried in patient's mouth, and the initial stability and retention was checked. The inclination of the guide-flange was adjusted by selectively trimming the teeth-contacting surface or adding the auto-polymerizing clear acrylic resin (DPI Cold Cure Clear; Dental Products of India, Mumbai, India). Thus, the smooth gliding flange surface was developed intraorally to guide the mandible in a definite closing point (rather than the area) in occlusion [Figure 10]. Treatment was completed to the esthetic and functional satisfaction of the patient, who has been using her prosthesis for 1 year with no complaints.

DISCUSSION

Rehabilitation in cancer patients should be taken under consideration from the time of diagnosis in complete and comprehensive treatment plan. The primary objective of rehabilitation is to improve both facial symmetry and masticatory function. Depending upon the location and extent of the tumor in the mandible, various surgical treatment modalities such as marginal, segmental, hemi, subtotal, or total mandibulectomy can be performed. To restore mandibular function, a corrective device named "GFP" is indicated to reduce clinical manifestation. This clinical report elaborates the prosthetic management of a patient who has underwent surgery for squamous cell carcinoma and ameloblastoma by various types of GFP.

Various literature shows different types of cast metal guidance prosthesis that are effective in managing mandibular deviation,^[9,11] but these types of appliances are costly and require a number of patient visits whereas acrylic GFP are cost-effective, easy to adjust, and require less number of patient visits. The presence of teeth in both arches is important for effective guidance and reprogramming of mandibular movements.^[9] Except on the side of defect, patient in this clinical report retained all his teeth. Therefore, the patient had a better proprioceptive sense with better functional position after insertion of the prosthesis.

The main objective is to re-educate the mandibular muscles to re-establish an acceptable occlusal relationship (physiotherapeutic



Figure 8: Deviation on opening toward the resected side

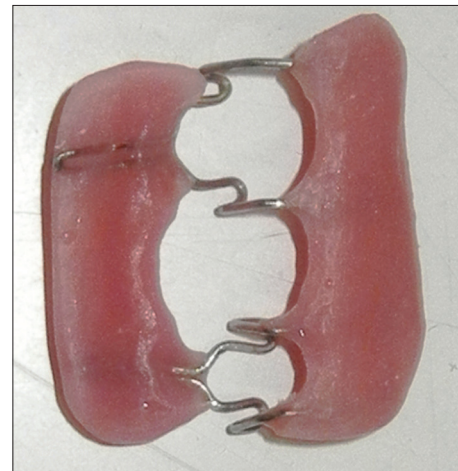


Figure 9: Acrylic guiding flange with retentive wires

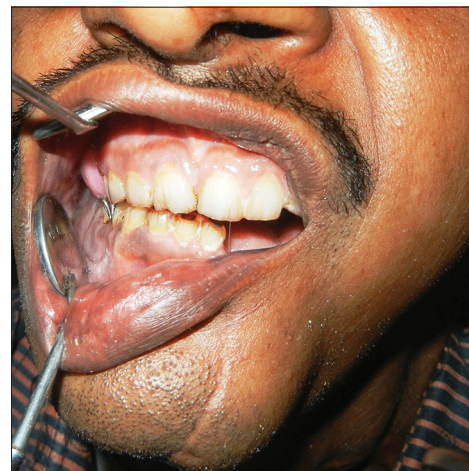


Figure 10: Prosthesis in place at the final closing point

function) for the residual hemimandible so that the patient can control the opening and closing of the mandibular movements adequately and repeatedly.^[11] For better prognosis, the patient should be put on an exercise program that can be started 2 weeks after surgery. On opening completely, the mandible can be

displaced by hand as forcefully as possible toward the nonsurgical side. These movements tend to lessen the scar contracture, reduce trismus, and improve maxillomandibular relationship.

SUMMARY

Following the surgical intervention, it is important for the prosthodontist to functionally rehabilitate the abused stomatognathic system in combination with an effective mandibular exercise program. A prosthetic option known as mandibular guide-flange aids in restoring the physiologic oral activities of speaking, mastication, or deglutition to almost the original state of function. The successful outcome of mandibular guidance therapy depends on the type of the surgical defect, timely initiation, and cooperation of the patient. When treated with the corrective device in the initial healing phase, many of the postresection sequels can be alleviated.

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Conflicts of interest

There are no conflicts of interest.

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