

Guide flange Prosthesis for management of hemimandibulectomy

ABSTRACT

Guide flange is given to patients who have undergone surgical hemi/segmental/subtotal mandibulectomy due to various reasons (leading cause being squamous cell carcinoma), with resultant mandibular deviation. If procedures such as secondary osseous grafting are planned, the clinician has to wait for healing of the graft, lesion, or radiotherapeutic effects to abate. Only after the healing of the graft, a definitive prosthesis can be planned. During this time lag, prosthesis must be given to the patient to correct mandibular deviation on account of unilateral muscle pull. Furthermore, in certain cases, a definitive prosthesis has to be put on hold due to failure of bone grafting or when the patient is not willing for a second surgery. This report describes the fabrication of such a mandibular guide flange prosthesis.

Keywords: Guiding flange, mandibulectomy, squamous cell carcinoma

INTRODUCTION

Oral squamous cell carcinoma (OSCC) is one of the most commonly occurring cancers of the oral cavity and is the 12th most commonly occurring cancer in the world.^[1] It ranks among the top three most common malignant lesions in India.^[2] OSCC occurs most commonly on the lateral margins of the tongue and floor of the mouth, with the risk of invasion of the tumor to the mandible. This necessitates its resection in conjunction with large portions of the tongue, floor of the mouth, and regional lymphatics. Hence, management poses a difficult challenge for the surgeon, radiation oncologist, and prosthodontist to both control the primary disease and rehabilitate following treatment. Loss of mandibular continuity may result in severe impairments of mastication, speech and swallowing, deviation of the mandible toward the affected side during functional movements, rotation of the occlusal plane inferiorly, drooling of saliva, and severe cosmetic disfigurement.^[3]

Immediate mandibular reconstruction is desirable and aims to restore facial symmetry, arch alignment, and stable occlusion.^[4,5] Various alternative treatment modalities available are conventional guide flange prosthesis (GFP)

prostheses, surgical reconstructive procedures followed by cast partial dentures or use of osseointegrated implant retained fixed, and removable prostheses to reestablish the patients' oral functions and quality of life. These are often the options when the surgeon wants to rule out recurrence of lesion and hence opts out of primary reconstruction. GFP is often designed for the patient who is able to achieve a guided appropriate mediolateral position of the mandible but is unable to repeat this position voluntarily and consistently for adequate mastication.^[6] It accounts for the deviation in occlusion because of unilateral muscle pull, resection of condyle, and fibrosis of surgical site, till a more definitive treatment plan can be instituted. This

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case report describes GFP management of a patient who had undergone a hemimandibulectomy (from the left condyle to midline region) and a failed attempt at free fibula grafting.

CASE REPORT

A 42-year-old male was referred to the department of prosthodontics for prosthetic rehabilitation following a hemimandibulectomy (Cantor and Curtis Class III) and attempted but failed reconstruction with free vascular fibula graft 4 months back. History revealed that the patient had a tobacco chewing habit for 20 years and was diagnosed with squamous cell carcinoma of the left mandible 6 months back. Extraoral examination revealed diffuse swelling of the left side of the face, extending from the corner of the mouth to the superior border of neck superoinferiorly and from mandibular midline to left ear anteroposteriorly [Figure 1]. Intraoral examination revealed missing teeth in relation to #24–27, 31–37, and 41 [Figure 2]. It also revealed thick,

freely movable soft tissues with scar formation, loss of alveolar ridge, and obliteration of buccal and lingual sulci in the left half of mandibular region intraorally (mesial to right lateral incisor) [Figure 3]. Deviation of mandible was observed to the left side (about 16 mm from the midline on 30 mm of mouth opening) due to effect of normal right mandibular muscle action in the absence of contralateral left muscles. Frontal plane rotation was noted as the patient tried to close his mouth to maximum intercuspation. The patient was not able to achieve an appropriate mediolateral position of the mandible with the scissor bite being 1 mm after guided closure. Furthermore, the patient was unable to repeat this position himself for mastication. A postsurgical panoramic radiograph revealed missing left ramus, including coronoid process and body of the mandible up to the midline [Figure 4].

A stock tray and a sectional stock edentulous tray were used to record impressions of the maxillary and mandibular arch, respectively, with irreversible hydrocolloid (2002, Dentsply). The impressions were poured with Type III gypsum material (Kalstone; Kalabhai Karson) and casts were retrieved. A 19-gauge round, stainless steel orthodontic wire was manipulated [Figures 5 and 6] on the tooth-bearing segment of the remaining mandible to fabricate a framework for the GFP. Furthermore, C clasps were fabricated on both



Figure 1: Pretreatment view



Figure 2: Maxillary arch



Figure 3: Mandibular arch

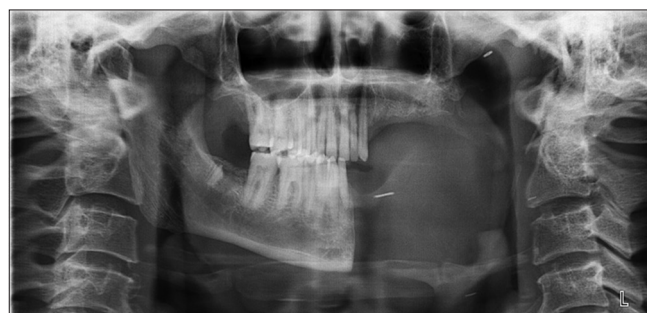


Figure 4: Orthopantomogram



Figure 5: Framework of guide flange

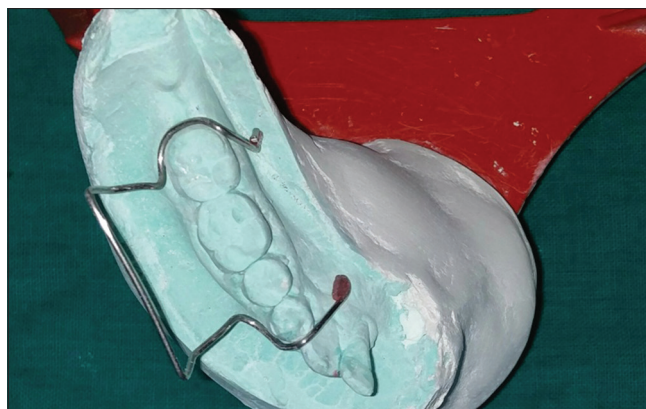


Figure 6: Framework (occlusal view)

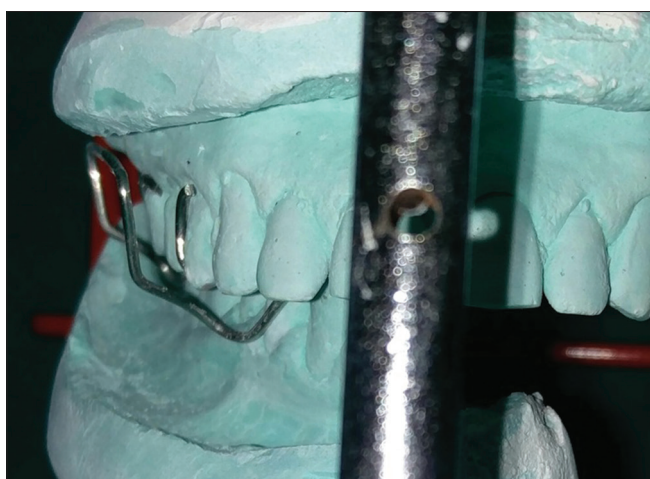


Figure 7: Framework (in occlusion)

first premolars and molars on the maxillary cast [Figure 7]. On the mandibular cast, the vestibular (buccal and lingual) flanges, occlusal surface to compensate for the scissor bite, and the mandibular guide-flange to the level 3 mm over the free gingival margin of the opposing maxillary teeth were waxed-up (Modeling wax; Deepti Dental Products) around the wire substructure with keeping a maxillary cast in occlusion. On the maxillary cast, a single thickness modeling wax was adapted covering the entire hard palate. Subsequently, both were acrylized into the clear heat-polymerized acrylic resin (DPI Heat cure clear; Dental Products of India) [Figure 8]. The GFP and maxillary plate were finished and polished.

The inclination of the guide-flange was adjusted by selectively trimming the surfaces of the GFP contacting the occlusal surface of maxillary teeth or adding autopolymerizing clear acrylic resin intraorally (DPI Cold cure clear; Dental Products of India, Mumbai, India) [Figures 9 and 10]. Thus, smooth gliding flange surface was developed intraorally to guide the mandible to occlusion. Care was taken to preserve the



Figure 8: Guide flange (postacrylization)

buccal-surface indentations of the opposing maxillary teeth in guiding the mandible to a final definite closing point during mastication. The flange height was adjusted from opening position to maximum intercuspation in a smooth unhindered path. The prosthesis was delivered and postinsertion instructions were given. The patient was followed up at the regular interval of 3 months for the next 1 year. The patient could use the prosthesis without much difficulty and could speak and masticate successfully.

DISCUSSION

Carcinoma affects a vast majority of individuals. Around 300,000 patients are annually estimated to have oral cancer worldwide.^[7] India has the ignominy of world's highest occurrence (nearly 20%) of oral cancers, with an estimated 1% of the population having oral premalignant lesions.^[8] Depending on 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.^[9] Deviation of remaining mandibular segment(s) occurs toward the defect when there is loss of mandibular continuity without reconstruction. A vertical acrylic projection from the buccal



Figure 9: Guide flange (intraorally)

aspect of mandibular teeth on the nonresected side extends to contact the buccal surfaces of maxillary teeth on the same side. This helps to maintain the mandible in approximately its proper mediolateral position. This mostly allows for vertical strokes but limited lateral movement. Intermaxillary fixation was used in the past to reduce the deviation associated with resection of the mandible but is currently not in favor. This was done using arch bars and elastics for 5–7 weeks postsurgically. It is feasible only in patients with resections confined to the mandible and with little associated soft-tissue loss. Scar contracture is, therefore, minimal and since ample soft tissue is available for closure, mandibular deviation is actually secondary to muscle imbalance and compromised proprioception. Using intermaxillary fixation in these patients maintains the proprioceptive sense of occlusion and enables most patients to readily assume appropriate intercuspal positions following removal of fixation. However, it is not feasible or appropriate if the patient required composite resection with a classical radical neck dissection and/or radiation therapy, if the oral wound was closed primarily, mandibular deviation is worsened, and the resulting scar contracture is more profound and unyielding. In such patients, scar contracture and tight wound closure contribute more to deviation than do muscle imbalance and/or loss of the proprioceptive sense of occlusion.^[10]

When surgical removal of segment of mandible is planned, ideally, it should be planned for immediate reconstruction. This helps the patient in maintenance of function. Despite advancements in procedures for reconstructive surgery and prosthodontic reconstruction and rehabilitation, more than 50% of reconstructed head-and-neck cancer patients still report impaired masticatory function.^[4,5] Advances in reconstructive surgery and procedures involving dental implants have allowed the patients to have hopes for marked improvement in the quality of life.



Figure 10: Guide flange (in function)

The disadvantage of dental implants is increase in treatment, time firstly due to tissue healing required post surgery and grafting, and secondly time taken for osseointegration of the implants.^[11] In this time lag, a mandibular guide flange can be given to the patient, as it will help the patient to guide the residual mandible into its normal position which will improve masticatory efficiency.

In this case, the patient was a middle-aged male who had already undergone a reconstruction, but the free fibula bone graft procedure failed and the patient did not want to undergo another surgical procedure. Furthermore, his maxillary teeth were absent on the side of mandibulectomy. The main aim of the treatment in this case was to guide the remaining mandible into normal position to allow the patient to carry out basic activity of mastication of food, and to some degree, compensate for the facial appearance due to the excessive deviation of remaining mandible. Furthermore, attempts were made to prevent tipping of maxillary teeth due to constant force of the mandibular guide flange on the teeth by giving the patient a maxillary stabilization plate. To enhance the esthetics to some degree, the prosthesis can be fabricated in clear acrylic and the wire components can be shifted as posterior as permissible. The prosthesis though should include as many teeth as possible and the flange should have sufficient extension to allow it to be stable and retentive, and at the same time, distribute stresses on an area as large as practically possible.

The GFP is commonly used on an interim basis as a training prosthesis until such a time when a permanent prosthesis is designed and fabricated. If the patient happens to successfully repeat the mediolateral position, the prosthesis can be discontinued. However, in certain cases, the patients may continue to wear the GFP for an indefinite amount of time due to various reasons such as financial constraints, time constraints, and guarded prognosis of the planned definitive treatment.

CONCLUSION

A GFP is given as an interim prosthesis in the aftermath of a mandibulectomy or postsurgical reconstruction of the defect to allow the patient to carry out his/her routine functions like mastication and to maintain esthetics to some extent by preventing the deviation of the jaw to the affected side. In certain cases, the patient may be forced to use the prosthesis for an indefinite amount of time due to reasons such as poor prognosis postbone grafting and financial constraints of the patient which precludes the expensive treatment.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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