

Prosthetic Rehabilitation of Hemimandibulectomy Defect with Removable Partial Denture Prosthesis Using an Attachment-Retained Guiding Flange

Abstract

The restoration of normal function and esthetics is often challenging in the prosthetic rehabilitation of patients with hemimandibulectomy defects due to unstable occlusion and mandibular deviation. The extensive period of time for completion of healing of the reconstructed mandible through reconstructive plastic surgery and/or implant-assisted prosthesis may compromise the masticatory function by causing delay in the fabrication of definitive prosthesis. This case report describes a novel technique for the construction of customized attachment-retained mandibular guiding flange prosthesis for immediate rectification of the frontal plane rotation occurring after hemimandibulectomy.

Keywords: Guiding flange, hemimandibulectomy, mandibular deviation

Introduction

Mandibular deviation due to unilateral mandibular discontinuity defects caused by surgery or trauma results in lack of occlusion and altered maxillomandibular relationships for optimum mastication and appearance.^[1] The extensive involvement of osseous and soft tissues, loss of sensory and motor innervations, and scar tissue formation after hemimandibulectomy radically compromise the prosthetic prognosis. One of the basic aims in rehabilitation is to retrain the muscles for repeated occlusal approximation. Various mandibular reconstruction techniques and microvascular surgical approaches have been used in the past decade to provide a favorable attached tissue foundation and improve prosthetic rehabilitation in patients who have undergone hemimandibulectomy.^[2] However, only limited improvement has been reported so far in terms of esthetics, speech, swallowing, and masticatory performance due to the prolonged period required for completion of healing and acceptance of the osseous graft before considering the definitive prosthesis.^[3,4] Prosthodontic intervention is usually recommended in the initial healing period of reconstructed mandible to prevent the rotation of the mandibular occlusal plane inferiorly and extrusion of the maxillary teeth and improve the masticatory efficiency.^[5] Depending on the nature and severity of the mandibular defects, several

methods including intermaxillary fixation, prosthetic rehabilitation with conventional prostheses such as mandibular based guidance restorations, and palatal based guidance restorations or implant-supported prostheses have been advocated for the correction of mandibular deviation.^[6,7] This case report describes the fabrication of mandibular guiding flange prosthesis attached to definitive cast partial denture using customized rod and tube attachment for a patient with hemimandibulectomy defect on the right side.

Case Report

A 25-year-old female patient was referred to the Department of Prosthodontics (Manipal College of Dental Sciences, Manipal, India) for prosthetic rehabilitation following a hemimandibulectomy reconstructed with sternocleidomastoid flap. A detailed case history revealed that the patient was diagnosed with the follicular ameloblastoma of the right mandible 6 months back. Facial asymmetry and deviation of the mandible to the reconstructed (right) side (about 10–12 mm from midline on 37 mm of mouth opening) was noted [Figure 1a]. The lower anterior teeth were drifted toward the defect and first molar on the left side of the mandible was missing. An orthopantomogram revealed resection of the mandible distal to the right lateral incisor involving the ramus,

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coronoid process, and condyle [Figure 1b]. Removable partial denture (RPD) prosthesis with customized attachment-retained guiding flange was designed for this patient. Maxillary and mandibular primary impressions were made in irreversible hydrocolloid (Dentalgin; Prime Dental Products, Mumbai, India) and casts were poured with Type III dental stone (Kalstone; Kalabhai Karson, Mumbai, India). The mandibular RPD framework was designed after surveying the cast (MARATHON, Surveyor 103 Complete) and customized tube-shaped wax pattern (10 mm length; 5 mm × 5 mm square cross-section) (Alphabond Dental, BEGO wax profiles; Germany) was attached to the mesh minor connector on the nondefective side before casting [Figure 1c]. A metal rod [Figure 1d] was casted separately (12 mm length; 4 mm × 4 mm square cross section) with a U-loop at one end to retain the acrylic guiding flange (Remanium; Dentaurum GmbH and Co. KG, Ispringen) [Figure 2a]. The RPD metal framework was evaluated inside the mouth for proper fit, and occlusion recording wax (Dental Wax; Carmel Group Inc.) was used to record centric occlusion by guiding the mandible into the best possible occlusal relationship. The casts were mounted on a semiaadjustable articulator (Hanau Wide-View Articulator; Whip Mix Corp; Louisville, KY, USA) and semianatomic teeth (Lactodont, Pyrax polymers, Roorkee, India) were arranged in the posterior region. The RPD was processed in heat-activated acrylic resin (Heat Cure; DPI). After insertion of the RPD, the metal rod was inserted through the tube [Figure 2b], and softened modeling plastic impression compound (DPI Pinnacle; Mumbai) was placed on the U-loop of the rod for intraoral functional molding of the guiding flange that extended laterally and superiorly up to the maxillary buccal sulcus [Figure 2c]. Subsequently, the guiding flange was flasked and processed with clear heat-activated acrylic resin (Heat Cure; DPI) [Figure 2d]. On the maxillary cast, wax-up of a palatal plate engaging the buccal surface of maxillary teeth on the nondefective side was done by adapting 1-mm thick

orthodontic wrought wire (KC Smith and Co). This maxillary stabilization plate was processed using clear acrylic resin (Heat Cure; DPI) [Figure 3a].

Discussion

Nowadays, the modern maxillofacial surgery offers a wide range of good results with mandibular reconstruction after cancer ablation. However, the failure of grafts or delay in healing due to infection, compromised underlying host defense, and advanced age of the patient result in unpredictable functional outcome and poor facial profile.^[8] Osseointegrated implant rehabilitation as a secondary procedure after free-flap mandible reconstruction also has some excluding factors such as extent of disease, amount of remaining dentition, postoperative radiation therapy, patient preference, and expense.^[9] The temporary and propaedeutic use of mandibular guidance serves the purpose of reducing mandibular deviation by reducing the contraction of the cicatricial tissue on the operated side that tends to fix the residual fragment in its deviated position.^[10] Thus, its prompt usage also helps to prevent facial deformity and functional loss when the patient is scheduled for a delayed reconstruction of the mandible.

Joshi *et al.*^[11] advocated the use of removable guide flange prostheses for most patients with mandibular deviation, considering the poor prognosis and economic feasibility. Nelogi *et al.*^[12] described the fabrication of a fixed guide flange appliance that consisted of a molar band with a U-loop, cemented to the tooth, and claimed it to be particularly beneficial for patients with reduced mouth opening and poor motor skills to manage a removable prosthesis. However, its use was limited to periodontally sound teeth only. Cast metal guidance prosthesis with supporting and retentive flanges were also advocated to alleviate self-mutilation of cheek and tongue during function.^[13] Principe *et al.*^[14] described the fabrication of a mandibular guiding flange attached to the RPD by two precision attachments.

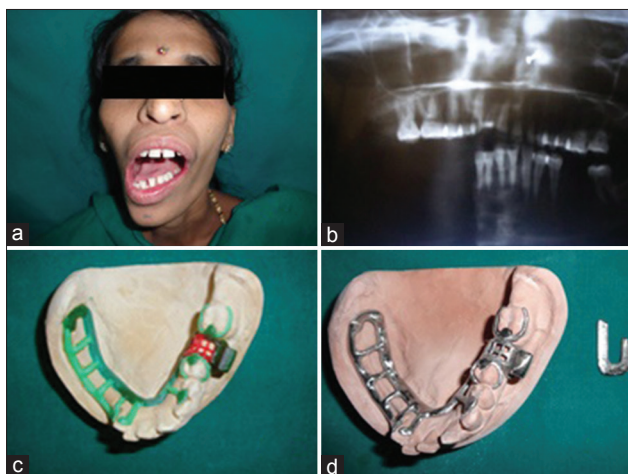


Figure 1: (a) Mandibular deviation toward the defect. (b) Orthopantomogram showing the defect distal to the right lateral incisor. (c) Rectangular tube attached to mesh minor connector on nondefective side. (d) Cast metal rod



Figure 2: (a) Metal rod with U-loop to retain acrylic guiding flange. (b) Metal rod inserted through tube. (c) Intraoral functional molding of guiding flange. (d) Acrylic guiding flange

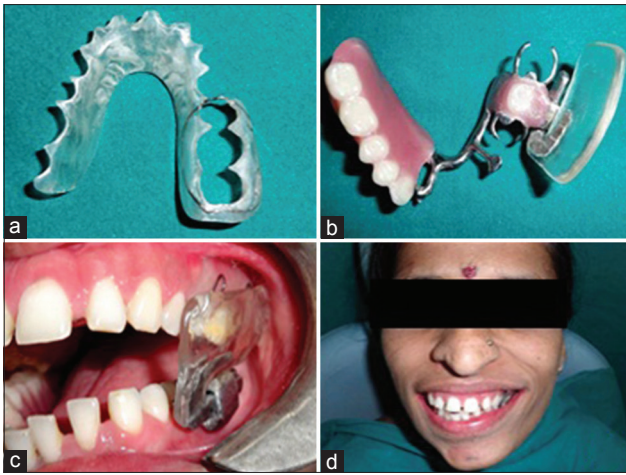


Figure 3: (a) Maxillary stabilization plate. (b) Detachable acrylic guiding flange retained to mandibular removable partial denture. (c) Acrylic maxillary plate covering posterior teeth. (d) Patient with guiding flange prosthesis

Treatment modality adopted for this patient consisted of a detachable clear acrylic guiding flange retained to mandibular RPD through a customized tube-and-rod attachment that interlocked through frictional resistance [Figure 3b]. This attachment can be connected to the RPD through minor connector/denture base or embrasure clasps on posterior teeth along the buccal aspect of nondefective side [Video 1]. The intermittent use of such guiding flange therefore may also help to maintain adequate periodontal health by reducing the amount and duration of angular loads on the remaining dentition. It is particularly useful for patients with limited mouth opening as the guiding flange can be separated from the RPD for easy insertion and removal of the prosthesis from the mouth. A palatal plate with buccal extension over maxillary posterior teeth on the nondefective side was fabricated to form an inclined surface that assisted the flange in mandibular guidance, prevented trauma to the maxillary soft tissues during mandibular functions, and offered resistance against palatal orthodontic movement of maxillary teeth because of the amount of force generated by the flange [Figure 3c]. The guiding flange was localized to three teeth (two premolars and a first molar) and processed in clear heat-cured acrylic resin for esthetic reasons [Figure 3d]. This prosthesis requires frequent follow-ups as acrylic adjustments are mandatory in the guiding flange during the course of correction of mandibular deviation. Improvement in achieving proper centric occlusion was noted after 6 months without guiding flange.

Conclusion

The mandibular guiding flange described in this article can be regarded as a training type of prosthesis that helps to improve both facial symmetry and masticatory function for the rehabilitation of patients with mandibular discontinuity defects. Patients may discontinue with the guiding flange attached to the definitive prosthesis if mediolateral position of the mandible can be repeated successfully.

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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Nil.

Conflicts of interest

There are no conflicts of interest.

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