International Journal of Dental Sciences
www.dentaljournal.in
E-ISSN: 2663-4708
Received: 12-01-2026; Accepted: 11-02-2026; Published: 26-02-2026
Volume 8, Issue 1, 2026, Page No. 90-93

Prosthodontic rehabilitation of a hemimandibulectomy patient using a guide flange prosthesis: A case report

Dr. Vinay Tiwari, Dr. Manish Chadha, Dr. Nikhil Singh, Dr. Anshadha Yede
Pacific Dental College and hospital Debari Rajasthan Udaipur, Rajasthan, India

Abstract
Mandibular deviation following hemimandibulectomy results from loss of mandibular continuity and neuromuscular imbalance, often worsened by post-radiotherapy changes. This condition significantly impairs mastication and occlusal control. A guide flange prosthesis is a conservative approach that redirects the mandibular segment and promotes neuromuscular re-education. This case report describes the successful rehabilitation of a 74-year-old male patient using a removable guide flange prosthesis.

Keywords: Guide flange prosthesis, hemimandibulectomy, mandibular deviation, maxillary guidance prosthesis, neuromuscular re-education, post-radiotherapy rehabilitation, maxillofacial prosthetics

Introduction

Benign and malignant neoplasms of the mandible frequently require surgical excision of the pathological lesion along with resection of a significant portion of the lower jaw. Mandibular resection results in loss of continuity, leading to deviation of the residual mandibular segment toward the resected side and inferior rotation of the occlusal plane. These alterations cause functional disturbances such as impaired mastication, speech difficulties, swallowing problems, facial disfigurement, and compromised mandibular movements [1].

Oral squamous cell carcinoma (OSCC) is one of the most commonly occurring malignancies of the oral cavity and ranks among the top three malignant oral lesions in India. The lesions commonly involve the lateral border of the tongue and floor of the mouth, often necessitating mandibular resection along with adjacent soft tissues and regional lymphatics. Loss of mandibular continuity following such surgical procedures leads to severe deviation of the mandible during function, drooling of saliva, rotation of the occlusal plane, and marked esthetic and functional impairment [2].

Following segmental or hemimandibulectomy, masticatory efficiency is significantly reduced due to unilateral muscle removal, altered maxillomandibular relationships, loss of proprioceptive sensation of occlusion, and fibrosis at the surgical site. Although immediate mandibular reconstruction aims to restore facial symmetry, arch alignment, and stable occlusion, neuromuscular imbalance frequently results in uncontrolled and uncoordinated mandibular movements during function [1, 3].

The primary goal of prosthodontic rehabilitation in such patients is to re-educate the mandibular musculature and establish a repeatable, functional occlusal relationship. A guide flange prosthesis (GFP) is a conventional mandibular prosthesis indicated for patients who are capable of achieving an acceptable mediolateral intercuspal position of the mandible but are unable to consistently reproduce this position voluntarily during mastication. The guide flange assists in limiting mandibular deviation caused by unilateral muscle pull, loss of condylar guidance, and surgical fibrosis, thereby improving masticatory efficiency and mandibular control until definitive rehabilitation can be achieved [1, 3].

Case Report

Patient Information

A 74-year-old male patient, Mr. Bhim Raj Banjara, reported to the Department of Prosthodontics with the chief complaint of missing teeth in the lower jaw and deviation of jaw, resulting in difficulty in mastication.

Medical and Surgical History

The patient had a history of Squamous cell carcinoma, for which he underwent partial hemimandibulectomy. Post-surgical management included radiotherapy. No other relevant systemic illness was reported.

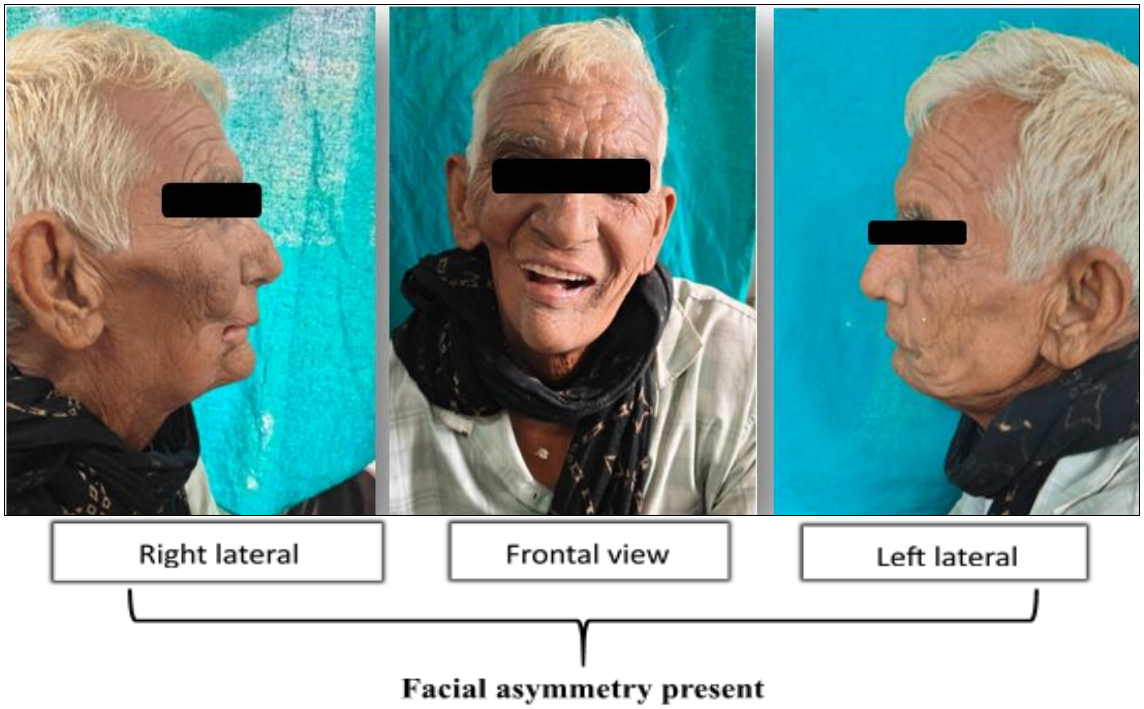
Dental History

The patient had experienced progressive tooth loss following surgical intervention. No previous prosthodontic rehabilitation had been attempted.

Clinical Examination

Extra-Oral Examination

- Facial asymmetry
- Deviation of the mandible toward the resected side was observed during opening and closing movements.
- Reduced control of mandibular movements was noted.



Intra-Oral Examination

- Missing teeth were recorded as:
- **Maxilla:** 15, 16, 17
- **Mandible:** 31 and 41–47
- Occlusal disharmony was present due to altered mandibular closure path.
- Soft tissues showed post-radiotherapy changes but were free from active pathology.

Diagnosis

- Partially edentulous maxilla and mandible
- Mandibular deviation secondary to partial hemimandibulectomy following tumor resection and radiotherapy

Treatment Objectives

- To guide the deviated mandible into a more favorable occlusal position
- To improve masticatory efficiency
- To re-establish neuromuscular coordination
- To enhance patient comfort and function

Treatment Plan

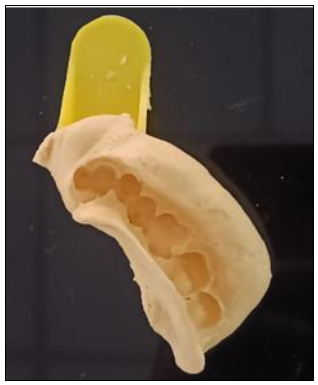
A removable mandibular guide flange prosthesis was planned as an initial prosthodontic intervention to correct mandibular deviation and facilitate neuromuscular re-education.

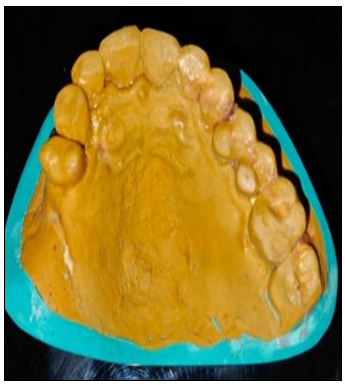
Clinical Procedure

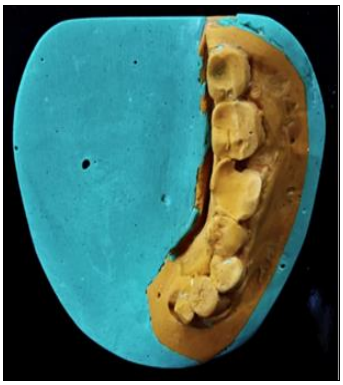
1. **Primary Impressions**

- Maxillary and mandibular impressions were made using irreversible hydrocolloid.
- Diagnostic casts were poured in dental stone.

Alginate Impression



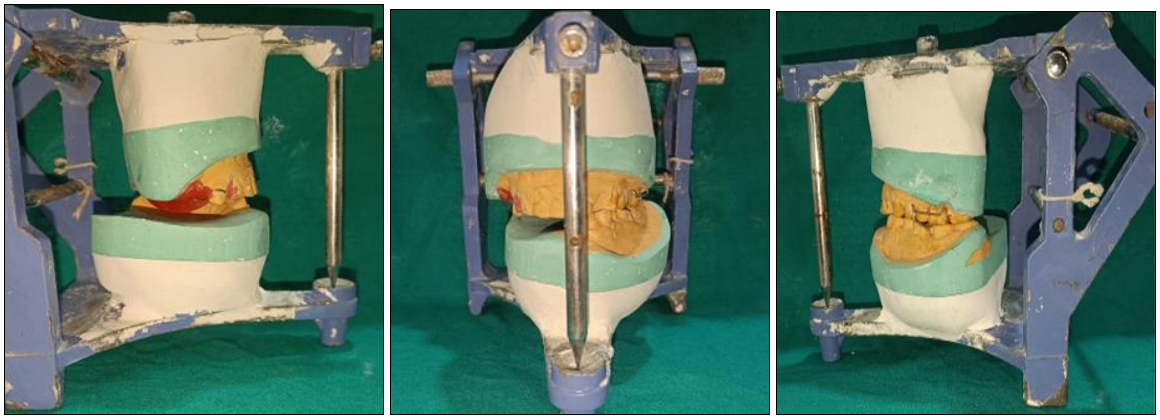




Diagnostic Cast Prepared

2. **Jaw Relation Recording**

- Maxillomandibular relation was recorded by manually guiding the mandible toward the non-defect side.
- The position that achieved maximum occlusal contact was registered.



Jaw Relation Recorded in Guided Position

3. Design and Fabrication

- A mandibular removable prosthesis incorporating a buccal guide flange was designed.
- The flange was extended superiorly to contact the maxillary teeth during closure, thereby directing the mandible into the desired position.

4. Try-In

- Wax try-in was performed to evaluate the guiding effect, patient comfort, and occlusal relationship.
- Necessary adjustments were made.

5. Insertion

- The processed prosthesis was delivered.
- Occlusal adjustments were performed.
- The patient was trained to close the mandible along the guiding surface.

Prosthesis design

Final Prosthesis

Post-Insertion

Post-Insertion

Follow-Up

The patient was reviewed at regular intervals. Progressive improvement in mandibular control and closure path was observed. The patient reported enhanced masticatory efficiency and comfort, with no evidence of mucosal irritation or prosthesis-related complications.

Discussion

Partial hemimandibulectomy results in loss of mandibular continuity, leading to deviation of the residual mandibular segment toward the resected side and inferior rotation of the mandibular plane. This deviation occurs due to the uncompensated pull of the contralateral musculature, particularly the medial pterygoid muscle, combined with loss of proprioceptive control and postoperative cicatricial tissue contraction. If left uncorrected, the residual mandibular fragment may become fixed in a deviated position, resulting in facial asymmetry, impaired mastication, speech difficulty, and significant functional disability [1-4].

In the present case, the 74-year-old patient demonstrated classical clinical features of a mandibular discontinuity defect, including facial asymmetry, deviation of the mandible toward the resected side during opening and closing movements, occlusal disharmony, and reduced neuromuscular coordination. These findings are consistent with previous reports describing compromised masticatory efficiency and functional limitations following segmental or hemimandibulectomy [1, 2, 4].

The patient had undergone partial hemimandibulectomy followed by radiotherapy, which further complicated rehabilitation due to radiation-induced fibrosis, soft-tissue contracture, and compromised neuromuscular control. Although contemporary maxillofacial surgery offers reconstructive options such as vascularized free flaps and implant-supported rehabilitation, factors such as delayed healing, graft failure, postoperative radiation therapy, advanced age, patient preference, and financial constraints often limit their feasibility [4-6]. In such situations, early prosthodontic intervention using a mandibular guide flange prosthesis plays a crucial role in preventing further deviation, minimizing cicatricial fixation, and improving functional outcomes [4-6].

The primary objective of rehabilitation in this case was to guide the deviated mandible into a repeatable and functional occlusal position and to re-educate the mandibular musculature. A removable mandibular guide flange prosthesis was selected as the patient was able to achieve an acceptable mediolateral mandibular position manually but was unable to consistently reproduce it during functional closure. This indication aligns with the established role of guide flange prostheses as training appliances during the early and intermediate phases of rehabilitation [4-6].

The guide flange was designed to extend on the buccal aspect of the mandibular teeth on the non-defect side, allowing engagement with the maxillary teeth during closure to guide the mandible into an acceptable intercuspal position. Similar designs using cast metal guidance flanges have been reported to facilitate functional intercuspation, although mastication may remain largely limited to vertical movements [4, 5]. Removable acrylic guide flange prostheses have been advocated as a simpler, economical, and adjustable alternative, particularly in patients with poor prognosis or limited financial resources [4-6].

In the present case, an acrylic guide flange with a guidance ramp was preferred as it allowed ease of fabrication, chairside adjustments, and progressive neuromuscular training. Support for the prosthesis was derived from the remaining natural teeth and residual alveolar ridge, similar to other removable prostheses. Adequate retention was achieved using clasps placed in widely distributed areas, ensuring sufficient rigidity without overloading the abutments. The lingual extension of the flange was designed to enhance stability while avoiding extension into the graft–normal tissue junction to prevent tissue irritation, as emphasized in previous studies [4].

Regular follow-up demonstrated gradual improvement in the mandibular closure pattern, enhanced neuromuscular coordination, and improved masticatory efficiency. The patient reported better comfort, speech, and functional control without prosthesis-related complications. Successful mandibular guidance therapy has been reported to be more predictable in cases with minimal soft-tissue loss and preserved neuromuscular function; however, acceptable outcomes can still be achieved in post-radiotherapy patients with careful prosthesis design and monitoring [4-6].

The guide flange prosthesis is generally considered a training or intermediate prosthesis. Once the patient can consistently achieve the corrected mandibular position, the appliance may be discontinued. However, in elderly patients or in cases with delayed or contraindicated definitive reconstruction, prolonged or indefinite use of the guide flange may be necessary, warranting periodic evaluation of occlusal forces and supporting structures [4, 6, 7].

Thus, in the present case, the removable acrylic mandibular guide flange prosthesis proved to be a simple, conservative, cost-effective, and non-invasive prosthodontic modality for managing mandibular deviation following partial hemimandibulectomy, resulting in satisfactory functional improvement and enhanced quality of life.

Conclusion

Mandibular deviation following partial hemimandibulectomy results in significant functional impairment due to loss of neuromuscular coordination and occlusal disharmony. In the present case, a removable mandibular guide flange prosthesis effectively guided the mandible into a favorable occlusal position and improved masticatory efficiency. The prosthesis served as a conservative and non-invasive modality for neuromuscular re-education, especially in a post-radiotherapy patient where surgical reconstruction was not feasible. Thus, guide flange prosthesis remains a reliable rehabilitative option for restoring function and improving quality of life in hemimandibulectomy patients.

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