

Prosthodontic Rehabilitation of a Hemimandibulectomy Patient with Twin Occlusion Complete Denture

Dr. Nivedha S.^{1*}; Dr. Sanjayagouda B. Patil²; Dr. Swetha D.¹; Dr. Khaleel¹;
Dr. A. H. Shoeab Khan¹; Dr. Chilakala Ravallika¹

¹Post Graduate, Department of Prosthodontics, Crown & Bridge and Implantology,
Sri Hassanamba Dental College and Hospital, Hassan-573202, Karnataka, India

²Professor and Head, Department of Prosthodontics, Crown & Bridge and Implantology,
Sri Hassanamba Dental College and Hospital, Hassan-573202, Karnataka, India

Corresponding Author: Dr. Nivedha S.^{1*}

Publication Date: 2025/10/10

Abstract: Hemimandibulectomy often results in significant functional and esthetic impairment due to loss of mandibular continuity, deviation of the residual segment, and compromised occlusal contacts. Prosthetic rehabilitation in completely edentulous patients presents a considerable challenge owing to the absence of proprioceptive feedback and altered mandibular dynamics. This case report describes the prosthodontic management of a 69-year-old completely edentulous female patient with a history of right-sided hemimandibulectomy. The patient was rehabilitated using a conventional mandibular complete denture and a maxillary complete denture incorporating twin occlusion on the non-resected side. This arrangement aided in guiding mandibular closure, restoring function, and improving facial esthetics. The twin occlusion setup in the maxillary prosthesis proved to be a functionally effective and economical approach for managing mandibular deviation in hemimandibulectomy patients. With appropriate training and neuromuscular adaptation, this technique significantly improved masticatory efficiency and overall quality of life.

Keywords: Hemimandibulectomy; Twin Occlusion; Mandibular Deviation; Complete Denture; Maxillary Denture; Oral Rehabilitation.

How to Cite: Dr. Nivedha S.; Dr. Sanjayagouda B. Patil; Dr. Swetha D.; Dr. Khaleel; Dr. A. H. Shoeab Khan; Dr. Chilakala Ravallika (2025) Prosthodontic Rehabilitation of a Hemimandibulectomy Patient with Twin Occlusion Complete Denture. *International Journal of Innovative Science and Research Technology*, 10(10), 395-399.
<https://doi.org/10.38124/ijisrt/25oct072>

I. INTRODUCTION

Hemimandibulectomy refers to the surgical resection of one lateral half of the mandible, typically indicated in the treatment of malignant neoplasms such as oral squamous cell carcinoma. This surgical intervention, while often life-saving, results in a discontinuity defect that causes significant anatomical and functional disruption. Common sequelae include mandibular deviation toward the resected side, facial asymmetry, compromised occlusal contacts, impaired mastication, and speech difficulties—all of which collectively reduce the patient's quality of life and psychosocial well-being [1–3].

The deviation of the mandible following hemimandibulectomy is primarily attributed to the unopposed pull of contralateral muscles and the loss of

stabilizing bony structures [4]. Prosthetic rehabilitation of such patients presents unique challenges, particularly in those who are completely edentulous. The absence of periodontal proprioception, altered muscle dynamics, and reduced denture-bearing area further complicate the establishment of maxillomandibular relations, occlusal stability, and retention [5,6].

Conventional prosthodontic approaches, while useful, often fall short in achieving predictable function in these patients. In such cases, the occlusal scheme can be strategically modified to redirect mandibular closure into a guided path. One such technique is the twin occlusion concept, first introduced in resection prosthodontics, which involves arranging two rows of posterior teeth buccolingually on the non-resected side of the maxillary denture [7]. The buccal row functions as a guiding ramp to

assist the deviated mandible in re-establishing an acceptable intercuspation, while the lingual row provides masticatory efficiency [8].

This clinical case report describes the successful prosthodontic rehabilitation of a completely edentulous hemimandibulectomy patient using a maxillary complete denture incorporating a twin occlusion arrangement.

II. CASE REPORT

A. Patient History and Evaluation

A 69-year-old female patient reported to the Department of Prosthodontics with chief complaints of difficulty in chewing and unaesthetic facial appearance. She had undergone a right-sided hemimandibulectomy four years earlier as a surgical intervention for oral squamous cell carcinoma. Since the surgery, the patient had not received any form of prosthetic rehabilitation.



Fig 1 Pre-Operative Extraoral Photograph.

Extraoral examination revealed noticeable facial asymmetry with the chin markedly deviated toward the resected side. Reduced lower facial height and compromised lip support were also evident.

Intraoral examination revealed completely edentulous maxillary and mandibular arches, with the mandibular residual segment deviating significantly toward the resected side during functional movements.



Fig 2 Pre-Operative Intraoral Photograph.

Radiographic evaluation (orthopantomogram) confirmed the complete resection of the right mandibular body extending to the midline, with no reconstructive surgical grafting performed post-resection.



Fig 3 Orthopantomogram.

B. Treatment Planning

Given the patient's edentulous state, absence of reconstructive graft, and deviation of the mandible, a non-invasive and cost-effective prosthodontic solution was proposed.

➤ The Final Treatment Plan Included:

- A conventional heat-cured mandibular complete denture.
- A maxillary complete denture incorporating a twin occlusion setup on the non-resected (left) side to facilitate mandibular guidance during functional movements and improve occlusal stability.

➤ The Objectives of Using Twin Occlusion were to:

- Provide a mechanical guide to redirect the deviated mandible toward a repeatable centric position.
- Re-establish occlusal contact on the non-resected side.
- Restore vertical dimension and improve lower facial esthetics.
- Enhance masticatory efficiency and facilitate neuromuscular retraining for functional mandibular closure.

C. Clinical Procedure

➤ Primary Impression and Cast

Preliminary impressions were made for both arches using impression compound. The impressions were poured in Type II dental plaster to obtain diagnostic casts.



Fig 4 Primary Impression and Cast.

➤ *Custom Tray Fabrication and Border Molding*

Custom trays were fabricated using auto-polymerizing resin. Border molding was carried out with low-fusing impression compound to capture functional sulcus extensions. Final wash impressions were made with polyvinyl siloxane, and the casts were poured in Type III dental stone.

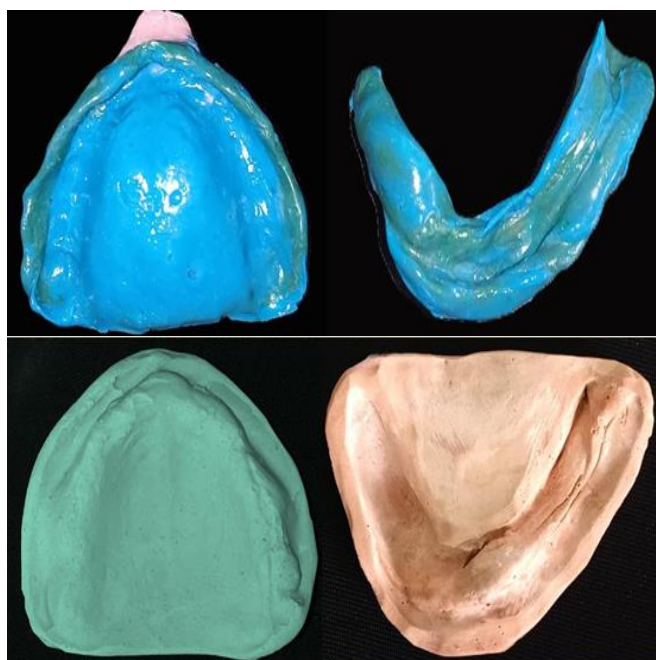


Fig 5 Secondary Impression and Master Cast.

➤ *Jaw Relation Recording*

Wax occlusion rims were fabricated. The tentative vertical dimension of occlusion (VDO) was established based on esthetics, phonetics, and rest position. The patient was guided into tentative centric relation manually, given her restricted mandibular control. The record was transferred to a mean value articulator.

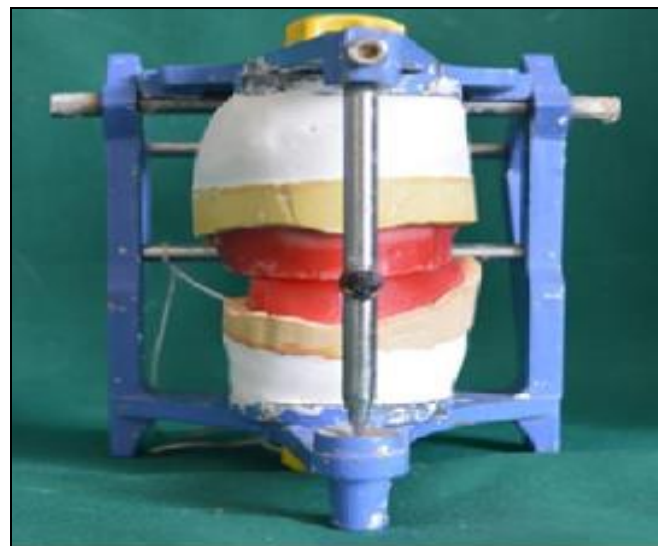


Fig 6 Tentative Jaw Relation.

➤ *Teeth Arrangement and Wax Try-in*

- Non-anatomic acrylic teeth were selected to facilitate smooth gliding contacts.
- Mandibular arch: standard single-row occlusion.
- Maxillary arch (non-resected side): twin occlusion arrangement.
- Buccal row: shallow cusp teeth arranged laterally as a guiding incline.
- Lingual row: arranged in functional occlusion with mandibular posterior teeth for mastication.
- Resected side: conventional single row maintained, due to limited function.

At the wax try-in appointment, esthetics, phonetics, and mandibular closure were evaluated. Minor refinements were made to optimize the guiding ramp.



Fig 7 Wax Try-in Showing Twin Occlusion.

➤ Denture Processing and Insertion

The waxed-up dentures were processed using conventional compression molding with heat-cured polymethyl methacrylate. Dentures were finished, polished, and delivered to the patient. Insertion checks confirmed retention, stability, and esthetics. Occlusion was refined intraorally.

The patient was trained to perform repetitive closure exercises toward the twin occlusion to aid neuromuscular adaptation. Instructions were given for hygiene maintenance, denture removal at night, and functional adaptation.



Fig 8 Final Twin Occlusion Prosthesis.

D. Post-Treatment Outcome

Within two weeks of denture insertion, the patient reported:

- Noticeable improvement in chewing efficiency and facial esthetics.
- Reduced mandibular deviation on closure.
- Improved speech clarity and confidence.

At the six-month follow-up, oral tissues were healthy with no sore spots. The patient demonstrated stable mandibular closure with minimal deviation and continued to use the prosthesis comfortably.



Fig 9 Post-Operative Frontal View.

III. DISCUSSION

Prosthetic rehabilitation of hemimandibulectomy patients is challenging due to anatomical discontinuity, mandibular deviation, and impaired neuromuscular control. The absence of teeth worsens the problem, as proprioception is lost and support is reduced [1–5].

Although implant-retained prostheses provide superior stability, they are not always feasible due to insufficient bone, systemic conditions, or financial constraints [6,7]. Conventional dentures must therefore be adapted.

The twin occlusion technique, introduced by Robinson [7] and refined by Cantor and Curtis [2], involves two rows of posterior teeth on the non-resected side. The buccal row functions as a guiding ramp, while the lingual row maintains functional occlusion. This setup broadens the occlusal table, provides mechanical guidance, and aids neuromuscular retraining.

In this case, twin occlusion successfully guided mandibular closure, improved masticatory function, and enhanced facial esthetics. These results align with previous studies demonstrating improved stability, better speech, and higher patient satisfaction with twin occlusion dentures [8–11].

The technique requires precise arrangement of teeth and patient training, but it remains a predictable and economical approach when implants or surgical reconstruction are not possible [12–16].

IV. CONCLUSION

This clinical case highlights the efficacy of incorporating a maxillary twin occlusion in prosthodontic rehabilitation of hemimandibulectomy patients. The technique provides a practical, non-invasive, and cost-effective solution for managing mandibular deviation in completely edentulous patients. By offering a guided pathway for mandibular closure, restoring vertical dimension, and enhancing neuromuscular coordination, twin occlusion significantly improves function and esthetics.

ACKNOWLEDGMENT

The authors thank the Department of Prosthodontics, Sri Hasanamba Dental College and Hospital, Hassan, for their support during the rehabilitation and documentation of this case.

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