

# Rehabilitation of a Patient with Combined Hemimaxillectomy-hemimandibulectomy Defect using Unilateral Implant-supported Magnet-retained Prosthesis: A 3-year Follow-up

RAMYA SRINIVASAN<sup>1</sup>, SAUMYENDRA VIKRAM SINGH<sup>2</sup>, DEEKSHA ARYA<sup>3</sup>, R ROHINI<sup>4</sup>, MAYANK SINGH<sup>5</sup>

**Keywords:** Dental prosthesis, Mastication, Maxillofacial prosthesis, Osseointegrated dental implant, Quality of life, Segmental mandibulectomy

A 60-year-old patient presented with complaints of difficulty in chewing and deteriorating systemic health [Table/Fig-1]. The medical history revealed squamous cell carcinoma affecting the right part of the maxilla and mandible, which was surgically treated 15 years ago. The surgical intervention involved the removal of the maxillary alveolus, tuberosity, mandibular condyle, and coronoid process, extending up to the mandibular midline. Soft tissue reconstruction was performed to address the maxillary defect. There was a recurrence of the carcinoma, which was managed through radiotherapy. The patient had controlled diabetes and hyperthyroidism and was on medication for these conditions. On examination, a hemimaxillectomy without oronasal fistula and a hemimandibulectomy that included the condyle were observed. Decayed root stumps with periapical radiolucencies [Table/Fig-2] were extracted. The presence of a scar band in the right cheek ruled out the possibility of placing zygomatic or pterygoid implants. Furthermore, the patient expressed unwillingness to undergo an extensive and invasive reconstructive surgery due to personal reasons.

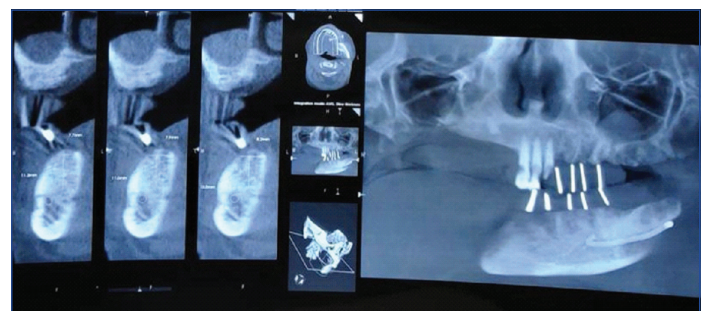
deviation correction appliance. The option of unilaterally functioning rehabilitation on one side was suggested and consented to by the patient. After the healing of extraction sockets, Cone Beam Computed Tomography (CBCT) was taken with a surgical stent containing radiopaque markers in the proposed implant region and assessed [Table/Fig-3]. The interarch distance was found to be less than 12 mm. A total of three implants were planned in both the upper and lower arches with delayed loading, along with an RP5-type prosthesis [1]. Antibiotic prophylaxis was initiated a day before the implant surgery following routine blood investigations. The procedure involved crestal incision, mucoperiosteal flap reflection, and sequential drilling for osteotomies. Implants (Superline, Dentium, USA) measuring 4.5×10 mm, 5×10 mm, and 4.0×10 mm in the maxilla, and 4.0×12 mm, 4.0×12 mm, and 5.0×10 mm in the mandible, were placed according to the CBCT assessment [Table/Fig-4], and the flaps were sutured. After three months, evidence of osseointegration was observed [Table/Fig-5], and second-stage surgery was performed, with healing caps placed. The decayed broken maxillary central incisors underwent endodontic treatment and were submerged to preserve alveolar bone [Table/Fig-6a]. After one week, open tray impressions were made using addition



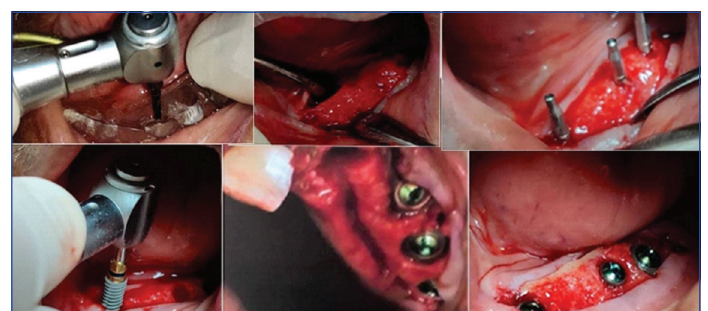
[[Table/Fig-1]: Prerehabilitation clinical images.



[[Table/Fig-2]: Prerehabilitation orthopantogram.



[[Table/Fig-3]: CBCT with surgical stent having radiopaque inserts.



[[Table/Fig-4]: Placement of dental implants.

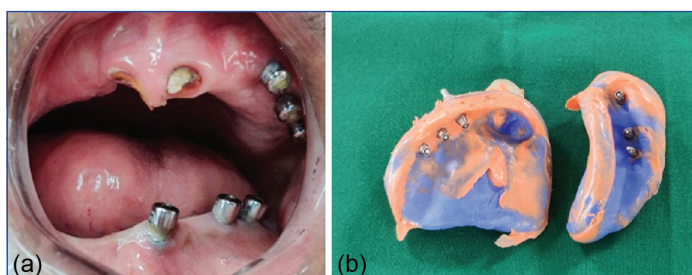
The patient was capable of guiding the mandible into an almost un-deviated closure and, therefore, did not require a mandibular



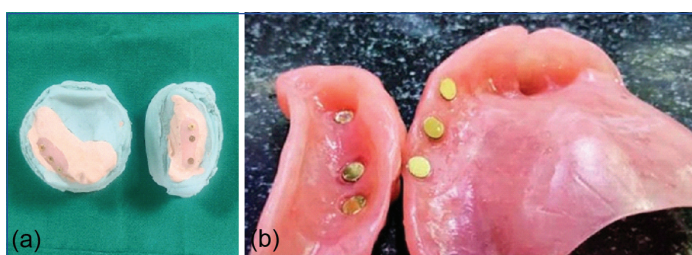
silicone and poured with die stone, ensuring intimate contact with the residual ridges and stability of the impressions [Table/Fig-6b]. Magnetic keepers with a thickness of 1 mm and a collar length of 1 mm (MKP 45 10 D, Superline, Dentium USA) were screwed onto implant analogs, and magnets were incorporated opposite the analogs in the trial denture base [Table/Fig-7a,b]. The habitual horizontal maxillo-mandibular relation was recorded at the vertical relation determined by phonetics and aesthetics, using interocclusal registration medium. Mandibular denture stability during functional movements was improved by incorporating an outrigger zone in the anterior mandibular region, which also enhanced aesthetics. Teeth selection, setting, and the incorporation of a Lingualised occlusal scheme were performed to ensure aesthetics, phonetics, and function without disruptive eccentric interferences. Each of these steps was critical as the patient could not establish a true centric relation due to the absence of the right part of the mandible.



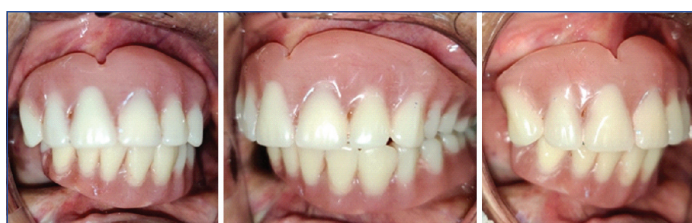
[Table/Fig-5]: Radiographic evaluation after 3 months of implant surgery.



[Table/Fig-6]: a) Second stage b) Open tray impression.



[Table/Fig-7]: a) Magnetic keepers and b) Magnet incorporated dentures.



[Table/Fig-8]: Magnet retained dentures in place.

The acrylic resin was packed into the molds after dewaxing, ensuring precise placement of magnets over the keepers. The dentures were processed with magnets (MGT 45 20 D, Retention force 350gf, Superline, Dentium USA) in place and delivered [Table/Fig-8]. Post-insertion instructions were given, and follow-up appointments were scheduled at six month intervals [Table/Fig-9].

During the three year follow-up period, an improvement in mandibular deviation was observed. Clinical signs and examinations, peri-implant probing, and panoramic radiographs revealed no pain or



[Table/Fig-9]: Postoperative view showing improvement in aesthetics.

signs of implant-related complications. Oral and denture hygiene, as well as magnetic retention, were found to be satisfactory.

In patients with hemimandibulectomy, the remaining segment of the mandible is retruded and deviates towards the resected side, causing functional disability that is exacerbated in edentulous patients. The closure of the maxillary defect using a soft tissue flap prevents the fabrication of a prosthesis in the defect area. Therefore, the use of soft tissue flaps for maxillary defect reconstruction is discouraged, as they do not provide prosthetic support. The combined defect of the maxilla and mandible makes rehabilitation more challenging, as restoring a deficient arch opposing a normal dentition provides some reference for rehabilitation. Reconstructing the resected maxilla and mandible has been successful but requires multiple surgeries and may lead to donor site morbidity. Osseointegrated dental implants have been recommended for rehabilitating such patients as they aid in prosthesis retention, support, and stability. However, the loss of normal hinge movement, the angular path of opening and closing of the mandible, lack of cross-arch stability, and uncoordinated mandibular movements at the surgical site [2] exclude the use of fixed implant prosthesis. The magnet-retained implant prosthesis allows prosthetic movement in four directions [3] without causing horizontal stresses on the implants and bone. The magnetic retention and support provided by both the implants and tissues are crucial for the functioning of this unilateral prosthesis.

The usage of ball/bar retained removable implant prosthesis was not considered due to the reduced interarch distance (12 mm) [4]. As a result, magnetic keepers with a 1 mm collar length and 1 mm thick magnets were used to accommodate the necessary thickness of the denture base. The concept of achieving function on one side is still controversial but may be employed in cases where multiple surgeries or zygomatic/pterygoid implants are not feasible. Sahu SK et al., reported the successful rehabilitation of a completely edentulous hemimandibulectomy patient with a removable prosthesis featuring a twin occlusal table. This approach improved denture stability, masticatory efficiency, and aesthetics over a 6 month follow-up period [5]. However, in present case, the usage of an implant-supported magnet-retained prosthesis could have further enhanced retention and stability. Another study reported notable functional benefits from promptly performing surgical closure of a significant palatal defect following hemimaxillectomy, combined with an osseointegrated implant-supported prosthesis [1].

Authors team achieved successful rehabilitation of a debilitated patient with a combined hemimaxillectomy-hemimandibulectomy defect, where a soft tissue flap was used to mask the maxillectomy. This was accomplished without the need for additional surgeries.

The magnet-retained removable unilateral implant prosthesis aided in achieving functional occlusion and aesthetics. In the future, the use of precision attachment-retained prosthesis may be considered for this patient to effectively limit prosthesis movement.

## REFERENCES

- [1] Lee JS, Lim YJ. Prosthodontic rehabilitation after myofascial flap surgery of hemimaxillectomy defects in the edentulous patient: A clinical report. *J Craniofac Surg.* 2014;25(2):e96-98.
- [2] Sharma V, Paliwal J, Dadarwal A, Meena KK. Guidance prostheses for partial mandibulectomy patients: A case series. *Cureus.* 2022;14(10):e30132.
- [3] Ramakrishnan H, Ragupathi M. Fundamentals of implant overdenture-overview. *On J Dent and Oral Health.* 2021;4(3):01-06. Doi: 10.33552/OJDOH.2021.04.000587.
- [4] Yoo SY, Kim SK, Heo SJ, Koak JY, Jeon HR. New rehabilitation concept for maxillary edentulism: A clinical retrospective study of implant crown retained removable partial dentures. *J Clin Med.* 2021;10(8):1773.
- [5] Sahu SK, Motwani BK, Dani A. Prosthetic rehabilitation of edentulous hemimandibulectomy patient: A clinical report. *Clin Case Rep.* 2017;5(11):1739-42.

### PARTICULARS OF CONTRIBUTORS:

1. Senior Resident, Department of Prosthodontics, King George's Medical University, Lucknow, Uttar Pradesh, India.
2. Professor, Department of Prosthodontics, King George's Medical University, Lucknow, Uttar Pradesh, India.
3. Additional Professor, Department of Prosthodontics, King George's Medical University, Lucknow, Uttar Pradesh, India.
4. Lecturer, Department of Dentistry, Government Institute of Medical Sciences, Lucknow, Uttar Pradesh, India.
5. Additional Professor, Department of Prosthodontics, King George's Medical University, Lucknow, Uttar Pradesh, India.

### NAME, ADDRESS, E-MAIL ID OF THE CORRESPONDING AUTHOR:

Saamyendra Vikram Singh,  
2/273, Viramkhand, Gomti Nagar, Lucknow-226010, Uttar Pradesh, India.  
E-mail: saamyendravsingh@rediffmail.com

### PLAGIARISM CHECKING METHODS: [Jain H et al.]

- Plagiarism X-checker: Jul 13, 2023
- Manual Googling: Aug 25, 2023
- iThenticate Software: Aug 28, 2023 (4%)

### ETYMOLOGY: Author Origin

### EMENDATIONS: 7

### AUTHOR DECLARATION:

- Financial or Other Competing Interests: None
- Was informed consent obtained from the subjects involved in the study? Yes
- For any images presented appropriate consent has been obtained from the subjects. Yes

Date of Submission: **Jul 12, 2023**

Date of Peer Review: **Jul 27, 2023**

Date of Acceptance: **Aug 30, 2023**

Date of Publishing: **Oct 01, 2023**