

CUSTOMIZED SOAP-SPACER TECHNIQUE FOR FABRICATING A HOLLOW MAXILLARY COMPLETE DENTURE IN AN IRRADIATED POST-MAXILLECTOMY PATIENT: A CASE REPORT

* Rajat R Hegde, ** Indu Raj

*Junior Resident, **Professor and HOD, Department of Prosthodontics and Crown & Bridge, Government Dental College, Kottayam. Corresponding author: Dr. Rajat R Hegde. Email: rajathegde19@gmail.com

<https://doi.org/10.55231/jpid.2026.v10.i01.04>

Abstract

Introduction: Maxillary tumor resection compromises the retention, stability, and support necessary for conventional dentures. Adjunctive radiotherapy exacerbates mucosal friability and causes xerostomia, making heavy prostheses clinically problematic.

Case Presentation: A 71-year-old male presented with edentulous arches following an anterior maxillectomy and radiotherapy for squamous cell carcinoma. Clinical examination revealed total loss of the anterior maxilla, right tuberosity hypertrophy, a hypermobile mandibular anterior ridge, and advanced bilateral posterior resorption. To optimize retention and minimize mucosal loading, a lightweight hollow maxillary complete denture was fabricated using a customized soap-spacer technique, paired with a conventional mandibular denture.

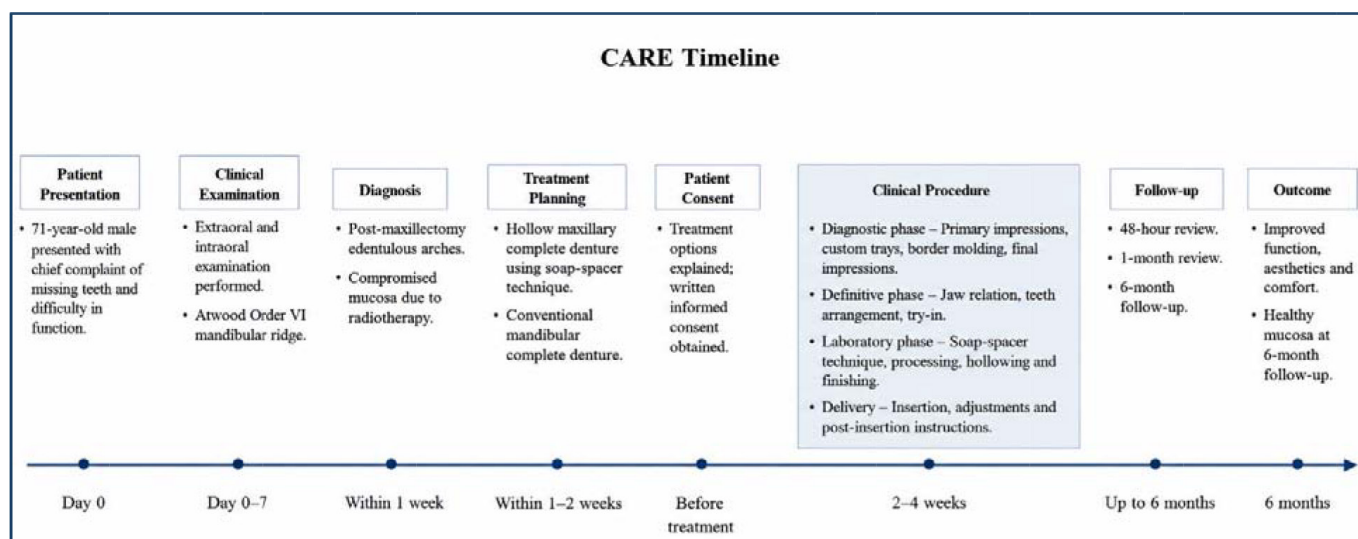
Conclusion: The hollow maxillary denture successfully compensated for missing bone support

without overloading the irradiated mucosa. This cost-effective protocol provided a highly functional prosthesis, presenting a viable pathway for post-oncological prosthodontic rehabilitation.

Keywords: maxillectomy, radiotherapy, hollow denture, oral rehabilitation

Introduction

Surgical maxillectomy for oral malignancies severely reduces the mechanical supporting tissue area required for complete dentures, while adjunctive radiotherapy compromises mucosal micro-vascularity and causes chronic xerostomia.^{1,2} The resulting loss of the peripheral seal renders heavy, conventional acrylic resin dentures highly prone to gravitational



dislodgement and recurrent mucosal trauma.³

Fabricating a hollow maxillary denture significantly reduces the total prosthetic mass, thereby lessening gravitational dislodging forces and preserving compromised underlying structures.⁴ While advanced digital workflows offer precise modern alternatives, traditional mechanical hollowing techniques remain vital for accessible, cost-effective care.⁵ This case report outlines a predictable, low-cost laboratory modification using a custom soap spacer to

successfully rehabilitate a post-maxillectomy edentulous patient as shown in the below CARE timeline.

Case Presentation

A 71-year-old male patient presented to the Department of Prosthodontics seeking prosthetic rehabilitation for missing teeth. His medical history was significant for type 2 diabetes mellitus, which was well-controlled with oral hypoglycemic agents. The patient had been

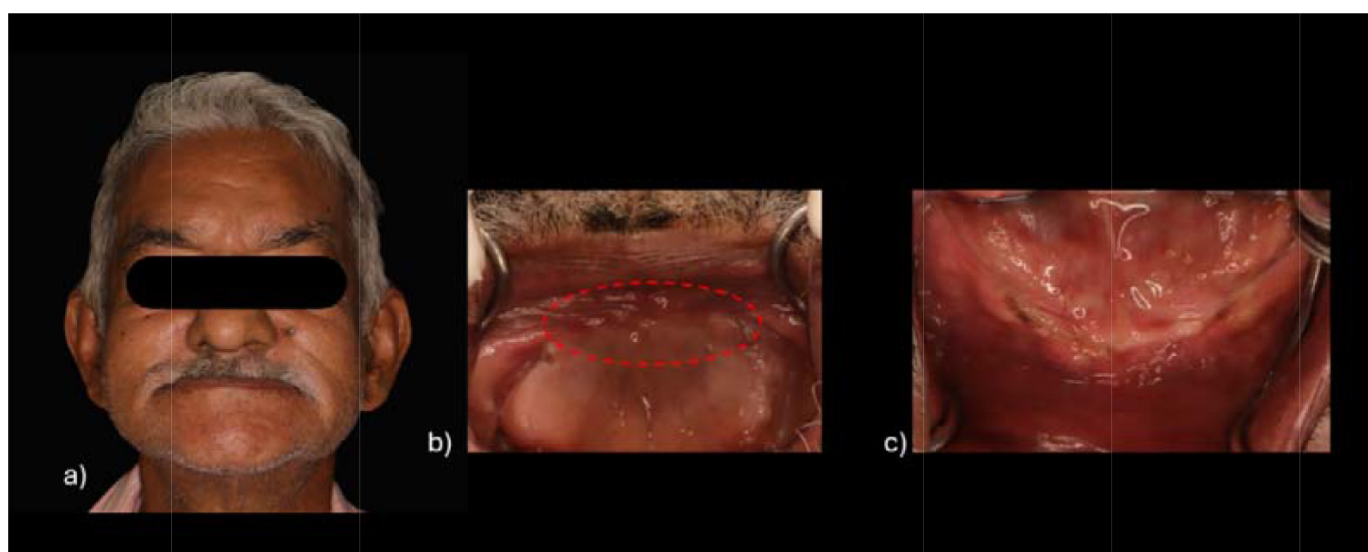


Fig. 1: a) Frontal appearance b) Edentulous maxillary arch depicting resection of pre-maxilla c) Edentulous mandibular arch

PROSTHETIC AND IMPLANT DENTISTRY

Official Publication of Indian Prosthodontic Society
Kerala State Branch

diagnosed with poorly differentiated squamous cell carcinoma of the maxilla two years prior. His oncological treatment plan consisted of a surgical anterior maxillectomy (premaxillary region) followed by external beam radiation therapy (total dose: 60 Gy), completed 18 months before presentation.

Extraoral examination revealed a significant loss of lip support in the subnasal region [Figure

1a]. Intraoral examination revealed completely edentulous maxillary and mandibular arches. In the maxillary arch, the alveolar ridge in the premaxillary region was completely absent due to surgery; however, mucosal continuity remained intact without open oronasal communication. Hypertrophy of the right maxillary tuberosity was noted. The mandibular arch exhibited a hypermobile, flabby anterior residual ridge and advanced residual ridge resorption in

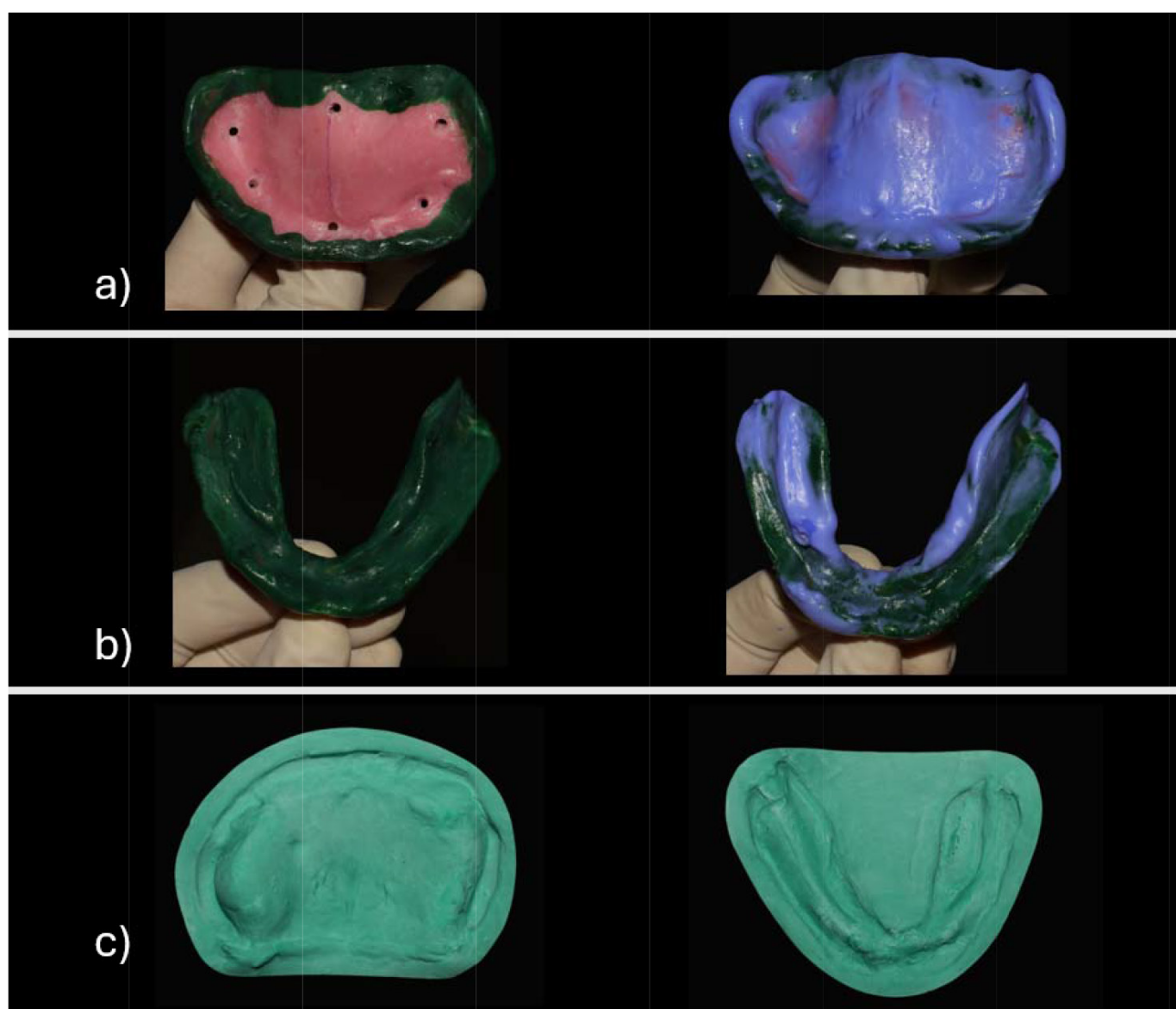


Fig. 2: a) Maxillary arch border molding and wash impression, b) All-green technique for mandibular arch and wash impression, c) Master casts

PROSTHETIC AND IMPLANT DENTISTRY

Official Publication of Indian Prosthodontic Society
Kerala State Branch

the bilateral posterior segments, classified as Atwood's Order VI [Figure 1b, 1c].

Therapeutic Interventions

Given the anatomical constraints and compromised mucosal support, the below prosthetic workflow was initiated:

- **Preliminary Impressions:** Impressions of both arches were captured with non-perforated metal stock trays using a high-viscosity impression compound (PyraxImprex). Preliminary casts were poured using dental plaster.
- **Custom Tray Fabrication:** Custom impression trays were fabricated using auto-polymerizing acrylic resin (DPI RR Cold Cure). A 2-mm wax relief spacer was adapted over the mid-palatine raphe and the sharp mandibular residual ridge to prevent localized tissue trauma during definitive impression making.
- **Border Molding and Final Impressions:** Conventional green stick compound border molding was executed for the maxillary tray until an acceptable peripheral seal was achieved [Figure 2a]. For the mandibular arch, an "all-green" technique was implemented to record the extensive flabby and resorbed structures dynamically, ensuring maximum functional coverage and stability [Figure 2b]. Definitive wash impressions were made using a low-viscosity (light-body) polyvinyl siloxane impression material (Ad Sil Acura) and poured with Type 3 dental stone (NeelkanthDentstone) to generate the master casts [Figure 2c].
- **Maxillomandibular Relations and Laboratory Setup:** Permanent heat-polymerizing denture bases were processed early in the workflow to ensure maximum adaptation and stability during jaw relation records.

Maxillomandibular relations revealed a skeletal Class III relationship due to the surgical loss of the premaxilla. The centric relation was recorded using the physiologic pressure-less stapler pin method, and the casts were mounted on a mean-value articulator.

- **Teeth Arrangement and Clinical Trial:** Anterior teeth arrangement was prioritized to restore missing subnasal lip support, aesthetics, and phonetics. Posterior teeth were arranged adhering to a Class III molar crossbite scheme to maximize mechanical stability. The trial dentures were clinically evaluated and approved by the patient.

Laboratory Technique for the Fabrication of a Hollow Maxillary Denture

Following clinical try-in, the trial maxillary denture was invested in a dental flask. A silicone putty index (Zhermack Elite HD+) was adapted over the teeth and polished surfaces before final flask closure to preserve the tooth positions accurately during dewaxing. After conventional dewaxing, the putty index within the upper flask member was poured with a second layer of dental stone to create a secondary duplicate cast of the teeth setup.

A custom soap spacer was meticulously sculpted. The spacer's dimensions were fabricated slightly smaller than the internal ridge-to-tooth gap to guarantee a uniform, predictable 2 to 3 mm boundary thickness of acrylic resin around the final hollow core. The physical fit of this soap spacer was verified against the secondary duplicate stone cast [Figure 3a].

A fluid, early-dough mix of heat-polymerizing polymethyl methacrylate (PMMA) resin (Acryton-'H') was adapted into the mold cavity. The custom

PROSTHETIC AND IMPLANT DENTISTRY

Official Publication of Indian Prosthodontic Society
Kerala State Branch

soap spacer was precisely embedded within the center of this resin pack [Figure 3b]. The remaining dough-stage PMMA was immediately packed over the spacer before the initial layer transitioned into a late dough stage. This ensured a seamless chemical bond between the upper and lower halves of the resin, mitigating future split-line failures.

The flask was compressed in a hydraulic press and processed using a standard long heat-curing

cycle. Following deflasking, escape holes were drilled into the distal palatal aspect of the cured denture. Warm water was injected through these access holes to dissolve and thoroughly flush out the internal soap core, creating a clean internal void. The escape holes were subsequently sealed using auto-polymerizing resin. The hollowness and reduction in mass of the maxillary denture were verified by placing it in a water vessel and observing its buoyancy [Figure 3c]. The completed dentures were finished, polished,

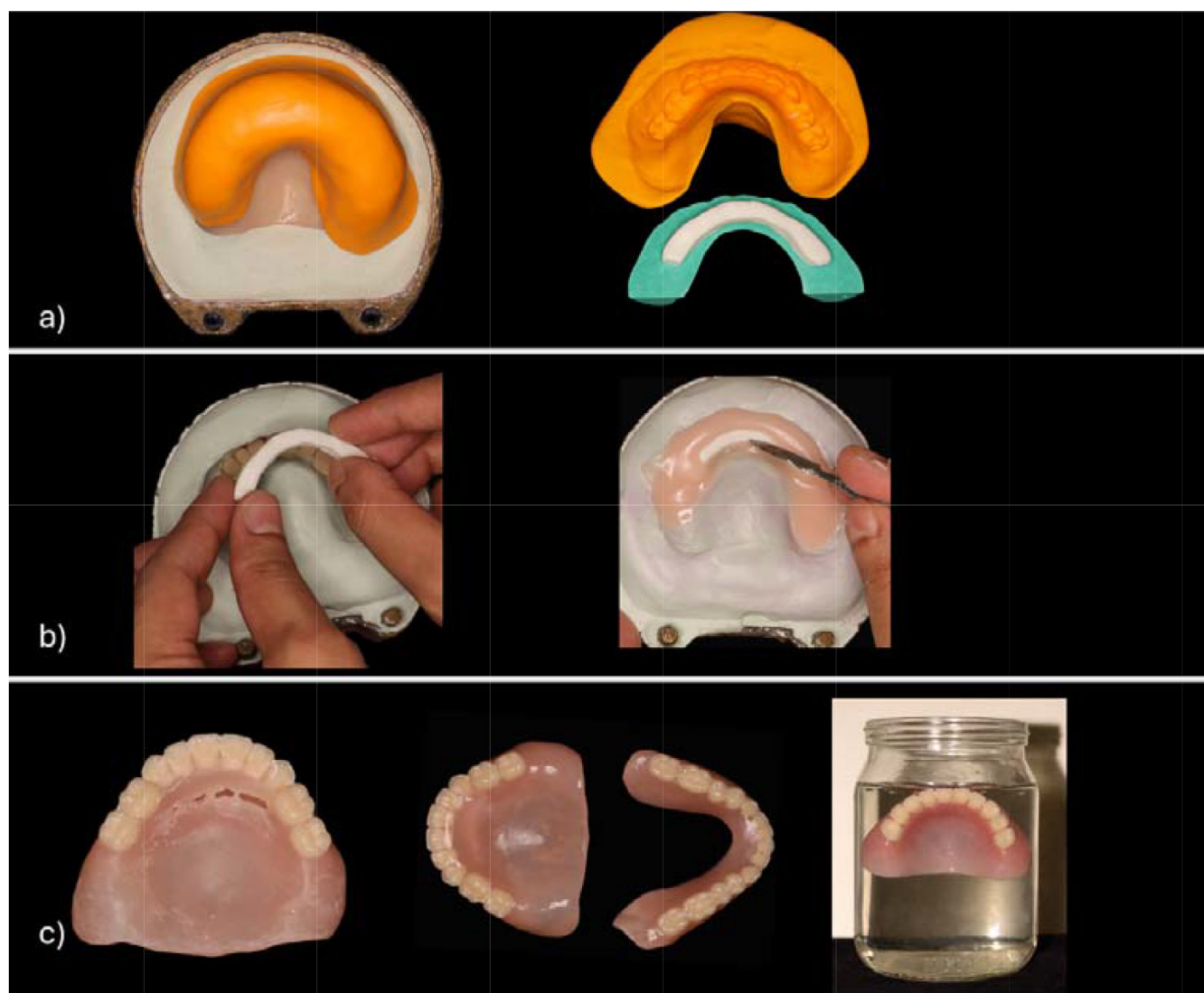


Fig. 3: a) Silicone putty index with soap spacer being verified on cast b) Soap spacer being embedded in resin c) Escape holes on palatal aspect of maxillary denture and verification of hollowness in water filled jar

and delivered. Comprehensive post-insertion hygiene and wear instructions were provided to the patient [Figure 4].

Follow-up and Outcomes

Clinical evaluations were performed at 48 hours, 1 month, and 6 months post-insertion. Minor pressure areas were identified on the

mucosal surface during the initial 48-hour follow-up and were relieved using a selective grinding technique. At the 6-month recall, the patient reported good retention and stability in both arches, improved speech clarity, and a significant improvement in masticatory efficiency and comfort. The surrounding mucosa remained healthy, with no signs of soft-tissue irritation or ulceration.

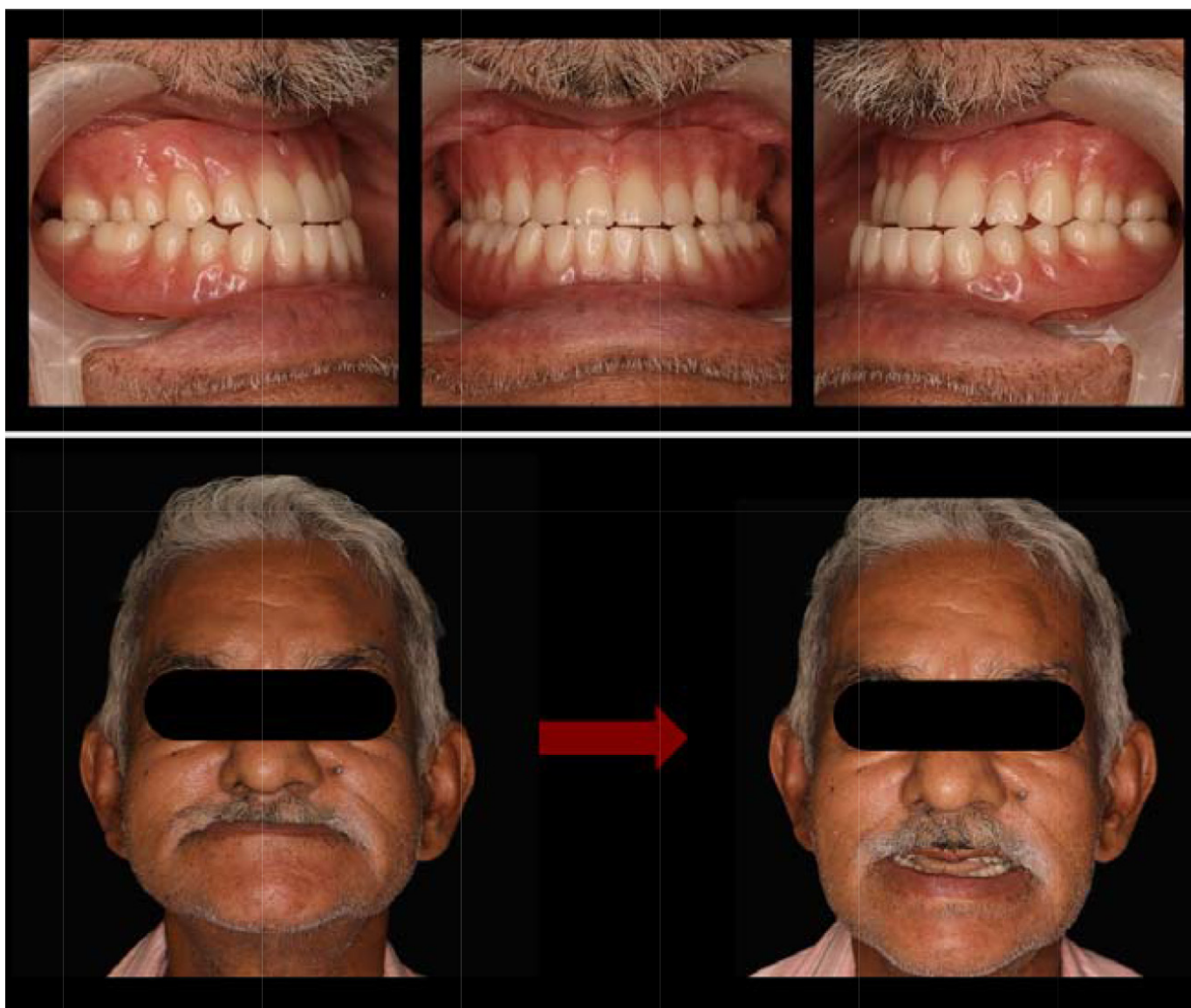


Fig. 4: Post-insertion of maxillary and mandibular dentures

PROSTHETIC AND IMPLANT DENTISTRY

Official Publication of Indian Prosthodontic Society
Kerala State Branch

Discussion

Prosthetic management of a completely edentulous post-maxillectomy patient who has undergone radiation therapy presents distinct biomechanical hurdles. The loss of the premaxilla shifts the prosthesis's center of gravity posteriorly, deprives it of crucial anterior skeletal support, and alters the fundamental physics of denture function.² Additionally, irradiated tissues exhibit reduced cell turnover and decreased micro-vascularity, making them highly susceptible to chronic ulceration or osteoradionecrosis under heavy, uneven structural loads.⁶

Reducing the overall mass of the maxillary prosthesis is an established method to enhance vertical retention and stability; minimizing the gravitational pull reduces the dislodging forces operating on the maxillary peripheral seal. [3] While several materials can be used as three-dimensional placeholders during laboratory processing including salt, sugar, and industrial wax, soap offers unique technical advantages. It functions as an easily carved spacer that maintains its structural volume under flask compression, yet dissolves completely in warm water, creating a clean internal void without degrading the polymer matrix of the surrounding acrylic resin. This approach aligns directly with classic weight-reduction principles established in prosthodontic literature.^{1,7}

The mandibular arch presentation added further complexity due to the combination of an anterior hypermobile ("flabby") ridge and advanced posterior resorption (Atwood's Order VI). This was successfully managed by applying the "all-green" border molding technique, which records mucosal tissues under dynamic functional loads, distributing masticatory forces across a wider surface area to minimize localized stress concentrations.⁸

While advanced 3D-printing and CAD/CAM workflows are increasingly used to precisely control internal wall thickness in modern maxillofacial prosthetics, conventional techniques utilizing soluble spacers remain a clinically reliable, accessible, and cost-effective standard where advanced digital infrastructure is unavailable.^{4,5,9}

Limitations

This case report describes a single clinical case with a relatively short follow-up period of six months. Objective quality-of-life parameters (such as validated OHIP questionnaires) and long-term mechanical fracture resistance of the hollowed PMMA base were not quantified. Further prospective clinical trials are required to validate the long-term performance of this protocol.

Conclusion

Rehabilitating post-oncological, irradiated edentulous patients requires creative modifications to conventional prosthodontic protocols. The soap-spacer technique used here provides a simple, precise, and inexpensive method to manufacture a hollow maxillary complete denture. By minimizing gravitational dislodgement and reducing mechanical stress on compromised supporting tissues, this approach represents a highly promising alternative when surgical reconstructions or implant-retained options are restricted by anatomical or financial constraints.

Informed Consent

The patient provided all appropriate consent for the publication of this case report. In the form, the patient has given his consent for his images and other clinical information to be reported in the journal. The patient understands that his

name and initial will not be published and due efforts will be made to conceal his identity, but anonymity cannot be guaranteed.

References

1. Rathee M. Maxillofacial rehabilitation with definitive hollow obturators using glycerin soap and ice cube techniques: two case reports. *Acta Med Bulgarica*. 2025;52(Suppl 1):34-9.
2. Crupi A, et al. Surgical procedures to enhance prosthetic prognosis in the rehabilitation of a maxillectomy defect due to sinonasal carcinoma: a case report. *Prosthesis*. 2026;8(1):6-12.
3. Gomes I, et al. Digital workflow for a two-piece hollow bulb obturator in maxillary defect rehabilitation: a clinical case report. *Case Rep Dent*. 2025;2025:e12659988.
4. Rudrawadi S, et al. Reconstruction of maxillary defect with obturator prosthesis in maxillectomy using lost salt technique: a clinical report. *Ann ClinProsthodont*. 2025;3(1):31-7.
5. Fayad MI, et al. Innovations driving the future of maxillofacial prosthetics, Part I: the technological leap in maxillofacial rehabilitation. *J MaxillofacProsth*. 2025;14(2):102-9.
6. Stalin M, Rathee M, Singla S, et al. Enhancing recovery from oral facial neoplasia: a narrative review of the role, design, and rehabilitation impact of surgical obturators. *Acta Med Bulgarica*. 2025;52(1):45-51.
7. Worley JL, Kniejski ME. A method for controlling the thickness of hollow obturator prostheses. *J Prosthet Dent*. 1983;50(2):227-9.
8. Rathee M, Diwan K, Tomar S, et al. Management of unstable dentures on atrophied mandibular ridges using different impression materials for recording the neutral zone: a case series. *Acta Med Bulgarica*. 2025;52(Suppl 1):12-8.
9. Ta AT, et al. Design process and early functional outcomes of digitally planned immediate obturator prostheses after partial maxillectomy. *Diagnostics*. 2025;7(4):80-7