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Review Article

Maxillofacial Prosthodontics in Oncology: A Narrative Review on Prosthetic Rehabilitation, Function Restoration, and Quality-of-Life Enhancement

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Abstract

Prosthodontics is a specialized branch of dentistry focused on the diagnosis, treatment planning, rehabilitation, and maintenance of oral function, comfort, esthetics, and overall health in patients with missing or deficient teeth and maxillofacial structures. Maxillofacial prosthodontics, a vital subdiscipline, plays a crucial role in restoring facial and oral defects resulting from cancer ablation surgeries, congenital anomalies, trauma, or other pathological conditions. It aims to re-establish essential functions such as mastication, speech, swallowing, and facial esthetics using biocompatible prosthetic substitutes.

Maxillofacial prostheses may be classified as intraoral or extraoral. Intraoral prostheses include obturators, palatal lift devices, palatal augmentation prostheses, speech-aid prostheses, feeding aids, and mandibular resection or guide flange prostheses. Extraoral prostheses encompass ocular, nasal, auricular, cranial, and facial segmental prostheses, as well as nasal stents. These devices not only support postsurgical rehabilitation but also assist in ongoing cancer therapy. For example, jaw-positioning stents and fluoride carriers enhance outcomes during chemoradiation therapy by improving patient comfort and reducing complications.

The primary goals of maxillofacial prosthetics include preservation of remaining structures, restoration of function, improvement of facial form, facilitation of healing, and enhancement of psychological well-being. Beyond physical rehabilitation, these prostheses significantly elevate the patient's quality of life by reducing the emotional and psychological burden associated with cancer treatment. Successful rehabilitation requires a collaborative, multidisciplinary effort involving maxillofacial prosthodontists, oral surgeons, oncologists, laboratory technicians, and other specialists. The choice of materials—such as silicone elastomers, acrylic resins, and various copolymers—plays a critical role in achieving optimal esthetics, durability, and biocompatibility. Ultimately, factors such as support, stability, and osseointegration determine the long-term success and functionality of maxillofacial prostheses.

Keywords: *Acrylic resin; Facial prosthesis; Maxillofacial prosthodontics; Oncology rehabilitation; Prosthetic materials; Quality of life; Silicone elastomers.*

INTRODUCTION

Oral and maxillofacial oncology patients often undergo surgical resection for the removal of malignant or benign tumors, a process that may result in the loss of significant anatomical structures, compromised function, and severe deterioration of facial esthetics.[1,2] These defects can negatively impact mastication, speech, deglutition, vision, hearing, and overall facial integrity, ultimately reducing patient quality of life. The major clinical conditions encountered in such cases are summarized in Table 1.

Table 1. Clinical Conditions Requiring Maxillofacial Prostheses

Clinical Area	Associated Tumors / Conditions	Resulting Defects
Maxilla & Palate	Maxillary sinus tumors, palatal malignancies, minor salivary gland tumors	Oro-nasal/oro-antral defects, loss of palatal structure
Mandible	Ameloblastoma, odontogenic tumors, cystic lesions	Segmental or marginal mandibular defects; loss of continuity
Orbit	Retinoblastoma, eyelid skin cancers, intraocular malignancies	Orbital tissue loss
Ear / Auricle	Skin cancer, trauma	Partial/complete auricular loss

To overcome these challenges, prosthodontists play a pivotal role by reconstructing or replacing missing anatomical structures with biocompatible materials, resulting in customized maxillofacial prostheses.[3] This interdisciplinary collaboration between oral surgeons and prosthodontists is essential for functional rehabilitation, esthetic restoration, and psychosocial recovery of oncology patients. Such advancements have been made possible due to progressive developments in surgical oncology, biomaterials science, digital workflows, and CAD–CAM technology, which now allow the fabrication of complex, highly individualized prostheses.[4,5]

This narrative review aims to highlight the crucial role of prosthodontists in the rehabilitation of oncology patients, detailing the types of maxillofacial prostheses, clinical scenarios requiring them, and material selection criteria based on functional and esthetic demands. In addition, it discusses the role of oral surgeons in planning and preparing surgical sites to facilitate prosthetic rehabilitation. The review also examines the psychological, emotional, and social impact of maxillofacial prostheses on patient well-being.

DISCUSSION

The rehabilitation process begins with the surgical oncologist or oral and maxillofacial surgeon, whose primary role involves tumor excision with adequate oncologic clearance. While essential, this often results in removal of adjacent supportive tissues, impairing function and esthetics.[6] Aggressive malignant tumors—such as squamous cell carcinoma, malignant melanoma, and salivary gland tumors—tend to infiltrate surrounding tissues, creating extensive defects requiring prosthetic intervention. Even benign yet locally aggressive tumors like ameloblastoma or odontogenic keratocysts may necessitate substantial resection.[7]

Common clinical situations requiring prosthesis include maxillary and palatal defects (Figure 1), mandibular discontinuity defects, orbital defects (Figure 2), and auricular deformities (Figure 3) reconstructed with silicone prostheses, with or without osseointegrated implants.[8] An overview of these clinical scenarios and their rehabilitative requirements is presented in Table 1.

Figure 1 – Maxillary Defect

Figure 2 - Orbital Defect

Figure 3 - Auricular Defect

Types of Prostheses

The types of prostheses used in oncology patients vary depending on the location and extent of the defect. Table 2 provides a structured overview of these prostheses and their clinical applications.

Table 2. Types of Maxillofacial Prostheses Used in Oncology Patients

Type of Prosthesis	Primary Use / Indication	Clinical Benefits
Radiation Therapy Prostheses	During radiotherapy	Protect healthy tissues, optimize dose
Maxillary Obturators	Post maxillectomy	Restore speech, mastication, seal defects
Mandibular Guidance Prosthesis	Post mandibulectomy	Correct deviation, improve occlusion

1. **Prostheses Used During Radiation Therapy** Radiation carriers, stents, and shielding prostheses help optimize delivery of therapeutic radiation while minimizing damage to surrounding tissues. These devices improve dose concentration and reduce complications such as mucositis, xerostomia, and tissue necrosis.[9]
2. **Maxillary Obturators** Obturators (Figure 4) are indispensable for patients undergoing partial or total maxillectomy due to tumors of the maxillary sinus, alveolar ridge, or hard palate. Their design depends on remaining dentition, the size and location of oroantral/oronasal communications, and involvement of the soft palate.[10] Obturators restore separation between the oral and nasal cavities, prevent nasal regurgitation, improve speech and swallowing, support facial contours, and enhance psychosocial well-being.[10,11]
3. **Mandibular Resection and Mandibular Guidance Prosthesis** Tumors of the mandible may necessitate segmental or marginal mandibulectomy. Loss of mandibular continuity leads to deviation toward the resected side due to muscular imbalance, compromising occlusion and mastication.[12] A mandibular guidance flange prosthesis assists in re-establishing acceptable intercuspation during healing, improving neuromuscular coordination and long-term function.[13]

Role of the Prosthodontist

Maxillofacial rehabilitation is inherently interdisciplinary, with the prosthodontist serving as a central figure in diagnosis, treatment planning, prosthesis fabrication, and long-term follow-up. A comparative summary of the roles of the surgical oncologist/oral surgeon and the prosthodontist is provided in Table 3.

Table 3. Roles of Surgeon vs Prosthodontist

Aspect	Surgical Oncologist / OMFS Role	Prosthodontist Role
Primary Treatment	Tumor removal	Pre-prosthetic planning
Rehabilitation Planning	Prepare surgical site	Design & fabricate prosthesis
Function Restoration	Reconstruction	Restore mastication, speech
Aesthetics	Initial reconstruction	Facial restoration
Long-term Care	Recurrence surveillance	Maintenance & support

The prosthodontist contributes by:

- Restoring mastication, swallowing, and speech;
- Improving facial esthetics and self-image;
- Providing psychological reassurance;
- Preparing the oral cavity prior to oncology treatment;
- Educating patients regarding complications;
- Monitoring for recurrence through continuous follow-up.[14-16]

In many cases, prosthetic rehabilitation is preferred over reconstructive surgery due to advanced age, compromised vascularity, history of radiotherapy, medical comorbidities, or patient preference. Prostheses are often associated with reduced morbidity, reversibility, and excellent esthetic outcomes.[17]

Materials Used in Maxillofacial Prostheses

Material selection is crucial for optimizing prosthesis function, comfort, and esthetics. Table 4 outlines commonly used materials and their specific applications.

Table 4. Materials Used in Maxillofacial Prostheses

Material	Type	Advantages	Applications
Acrylic Resin	Rigid polymer	Durable, tintable	Intraoral prostheses
Silicone Elastomers	Flexible	Skin-like, hypoallergenic	Extraoral prostheses
Vinyl Polymers	Thermoplastic	Stable	Facial prostheses
PEEK	Polymer	Strong, light	Frameworks
Titanium	Metal	Biocompatible	Implant-supported prostheses
Co-Cr Alloy	Metal	Rigid, corrosion-resistant	Frameworks

Options include:

- **Acrylic resin** (Figure 5) — rigid, stable, tintable; ideal for intraoral prostheses[18]
- **Medical-grade silicone elastomers** (Figure 6) — flexible, skin-mimicking, hypoallergenic; preferred for extraoral facial prostheses[19]
- **Vinyl polymers** — dimensionally stable under moisture and thermal changes
- **Framework materials (PEEK, titanium, composite resins, cobalt-chromium alloy)** — provide strength and long-term support[20]

Figure 4 – Maxillary Obturator

Figure 5 – Acrylic Resin

Figure 6 – RTV Silicone

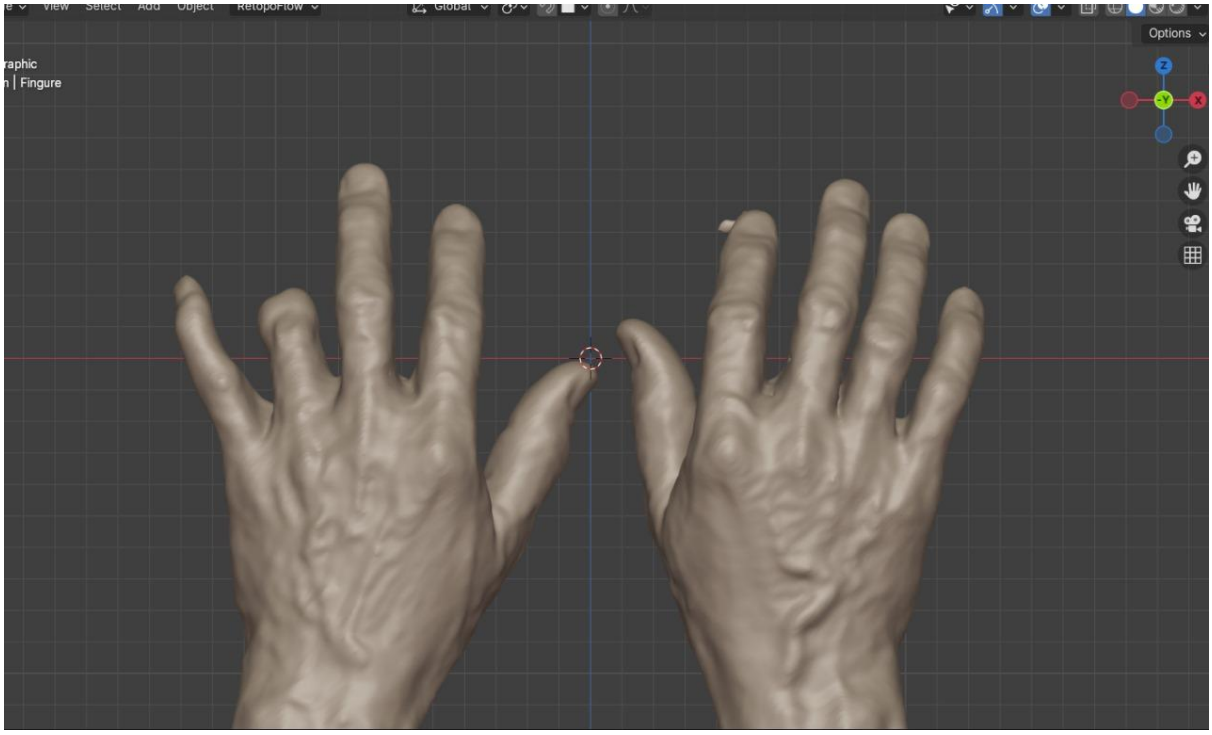

Figure 7 – CAD-CAM design

Advances in digital technology—including 3D scanning, CAD-CAM design (Figure 7), and additive manufacturing—have significantly improved precision, customization, and esthetic outcomes.[21] These digital components are summarized in Table 5.

Table 5. Digital Technologies in Prosthesis Fabrication

Technology	Application	Benefits
3D facial scanning	Extraoral capture	Accuracy
Intraoral scanning	Oral defect capture	Comfort
CAD software	Digital design	Precision
Milling	Rigid prostheses	Strength
3D printing	Custom prostheses	Speed

Biocompatibility remains essential and is influenced by chemical composition, pigmentation stability, environmental exposure, and mechanical resilience.[19]

Impact on Patient Well-Being

Maxillofacial prostheses exert broad functional and psychosocial benefits.

1. Functional Impact

They restore mastication, swallowing, speech, and respiration; prevent hypernasality and regurgitation; and support improved oral hygiene and oral health–related quality of life (OHRQoL).[22] Table 6 summarizes these functional improvements.

Table 6. Functional Impacts of Prosthetic Rehabilitation

Functional Domain	Improvements
Mastication	Better chewing
Speech	Reduced hypernasality
Swallowing	Prevents regurgitation
Respiration	Restored airflow
Oral Hygiene	Improved hygiene

2. Psychological and Social Impact

Patients commonly report improved self-esteem, reduced social withdrawal, enhanced emotional stability, and stronger reintegration into society. Collaboration with psychologists further supports adaptation and coping.[23] Table 7 presents an overview of these psychosocial benefits.

Ultimately, maxillofacial prosthetic rehabilitation serves as an essential bridge between surgical treatment and the patient's return to daily life, supporting comprehensive, holistic recovery.

Table 7. Psychological and Social Benefits

Aspect	Impact
Self-esteem	Improves confidence
Social interaction	Better reintegration
Emotional stability	Reduces anxiety
Quality of life	Improves overall satisfaction

CONCLUSION

Maxillofacial prosthetic rehabilitation remains an indispensable component of comprehensive oncologic care. Surgical resection of tumors in the oral and maxillofacial region often results in complex anatomical, functional, and psychological deficits that significantly impact the patient's quality of life. Through close interdisciplinary collaboration with surgical oncologists, prosthodontists play a crucial role in restoring lost structures, re-establishing oral and facial function, and supporting the patient's emotional and social recovery.

Advances in biomaterials, digital technologies, imaging, and CAD-CAM workflows have transformed the field, enabling fabrication of highly customized prostheses that offer superior fit, esthetics, and long-term durability. Whether through maxillary obturators, mandibular guidance prostheses, radiation therapy appliances, or extraoral silicone prostheses, the goal remains consistent: to optimize function while providing a natural appearance that promotes confidence, social interaction, and psychological well-being.

Ultimately, maxillofacial prosthetic rehabilitation serves as a bridge between surgical intervention and the patient's return to daily life. By addressing functional impairments, facial disfigurement, and emotional distress, prosthodontic care not only enhances post-treatment outcomes but also upholds the dignity, self-image, and overall quality of life of individuals recovering from head and neck cancer. The continuous evolution of materials and digital innovations promises even greater precision and patient satisfaction in the future, reinforcing the essential role of prosthodontists in oncologic rehabilitation.

REFERENCES

1. Aziz, T., Waters, M., & Jagger, R. (2003). Prosthetic materials in maxillofacial rehabilitation. *Journal of Prosthodontics, 12*(4), 242–249. https://doi.org/10.1111/j.1532-849x.2003.00142.x
2. Barazanchi, A., Li, K. C., Al-Amleh, B., Lyons, K., & Waddell, N. (2019). Pre- and post-operative prosthodontic care in oncology. *Journal of Prosthodontics, 28*(5), 544–556. https://doi.org/10.1111/jopr.12795
3. Beumer, J., Curtis, T. A., & Marunick, M. T. (2011). *Maxillofacial rehabilitation: Prosthodontic and surgical considerations* (3rd ed.). Ishiyaku EuroAmerica.
4. Bidra, A. S., Taylor, T. D., & Agar, J. R. (2013). Digital prosthodontics: A review of current technology and future directions. *Journal of Prosthetic Dentistry, 110*(6), 402–408. https://doi.org/10.1016/S0022-3913(13)60327-0
5. Carlson, E. R., & Marx, R. E. (2016). *Oral and maxillofacial pathology and oncology*. Wiley.
6. Chalian, V. A., Drane, J. B., & Standish, S. M. (1971). *Maxillofacial prosthetics*. Williams & Wilkins.
7. Chander, N. G., & Kumar, V. V. (2020). Maxillofacial prosthetics: Evolution and recent trends. *Journal of Indian Prosthodontic Society, 20*(1), 1–7. https://doi.org/10.4103/jips.jips_365_19
8. Ciocca, L., & Scotti, R. (2004). CAD–CAM in the fabrication of facial prostheses: A review of the literature. *Journal of Prosthetic Dentistry, 92*(4), 373–378. https://doi.org/10.1016/j.prosdent.2004.07.015
9. Craig, R. G. (2010). *Restorative dental materials*. Mosby.
10. Devlin, H., Barker, G. R., Hill, G., Brown, D., & Newman, L. (2001). The role of radiation stents in radiotherapy of oral cancer. *British Journal of Oral and Maxillofacial Surgery, 39*(1), 30–33. https://doi.org/10.1054/bjom.2000.0524
11. Dropkin, M. J. (1989). Psychological considerations in head and neck cancer rehabilitation. *Oncology Nursing Forum, 16*(3), 283–288.
12. Genden, E. M., Ferlito, A., Silver, C. E., Takes, R. P., Suárez, C., Owen, R. P., & Shaha, A. R. (2004). Rehabilitation after head and neck cancer surgery. *The Lancet Oncology, 5*(4), 284–291. https://doi.org/10.1016/S1470-2045(04)01450-8
13. Keyf, F. (2001). Obturator prostheses for hemimaxillectomy patients. *Journal of Oral Rehabilitation, 28*(9), 821–829. https://doi.org/10.1046/j.1365-2842.2001.00898.x
14. Lemon, J. C., Chambers, M. S., Wesley, P. J., & Martin, J. W. (1996). Prosthetics versus reconstructive surgery for head and neck cancer patients. *Journal of Prosthetic Dentistry, 75*(3), 256–260. https://doi.org/10.1016/S0022-3913(96)90010-1

15. Markkanen-Leppänen, M., Mäkitie, A. A., Suominen, S., Sintonen, H., & Roine, R. P. (2020). Quality of life after maxillofacial cancer surgery. *Journal of Cranio-Maxillofacial Surgery, 48*(4), 345–352. https://doi.org/10.1016/j.jcms.2020.01.004
16. Marunick, M. T., Harrison, R., & Beumer, J. (2020). Prosthodontic treatment of maxillary defects. *Clinics in Plastic Surgery, 47*(2), 203–214. https://doi.org/10.1016/j.cps.2019.11.008
17. Phoenix, R. D., & DeFreest, C. F. (2012). *Contemporary fixed prosthodontics*. Mosby.
18. Pradhan, V., Patel, J., Sethuraman, R., & Shah, N. (2014). Guidance flange prostheses in mandibular defects: A clinical report. *Journal of Indian Prosthodontic Society, 14*(2), S79–S82. https://doi.org/10.4103/0972-4052.133998
19. Rogers, S. N., Lowe, D., Fisher, S. E., Brown, J. S., & Vaughan, E. D. (2002). Health-related quality of life after primary surgery for oral cancer. *British Journal of Oral and Maxillofacial Surgery, 40*(1), 11–16. https://doi.org/10.1054/bjom.2001.0716
20. Schneider, R. L. (1977). Mandibular guidance therapy. *Journal of Prosthetic Dentistry, 38*(5), 546–553. https://doi.org/10.1016/0022-3913(77)90157-8
21. Shah, J. P., & Patel, S. G. (2012). *Head and neck surgery and oncology* (4th ed.). Elsevier.
22. Taylor, T. D. (2000). *Clinical maxillofacial prosthetics*. Quintessence Publishing.
23. Wolfaardt, J. F., Coss, P., Taylor, T. D., & Schubert, W. (1992). Osseointegrated implants in facial prosthetic rehabilitation. *International Journal of Prosthodontics, 5*(2), 130–136.

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