The journal of
PROSTHETIC AND IMPLANT DENTISTRY
Official Publication of Indian Prosthodontic Society
Kerala State Branch

PROSTHETIC REHABILITATION OF UNILATERAL MIDFACIAL DEFECT RESULTING FROM FLAP RELATED COMPLICATION: A CASE REPORT OF CLINICAL CHALLENGES AND THEIR SOLUTIONS

*Madhura Sharma, **Kiran Jagtiani, ***Gurkaran Preet Singh, ****Sandeep Gurav

*Assistant Professor, Department of Dental and Prosthetic Services, Tata Memorial Centre-Advanced Centre for Treatment, Research and Education in Cancer (TMC-ACTREC), Homi Bhabha National Institute, HBNI, Navi Mumbai. **Senior Resident, TMC, Homi Bhabha National Institute (HBNI), Mumbai. ***Associate Professor, TMC, Homi Bhabha National Institute HBNI, **** Professor, TMC, Homi Bhabha National Institute HBNI| Corresponding author: Dr Sandeep Gurav, Email: drsandeepgurav@gmail.com

https://doi.org/10.55231/jpid.2024.v07.i02.05

Abstract

Composite defects of the head and neck region after oncologic resection are challenging and require reconstruction of several layers, including the intraoral lining, osseous reconstruction of the mandible or maxilla and soft tissue/skin coverage. Management of complications resulting from flap failure is a challenging task from a technical and aesthetic perspective that can have a substantial social and psychological impact on those affected. This clinical report describes prosthetic rehabilitation of a lateral midfacial defect and the clinical challenges encountered and their solutions in a patient with carcinoma of gingivobuccal complex who underwent composite bite resection, reconstruction and adjuvant radiation therapy. A conventional approach that employed an acrylic substructure and silicone (one-piece) prosthesis was implemented to address the cutaneous cheek defect taking into account history of recent radiotherapy and comprehensive medical history. The delivered prosthesis effectively restored the lost facial contour and concealed the facial defect, contributing to aesthetics and improving the patient's quality of life.

Keywords: facial prosthesis, extraoral prosthesis, maxillofacial, silicone, squamous cell carcinoma.

Introduction

The gingivobuccal complex (GBC), includes the buccal mucosa, upper and lower gingivobuccal sulci, alveolus and retromolar trigone, is a common subsite for oral cancer.[1] Squamous cell carcinoma (SCC) of the GBC is uncommon

The journal of
PROSTHETIC AND IMPLANT DENTISTRY
Official Publication of Indian Prosthodontic Society
Kerala State Branch

in Western countries, accounting for only 10% of oral cancers. However, it accounts for 40% of oral cancers in Southeast Asia, South-central China and Africa.[2] This can be attributed to the widespread use of smokeless tobacco in the form of chewing tobacco, nut, and lime. Compared with other common oral cancers, such as tongue and floor of mouth cancer, SCC of GBC readily infiltrates the buccinator muscle and buccal pad of fat, more easily invades the mandible and skin and spreads to cervical lymphatic tissue.[2,3]

Reconstructing composite defects in the head and neck region after oncologic resection involves the reconstruction of multiple layers such as intraoral lining, osseous reconstruction of mandible or maxilla, and soft tissue/skin coverage to achieve adequate sealing of the intraoral defect and visually appealing external skin coverage capable of withstanding adjuvant radiation therapy.[4-6] The pectoralis major myocutaneous flap (PMMC) remains the flap of choice for reconstruction of complex full-thickness defects in the head and neck region following ablative resections, despite the availability of microvascular surgery and other free flap reconstructions.[7,8] Noteworthy benefits of PMMC flaps include good vascularity, short learning curve, and reduced requirement for specialized equipment.[6] Potential complications include orocutaneous fistula (5.2%), partial flap loss (3.5%), flap dehiscence (1.7%), hematoma (1.7%), donor site abscess (1.7%), plate exposure (1.7%).[1,10]

Vartanian et al. have reported low complication rates with the PMMC flap, for complete and partial flap necrosis of 2.4% and 9.7%, respectively, in 371 cases.[11] The most common complication is dehiscence of the sutures, which can lead to salivary leakage and secondary infection. It can lead to prolonged hospital stay, delay recovery and significantly increasing morbidity.[12] Management of a defect resulting from flap failure is a challenging task from a technical and aesthetic perspective.[9,13] Many times secondary reconstruction of the defect is not a feasible option, due to the lack of availability of tissue, the impact of irradiation on the local vascular bed in tumour patients, and the patient's physical condition.[14,18,19] It is not uncommon for surgeons to wait at least a year after a major resection before considering surgical reconstruction of a facial defect caused by a flap complication or the tumour itself.[15] Thus, a facial prosthesis (interim or definitive) constitutes a viable alternative for many patients to enhance their confidence, facilitate social integration, and reduce psychological burden.[16,17]

This clinical report describes the prosthetic rehabilitation of a lateral mid-facial defect and the clinical challenges encountered and their solutions. A conventional approach that employed an acrylic substructure and silicone (one-piece) prosthesis was implemented, taking into account history of recent radiotherapy and comprehensive medical history. The primary goal was to effectively restore the lost facial contour and conceal the facial defect, contributing to aesthetics and improving the patient's quality of life.

Case report

A 35-year-old young gentleman reported to our tertiary cancer care centre with a clinical presentation of ulcero-proliferative growth in the right buccal mucosa. A computed tomography of head and neck region suggested well-defined heterogeneously enhancing lesion involving both upper and lower GBS, retromolar trigone, abutting right masseter and medial pterygoid muscle, erosion of posterior wall of maxilla on the right side. The patient underwent right bite composite resection with right neck dissection and bipaddle pectoralis major myocutaneous

flap reconstruction (pT2N0M0). During the initial postoperative period, the patient developed seropurulent discharge, parotid leak, and suture dehiscence with no fever. Following which the sutures over the outer pedicle were removed to facilitate pus drainage and betadine wash followed by application of regular dressing. After 3 weeks of healing period, the patient was advised postoperative adjuvant radiotherapy of 60 grays and 30 fractions. During the course of radiotherapy (19 fractions), flap dehiscence was encountered involving only the outer aspect of the flap and no intraoral gaping or discharge. The patient received a total of 56 grays / 28 fractions and periodic follow-up to assess the flap site.

Seven months after radiation therapy, the patient was referred to the Dental and Prosthetic Surgery Department for an assessment of the midfacial defect. Clinical examination revealed a cutaneous defect measuring 3x3 cm, below the zygomatic arch along the upper border of the PMMC flap and altered facial contour on the right side of the face. There was no intraoral or nasal communication of the defect. (Figure 1) The mucosal quality on the remaining portion of the defect showed no signs of inflammation, residual skin tags, or scar tissue. The junction between the underlying mucosa and the outer skin was distinct and healthy. Diminished vascularity, fibrosis, and scarring of the tissues surrounding the defect increase the probability

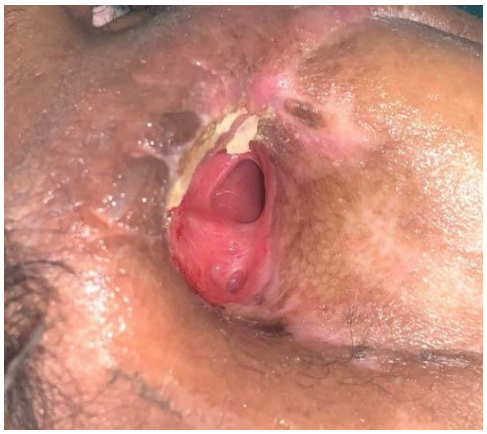

Fig. 1. Pre- prosthetic rehabilitation view of the defect

Fig. 2. Impression making of the defect

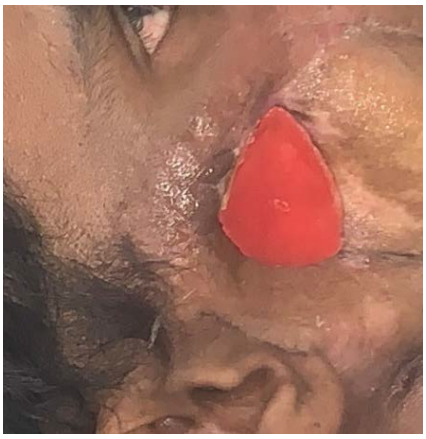

Fig. 3. Try in of the wax bulb

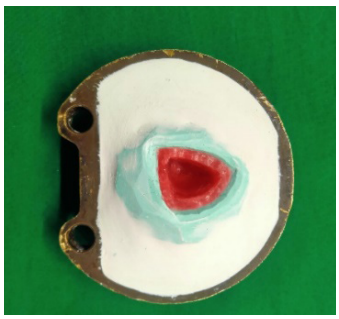

Fig. 4. Hollowed out wax bulb before processing

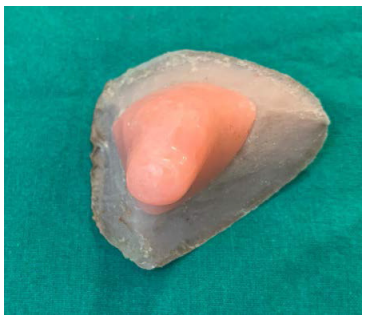

Fig. 5. Silicone patch prosthesis post processing and bonding with the acrylic bulb

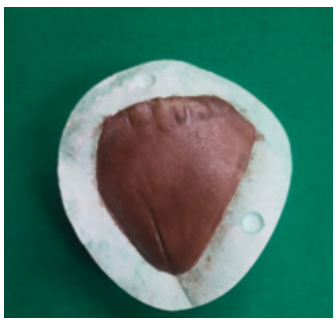

Fig. 6. Silicone patch after extrinsic staining

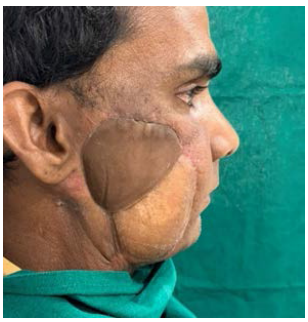

Fig. 7. Definitive Prosthesis

The journal of
PROSTHETIC AND IMPLANT DENTISTRY
Official Publication of Indian Prosthodontic Society
Kerala State Branch

of complications associated with secondary reconstruction. To avoid such risks, the surgeons opted to postpone secondary reconstruction of the facial defect for at least a year after head and neck irradiation. Therefore, prosthetic rehabilitation was planned during this interim phase with a conventional approach that utilized an acrylic substructure and silicone (one-piece) prosthesis.

A facial moulage of the defect side was made with irreversible hydrocolloid impression material to accurately record the tissue undercuts (Figure2) and a working model was obtained. On this model, a wax bulb was fashioned to encompass the inner aspect of the defect. This was evaluated on the patient to obtain the appropriate base for the prosthesis while ensuring passive fit, no gaping, and undue trauma to the internal tissue bed (Figure 3). Once satisfactory, it was hollowed out to ensure it was lightweight and then processed in acrylic (Figure 4). The acrylic bulb was assessed on the patient and with it properly situated within the defect, a pick-up impression was made using irreversible hydrocolloid impression material for subsequent prosthesis fabrication. A working stone model was obtained, and tin-foil was adapted. A clay sculpture was carved to simulate cheek contours with proper margin placement. A clinical trial was performed and modified as necessary. Standard laboratory steps were followed for investing, dewaxing, and mould preparation without the acrylic bulb. Room temperature vulcanising silicone (A 20001, Factor II Inc., USA) was packed into the mold space after shade matching with patient's skin and intrinsic staining according to the manufacturer's instructions. The silicone patch was recovered, trimmed and bonded to the acrylic bulb using medical adhesive (Factor II, Inc) (Figure 5). As the final step, the prosthesis was clinically evaluated in the patient for proper fit, intimate adaptation of the margins, colour and it was extrinsically stained for better characterization and precise matching. Once cured, it was delivered to the patient (Figure 6 and 7). We did not experience clinically significant mobility or sinking of the prosthesis during functional movements due to the light weight of the prosthesis, use of undercuts and good support from the remaining orbital roof and zygoma. Instructions regarding the positioning and maintenance of the prosthesis were given and regular follow-up (1 day, 1 week, monthly) was advised.

Discussion

The loss of a part of the face can have a substantial social and psychological impact on those affected.[13] The use of a facial prosthesis can provide support during the adjustment process. The facial prosthesis may be made of silicone, acrylic resin, or a combination of both. The skin in the cheek area is affected by facial expressions and jaw movements and more susceptible to compression due to the absence of supportive bony structures.[14,16] Certain challenges encountered during clinical procedures for prosthetic rehabilitation included choice of retention, placement of the prosthesis margins in natural junction zones of the face, choice of prosthetic material, accurate colour matching and static appearance of the prosthesis.

There are several means of retention used in maxillofacial prostheses depending on the size of the defect, the options available, the patient's condition, and preference.[15] Among the choices are anatomical undercuts, adhesive, magnets, implants, and combinations of the previous means. As for the magnet attachment, the potential problem of losing its magnetic attraction must be taken into account.[7] Although craniofacial implants represent a state-of-the-art solution, certain patients may not meet the criteria for implant intervention due to

diverse reasons, such as unfavourable tumour prognosis, defect location, compromised irradiated tissue beds, higher susceptibility to peri-implant skin reactions, and unfavourable loading conditions.[18] Whilst several previous studies have demonstrated differences in failure rate of craniofacial implants at irradiated sites, it is recommended that patients received implants 12 months or more following irradiation.[19] The use of adhesive may act as a potential irritant on a previously irradiated tissue bed; thus, it was avoided. Engaging anatomical undercuts in an atraumatic manner was the choice of retention in the clinical present case.

Special emphasis was placed on intrinsic colour matching and margin thickness to obtain slight pressure on the skin and at the same time properly adapt to the facial expressions and jaw movements. The construction of a silicone patch that adheres to an acrylic resin substructure effectively addressed the issue of autonomous mobility within the cheek defect during mastication and facial movements. Room temperature vulcanizing silicone material was chosen as it is easily processed with readily available instrumentation, has sufficient flexibility for use on movable tissue beds that offered a distinct advantage. Shades in different regions were developed chair side using extrinsic stains to simulate the lighter and darker areas present on the patient's face. In general, patient acceptance of the prosthesis was notably improved markedly due to good retention, favourable aesthetic outcomes resulting from precise and consistent positioning of the margins and ease of maintenance.

Conclusion

Reconstruction of oncologic head and neck defects continues to pose a formidable challenge, even with recent progress in surgical reconstruction techniques and history of adjuvant radiotherapy only exacerbate the difficulties of the reconstruction process. In the present clinical case, the patient underwent prosthetic rehabilitation using a one-piece acrylic-based silicone prosthesis that exhibited improved functionality, aesthetics, and patient acceptance.

Acknowledgement

Authors would like to thank Mr Sagar Kulthe and Mr Akshay Umale for extending their assistance in laboratory procedure.

References

1. Konduru V, Tirkey AJ, Samy K, Devarakonda KK, Janakiraman R. The folded, bipaddled pectoralis major myocutaneous flap for complex oral cavity defects: Undiminished relevance in the era of free flaps. JPRAS open. 2021 Mar 1;27:108-18.
2. Zhu Y, Li B, Liu H, Li D, Cheng A, Wang C, Han Z, Feng Z. Prognostic factors and related complications/sequalae of squamous cell carcinoma located in the gingivobuccal complex. World Journal of Surgical Oncology. 2022 Jul 26;20(1):240.
3. Mandlik DS, Nair SS, Patel KD, Gupta K, Patel P, Patel P, Sharma N, Joshipura A, Patel M. Squamous cell carcinoma of gingivobuccal complex: Literature, evidences and practice. Journal of Head & Neck Physicians And Surgeons. 2018 Jan 1;6(1):18.
4. Ahmad QG, Navadgi S, Agarwal R, Kanhere H, Shetty KP, Prasad R. Bipaddle pectoralis major myocutaneous flap in reconstructing full thickness defects of cheek: a review of 47 cases. Journal of plastic, reconstructive & aesthetic surgery. 2006 Feb 1;59(2):166-73.
5. PMMC Flap Revisited and its Clinical Outcome in 150 Patients Venkatesh Anehosur Veselova K, Gromova N, Antonova I, Kalakutskii I. Prosthetic rehabilitation of combined facial defect resulting after arteriovenous malformation. Oral & Implantology. 2022 Dec 28;15(1).
6. Neville JF, Tilak M, Kumar JA, Mishra N, Singh AK, Sharma N, Durrani F. Mango-shaped Bi-paddled pectoralis major myocutaneous flap reconstruction for large full-thickness defects post resection of squamous cell carcinoma of oral cavity: An analysis of 232 cases. National Journal of Maxillofacial Surgery. 2022 May 1;13(2):216.
7. Ariyan S. The pectoralis major myocutaneous flap. A versatile flap for reconstruction in the head and neck. Plast Reconstr Surg 1979;63:73-81.
8. McLean JN, Carlson GW, Losken A. The pectoralis major myocutaneous flap revisited: a reliable technique for

The journal of
PROSTHETIC AND IMPLANT DENTISTRY
Official Publication of Indian Prosthodontic Society
Kerala State Branch

head and neck reconstruction. Annals of plastic surgery. 2010 May 1;64(5):570-3.

9. Buzayan MM. Prosthetic management of midfacial defect with magnetretained silicone prosthesis. Prosthet Orthot Int 2014;38:627.
10. Singh AK, JF N, Sharma NK, Anandkumar J, Mishra N, Pandey A. Bipaddled Pectoralis Major Myocutaneous Flap in Complex Oral Cancer Defects-A Single Center Experience with Quality of Life Assessment. Indian Journal of Otolaryngology and Head & Neck Surgery. 2022 Dec 19:1-8.
11. Vartanian JG, Carvalho AL, Carvalho SMT, Mizobe L, Magrin J, Kowalski LP. Pectoralis major and other myofascial/myocutaneous flaps in head and neck cancer reconstruction: experience with 437 cases at a single institution. Head Neck. 2004 Dec;26(12):1018–1023.
12. Leite AK, De Matos LL, Belli M, Kulcsar MA, Cernea CR, Brandão LG, Pinto FR. Pectoralis major myocutaneous flap for head and neck reconstruction: risk factors for fistula formation. Acta Otorhinolaryngologica Italica. 2014 Dec;34(6):389.
13. Marunick M. Harrison, R. Beumer. J. Prosthodontic rehabilitation of midfacial defects. J Prosthet Dent 1985:54:533-560.
14. Beumer J, Marunick MT, Esposito SJ. Rehabilitation of facial defects. Maxillofacial rehabilitation: prosthodontic and surgical management of cancer-related, acquired, and congenital defects of the head and neck. 3rd ed. Batavia: Quintessence Pub; 2011.
15. Taylor TD. Clinical maxillofacial prosthetics. Assessment. 2000;20:155-88.
16. Markt JC, Lemon JC. Extraoral maxillofacial prosthetic rehabilitation at the MD Anderson Cancer Center: a survey of patient attitudes and opinions. The Journal of prosthetic dentistry. 2001 Jun 1;85:608-13.
17. Chalian VA, Drane JB, Metz HH, Roberts AC, Standish SM. Extraoral prosthetics. Chalian VA, Drane JB, Standish SM. Maxillofacial prosthetics; multidisciplinary practice. Baltimore (MD): Williams & Wilkins Co. 1971:308-10.
18. Granström G. Osseointegration in irradiated cancer patients: an analysis with respect to implant failures. Journal of Oral and Maxillofacial Surgery. 2005 May 1;63(5):579-85.
19. Subramaniam SS, Breik O, Cadd B, Peart G, Wiesenfeld D, Heggie A, Gibbons SD, Nastri A. Long-term outcomes of craniofacial implants for the restoration of facial defects. International Journal of Oral and Maxillofacial Surgery. 2018 Jun 1;47(6):773-82.