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
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.\(^8\) 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 ulcer-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.
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
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 (Figure 2) 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.\textsuperscript{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.\textsuperscript{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.

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References

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