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EXTERNALLY ROTATED FOREHEAD FLAP – A SELF SUFFICIENT FLAP FOR DONOR SITE RECONSTRUCTION

Oncology

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ABSTRACT

Oral squamous cell carcinoma being the most common mucosal malignancy in head and neck requires ablative surgeries and radiotherapies that creates large defects which handicaps patients functionally and psychologically. All reconstructive surgeries are aimed at restoring function and esthetics. At times reconstructive surgeons are forced to trade esthetics for function. While reconstructing large defects donor sites are often left with unsighty scars. Among the various flaps used in head and neck reconstruction forehead flap being loco-regional flap has advantages like colour , texture match, proximity to surgical field and ability to cover midface and lower face defects. The chief drawback of this flap is the large cosmetic defect left in donor site. Some surgeons prefer to cover it with skin grafts or dermal substitutes which however leaves unacceptable scar. In this article we present two cases of forehead flap reconstruction for buccal mucosa and lip-commissure defects using two different techniques.

KEYWORDS

INTRODUCTION

Trauma, tumour, pathologies and infection result in oral and maxillofacial defects of different severity. Composite defects not manageable by primary closure places the operating surgeon to choose the most suitable option from the reconstructive ladder for individual patients. Size and depth of the defect, location and patient systemic condition are important factors deciding flap selection and survival. Forehead flap is a fascio-cutaneous pedicled flap based on superficial temporal vessels. Its use in reconstruction of nasal defects dates back to 800 BC as mentioned in 'Susruta Veda' (1).

Its capability to reconstruct oropharyngeal lining was described by Blair, Moore, and Byars in 1941 which was further popularized by McGregor to cover gingival and buccal mucosal defects.

The presence of both longitudinally and horizontally oriented vasculature allows for flap rotation based on superficial temporal or supraorbital arteries thus extending its capabilities to reconstruct midface and lower face defects (2).

Given the various modifications and different routes by which forehead flap can be introduced into oropharynx it is important to weigh risk-benefit ratio of each technique in individual patients. Here we present two cases of oral cancer reconstructed with forehead flap employing two different techniques.

Case Report

In this report two patients who underwent forehead flap reconstruction for stage 3 squamous cell carcinoma of buccal mucosa is presented. Institutional ethical committee clearance has been obtained.

A 57 year old male patient presented to our department with the chief complaint of non - healing ulcerative growth in his left buccal mucosa for 8 months (Fig 1a).

Contrast Enhanced Computed Tomography (CECT) and histopathological examinations were done and he was diagnosed with oral squamous cell carcinoma of left buccal mucosa, TNM staging T3N1M0. Resection of primary along with hemimandibulectomy, MRND and reconstruction with forehead flap was planned. An axial pattern flap was raised based on anterior branch of superficial temporal artery which was tunnelled deep to the zygoma and sutured in the intraoral defect area (Fig 1b,1c,1d).

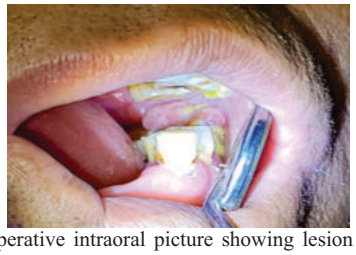

Fig 1a preoperative intraoral picture showing lesion in left buccal mucosa.

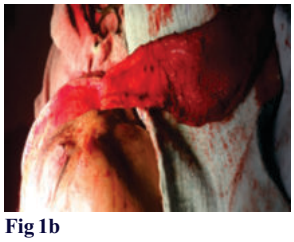

Fig 1b

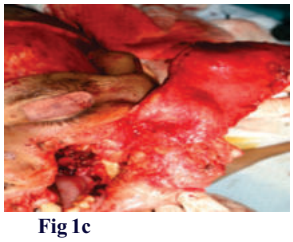

Fig 1c

Fig 1b showing the forehead flap harvest, 1c showing the tunnelling of flap into intraoral defect.

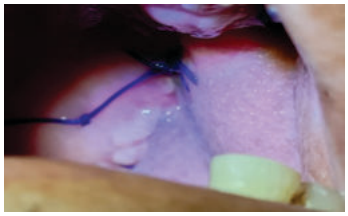

Fig 1d showing forehead flap sutured into intraoral defect

The donor site defect was covered with split thickness graft harvested from left thigh (Fig 1e,1f). Pedicle revision was planned after 4 weeks.

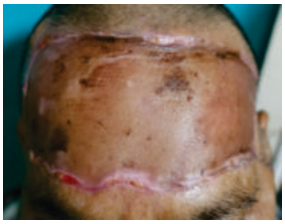

Fig 1e **Fig 1f**

Fig 1e showing split thickness graft harvested from left thigh, 1f showing donor site healing after uptake of skin graft.

A 43 year old male patient reported to our department with the chief complaint of non-healing ulcer in his left buccal mucosa for 10 months (Fig 2a).

Fig 2a preoperative picture showing lesion extension till commissural area.

CECT and histopathological examinations were done and he was diagnosed with oral squamous cell carcinoma of left buccal mucosa, TNM staging T3N2BM0. Resection of primary along with hemimandibulectomy, MRND and reconstruction with forehead flap was planned. A similar axial pattern fascio-cutaneous flap was raised and was rotated externally to reach intraoral defect (Fig 2b). Donor site was allowed to granulate for atleast 4 weeks (Fig 2c).

Fig 2b **Fig 2c**

Fig 2b showing forehead flap harvest, 2c showing postoperative healing at 3 weeks.

After complete healing of flap and sufficient granulation tissue has developed in the donor site the externally rotated flap was cut at the commissure area leaving sufficient cuff of flap tissue for any post radiation shrinkage (Fig 2d, 2e). The rest of the flap was returned and sutured back to the donor site (Fig 2f).

Fig 2d **Fig 2e**

Fig 2d intraoperative picture during flap revision, 2e immediate postoperative picture following flap revision.

Fig 2f showing portion of the flap returned back and sutured in the donor site.

This technique offers dual advantage of alleviating an unsighty scar in the donor site and also avoiding the need for a second donor site. Both the patients showed excellent flap healing on follow-up (Fig 2g, 2h) and were referred for postoperative radiotherapy.

Fig 2g **Fig 2h**

Fig 2g 2nd week postoperative picture, 2h intraoral picture depicting excellent flap healing.

DISCUSSION

Postoperative defects arising in the oral cavity following surgical resection of oral cavity neoplasms often places reconstructive surgeon in a difficult situation to run between both function and esthetics. Such kind of surgical defects are often composite defects with loss of mucosa, soft tissue, skin and/bone and primary closure is not possible. Therefore local, regional or distant flaps are used for reconstruction purpose. Cutaneous flaps like cervical flap, posterior cervical flap, fasciocutaneous flap like deltopectoral flap and myocutaneous flaps like pectoralis major myocutaneous flap, trapezius myocutaneous flaps are used depending upon the amount of soft tissue loss. Microvascular free flaps like free fibula, radial forearm free flap, rectus abdominis free flap, anterolateral thigh flap should be considered as a reconstructive option in all eligible patients.

Forehead flap is an axial pattern fascio-cutaneous flap supplied by the anterior branch of superficial temporal artery (3) first used by Susruta for reconstruction of nasal defects in 800 BC (4). It was introduced by McGregor in head and neck reconstruction (5). Owing to the several advantages of forehead flap like robust and reliable vascularity, excellent colour and texture match, non-hair bearing area, ease of harvesting and proximity to recipient site, absence of gravitational pull on the flap and its ability to reconstruct midface and lower face defects it has gained considerable attention among reconstructive surgeons. Further it can be folded 180^0 to form both intraoral lining and extraoral cover in the reconstruction of through and through cheek defects as described by Conley(6) In order to repair intraoral and extraoral facial defects forehead flap is either tunnelled deep to zygoma and sutured to intraoral defect or rotated externally to reconstruct through and through cheek defects along with lip-commissure complex. Tunnelled flaps has high chances of repeated infection due to ingrowth of hair at the proximal part of the flap. Cohen et al (7) tunnelled the forehead flap in subcutaneous plane superficial to parotid gland in two of his cases both of which developed sepsis.

The technique of forehead flap harvesting varies with individual surgeons. Biller et al (8) conducted a study to analyse the various complications associated with different techniques in order to determine the technique with least morbidity. The forehead flap can enter the oral cavity through three routes :

a. Lateral to zygoma (subcutaneously) : facial nerve paralysis is the most common complication in this technique even after careful dissection
b. Externally through cheek which requires a cheek incision and since route is long the flap may fall short for reconstruction of base of tongue or posterior pharyngeal wall.
c. Medial or deep to zygoma where a two-finger breadth space is needed to avoid flap pedicle constriction, which is especially a concern in female patients and in whom mandible resection is not performed. However this space can be obtained by out-fracturing zygoma and then repositioning it later.

Tunnelling the flap medial to zygoma is the most accepted route as it has least complications provided the pedicle constriction is taken care of and this allows for maximum flap length by being the shortest route.

The technique of suturing the flap back to its original site as shown in the second case is actually a modification of Dunhams technique which he proposed in mid 1892 (9). In his technique in order to maintain the vascularity of the flap he dissected the pedicle out from the flap and created a trough in the skin to receive this and then sutured the skin. Bulk of the flap was then returned to the donor site, by this way he was able to fill the donor site defect and at the same time the pedicle containing anterior temporal vessels was still connected with the flap thereby eliminating any chance of flap necrosis. Biller et al in 1973 (8) also mentioned in his study the technique of returning the flap to the donor site after three weeks to reduce the donor site morbidity.

Since tunnelling the flap has associated complications like sepsis and possible recurrence in the flap tunnel which may go unrecognized (10) the technique of rotating the flap externally around the cheek should be considered for reconstruction of intraoral and through and through cheek defects. Nevertheless this forms a long route and cannot be used for reconstructing posterior pharyngeal and tongue base defects.

CONCLUSION

The ever increasing popularity of free flaps as a single stage reconstructive option has overpowered other multi-stage pedicled flaps like forehead flap, but these time tested age old flaps are still working horses of reconstructive surgeries where resources are limited and patient factors preclude the use of free flaps. Owing to the donor site cosmetic defect, forehead flap was termed earlier as a “lifeboat” after flap failures. The technique of returning the flap to the donor site addresses this primary complication thereby compelling to consider forehead flap as a primary choice in reconstruction of midface and oral defects.

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