DOI: 10.7860/JCDR/2025/79249.20991

Case Report

Oncology Section

Single-staged Islanded Forehead Flap for Cheek Defect in Recurrent Buccal Mucosa Cancer: A Case Report

NIDHI VIJAY KUMAR BODIWALA[1], NITIN D BHOLA[2], CHETAN S GUPTA[3], HEMA S ANUKULA[4]

ABSTRACT

Facial defect reconstruction restores function and aesthetics following trauma, malignancy, or other anomalies. Among various techniques, the pedicled forehead flap offers superior outcomes due to its robust vascularity and ability to incorporate multiple tissue types. The present case presents a 54-year-old male with recurrent oral squamous cell carcinoma and a full-thickness cheek defect following tumour excision. Given his history of multiple surgeries and radiation, conventional flap options had already been used or were limited due to compromised vascularity after treatment. A single-staged islanded pedicled forehead flap was innovatively used as a reliable backup reconstructive approach. Preoperative workup included Contrast-Enhanced Computed Tomography (CECT) to assess tumour extent and Doppler sonography for temporal vessel patency. Following wide local excision, the forehead flap was designed, islanded and transposed in a single stage, ensuring adequate tissue coverage, functional restoration and aesthetic symmetry without the need for multiple surgeries. The patient achieved acceptable oral competence, facial contour and minimal donor site morbidity. The novelty of the present case lies in the successful application of a single-staged islanded forehead flap in a previously treated, surgically complex field, avoiding the need for free tissue transfer or staged procedures. The technique's ability to provide reliable vascularity and optimal cosmetic and functional results with minimal complications highlights its significance as a valuable option in challenging oncologic reconstructions. The present case underscores the enduring role of the forehead flap as a salvage option, particularly in patients with limited reconstructive choices due to prior surgeries or radiation, reinforcing its versatility in modern facial reconstructive surgery.

Keywords: Chimeric flap, Oral squamous cell carcinoma, Reconstruction, Superficial temporal artery flap

CASE REPORT

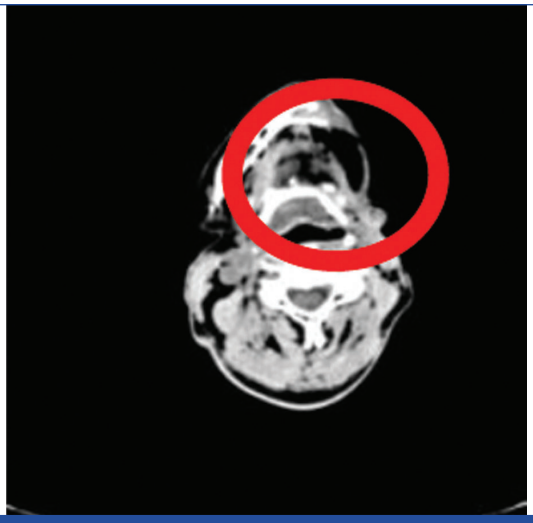
A 54-year-old male patient reported to the Department of Oral and Maxillofacial Surgery with a chief complaint of a painful, non healing ulcer over the left corner of the mouth for the last three months [Table/Fig-1]. The patient had undergone surgery for carcinoma of the lower left alveolus, which involved composite resection, segmental mandibulectomy and reconstruction with a pectoralis major myocutaneous flap, followed by postoperative radiotherapy (30 fractions) in 2020 at another centre. He had a history of diabetes mellitus for the past five years and a history of varicose veins for which he was under medicinal management; however, the details regarding this were not provided by the patient.

On examination, the lesion was present at the left corner of the mouth, approximately 3 cm in size, with extraoral skin involvement measuring approximately 2.5 cm [Table/Fig-1,2]. An incisional biopsy from the left corner of the mouth reported squamous cell carcinoma. Contrast-Enhanced Computed Tomography (CECT) The heterogeneous enhancement of the buccal mucosa at the left corner of the mouth with multiple irregularities suggestive of a second primary carcinoma in that area is shown in [Table/Fig-3,4].

Surgery was planned to perform a wide local excision of the lesion; however, reconstruction options were limited due to the previously used Pectoralis Major Myocutaneous (PMMC) flap on the same side for primary reconstruction, the patient's moderate general condition, a history of peripheral vascular disease and depleted neck vessels due to radiotherapy. Considering these factors, a forehead flap was planned for reconstruction. The superficial temporal artery was examined with a handheld Doppler and the course of the artery was marked on the skin. The defect was measured and the dimensions for the forehead flap (10×6 cm) were standardly marked. A T-shaped incision was made over the left temporal region, maintaining a 1-1.5 cm distance from the vascular pedicle to avoid injury during

[Table/Fig-1]: Intraoral lesion in left corner of mouth in red circle.

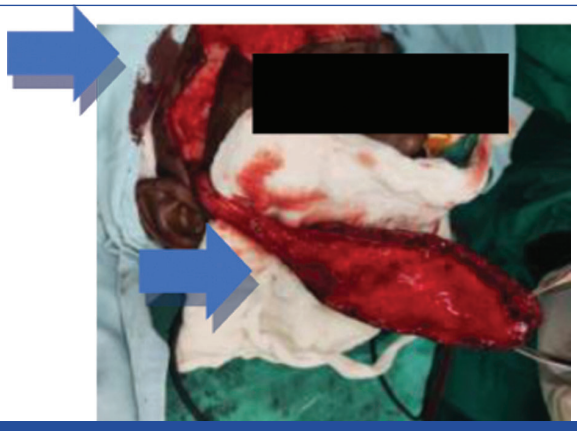
[Table/Fig-2]: Extraoral extension of lesion (blue) involving skin over left corner of mouth.



[Table/Fig-3]: Axial CT showing with multiple irregularitiesin left mandible (red circle).

[Table/Fig-4]: Axial CECT of left-side showing heterogeneous involvement (red circle).

flap dissection. Sharp dissection was then performed through the skin and subcutaneous tissue until the superficial temporal vessels were identified and marked with ink. Flap harvesting was completed while preserving 1 cm of tissue on either side of the marked pedicle [Table/Fig-5]. After achieving adequate pedicle length, tunnelling was performed through the zygoma into the oral cavity and the flap was adapted to the surgical defect both intraorally and extraorally [Table/Fig-6]. The donor site was covered with a split-thickness skin graft harvested from the medial aspect of the thigh [Table/Fig-7].



[Table/Fig-5]: T-shaped incision (blue arrow) with careful dissection and flap reflection.

[Table/Fig-6]: Suturing of flap intra and extraoal.

[Table/Fig-7]: Split thickness skin graft.

The patient was on regular follow-up until the writing of the present case report (approximately 1 year 11 months). During the follow-up period, swallowing, speech, lip competence and the colour and texture of the flap were assessed and the postoperative healing was good [Table/Fig-8]. The postoperative histopathological report suggested well-differentiated squamous cell carcinoma, with all margins negative, a depth of invasion of 2 mm, perineural invasion negative and a Tumour, Node, Metastasis (TNM) classification of yT1N0Mx, Stage I.

[Table/Fig-8]: Follow-up photo recepient (red circle) and donor site (blue arrow).

DISCUSSION

In full-thickness cheek defect reconstruction, various flap techniques have been developed across different regions of the face to achieve improved aesthetic outcomes [1]. These options may include the bi-paddled pectoralis major flap, the folded trapezius island myocutaneous flap, the latissimus dorsi flap and microvascular free flaps [2]. The forehead and scalp flaps are often utilised in secondary reconstruction as a backup option due to their complexity, enabling precise planning to address defects or complications from previous surgeries while ensuring adequate vascular supply and effective restoration of form and function in cases where primary options were inadequate or unsuccessful. The forehead flap can be either pedicled or islanded. The pedicled flap is attached and rotated over the zygomatic arch extraorally, which requires secondary surgery for flap division. In the islanded type, the pedicle is identified and sharp subcutaneous dissection is carried out to tunnel the flap through the zygomatic arch intraorally, adapting it over the defect; this is a single-step procedure [3]. In the present case, the authors utilised the islanded pedicled forehead flap for the reconstruction of a full-thickness cheek defect.

Numerous surgical procedures have been designed utilising branches of the superficial temporal artery as a vascular pedicle [3]. A thorough understanding of forehead anatomy is crucial when designing a forehead flap. The region is well-vascularised, enabling the creation of various axial-pattern flaps [4]. The primary arterial supply to the forehead includes three main paired arteries: the superficial temporal arteries—particularly their frontal branches—which are critical in forehead reconstructive procedures; the supratrochlear arteries; and the supraorbital arteries [5].

This flap is harvested from the forehead area and has the unique capability of incorporating various tissue types, each supplied by its own distinct blood vessels [4]. Studies have consistently shown that the forehead flap, being an axial pattern flap combined with its ample blood supply, provides a significant advantage in ensuring flap survival, even in cases with extensive tissue transfer [6].

A forehead flap combines multiple tissue elements—such as skin, muscle and fascia—within a single flap. This configuration allows for the reconstruction of complex defects by providing specific tissue characteristics tailored to the defect's requirements. The integration of different tissue types within the flap enables greater customisation and enhances both functional and aesthetic restoration [7].

Reconstructive surgery often addresses significant defects resulting from trauma, malignancy, or congenital anomalies. The repair of facial tissue defects poses a considerable challenge for reconstructive surgeons, despite advancements in various flap techniques [7]. The primary goal of facial reconstruction is to re-establish essential functions, including respiration, mastication and facial expressions, while simultaneously providing a natural and visually appealing result [8].

The choice of flap for reconstruction plays a critical role in achieving both functional and aesthetic outcomes. Such surgery aims to restore function and aesthetics following significant tissue loss [4]. There is a consensus among plastic surgeons that, following Gillies' principle, any defect should ideally be repaired using local flaps whenever possible. Local tissues generally provide better aesthetic and functional results compared to any type of graft or distant flap [9].

In the present case, considering the recurrent lesion, the patient had already undergone surgery and a PMMC flap was used. Another option, such as a microvascular free flap, was not viable due to vessel depletion in the neck and the presence of peripheral vascular disease. Thus, the decision was made not to use a microvascular free flap.

Among these various reconstructive options, especially for recurrent full-thickness buccal mucosa lesions, the forehead flap is notable for its vascular supply and good tissue match [10]. This allows for enhanced customisation of the flap to meet specific reconstructive needs. The ability to incorporate both skin and underlying tissues, such as muscle or fascia, makes the islanded pedicled forehead flap a flexible single-staged option for complex reconstructions [11].

A study conducted by Liu A et al., in 2021 demonstrated the procedure in 12 patients who required immediate facial defect reconstruction following curative surgery. They reconstructed defects with a forehead flap and concluded that it is a highly useful and one of the best reconstruction options, with follow-up periods ranging from 8 to 43 months [11]. Although free flap techniques have become more common, regional flaps like the forehead flap and its variations continue to be highly effective, providing competitive outcomes in both appearance and functionality for facial reconstructions in patients with recurrent buccal mucosa malignancies, those with primary flap failure and patients with co-morbidities such as peripheral vascular disease where microvascular reconstruction is contraindicated [12].

A study by Mittal S et al., in 2024 demonstrated the forehead flap as a workhorse for the reconstruction of facial defects. In their study, 20 patients underwent facial reconstruction procedures for various facial defects. The authors concluded that the forehead flap likely offered the best skin match, optimal intraoral lining, adequate tissue thickness and stood as a reliable option with the least complications or failure compared to other local, regional, or even free flaps [13]. The forehead flap remains a backup option in reconstructive surgery, effectively addressing various facial defects with minimal complications.

CONCLUSION(S)

In resource-restrained areas or cases with compromised vascularity, the pedicled forehead flap may serve as a reliable backup for complex facial reconstructions. It provides a large, well-vascularised tissue source, ensuring functional restoration and aesthetic harmony. Its versatility can be tailored to accommodate defects of any size while minimising complications. This technique eliminates the need for free flap transfers or multiple staged procedures, making it a practical option in challenging oncologic reconstructions. The forehead flap remains a valuable and time-tested approach in modern facial reconstructive surgery.

REFERENCES

[1] Small JO, Leonard AG. Posterior superficial temporal artery island flap for intra-oral reconstruction: A case report. Br J Plast Surg. 1985;38(4):488-91.
[2] Fang SL, Zhang DM, Chen WL, Wang YY, Fan S. Reconstruction of full-thickness cheek defects with a folded extended supraclavicular fasciocutaneous island flap following ablation of advanced oral cancer. J Cancer Res Ther. 2016;12(2):888.
[3] Özdemir R, Sungur N, Sensöz Ö, Uysal ÇA, Ulusoy GM, Ortak T, et al. Reconstruction of facial defects with superficial temporal artery island flaps: A donor site with various alternatives. Plast Reconstr Surg. 2002;109(5):1528-35.
[4] Huang WC, Chen HC, Wei FC, Cheng MH, Schnur DP. Chimeric flap in clinical use. Clin Plast Surg. 2003;30(3):457-67.
[5] Fan J. A New technique of scarless expanded forehead flap for reconstructive surgery. Plast Reconstr Surg. 2000;106(4):777-85. Doi: 10.1097/00006534-200009040-00004.
[6] Correa BJ, Weathers WM, Wolfswinkel EM, Thornton JF. The forehead flap: The gold standard of nasal soft tissue reconstruction. In: Seminars in plastic surgery. Thieme Medical Publishers; 2013. p. 096-103.
[7] Bridger AG, Walpoe M, Costantino PD. The pedicled temporoparietal fascial flap for complex midfacial reconstruction. Oper Tech Otolaryngol-Head Neck Surg. 2000;11(3):198-200.
[8] John Yousif N, Matloub HS, Sanger JR, Campbell B. Soft-tissue reconstruction of the oral cavity. Clin Plast Surg. 1994;21(1):15-23.
[9] Gonzalez-Ulloa M. Restoration of the face covering by means of selected skin in regional aesthetic units. Br J Plast Surg. 1956;9(3):212-21.
[10] Nakajima H, Imanishi N, Minabe T. The arterial anatomy of the temporal region and the vascular basis of various temporal flaps. Br J Plast Surg. 1995;48(7):439-50.
[11] Liu A, Su X, Jiao Y, Yang P, Dai D, Xu J. Facial defect repair using a flap based on the superficial temporal artery. Plast Reconstr Surg- Glob Open. 2021;9(4):e3541.

[12] Algan S, Tan O, Kara M, Inaloz A, Cakmak MA, Aydin OE. Chimeric reverse temporal muscle and pericranial flap for double-layer closure of deep facial defects. J Oral Maxillofac Surg. 2018;76(1):199-205.

[13] Mittal S, Makkar JS, Singh D, Mitta R. Forehead flap a workhorse flap for facial reconstruction- our experience at tertiary care institute. J Surg Res [Internet]. 2024;7(1):72-75. [Cited 2025 Jan 4].

PARTICULARS OF CONTRIBUTORS:
1. Junior Resident, Department of Oral and Maxillofacial Surgery, Sharad Pawar Dental College and Hospital, Datta Meghe Institute of Higher Education and Research (Deemed to be University), Sawangi, Wardha, Maharastra, India.
2. Professor and Head, Department of Oral and Maxillofacial Surgery, Sharad Pawar Dental College and Hospital, Datta Meghe Institute of Higher Education and Research (Deemed to be University), Sawangi, Wardha, Maharastra, India.
3. Associate Professor, Department of Oral and Maxillofacial Surgery, Sharad Pawar Dental College and Hospital, Datta Meghe Institute of Higher Education and Research (Deemed to be University), Sawangi, Wardha, Maharastra, India.
4. Assistant Professor, Department of Oral and Maxillofacial Surgery, Sharad Pawar Dental College and Hospital, Datta Meghe Institute of Higher Education and Research (Deemed to be University), Sawangi, Wardha, Maharastra, India.

NAME, ADDRESS, E-MAIL ID OF THE CORRESPONDING AUTHOR:
Dr. Nidhi Vijay Kumar Bodiwala,
Junior Resident, Department of Oral and Maxillofacial Surgery, Sharad Pawar Dental College and Hospital, Datta Meghe Institute of Higher Education and Research (Deemed to be University), Sawangi, Wardha-442001, Maharastra, India.
E-mail: nidhi19697bodiwala@gmail.com

PLAGIARISM CHECKING METHODS: [Jain H et al.]
- Plagiarism X-checker: Mar 15, 2025
- Manual Googling: Apr 03, 2025
- iThenticate Software: Apr 12, 2025 (7%)

ETYMOLOGY: Author Origin

EMENDATIONS: 6

AUTHOR DECLARATION:
- Financial or Other Competing Interests: None
- Was informed consent obtained from the subjects involved in the study? Yes
- For any images presented appropriate consent has been obtained from the subjects. Yes

Date of Submission: **Mar 09, 2025**
Date of Peer Review: **Mar 23, 2025**
Date of Acceptance: **Apr 14, 2025**
Date of Publishing: **May 01, 2025**