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A Novel Application of the Modified Yu Flap in Buccal Mucosa Squamous Cell Carcinoma Reconstruction: A Case Report

Modified Yu Flap in Buccal SCC Reconstruction

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ABSTRACT

Background

Reconstruction of oral cavity defects following oncologic excision demands simultaneous restoration of mucosal lining, oral competence, cheek contour, and satisfactory aesthetics. Local flap techniques remain indispensable for small-to-medium defects because of their simplicity, tissue compatibility, reliable vascularity, and feasibility in resource-limited or high-risk surgical settings. The Yu flap, originally devised for lower lip reconstruction, integrates rotational and advancement components to achieve tension-free closure with favorable functional outcomes. Modifications of this technique have broadened its applicability to perioral and intraoral defects, including those of the buccal mucosa.

Case Presentation

A 66-year-old male with a three-decade history of tobacco chewing and concurrent smoking presented to the Department of Oral and Maxillofacial Surgery with a painful ulcerative lesion of the left buccal mucosa. Contrast-enhanced computed tomography confirmed an ill-defined heterogeneously enhancing lesion measuring 2.6 × 1.8 × 2.9 cm along the left gingivobuccal sulcus with a depth of invasion of approximately 13 mm and involvement of terminal facial artery branches. Histopathology from an incisional biopsy performed prior to referral established a diagnosis of moderately differentiated squamous cell carcinoma. Following thorough preoperative systemic optimization—including management of hypertension, hyperkalemia, and mild cardiac risk—the patient underwent wide local excision with radical neck dissection under general anesthesia. The resultant defect was reconstructed using a modified Yu flap incorporating rotational and advancement components from the adjacent cheek. Healing was uneventful, with satisfactory oral competence, acceptable mouth opening, and no flap-related complications at follow-up.

Conclusion

The modified Yu flap provides a dependable single-stage reconstructive solution for selected buccal mucosal defects following oncologic resection. Its favorable tissue match, predictable vascularity, and minimal donor-site morbidity render it a viable alternative to distant or microvascular flaps in appropriately selected patients with comorbidities that increase operative risk.

Keywords: *Buccal mucosa carcinoma; squamous cell carcinoma; Yu flap; oral reconstruction; local flap; oncologic surgery; commissuroplasty*

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I. INTRODUCTION

Oral squamous cell carcinoma (OSCC) constitutes approximately 90% of all oral malignancies and represents a significant public health burden, particularly in South and Southeast Asia where the combined use of tobacco and areca nut is prevalent [1]. The buccal mucosa is among the most frequently affected sites in the Indian subcontinent, a pattern closely linked to habitual tobacco chewing, which induces sustained mucosal carcinogenesis [2]. Surgical excision with adequate oncological margins remains the cornerstone of curative treatment for resectable lesions; however, the resulting tissue defects demand thoughtful reconstruction to restore oral function, facial symmetry, mastication, speech, and swallowing [3].

The ideal reconstructive approach should provide sufficient tissue volume, maintain oral competence, preserve mouth opening, and achieve a satisfactory cosmetic appearance while minimizing donor-site morbidity [4]. Free tissue transfer is the preferred modality for large and composite defects; however, its application in elderly patients or in institutions with limited microsurgical infrastructure is constrained by prolonged operative time, increased perioperative risk, and the requirement for specialized expertise [5,6]. In such contexts, local and regional flaps continue to fulfill an indispensable role.

The Yu flap was originally described by Yu in 1989 as a combined rotation-advancement flap for lower lip reconstruction following tumor resection [7]. Belmonte-Caro and colleagues subsequently demonstrated its applicability to upper lip defects in a reverse configuration [8]. Lee and associates further documented satisfactory functional and cosmetic outcomes using this technique for upper lip reconstruction in two cases involving carcinoma excision and trauma [9]. More recently, Kimura and colleagues described an anchor flap modification of the reverse Yu technique for upper lip reconstruction [10], and Leme and colleagues highlighted the broader versatility of the Yu flap across varied perioral and labial defects [11]. These incremental modifications reflect a growing recognition of the flap's adaptability to diverse anatomical and oncological scenarios.

The present report describes the clinical course, operative technique, and postoperative outcomes of a 66-year-old male who underwent wide local excision and radical neck dissection for moderately differentiated squamous cell carcinoma of the left buccal mucosa, with subsequent immediate reconstruction using a modified Yu flap. This case extends the existing evidence for Yu flap modifications to buccal mucosal defects and illustrates the technique's practicability in patients with significant medical comorbidities.

II. CASE REPORT

Patient Information and History

A 66-year-old male, presented to the outpatient department of Oral and Maxillofacial Surgery with a chief complaint of pain and progressive swelling at the left corner of his mouth for one year. The pain was spontaneous and intermittent in character with an associated burning sensation during spicy food consumption. The swelling had gradually increased in size over the preceding two months and was not associated with pus or blood discharge, and there was no history of fever.

A detailed personal history revealed habitual tobacco chewing for 20 years at a consumption rate of three to four packs per day, in addition to cigarette smoking for 10 years at two cigarettes per day. These are well-established risk factors for oral mucosal carcinogenesis, particularly in the Indian population [2]. The patient had no known systemic conditions and reported no drug allergies. He had received COVID-19 vaccination. Notably, the patient had self-medicated with intramuscular diclofenac, along with unsupervised oral rabeprazole, a hepatoprotective agent, and linezolid for five days prior to presentation, without prior medical consultation.

Relevant medical background included a previous incisional biopsy performed at an external institution on 28 December 2024, which had established a histopathological diagnosis of moderately differentiated squamous cell carcinoma of the left buccal mucosa. Extractions of teeth 35 and 36 had been performed at the same institution on the same date. A systemic review identified no prior malignancy, radiotherapy, or significant family history.

Clinical Examination

General examination revealed an alert, cooperative patient in no acute distress. Vital signs were notable for elevated blood pressure. Extraoral examination demonstrated facial asymmetry attributable to a hard, firm swelling in the left cheek region, approximately 2 cm in diameter, without overlying skin changes at presentation. Cervical palpation identified enlarged lymph nodes at left level IB with a short-axis diameter of 9.8 mm on imaging, consistent with regional metastatic involvement.

Intraoral examination was performed with a mouth opening restricted to two finger-breadths, indicating early trismus likely attributable to tumoral infiltration of the masticatory musculature. An ulcerative lesion measuring approximately 1 × 2 cm was identified over the left buccal mucosa with indurated margins. A white patch was also observed over the right buccal mucosa, representing a separate area of leukoplakia warranting surveillance. The dentition was otherwise unremarkable in the context of the prior extractions.

Figure 1-Extraoral view — facial asymmetry, left cheek swelling (diameter ~2 cm), Intraoral view — ulcerative lesion on left buccal mucosa (1×2 cm), white patch right BM

Investigations and Preoperative Assessment

Contrast-enhanced computed tomography of the head and neck region, performed on 4 January 2025, revealed an ill-defined heterogeneously enhancing solid-cystic lesion measuring 2.6 × 1.8 × 2.9 cm along the left gingivobuccal sulcus, predominantly involving its anterior aspect. A large exophytic cystic-necrotic component measuring 18 × 15 × 17 mm extended to the skin surface along the left anterolateral aspect of the cheek. The depth of invasion was measured at approximately 13 mm. Terminal branches of the facial artery demonstrated loss of fat planes with the lesion, indicating probable vascular involvement. Enlarged lymph nodes were identified at left level IB (short-axis diameter 9.8 mm), and subcentimetric lymph nodes were noted bilaterally in the cervical region.

Hematological investigations revealed hemoglobin 14.0 g/dL and platelet count 2.9 × 10^5/μL, both within acceptable surgical thresholds. Serum electrolytes demonstrated sodium 134 mmol/L, potassium 5.8 mmol/L (hyperkalemia), and chloride 99.4 mmol/L. Prothrombin time/INR was 11.4 seconds/1.0, within normal limits. Serum creatinine was 0.9 mg/dL. Viral markers were negative.

A two-dimensional echocardiogram demonstrated trivial mitral regurgitation, trivial tricuspid regurgitation, a left ventricular ejection fraction of 60%, and grade I left ventricular diastolic dysfunction. ECG findings and echocardiographic results were reviewed by cardiology, which provided operative clearance with acknowledgment of mild cardiac risk. A general medicine consultation was obtained in view of elevated blood pressure and hyperkalemia; amlodipine 10 mg once daily and a potassium-binding agent (potassium polystyrene sulfonate sachet) were initiated, with a stipulation that surgery proceed only when blood pressure was below 140/90 mmHg, with eight-hourly blood pressure monitoring.

The lesion was provisionally diagnosed as squamous cell carcinoma of the left buccal mucosa. On the basis of clinical, radiological, and histopathological findings, the lesion was staged as T2N1M0 (AJCC 8th edition). Following multidisciplinary discussion and comprehensive written informed consent, the patient was planned for wide local excision of the lesion with immediate reconstruction using a modified Yu flap and concurrent radical neck dissection under general anesthesia.

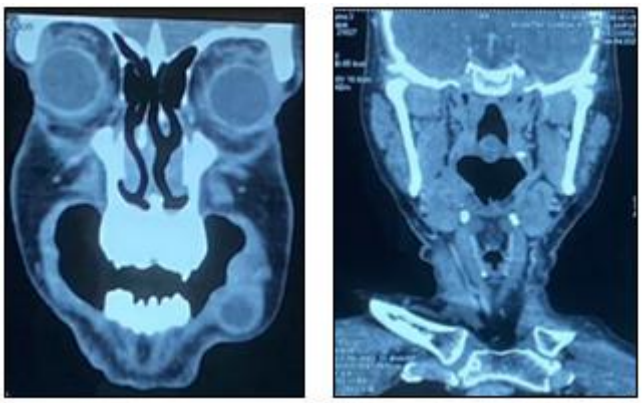

Figure 2 - CECT imaging-Coronal cut showing cystic-necrotic component reaching skin surface, Level IB lymph node enlargement (9.8 mm short axis

Operative Technique

The patient was admitted to the Male Surgery Ward under the Department of Oral and Maxillofacial Surgery and enrolled under the Bhamashah Swasthya Bima Yojana (BSBY) scheme. After confirming hemodynamic stability and blood pressure control within the target range, the patient was taken to the operating theatre. Nasotracheal intubation was performed to facilitate unobstructed intraoral access and permit adequate mouth opening for tumor visualization and margin assessment.

Wide local excision of the left buccal mucosal lesion was carried out with oncologically adequate margins. The excised specimen included the ulcerative lesion, surrounding mucosa, and associated subcutaneous tissue to achieve a depth of clearance consistent with the measured depth of invasion of 13 mm. Intraoperative assessment confirmed tumor-free margins. The resection produced a defect involving the left buccal mucosa and adjacent cheek tissue.

Concurrent radical neck dissection on the left side was performed to address regional lymph node involvement identified on preoperative imaging and clinical staging.

For reconstruction, a modified Yu flap was designed utilizing adjacent cheek tissue. Consistent with the flap's established design principles [7,9], the reconstruction incorporated both rotational and advancement components. An incision was planned from the commissure region laterally in a curvilinear fashion along the cheek, taking care to align scars with the natural skin tension lines and nasolabial contours. The flap design was adapted to the size and configuration of the buccal defect, ensuring adequate tissue reach without undue tension.

The medial component of the flap incorporated full-thickness mucosal and submucosal layers to reconstruct the mucosal lining, while the lateral component provided skin and subcutaneous tissue for external cheek coverage. The orbicularis oris muscle was partially divided at the commissure—with the medial two-thirds transected and the lateral one-third preserved—in keeping with the technique described by Lee and colleagues [9], thereby maintaining vascular continuity and partial motor function. The flap was elevated in the subcutaneous plane, rotated and advanced into the defect, and secured with layered closure using resorbable sutures for the mucosal layer and non-resorbable sutures externally. A parallelogram-shaped oral mucosal advancement flap was fashioned from the commissure to reconstitute the vermilion-mucosal junction. A suction drain was placed, and hemostasis was confirmed prior to wound closure.

Figure 3- Intraoperative photographs-Panel A: Post-excision defect with measured margins, Panel B: Flap design marked on cheek skin (dotted/dashed pen lines visible), Panel C: Flap elevated and rotated/advanced into defect, before final closure

Postoperative Management and Follow-up

Postoperative care included intravenous broad-spectrum antibiotics, analgesics, and proton pump inhibitor therapy. Nutritional support via nasogastric tube was provided during the initial recovery period. Blood pressure monitoring was continued eight-hourly in accordance with medical advice, and antihypertensive therapy was maintained. Oral hygiene protocols and progressive mouth-opening physiotherapy exercises were initiated from the early postoperative period to mitigate fibrosis and trismus.

The flap demonstrated uninterrupted viability throughout the postoperative course, with no evidence of infection, wound dehiscence, or flap necrosis. Sutures were removed on schedule. Functional assessment at follow-up, conducted using the scoring system proposed by Unsal Tuna and colleagues [12], demonstrated normal sensibility (score 2), complete oral competence (score 4), mild asymmetry of mouth-opening movement (score 1), moderate microstomia (score 2), asymmetry in the nasolabial region attributable to scar formation (score 2), and equal upper and lower vermilion height (score 2), yielding a composite functional and aesthetic score of 13 out of a maximum of 16 (Table 1). The patient reported satisfaction with swallowing, speech, and facial appearance. No evidence of local recurrence was identified during the follow-up period.

Figure 4- Follow Up Photos- 7th Post operative day, 1 month post operation, 3 months post operation

Table 1. Functional and Aesthetic Assessment Score

Domain	Parameter	Score	Case
Functional: Sensibility	Normal sensibility	2	2
Functional: Competence	Complete oral competence	4	4
Functional: Mouth opening	Asymmetric pouting/movement	1	1
Aesthetic: Stoma	Moderate microstomia	2	2
Aesthetic: Scar/Asymmetry	Asymmetry in nasolabial region	2	2
Aesthetic: Vermilion	Upper = Lower vermilion	2	2
Total Score (Max 16, Min 6)			**13 / 16**

Adapted from Unsal Tuna et al. [12]. Scores reflect postoperative follow-up assessment.

III. DISCUSSION

This case presents a 66-year-old male with moderately differentiated squamous cell carcinoma of the left buccal mucosa, a clinical scenario that is both diagnostically instructive and reconstructively challenging. Oral SCC at this site is strongly associated with habitual tobacco use, as evidenced by the patient's two-decade history of tobacco chewing and concurrent smoking [1,2]. Notably, the simultaneous presence of a white patch on the contralateral buccal mucosa underscores the concept of field cancerization, whereby chronic carcinogenic exposure predisposes the entire oral mucosa to dysplastic transformation [13]. Long-term surveillance of such lesions is warranted.

The preoperative workup in this case exemplifies the multidisciplinary coordination required for patients with head and neck malignancies and concurrent medical comorbidities. The identification of hyperkalemia, elevated blood pressure, and mild cardiac dysfunction mandated targeted optimization prior to surgery. Hyperkalemia in the context of unsupervised antibiotic use—including self-administered linezolid—may have reflected a pharmacological contribution, and its correction using a potassium-binding agent was prudent. Cardiology clearance with acknowledgment of mild cardiac risk is consistent with contemporary guidelines for perioperative risk stratification in noncardiac surgery [14].

The depth of invasion of 13 mm identified on CECT is particularly significant from an oncological standpoint. The AJCC 8th edition TNM staging system introduced depth of invasion as a T-category modifier, given its established association with regional metastasis and survival in oral SCC [15]. A depth exceeding 10 mm contributes to upstaging, which in this patient, combined with the presence of a level IB lymph node measuring 9.8 mm, supported a clinical stage of T2N1M0. The decision to proceed with concurrent radical neck dissection was therefore oncologically sound.

From a reconstructive perspective, the Yu flap's design principles align well with the anatomical requirements of buccal mucosal defects. The flap, originally described for lower lip reconstruction [7] and subsequently adapted for upper lip [8,9] and other perioral defects [10,11], relies on the reliable vascularity of the facial soft tissues and the proximity of the cheek to the oral commissure and buccal mucosa. The combined rotation-advancement movement allows the surgeon to recruit tissue from a favorable donor region with minimal tension, while the curvilinear scar design follows natural facial lines, thereby optimizing the cosmetic outcome.

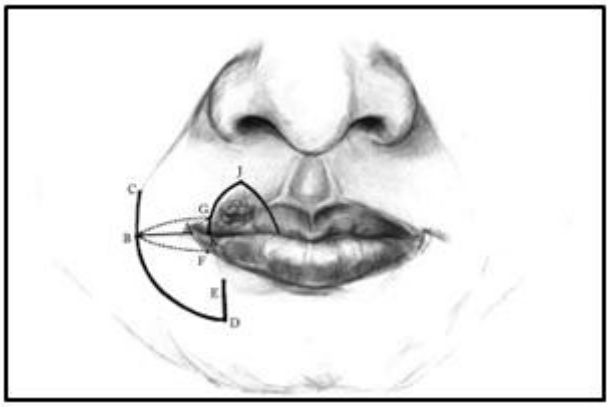

Figure 4 — Schematic diagram of modified Yu flap design

The partial preservation of the lateral orbicularis oris muscle is a critical technical detail that distinguishes the Yu flap from simpler advancement techniques. By maintaining the lateral one-third of the muscle intact, the reconstruction preserves partial oral sphincter function and vascular inflow to the flap, reducing the risk of ischemic necrosis. This approach mirrors the technique documented by Lee and colleagues in their two-case series [9] and contributes to the satisfactory oral competence observed in the present patient at follow-up.

Reconstruction of the vermilion-mucosal junction using a parallelogram-shaped oral mucosal advancement flap ensures that the reconstructed commissure possesses an appropriate mucosal surface, preserving both the functional and aesthetic characteristics of the native lip-cheek junction. This detail is consistent with the concept of the 'vermilion body' reconstruction described by Fries, in which buccal mucosa is advanced to reconstitute the red portion of the lip [16].

Compared with other reconstructive options, the modified Yu flap offers several practical advantages in this context. Primary closure of buccal mucosal defects of this magnitude risks microstomia, limitation of mouth opening, and mucosal contracture. Skin grafts provide mucosal coverage but lack bulk, contract significantly, and may result in tethering. Regional flaps such as the nasolabial flap or buccal fat pad flap are viable alternatives for buccal defects but each carries specific limitations, including visible donor-site scars or limited reach. The pectoralis major myocutaneous flap, while reliable for larger defects, introduces unnecessary bulk and morbidity for a defect of this scale [17]. Microvascular free flaps remain the gold standard for extensive reconstruction [5,6] but demand resources and physiological reserve that may not be universally available, particularly in an elderly patient with cardiac comorbidities.

The composite functional and aesthetic score of 13 out of 16 achieved in this case compares favorably with outcomes reported in the two-case series by Lee and colleagues, in which scores of 13 and 12 were recorded for patients undergoing lip reconstruction with the same technique [9]. This correspondence suggests that the modified Yu flap, when applied to buccal mucosal defects using similar technical principles, can yield outcomes comparable to those achieved in the perioral context for which the flap was originally designed.

Certain limitations of this report merit acknowledgment. As a single case description, this report does not permit statistical generalization. The follow-up duration, while sufficient to document early healing and functional recovery, does not address long-term oncological outcomes or the potential for delayed flap contraction. Additionally, the absence of formal quality-of-life assessment instruments limits a comprehensive evaluation of the patient-reported experience. Future prospective case series with longer follow-up periods would be valuable in establishing the role of the modified Yu flap within a structured reconstructive algorithm for buccal mucosal SCC.

IV. CONCLUSION

The modified Yu flap represents a reproducible and effective single-stage reconstructive option for selected buccal mucosal defects following oncologic excision. Its combined rotation-advancement design leverages the excellent tissue match of adjacent cheek tissue, the reliable vascularity of the facial soft tissue envelope, and the versatility afforded by partial muscle preservation. In patients with significant medical comorbidities or in resource-limited settings where microvascular reconstruction is impractical, the modified Yu flap provides satisfactory functional restoration of oral competence, acceptable aesthetics, and minimal donor-site morbidity. This case contributes to the growing body of evidence supporting the adaptability of the Yu flap beyond its original lip reconstruction context.

DECLARATIONS

Patient Consent

Written informed consent was obtained from the patient for publication of clinical details, investigation findings, and operative records in accordance with institutional policy..

Conflict of Interest

The authors declare no conflict of interest.

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Author Contributions

Concept and design, surgical management, manuscript preparation, critical revision, and final approval: All authors.

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