



# Forehead Flap Reconstruction Can Give Good Cosmesis and Quality of Life in a Case of Lower Lip Carcinoma with FRAFF Failure

Kar PP<sup>1</sup>, Chakraborty K<sup>2</sup> and Dey S<sup>3\*</sup>

<sup>1</sup>Consultant Maxillofacial Surgeon Desun Hospital, India

<sup>2</sup>Department of Pathology, Chittaranjan National Cancer Institute, India

<sup>3</sup>Department of Head and Neck Surgical Oncology, Chittaranjan National Cancer Institute, India

**\*Corresponding author:** Samyadipta Dey, MBBS, MS (ENT), Specialist Grade 2, Department of Head and Neck Surgical Oncology, Chittaranjan National Cancer Institute, 37 S.P. Mukherjee Road, Hazra, Kolkata - 700026, India, Tel: 09831074623; Email: dr.sdey.ent@gmail.com

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## Abstract

Squamous cell carcinoma (SCC) of the lower lip is the most common oral cavity malignancy in the world having less than 20% occult metastasis. A 60-year-old male patient presented with a gradually progressive UPG over the lower lip for 3 years with occasional bleeding. On examination, its approximate size was 9.5 x 4 cm with depth of invasion of 12 mm, extending from right angle to left angle of mouth, anteriorly from 2 cm inferior to vermilion border and posteriorly 2cm short of lower gingivo-labial sulcus. The lesion was clinically staged as cT3N0M0 after wedge biopsy report showed early invasive SCC.

As per NCCN guidelines, a WLE + bilateral selective neck dissection (I-III) was done with FRAFF reconstruction under general anesthesia. Unfortunately, the FRAFF devitalized even after re-exploration and re-anastomosis. Due to technical difficulties and precision of skill required for local flaps, we have utilized a right lateral forehead flap for the 2nd sitting reconstruction of the lower lip. STSG was used for donor site reconstruction. Post-op cosmesis of both the lower lip and forehead donor site was satisfactory and oral competence was good with a karnofsky score of 100.

**Keywords:** Lower Lip; Squamous Cell Carcinoma; Surgical Treatment; Reconstruction; Neck Dissection

**Abbreviations:** FRAFF: Free Radial Artery Forearm Flap; UPG: Ulcero Proliferative Growth; SCC: Squamous Cell Carcinoma; WLE: Wide Local Excision; NCCN: National Comprehensive Cancer Network; IJV: Internal Jugular Veins; STSG: Split Thickness Skin Graft; RT: Radiotherapy.

## Introduction

The worldwide incidence of lip cancer is low (1-2%), but squamous cell carcinoma (SCC) of the lower lip is the most

common malignant tumour of all oral cancers comprising 25-30%. It occurs more in males above the age of 50 years (male: female ratio, 6:1) [1]. SCC is the most common histological type (90%), seconded by Basal cell carcinoma (10%). SCC's usually involves the lower lip, arising from pre-cancerous lesions such as radiodermatitis, chronic cheilitis, xeroderma pigmentosa and in long term exposure to ultraviolet radiation. Some reports have also indicated the role of pathogenic viruses such as Human Papilloma Virus 16 and 24 and Herpes Virus 1 and 2, especially in immune-

compromised patients [2,3]. Better prognosis and a survival rate of 90% at a 5 year follow up are expected if lip cancers are diagnosed at an earlier stage. However, if there is occult nodal metastasis (5-20%), the overall survival rate reduces to 30-70% at the 5-year follow-up. According to Agostini T, et al. [2], the risk of nodal metastasis increases with tumour size >2cm and depth of invasion >4cm. Hosal IN, et al. [4] reported that the mean tumor thickness in patients with metastasis was 5.6mm compared to 3.6mm in patients who did not present with cervical metastasis.

The entity of lower lip reconstruction is quite challenging and a topic of debate as new techniques evolve every day, each having its own advantage and disadvantages. A full thickness surgical resection with adequate margins and reconstruction is the treatment of choice for SCC lower lip depending on the size and location of the tumour. Additionally, a neck dissection should also be done if there is cervical metastasis. The reconstruction of the lower lip post-op defect should aim to achieve the following principles:

- Preserve sensation of the lips.
- Maintain oral competence.
- Continuity of vermillion border.
- Avoid microstomia.
- Satisfactory cosmesis.

For reconstruction of the total loss of the lower lip defect as in our case, numerous local and distant pedicle flaps have been designed. Some noteworthy local reconstructive techniques are Fujimori's gate flap, Meyer-Bernard flap, B/L McGregor flap, B/L Depressor anguli oris flap, B/L Steeple flap, Delto-pectoral flap and Platysmal flap. Among distant flaps, a Free Radial Artery Forearm Flap (FRAFF) or an Antero-lateral thigh fascia lata flap is the gold standard. However, in contraindicated and failure cases, a robust flap like the forehead flap can be used. In our present case, we had initially utilised FRAFF for reconstruction but due to its failure, we had to use a second line option like the forehead flap, with which we have achieved good oral competence and cosmesis.

## Case Presentation

A 60-year-old male patient presented to our head & Neck Oncosurgery outpatient department with a gradually progressive ulceroproliferative growth (UPG) over the lower lip for 3 years which bled occasionally on touch and was associated with pain. The patient did not have any known comorbidities and was a chronic smoker. A preliminary clinical examination revealed a UPG with induration over the entire length of the lower lip of approximate size 9.5 x 4 cm with depth of invasion of 12 mm; it had the following extension:

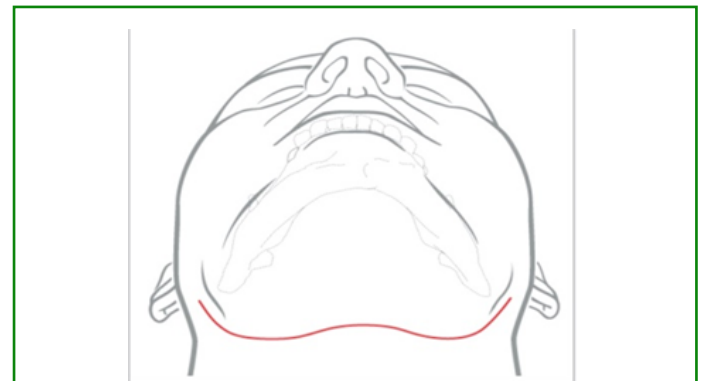
**Right and left lateral:** from Rt. Angle to Lt. angle of mouth.

**Posteriorly:** 2cm short of gingivo-labial sulcus.

**Anteriorly:** involvement of skin 2cm inferior to the vermillion border.

The floor of mouth, base of tongue and endolarynx showed no abnormality. There was no apparent trismus or ankyloglossia. Examination of the neck revealed no palpable lymph nodes. A representative wedge biopsy was taken from the lesion at our institute, which revealed early invasive moderately differentiated squamous cell carcinoma. The lesion was clinically staged at cT3N0M0 (Stage III) as per AJCC 8th edition.

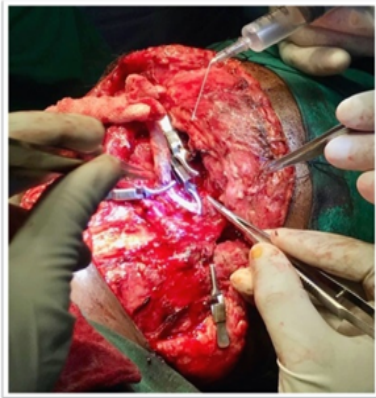
The patient was electively prepared for a wide Local Excision (WLE) of the lesion with B/L selective neck dissection (I-III) as per National Comprehensive Cancer Network (NCCN) guidelines [5] and reconstruction with a Free Radial Artery Forearm Flap (FRAFF) under general anaesthesia. Routine investigations as a part of the pre-operative work-up, including haematology results and chest x-ray, were unremarkable. After undertaking proper aseptic measures, the patient was positioned supine with the neck extended. A mid neck crease visor incision was made, extending from one mastoid tip to the other (Figure 1). B/L selective neck dissection from level I-IV was done in usual steps, preserving B/L Spinal accessory nerves, sternocleidomastoid muscles and internal jugular veins (IJV). The resection margins for the lower lip lesion were planned and a WLE of the growth was done, maintaining a margin of 2cm all around. A free forearm flap based on the left radial artery and Cephalic vein was harvested which was followed by a vascular anastomosis between left facial artery and left radial artery, left IJV end to side anastomosis with left cephalic vein (Figures 2 & 3). Orbicularis oris continuation was formed by the palmaris longus tendon. The left forearm donor site was closed with a split thickness skin graft (STSG) from left thigh (Figure 4). Primary defect site was sutured, haemostasis was achieved, surgical drains inserted, and the neck wound was closed in 2 layers.



**Figure 1:** Visor mid crease incision from one mastoid tip to another.



**Figure 2:** Left Free Radical Forearm Flap with its pedicle being harvested.



**Figure 3:** Showing FRAFF microvascular anastomosis.



**Figure 4:** Showing good uptake of STSG at the FRAFF donor site.

But in the post-op period the FRAFF became cold and shrunken, capillary filling time was < 2 secs. Therefore, re-exploration was done, anastomosis site checked, and re-anastomosis was done by our team. Unfortunately, on post-

op day 2, the free flap became dusky and gradually necrosed. On post-op day 5, the devitalised flap was debrided, and a right lateral forehead flap was harvested for reconstruction of the lower lip (flap pedicle being lateral to zygomatic process). Rt. Thigh STSG was harvested and placed over the forehead donor site.

Histopathological examination showed pT3N0M0 with an indication of Adjuvant Radiotherapy (RT). Delay of right lateral forehead flap was done 3 weeks after primary surgery. Patient received External Beam Radiotherapy (66 Gy/33 fractions x 7 weeks). The patient came for his first follow-up after RT completion with satisfactory cosmesis of the lower lip and forehead donor site (Figure 5) and good oral competence, post-op Karnofsky score was 100. The patient had good oral competence till his 3rd follow-up after completion of his treatment (Figure 6).



**Figure 5:** Showing satisfactory cosmesis of the lower lip and forehead flap donor site.



**Figure 6:** Patient having good cosmesis and oral competence at the 3-month follow-up post Adjuvant Radiotherapy.

## Discussion

The origins of head and neck reconstructive surgery date to 2000 years in the writings of Sushruta Samita, a 7th century Indian medical document, who described the use of forehead flap in nasal reconstruction. In the 15th century Antonio Branca of Italy discovered an Arabic translation of the Indian text and is believed to be the first to perform a similar procedure outside India. The FRAFF was one of the first free tissue transfer flaps to be described and became increasingly popular because of its versatility, allowing to replace both external skin and internal mucosal lining and may also incorporate a vascularised tendon, sensory innervation and/or bone. However, the FRAFF is largely limited in terms of oral function (loss of oral competence, loss of sensation and potential microstomia) and aesthetic results, as the donor site texture is different from facial skin [6]. FRAAF also has the disadvantage of flap failure which can result from several reasons such as inadequate surgical skills, error in flap design and elevation, vessel suturing, and post irradiated donor site may lead to venous thrombosis (83%) or arterial compromise (8%) [7]. In 756 cases Miyasaka M, et al. [8] performed 22 re-explorations for vascular pedicle compromise, 17 (77%) of which were due to venous occlusion and 5 were due to arterial occlusion.

Among distant pedicled flaps, the Forehead flap remains a valuable option in a resource depleted environment, where free flaps are either contraindicated or have failed. It has the advantage of colour, thickness, texture match, easier to harvest and can provide coverage as far as paramandibular and submandibular regions. Various flap designs have also been described based on axial or random pattern blood supply. The pedicle of the complete forehead flap may be medial or lateral to the zygomatic process, the disadvantage of the latter being that it requires a second flap delay/return procedure. Agbara R, et al. [9] in a study of 43 patients, used complete forehead flap for reconstruction in 31 cases and reported flap failure in only 2 cases and tumour occurrence at the flap donor site in 1 patient. In the 1980's Shah JP, et al. [10] also advocated the use of forehead flaps in reconstruction of through-and-through defects of the oro-maxillofacial region. Due to technical difficulties, precision and a steep learning curve, we have used forehead as a second option for reconstruction.

## Conclusion

In this case report we have achieved a satisfactory quality of life including good oral competence and cosmesis of both lower lip as well as forehead donor site, using forehead flap as a 2nd sitting reconstruction modality in a failed FRAFF

reconstructed lower lip. Therefore, we give emphasis on the forehead flap, the so-called obsolete flap in the era of microvascular free flaps, as a reconstruction modality in failed and contraindicated free flap cases.

**Informed Consent:** Written informed consent was obtained from patient who participated in this study.

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