



## Micro-vascular free flap reconstruction for complex head and neck cancer defects: A single Institution Retrospective study

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### Abstract

**Background:** Microsurgical free flap transfer has been the most popular method for reconstructing head and neck abnormalities in the last two to three decades. Complex tissue transplants are among the many reconstruction alternatives offered by free FLAPs. This study's objective was to assess the clinical results of individuals undergoing various microvascular free flap reconstructions.

**Materials and methods:** This was a retrospective study of 133 patients undergoing reconstructions with free flaps from 2020 to 2023. Micro-vascular free flap reconstructions performed were: Anterolateral thigh flap (36.1%) and Radial forearm free flap (63.9%). Patients' demographic data were collected, and the outcomes measured included flap survival complications and cosmetic outcomes.

**Results:** There were 85 radial forearm flaps (RFFF), and 48 anterior lateral thigh (ALT) flaps. The most common tumour location was buccal mucosa. The most common histology was squamous cell carcinoma (>90%). Venous thrombosis was the most common cause for re-exploration. Six patients underwent emergency surgical re-exploration. Fifteen patients had complications like Oro-cutaneous fistula (40%), surgical site infection (13.3%), recurrence (13.3%). The overall flap success rate was 92%.

**Conclusion:** Determining the reconstruction goals is crucial before selecting the appropriate reconstruction type. Setting appropriate, realistic reconstruction goals makes it feasible to apply the best reconstruction technique that helps to meet expectations and provide a satisfactory functional and aesthetic result. For oral lesions, microvascular repair using free flaps is a safe technique with a remarkably high success rate.

**Keywords:** Microvascular free flap, head and neck cancer

### Introduction

Large tissue defects and significant functional disability are linked to complicated defects that occur after aggressive resection for advanced head and neck malignancies. Significant functional and cosmetic loss as a result of cancer treatment also happens in the head and neck [1-2]. Because revascularized tissue can be harvested to custom fit any complex composite defect created after ablative radical resection with the best functional outcome and superior aesthetics, advancements in microvascular surgical technique have revolutionized head and neck reconstructive surgery [3-4].

Because reconstruction is now an option, many head and neck malignancies that were previously considered inoperable are now operable. Because it permits the need for radical excision for advanced head and neck cancer, this improves survival [5-6]. Additionally, free flaps speed up healing for patients who need post-operative radiation.

Regional flaps have long been the procedure for reconstructing surgical defects following advanced cancer ablation. The 1960s saw the introduction and widespread usage of medically based deltopectoral flaps in head and neck reconstruction [7].

The primary drawback of the deltopectoral flap is the requirement for a second operation to create and close an oral fistula. Since the 1980s, the pectoralis major musculocutaneous flap has been more common in head and

neck reconstruction than the deltopectoral flap [8]. Unfortunately, there are instances when the pectoralis major musculocutaneous flap is excessively large, distorting the nipple's location at the donor site and leading to aesthetic issues [9].

Microsurgical free flap transfer has been the most popular method for reconstructing head and neck abnormalities in the last two to three decades. Complex tissue transplants are among the many reconstruction alternatives offered by free FLAPs. This study's objective was to assess the clinical results of individuals undergoing various microvascular free flap reconstructions.

### Materials and methods

This was a retrospective study of 133 patients undergoing reconstructions with free flaps from 2020 to 2023. Micro-vascular free flap reconstructions performed were: Anterolateral thigh flap (36.1%) and Radial forearm free flap (63.9%). Patients' demographic data were collected, and the outcomes measured included flap survival complications and cosmetic outcomes.

All the free flaps procedures were performed by surgical oncology team in Vydehi institute of medical sciences and research centre. All patients had intraoperative anticoagulation using topical irrigation of the donor and recipient arteries with 4% lignocaine and diluted heparinized saline solution (100 u/ml). Until they stabilized,

every patient was observed in the critical care unit (ICU). The flap was checked for flap congestion or color changes, and a bleeding test was performed with a needle if needed. Visual inspection of the flap's skin paddle was used to monitor the flap after surgery.

On the first postoperative day, routine flap monitoring was performed every two to three hours. Then, the operating surgeon performed it twice a day, and the resident physician on duty performed it every four to five hours until the patient was moved out of the intensive care unit.

**Results**

For head and neck tumors, 133 patients in all (72 male and 61 female) had micro-vascular Free flap transfers. Various free flap types were used to reconstruct a variety of defects. There were 85 radial forearm flaps (RFFF), and 48 anterior lateral thigh (ALT) flaps.

The most common tumour location was buccal mucosa. The most common histology was squamous cell carcinoma (>90%). Venous thrombosis was the most common cause for re-exploration. Six patients underwent emergency surgical re-exploration. Table 1 is a summary of patient details and their management.

**Table 1:** Summary of patient details and their management

Diagnosis	Age/sex	Flap used	Cause of failure	Re-exploration
Ca buccal mucosa	48/male	ALT	Venous thrombosis	PMMC flap
Ca gingivo-buccal sulcus	52/female	RFFF	Venous thrombosis	PMMC flap
Ca buccal mucosa	60/male	RFFF	Arterial thrombosis	PMMC flap
Ca buccal mucosa	55/male	RFFF	Venous thrombosis	PMMC flap
Ca buccal mucosa	62/female	RFFF	Venous thrombosis	ALT flap
Ca buccal mucosa	45/male	ALT	Venous thrombosis	PMMC flap

Among these patient who underwent re-exploration, 5 out of 6 had venous thrombosis and only one patient had arterial thrombosis who underwent RFFF flap post buccal mucosa carcinoma excision. 4 out of 6 underwent RFFF flap and 2 underwent ALT flap cover. The failed flap was abandoned and the patients underwent PMMC flap reconstruction. Five out of 6 patients underwent PMMC flap reconstruction. One

patient underwent ALT flap who had failed RFFF flap status post Ca buccal mucosa excision.

Fifteen patients had complications like Oro-cutaneous fistula (40%), surgical site infection (13.3%), recurrence (13.3%). The overall flap success rate was 92%. The summary of complications and their management in various flap are shown in Table 2.

**Table 2:** Complications in various flaps and their management

Diagnosis	Age/sex	Flap used	Complication	Management
Ca lower lip	70/female	RFFF	Non-healing ulcer/recurrence	Conservative- inoperable
Ca buccal mucosa	48/male	ALT	Oro-cutaneous fistula	Conservative- dressings
Ca buccal mucosa	42/male	RFFF	Oro-cutaneous fistula	Conservative-dressings
Ca buccal mucosa	46/male	RFFF	Oro-cutaneous fistula	Conservative- dressings
Ca buccal mucosa	70/male	RFFF	Surgical site infection	Conservative- dressings
Ca buccal mucosa	46/male	RFFF	Oro-cutaneous fistula	Conservative- dressings
Ca buccal mucosaa	50/male	ALT	Oro-cutaneous fistula	Conservative- dressings
Ca buccal mucosa	70/male	ALT	Surgical site infection	Conservative- -dressings
Ameloblastoma	50/male	ALT	Oro-cutaneous fistula	Conservative- dressings

The majority of patients had satisfactory cosmetic and functional results of both donor site and recipient site.

**Discussion**

In our nation, head and neck cancers, particularly oral cancers, are a major problem, and regrettably, the majority of them also manifest late. The majority of advanced instances of head and neck cancer occur in the impoverished due to delayed diagnosis or treatment seeking. Given the aforementioned factors, our nation has a huge need for onco-surgeons to operate on patients with head and neck cancer.

The prognosis of patients with head and neck cancer has been considerably improved by reconstruction using free flap. With the potential for reconstruction via free flap, cancer that was previously thought to be incurable is now operable. Nowadays, free flap surgery for the reconstruction of head and neck abnormalities has become more and more common in many centers due to the development of sophisticated microvascular surgical techniques. However, because they require specialized knowledge, microvascular free flap procedures are not widely accessible in our nation

and are only frequently carried out in a few number of medical schools or tertiary referral centers.

The only option accessible in centers where free flap surgery is not feasible are local or pedalled flaps, which restrict oncological resection and significantly lower the patient's quality of life for the remainder of their life.

Without a doubt, the success rate of free flap surgery has increased due to improved microsurgical techniques. Nonetheless, flap failure and vascular problems continue to happen. Depending on the facility where they are conducted, free flap complications are reported to arise in 5–35% of patients, according to various publications [10-14]. The risk of vascular complications in our series was 4.5% (6/133). According to current reports, the success rate of free flap surgery is between 90% and 99% due to advancements in microsurgical technology.

The radial forearm has evolved into "the work horse" for numerous organizations. Thin, elastic tissue that is easy to harvest has good functional and aesthetic outcomes are the advantages of RFFF flap [15-16]. According to our research, the most popular flap for soft tissue repair is radial forearm flap. Additionally, there has been a growing interest in reconstructing the flap's sensation with encouraging

outcomes<sup>[17]</sup>, but Markkanen-Leppänen M *et al.* (2005) came to the conclusion that swallowing outcome had nothing to do with sensation and that their research did not support the need for sensate flaps<sup>[18]</sup>. Shibahara T *et al.* (2005) found no evidence of taste perception in the tongue regions that were rebuilt using forearm flaps<sup>[19]</sup>.

Anterolateral thigh flap and lateral arm flap have emerged as viable alternatives for oral reconstructions in recent years, with positive functional results. Although the donor site morbidity for lateral arm flap is extremely low, there are restrictions on flap size, pedicle length, and vascular diameter, necessitating more involved operation. Once flap harvesting is a routine surgery, anterolateral thigh flap (ALT) yields good functional and aesthetic results due to its adaptability, long pedicle, and low donor site morbidity. For the reconstruction of major soft tissue defects, ALT flap is helpful in certain patients<sup>[20]</sup>.

The overall flap success rate was 92%. This is consistent with the majority of microsurgical centers<sup>[21-24]</sup>. The aetiology, timing, center experience, and other factors all affect the successful salvage of a compromised free flap. However, we know that the damaged flap can be saved with early detection and action. Therefore, there should be a low threshold for returning to the operating room for re-examination when there is a suspicion of vascular compromise of the flap.

Our study has limitation. First, it's a single center study and second with limited sample size and less duration of follow up.

### Conclusion

Determining the reconstruction goals is crucial before selecting the appropriate reconstruction type. Setting appropriate, realistic reconstruction goals makes it feasible to apply the best reconstruction technique that helps to meet expectations and provide a satisfactory functional and aesthetic result. For oral lesions, microvascular repair using free flaps is a safe technique with a remarkably high success rate.

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