

## RECONSTRUCTION OF DEFECTS FOLLOWING ONCOLOGICAL RESECTIONS IN HEAD AND NECK MALIGNANCY – OUR EXPERIENCE

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### Abstract

**Background:** In India, Head and Neck Cancer (HNC) accounts for approximately 26% and 8% of all cancer cases in males and females, respectively. Reconstruction of defects from oncological resection of HNC often requires various flaps, including random, pedicled, and free flaps, based on the defect size, complexity, and technical expertise. This study examined experiences with random and pedicled flaps in HNC, detailing flap- and donor site-related complications. **Materials and Methods:** This retrospective study reviewed the records of 51 patients with HNC who underwent flap reconstruction over 10 years at the Department of Surgical Oncology, Government Thoothukudi Medical College (January 2014–December 2023). The pedicled flaps were meticulously harvested, ensuring vascular integrity. Donor sites were reconstructed with either primary closure or SSG depending upon the size. **Result:** Among 51 patients (33 males and 18 females; mean age, 61 years), 38 had oral cavity malignancy and 8 had basal cell carcinoma, 2 had laryngeal cancer, 2 had malignant parotid tumour and 1 had malignant skin adnexal tumour of scalp. The primary reconstruction involved 42 pedicled flaps (30 PMMC, 10 forehead, 2 combined PMMC and deltopectoral) and 9 random flaps. Flap-related complications included total flap loss (1 PMMC), partial flap loss (1 PMMC), marginal necrosis (6: 3 PMMC, 2 forehead, 1 random), and flap dehiscence (7: 5 PMMC, 2 forehead). Total and partial PMMC flap losses required salvage reconstruction with forehead flaps, whereas other complications were managed conservatively. Donor site complications included marginal loss of split skin graft (7: 5 PMMC, 2 forehead), seroma (4 PMMC), and superficial skin infection (3: 2 PMMC, 1 forehead). Donor sites were reconstructed with primary closure (31) or SSG (20), and all complications related to donor site were managed conservatively. **Conclusion:** In centers lacking free flap facilities, pedicled and random flaps remain valuable for reconstructing complex defects from head and neck cancer resections, with acceptable complications.

## INTRODUCTION

The Head & Neck region is a complex area that has multiple vital functions. In India, Head and Neck Cancer (HNC) accounts for approximately 26% of all cancer cases in males and 8% in females and more than 65% of patients attend the hospital with locally advanced disease.<sup>[1]</sup> Oncological resection in HNC can result in extensive loss of multiple tissue types. The complexity of the defect was further augmented while operating on locally advanced tumours. Resection of such large tumours can result in through-and-through defects. Reconstruction of such

defects can be a technical challenge in terms of the functional and aesthetic outcomes. Although free flaps are considered the gold standard, the lack of availability of such an expensive and technically demanding procedure makes traditional pedicled flaps and random flaps the reconstructive option of choice in many low-resource centers.

Many pedicled flaps, such as the Pectoralis Major Myocutaneous flap (PMMC), delto-pectoral flap (DP flap), and forehead flap, and their many modifications are available in the reconstructive armamentarium. The PMMC flap is a versatile flap that has remained steady even today in the field of

reconstruction since its inception by Ariyan.<sup>[2,3]</sup> The DP flap popularised by Backamjian has gradually lost its significance in recent days.<sup>[4]</sup> The age-old forehead flap and its many modifications are still extensively used in head and neck reconstruction.<sup>[5]</sup> We present our experience with pedicled flaps and random flaps for the reconstruction of defects following oncological resections in HNC.

**Aim**

This study describes flap and donor site-related complications that occur following various types of random and pedicled flap reconstruction in HNC.

**MATERIALS AND METHODS**

This retrospective study included a review of the records of 51 patients with HNC who required flap reconstruction for a 10-year period at the Department of Surgical Oncology, Government Thoothukudi Medical College between January 2014 and December 2023. This study was approved by the Institutional Ethics Committee.

Patients with HNC who required flap reconstruction were included in the study. Defects repaired with primary closure and split skin grafts (SSG) were excluded.

**Methods**

The PMMC flap is a type V flap according to Mathes and Nahai's classification.<sup>[6]</sup> During PMMC flap reconstruction, all major anatomical landmarks, and the course of the vascular pedicle to the flap are marked after the completion of resection. Our flap design was such that the skin paddle was in the inferomedial region of the nipple overlying the pectoralis major muscle. The nipple was excluded from the paddle to the extent possible. If it was necessary to extend the skin paddle inferiorly beyond the muscle, the rectus sheath was included in the flap. Extreme care was taken throughout the procedure to avoid injury to the vascular pedicle supplying the PMMC flap and additional care was taken to avoid damage to the skin and blood supply to the DP flap. We routinely take tacking stitches between the skin and muscle to avoid shearing injury to the perforators that supply the skin paddle. In the case of a combined PMMC and DP flap, the DP flap was elevated first, followed by the PMMC flap. After elevation of the PMMC flap, it was passed into the neck through a wide subcutaneous tunnel superficial to the clavicle. The flap inset was performed according to the requirements. The neck wound was closed primarily, and the donor area was either closed primarily or reconstructed using a split skin graft (SSG). Postoperatively, the positioning of the patient was given due importance so that tension would not be produced in the flap. Whenever the composite resection involves hemimandibulectomy, elective tracheostomy will be done after completion of the procedure.

The DP flap was harvested as a fasciocutaneous flap, based on the second and third perforators of the internal mammary artery. The donor area was closed

using SSG. The forehead flap as a complete flap was harvested as a fasciocutaneous flap based on the frontal branch of the superficial temporal artery. There are many modifications in the forehead flap. The para-median forehead flap was elevated based on the supratrochlear artery. The type of forehead flap used depends on the site and size of the defect. In the case of a complete forehead flap and DP flap, reconstruction was performed as a two-stage procedure. After the initial reconstruction, flap division and inset were performed 21 days later. Other random flaps were created in a standard manner.

All patients received appropriate adjuvant therapy, depending on our institutional protocol. Patients were followed-up monthly in the first year, two monthly in the second year, three monthly in the third year, six monthly in the fourth and fifth years, and yearly thereafter, as per our department protocol. Follow-up included a clinical examination at each visit and other investigations, as indicated. Data were collected, entered, and double-checked using a Microsoft Excel spreadsheet. Data are presented as frequencies and percentages.

**RESULTS**



**Figure 1: PMMC as Bipaddle Flap – Follow up Picture**



**Figure 2: BCC below left eye- Resection with reconstruction**



**Figure 3: Forehead flap for Buccal Mucosa Growth**

Among the 51 patients, 33 were male and 18 were female. Their ages ranged between 30 and 75 years, with a mean age of 61 years and a median age of 62. Among the 51 patients, 38 had oral cavity malignancy, 8 had Basal Cell Carcinoma (BCC), 2 had a malignant parotid tumour, 2 had laryngeal cancer, and 1 had malignant skin adnexal tumour of the scalp. Among the 51 patients, 42 received pedicled flaps, and the remaining 9 received random

flaps as primary reconstruction. Among the 42 pedicled flaps, 30 were PMMC, 2 were combined PMMC and DP, and 10 were forehead flaps. Among 32 patients with PMMC flaps, we experienced total flap loss in one patient and partial loss in another patient. In the patient who developed total flap loss, complete wound debridement was performed and the defect was reconstructed with a forehead flap. In the other patient with partial loss, after wound debridement, a forehead flap was used for lining the defect, and the remaining viable part of the PMMC was used as the skin cover. Thus, a complete forehead flap was used as the salvage flap

for these two patients. Except for these 2 patients, the complications that occurred in other patients did not require any additional procedures. Six patients with minimal marginal necrosis of the skin of the flaps and seven with flap dehiscence were managed conservatively [Table 1].

The donor site was reconstructed with primary closure in 31 patients and split skin grafting (SSG) in 20 patients. Regarding donor site, seroma was observed in 4 patients, minimal loss of SSG in 7, and superficial skin infection in 3, which were managed conservatively [Table 2].

**Table 1: Flap Related Complications.**

		Number of patients by flaps		
		PMMC	Forehead	Other random flaps
Flap related complication	Total loss of flap	1	0	0
	Partial loss of flap	1	0	0
	Marginal necrosis of the skin of the flap	3	2	1
	Flap dehiscence	5	2	0

**Table 2: Donor site-related complications**

		Number of patients by flaps		
		PMMC	Forehead	Other random flaps
Donor site-related complications	Marginal loss of SSG	5	2	0
	Seroma	4	0	0
	Superficial skin infection	2	1	0

## DISCUSSION

In the current era of technological advancement, free flaps are considered ideal flaps for the reconstruction of complex defects following resection of head and neck cancers, given their good aesthetic and functional outcomes. However, not all defects require a free flap to achieve a good outcome, and not every patient is a suitable candidate for a free flap. Longer operating time, increased cost, need for advanced instruments and technical expertise, higher anaesthetic risk in patients with multiple comorbid conditions, and intense postoperative monitoring are important factors to consider when planning free flaps. In contrast, pedicle flaps may overcome the limitations of free flaps. With the paucity of concrete comparative data in the Indian scenario regarding the outcome between free and pedicled flaps in Head and Neck reconstruction, pedicled flaps are still considered a viable reconstruction option in low-resource centers. We used the PMMC flap, DP flap, forehead flap and its modifications, and various random flaps in the reconstruction of defects following head and neck cancer resection with satisfactory results [Figure 1-3].

Deganello et al. in their retrospective study of 93 patients, found that pedicled flaps were not significantly inferior to free flaps for reconstruction of head and neck defects, considering functionality, complications, and prognosis.<sup>[7]</sup> Sittitjai et al. in their retrospective study of 171 patients concluded that with comparable complications and functional outcomes, while decreasing in cost, pedicled flaps are

a useful alternative to free flaps in oral cavity cancer reconstruction.<sup>[8]</sup> Katna et al. in their retrospective study of 628 patients found that the outcomes of free flaps are similar when compared to pedicled flaps in patients with oral cavity cancers. They also found that there was no significant delay in starting the planned adjuvant treatment in both groups.<sup>[9]</sup>

Many modifications of the PMMC flap have been described in the literature to improve the outcome.<sup>[10-12]</sup> Total loss of the PMMC flap is very rare.<sup>[2,3]</sup> In our study, we observed total loss of the PMMC flap in one patient. With the availability of myocutaneous flaps, the popularity of DP flaps has gradually faded.

Pradhan et al. in their study of 29 patients used combined PMMC and DP flap for reconstruction without any loss of flap.<sup>[13]</sup> We used a combined PMMC and DP flap in two patients without any major morbidity. Chan et al. in their study of 54 patients described the use of DP flap reconstruction for various sites without any loss of flap.<sup>[4]</sup> Agbara et al. in their study of oro facial reconstruction in 43 patients using forehead flap for various indications encountered loss of flap in 2 patients.<sup>[5]</sup> Forehead flap was used as the primary reconstructive option in 10 patients and as a salvage option in two patients in our study. We did not encounter any major morbidity with the forehead flap.

## CONCLUSION

In centers without the facility for free flaps, pedicled and random flaps retain their value in the

reconstruction of complex defects arising from head and neck cancer resections with acceptable complications.

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