



## PECTORALIS MAJOR MYOCUTANEOUS FLAP IN HEAD AND NECK CANCER: A RELIABLE OPTION FOR PRIMARY RECONSTRUCTION

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### ABSTRACT

**BACKGROUND:** Head and neck cancer are sixth most common cancers worldwide with cancer of oral cavity most common. The incidence of oral cancer in India is 20 per 100,000 population. Surgery is the primary treatment modality for oral cancer and defects after excision of tumour needs reconstruction. PMMC flap offers a reliable vascularity, good viability, protection of carotid artery, easy to harvest and covers even a large defect with minimal post operative complications as a reconstruction option for the surgeons.

**METHODS:** The current retrospective study was conducted in the Department of surgical oncology, AIIMS, Patna (Bihar). Within a span of 9 months, 22 reconstructions were done with PMMC flaps in patients with oral cancer and they were followed for a period of 1 year. Documentation was done for patient's demographics, site of lesion and occurrence of complications, etc.

**RESULT:** In the present study male to female ratio was 4.5:1. Most of the patients belongs to the age group of 41-55 (40.90%) followed by 56-70 (31.81%). All the tumours were squamous cell carcinoma and presented with advanced stage of disease (stage III & IV). Majority of patient of oral malignancy presented with lower alveolus malignancy (40.9%) followed by buccal mucosa malignancy (22.7%). Overall flap related complications were recorded in 40.90% patients, and 4.5% patients developed complications at donor site.

**CONCLUSION:** PMMC flap is a versatile flap for reconstruction of soft tissue defect in head and neck cancer for primary as well as salvage reconstruction.

**KEYWORDS :** Head And Neck Cancer, Pmmc Flap, Scg

### INTRODUCTION:

Head and neck cancer are sixth most common cancers worldwide with cancer of oral cavity most common. Oral and oropharyngeal carcinoma are the third most common in man and fourth most common in females in developing countries. [1]. The incidence of oral cancer in India is 20 per 100,000 population [2]. Reconstruction following head and neck cancer surgery is a tough task. Micro vascular free flap reconstructions are now considered as the gold standard for this purpose, however, they need considerable resources and training. [3]. Arlyan and Cuono *et al.* first described the clinical application of pectoralis major myocutaneous (PMMC) flap in head and neck reconstruction. [4] Since its description, it continues to be the workhorse of pedicled flaps for head and neck reconstruction with acceptable morbidity. [5] The main advantages of this flap are its reliable vascularity and good viability, [6] protection of carotid artery and acceptable cosmetic appearance in cases where bulk of tissue is required. In addition, this flap can easily be used in irradiated areas and even a large cutaneous island of donor site closed primarily. [7] Literature, however, has reported various complications following PMMC flap reconstruction such as partial necrosis, dehiscence, or fistula formation. A study was undertaken, therefore, to evaluate the reliability of this flap, in the reconstruction of oral cancer patients and to evaluate the complications arising thereof.

### AIM AND OBJECTIVE:

The objective of our study was to assess the feasibility of using PMMC flaps for reconstructing various subsites of oral cavity cancer irrespective of size of defect and to study the variables associated with occurrence of complications.

### PATIENTS AND METHODS:

We analysed 22 PMMC flap reconstructions (18 males and 4

females) for radical head and neck cancer surgery and age ranged from 25 to 70 years. Patients with diagnosis of squamous cell carcinoma of head and neck region were staged according to the TNM staging of AJCC-8th edition (2018). Each patient was informed and consent was taken to participate in the study. All the patients of malignancy underwent wide local excision of the tumour with modified radical neck dissection. After resection, the resultant defect was reconstructed with pectoralis major myocutaneous flap (PMMF). Analysis done with regard to the tumour location, tumour node metastasis staging and postoperative complication rates.

### INCLUSION CRITERIA:

Patients diagnosed with resectable oral carcinoma confirmed histopathologically and radiologically and underwent an immediate reconstruction with use of pectoralis major myocutaneous (PMMC) flap.

### EXCLUSION CRITERIA:

Unresectable tumour of head & neck and Tumour presents with distant metastasis.

### SURGICAL TECHNIQUE

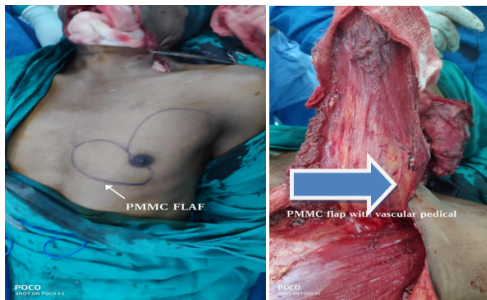
All the patients underwent wide excision of the lesion with segmental mandibulectomy (due to lesion involving mandible) along with modified radical neck dissection in continuity. Bony reconstruction was not undertaken for the continuity defect. Only PMMC flap was utilized for reconstruction of complex defect after ablative surgery. The size, shape, and location of the skin paddle were determined by the size, shape of the surgical defect, and its distance from the point of pivot (midclavicular point) of the flap.

**FLAP ELEVATION**

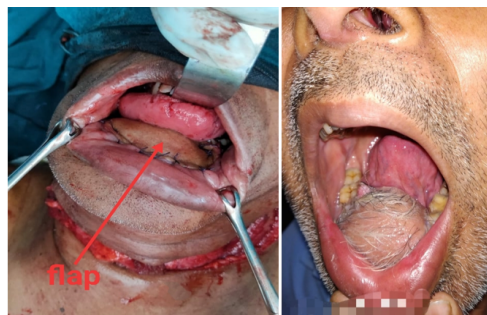
Initial incision was made from lateral edge of designed skin paddle toward the anterior axillary line [Fig 1]. The superior skin flap incision was made only up to the muscle fibres of the pectoralis major muscle. The inferior, medial, and lateral incisions were made through the muscle and fascia of the pectoralis major muscle and down to the chest wall. The skin paddle was temporarily secured to the muscle with few sutures to decrease any shearing injury to the perforators. The PMMC muscle was divided medial and lateral to the vessels with avoiding injury to the vessel which was identified by visualization and palpation on the deep surface of the muscle at about mid clavicular point [Fig 2], which permitted further elevation and greater arc of rotation. Flap was passed to the recipient site through a skin tunnel prepared above the clavicle.

**FLAP IN SETTINGS:**

Due care was taken in handling the skin paddle to avoid shearing injury and the flap was fixed into place by first suturing the muscle to surrounding soft tissue at recipient site. The anchoring sutures were then removed one at a time and the skin was sutured to the mucosal defect [Fig.3]. Bilobed PMMC flap was used in cases with oral as well as skin defect. Separate closed suction drains were utilized for neck and chest wounds.



**Fig 1 & 2: Marking of PMMC flap and vascular pedicle after flap harvesting.**



**Fig 3. PMMC flap place ment in oral cavity**

**Fig 4. PMMC flap with growth of hairs**

**RESULTS:**

In the present study, a total of 22 cases were reviewed, of these 18 were male and 4 were female (male: female- 4.5:1). Their age ranged from 3rd to 7th decade. Most of the patients belongs to the age group of 41-55 (40.90%) followed by 56-70 (31.81%). Youngest patient was 25 yr. old and oldest patient was 70 yrs old. (Table-1)

**Table 1: distribution of patients according to age and sex.**

Age group	Male	Female
25-40yrs	4 (18.18%)	2 (9.09%)
41-55yrs	8 (36.36%)	1 (4.54%)
56-70yrs	6 (27.27%)	1 (4.54%)

In this study all the tumours were squamous cell carcinoma majority of patient of oral malignancy presented with lower alveolus malignancy (40.9%) followed by buccal mucosa malignancy (22.7%). This study reconstructed the mucosal surface in 86.36% patients and mucosal surface with skin by bipedal use of PMMC flap was 13.63% as majority of the patient involved was lower alveolus and buccal mucosa without involvement of skin (Table 2, 3).

**Table 2: distribution of patients according to site of malignancy in oral cavity**

Site of malignancy	No. Of patients	% of patients
Buccal mucosa	5	22.7
Buccal mucosa with skin of cheek	3	13.6
Retromolar trigone	4	18.2
Lower lip	1	4.5
Lower alveolus	9	40.9

**Table 3: distribution of patients according to site of reconstruction**

Site of reconstruction	No of patients	% of patients
Only mucosa	19	86.36
Mucosa + skin	3	13.64

**POSTOPERATIVE COMPLICATIONS**

Postoperative complications were broadly classified as flap-related complications and complications to donor site. For the purpose of analysis of flap loss in the postoperative period, flap loss was classified as total or partial loss. Partial loss was defined as partial thickness loss with no significant delay in hospital discharge or requiring surgical intervention. Overall flap related complications were recorded in 40.90% patients, and 4.5% patients developed complications at donor site. Rest of the patients had an uneventful recovery without developing any complication. One patient developed total flap necrosis which expired in the postoperative period because of early recurrence. [Tables 3]

**Table 3: distribution of patients according to postoperative complications**

Postoperative complications	No of patients	% of patients
Total flap necrosis	1	4.54
Partial flap necrosis (skin involvement)	2	9.09
Hematoma	1	4.54
Wound dehiscence	1	4.54
Infection	2	9.09
Postoperative cutaneous fistula	2	9.09
Donor site wound infection	1	4.54

In this study, all the patients presented with higher TNM Staging, 6 patients had Stage III and 16 patients were in stage IV. [Table 5]

**Table 5: distribution of cases as per disease stage**

Stage of disease (TNM, AJCC-7)	No of cases	% of cases
Stage I & II	0	0
Stage III	6	27.28
Stage IV	16	72.72

TNM: Tumour, node, metastases, AJCC: American Joint Committee on Cancer

**DISCUSSION:**

Reconstruction of full thickness soft tissue defect in the head and neck regions remain a challenging task to the plastic surgeon.

ons. Currently, free tissue transfer is considered to be the gold standard for soft tissue coverage in the head neck regions. Microvascular reconstruction is not feasible at all centres, especially in developing countries and has its share of disadvantages like the need for vigorous monitoring and re-exploration. Saito et al. state that the most important benefit of PMMC flap is survival. Total microvascular flap loss may be seen even in the hands of skilled surgeons, but total PMMC flap failure is very rare even under inexperienced hands, due to its dependable vascularity and its shorter procedural learning curve [8].

Our analysis of data evidently proved the versatile applications of PMMC flaps to a wide spectrum of defects in head and neck region. The beauty of the PMMC flap is that, a very big skin paddle overlying whole of the muscle with the skin paddle extension as far down as the rectus abdominal sheath can be taken [9]. Kurse et al recommended that PMMC flap is an appropriate flap for huge defects in head and neck reconstruction particularly when large bulky flap is needed to cover carotid artery [10].

Pinto et al. [11] describes the use of PMMC flaps in postcancer resection soft tissue defect in head and neck region. They identified the factors causing various complications and outcome of reconstruction. They concluded that PMMC flap is a reliable and versatile flap for head neck reconstruction.

Talabani et al in their study found that females are affected less than males and the highest affected groups were those above 60 yrs, the peak of total malignancy was seen in their 6th decade but in our study we have found to be the mid age group to be affected most followed by elderly age group because of use of tobacco in early age.

In this study we have successfully used PMMC flap in reconstruction of soft tissue defect in head and neck region following cancer excision in 22 patients. Ahmad et al. [12] performed bipaddle PMMC flap in 47 patients with large full thickness cheek defects secondary to cancer ablative surgery. This modification was based on anatomical location of perforators to ensure good blood supply to both the skin paddles of flap. The flap was placed horizontally with nipple and areola included leading to increased reach and size of the available flap. In this study, we used the same modified bilobed flap in 3 cases to cover mucosal as well as skin defect. Traditionally PMMC flap related complications range between 17% and 63% [13,14]. Total flap necrosis is a rarity even in inexperienced hands (2-3%) [17]. Our rates of overall complication (51.7%) were comparable with that of Shah et al [18] (63%), Jjsselstein [19] et al (53%), Kroll [20] et al (63%) and El-Marakby et al [21] (60%). In our setting the overall complication rate is 45.45% which is similar to the above literature.

Mehrhof et al. [22] in a series of 73 patients reports total flap necrosis of 4%, Brusati et al. [23] in series of 100 patients reported total flap necrosis (2%). In present study, total flap necrosis is 4.5% which is due to early recurrence in a post adjuvant RT patient (not due to the technique of flap harvesting). The high success rate of PMMC flap is favourably described by the literature.

Schuller [24] noted partial flap necrosis 6.6%, Mehrhof et al. [22] found it to be 12.3% and Brusati et al. [23] reports partial necrosis of 9%. Our results were similar to the literature i.e. 9.09% which is managed conservatively in course of treatment without any surgical interventions.

Infection and orocutaneous fistula was most common complication in our study which accounts for 18.18% when join

ed together. Another study done by Kroll et al. [20] found a 24.8% incidence of fistula in 105 patients with intraoral defect. Mahammad tahir et al [25] observed infection in 10% patients done PMMC flap after head and neck reconstruction. Orocutaneous fistula incidence is less in our study as we use a gauze piece over the flap intraorally for the salivary secretion to absorb and it was changed 2 hourly. Orocutaneous fistula healed in due course of time with conservative management to proper oral care.

In this study hematoma formation occurred in 1 patient (4.5%), wound dehiscence in 1 patient (4.5%) and infection occurred in 2 patients (9.09%) which is managed by regular dressing. All the male patients develop hairs over the flap which gradually disappeared in 6 months [Fig.4].

## CONCLUSION:

It was concluded that PMMC flap is a reliable flap with an excellent vascularity, wide range of arc of rotation, large flap dimension, easy to harvest with minimal donor site and flap site morbidity and limited complications. It is a versatile flap for reconstruction of soft tissue defect in head and neck cancer for primary as well as salvage reconstruction.

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