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## Pectoralis major myocutaneous flap in oral cancer reconstruction: A review in 20 consecutive cases.

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### ABSTRACT

The pectoralis major myocutaneous (PMMC) flap has been used as a versatile and reliable flap since its first description by Ariyan in 1979. In India head and neck cancer patients usually present in the advanced stage making PMMC flap a viable option for reconstruction. Although free flap using microvascular technique is the standard of care, its use is limited by the availability of expertise and resources in developing world. The aim of this study is to identify the outcomes associated with PMMC flap reconstruction. we retrospectively analyzed 20 PMMC flap at sree balaji dental college and hospital ( 2014-2016). A total of 20 PMMC flap reconstructions were performed out of which follow-up data of 20 cases were available in our record. A total of 20 patients were reviewed with oral cavity reconstruction . Most tumors were advanced (T3 or T4 lesion). 20 PMMC flap reconstruction were done as a primary procedure. PMMC flap was used to cover mucosal defect in 14 patients, both skin and mucosal 6 patients. Overall flap related complications were, major complication in 2 patients and minor complications in 4 patients. No total flap loss occurred in any patient, major flap occurred in 2 patients and minor flap loss in 4 patients. In minor flap loss patients, necrotic changes were mostly limited to skin. Orocutaneous fistula developed in 1 patient. 1 patient required re-surgery after developing flap related complications, Pleural empyema developed in 1 patient. Other minor complications such as neck skin dehiscence and intra-oral flap dehiscence developed in 6 patients. PMMC flap is a versatile flap with an excellent reach to face oral cavity region .With limited expertise and resources, it is still a workhorse flap in head and neck reconstruction.

**Keywords:** oral cancer, oral reconstruction, pectoralis major myocutaneous flap, pedicled flap

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## INTRODUCTION

Reconstruction following head and neck cancer surgery is a daunting task. Microvascular free flap reconstructions are now considered as the gold standard for this purpose, however, they need considerable resources and training.<sup>[1]</sup> Pectoralis major myocutaneous (PMMC) flap owing to its robust vascularity and easy learning curve for surgeons, is still a workhorse at centers with limited resources and heavy patient load.<sup>[2]</sup> Forty years after its first description by Ariyan and with literature reporting a complication rate of 17–63% it still holds an unmatched acceptance in oral reconstruction. At our center oral malignancies constitute a major chunk of cancers in the adult population with most patients presenting in advanced stages PMMC flap is the principal mode of reconstruction following composite resections. It provides required bulk for a composite defect with acceptable cosmetic outcomes. We present a retrospective analysis of 20 PMMC flap reconstructions from the year 2014-2016

## PATIENTS AND METHODS

A total of 20 PMMC flap reconstructions were performed during the year 2014-2016, out of which follow-up data of 20 cases were available in our record. Data of 20 patients with oral cancers who underwent PMMC flap reconstruction during the 20 14-2016 were analyzed with regard to the clinical presentation, tumor node metastasis staging, operative procedure and postoperative complication rates. Ipsilateral PMMC flap was used for reconstruction after resection of the lesion. Standard technique for harvesting the PMMC flap as described in following section was implemented.<sup>[8]</sup>

### Technique for harvesting pectoralis major myocutaneous flap

The surface markings of the vascular pedicle were made by drawing a line from the ipsilateral acromion to the xiphisternum and another line vertically from the midpoint of the clavicle to intersect the first line. Skin paddle of the flap was positioned over the pectoralis muscle along the course of the pectoral branch of the thoracoacromial artery.

During flap elevation, care was taken not to undercut the skin paddle but rather to bevel it, so as to include as many myocutaneous perforators as possible. The skin paddle was sutured to the underlying pectoralis muscle with a few sutures to minimize the risk of shearing injury to myocutaneous perforators. The dissection plane between the pectoralis minor and pectoralis major muscle with its vascular pedicle was found by dissecting the lateral border of pectoralis major muscle. Once in the plane, we could easily free the pectoralis major with its vascular pedicle from pectoralis minor muscle. The pectoralis major muscle was divided lateral to the pedicle while keeping the pedicle in view, thereby freeing it from the humerus. A portion of the clavicular fibers of the muscle was divided to accommodate only the neurovascular pedicle and its adventitia, eliminating the supraclavicular hump. The flap was now passed into the neck through a subcutaneous tunnel created superficial to the clavicle. The tunnel was made wide enough to permit easy delivery of the flap into the neck without any compression. Suturing of the flap was accomplished with 3–0 vicryl interrupted sutures. Suction drains were placed in the neck and chest, and the wounds were closed in layers. The donor site was always closed primarily, which required extensive mobilization of fasciocutaneous flaps.<sup>[8]</sup>



Figure 1: Plan of initial excision and neck dissection



**Figure2: Surface marking of pectoralis major myocutaneous bipaddled flap**



**Figure 3 : Harvested flap**

### **OBSERVATION AND RESULTS**

A total of 20 cases were reviewed, of these 15 were male and 5 were females). Their age ranged from 3<sup>rd</sup> to 5<sup>th</sup> decade with the majority in 3<sup>rd</sup> and 4<sup>th</sup> decades. Almost all the tumors were squamous cell carcinomas (20/20) mainly located in the oral cavity with retromolar (8) lower gingivobuccal sulcus (8) buccal (4). Table 2

Pectoralis major myocutaneous flap reconstruction was done as a primary procedure in 20 patients .PMMC flap was used to cover mucosal defect in 14 patients, skin and mucosal 6 patients (bipaddled). We did not include osteomyocutaneous flaps in this series.

#### **Postoperative complications**

Postoperative complications were broadly classified as flap-related complications and complications unrelated to flap. For the purpose of analysis of flap loss in the postoperative period, flap loss was classified as total or partial loss, with latter being categorized as major or minor partial flap loss. Major partial loss was defined as full thickness partial loss prolonging hospital stay or requiring surgical intervention. Minor flap 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 5 patients, and 1 patient developed complications unrelated to flap. 14 patients had an uneventful recovery without developing any complication. [Table 3] and [Table 4].

### *Flap necrosis*

In our study varying degree of flap necrosis developed in 5 patients, of these 2 patients were major partial necrosis and 3 patients .patients developed minor flap necrosis. No case of total flap necrosis was recorded. Patients with minor flap necrosis were managed conservatively without any surgical intervention, however, out of 2 patients developing major flap necrosis, 1 required surgical debridement, followed by secondary suturing with skin grafting . Of 2 major flaps necrosis 1 occurred in patient in whom bipaddled flap was used, and 1 occurred in patient who received preoperative radiotherapy. Of these 1 patient with major flap necrosis were known cases of diabetes mellitus.

### *Fistula*

In a total of 20 , 1 patient developed fistula with major flap necrosis. These 1 patients required surgical intervention. The most common location for fistula formation was the anterior tri-pointer suture between the flap, mucoperiosteum of the cut edge of mandible and the mucosa of the floor of mouth. In our study, significant factors contributing to fistula formation were major resection, T4 primary lesion, presence of systemic disease and prior radiotherapy.

### *Wound dehiscence*

4 patients developed suture line dehiscence. All the patients with prior radiotherapy developed varying degree of wound dehiscence. In our study, common factors found in patients with wound dehiscence were prior radiotherapy, female gender, presence of systemic disease and resection of the mandible.

### *Hematoma*

Varying the degree of wound hematoma was recorded in 5 patients. All the 5 patients had major resection with neck dissection as a primary procedure.

### *Infection*

6 patients developed surgical site infection including superficial and deep surgical site infections. Of these 1 patients had infection at the donor site.

### *Complications unrelated to flap*

2 patients developed complications unrelated to flap. Of these pleural empyema developed in 1 patients, chyle leak occurred in 1 patient.

## **DISCUSSION**

Currently free flap reconstruction is undoubtedly the first choice for oral reconstruction, providing one stage restoration with lower morbidity and better cosmetic and functional results<sup>[9]</sup> [Figure 4]. However, PMMC flap continues to be an important tool in the armamentarium of head and neck surgeon especially in centers with high patient load and limited resources. Learning curve for the procedure is shorter and younger surgeons pick up the procedure very fast. In addition, a single team could continue with the surgery thus avoiding the problem of logistics of getting two teams work together always.<sup>[10]</sup> PMMC flap holds a great promise not only as a method of primary reconstruction but also as a salvage procedure after free flap necrosis and in cases bearing contraindication for free flap reconstruction such as medical conditions making patient unfit for long surgery and in cases with inadequate recipient vessel jeopardizing the feasibility of microvascular anastomosis. PMMC flap can also be used in combination with free flap to cover large soft tissue defects overlying a major vessel and in patients with high risk of wound dehiscence.[9,11]

The available literature on PMMC flap reconstruction showed varying definition of complications and the rate at which they occur. Reported complications varies from 17% to 63%.<sup>[5],[6],[7],[9]</sup> In our series, we

observed a complication rate of 30% with 10% occurrence of flap necrosis. Major flap necrosis occurred in 2 patients with no incidence of total flap necrosis. Our results are comparable to those in the literature.<sup>[4],[6],[9],[12]</sup> One major advantage of PMMC flaps is survival. Even in hands of an experienced microsurgeon, total flap necrosis occur in free flap reconstructions; however, total loss of PMMC flaps is uncommon.<sup>[11]</sup> Many factors have been associated with the occurrence of flap necrosis viz. use of electrocautery versus scalpel, preservation versus removal of the clavicular attachment of pectoralis muscle, and the presence of random portion of skin at the distal end of the flap, but their exact significance still remain elusive.<sup>[4],[6],[9]</sup> In our series 2 of total partial flap, necrosis occurred in patients in whom skin paddle was extended beyond the 7<sup>th</sup> rib. Rikimaru *et al.*, pointed out that positioning the skin island just medially to the nipple, over the fourth, fifth and sixth intercostal spaces, is essential for encompassing the skin perforator vessels that arise from the intercostal branches of the internal thoracic artery. These cutaneous vessels are supplied by the pectoralis branch of the thoracoacromial artery, through open choke vessels, when the main blood flow through the internal thoracic artery is interrupted during PMMC elevation.<sup>[13]</sup> Hence, a totally axial myocutaneous flap may be created respecting this anatomical condition. Below the seventh rib, the vascular supply for the skin comes from the cutaneous branches of the superior epigastric artery, and, therefore, when portions of skin beyond this limit are included in the flap, this creates an axial flap with a distal random portion, thereby increasing the risk of partial loss. Another pitfall, described by Cunha-Gomes *et al.*, relates to the lateral pectoralis nerve division. These authors observed that this nerve may lie parallel or oblique to the PMMC vascular pedicle. When running obliquely to the pedicle, the lateral thoracic nerve becomes taut after the flap is rotated through 180° and presses against the vascular pedicle, thus leading to PMMC vascular impairment. These authors observed this phenomenon in 30% of their cases and recommended that this nerve should be dissected and divided when the above situation is observed.<sup>[14]</sup> In our series, we did not study and look for this entity; hence it's contribution to flap necrosis in our study is not known.

Hematoma developed in 2 patients,. Out of which 1 patient required re-exploration .Meticulous attention must be paid to hemostasis, especially to the cut edge of the pectoralis muscle paddle,. During re-exploration Rough handling may compromise vascular pedicle of the flap. Fistula occurred in 1 patient, were associated with some degree of flap necrosis. In patients with oral cavity lesions, intra-oral portion of PMMC flap stays in a contaminated environment of saliva and food debris, and this area is not easily accessible to the patient for mechanical cleaning. Second special attention must be paid to the tri-pointer suture in the anterior region between the flap, mucosa of the floor of mouth and mucoperiosteum of the cut edge of the mandible. Fistula was seen more commonly in postradiotherapy patients, in patients with extensive resection and in patients with systemic diseases like diabetes. fistulas healed spontaneously. Like in other major surgery, infection is a major concern in PMMC flap reconstruction. The best way to prevent it is to adhere to strict asepsis.

According to our study, with overall complication rate of 30%, which is comparable to the available literature,<sup>[3],[9],[12],[13]</sup> PMMC flap is an excellent choice in limited resources.

### CONCLUSION

To conclude, owing to its versatility, easy learning curve, and a constant vascular pedicle, PMMC flap is still one of the most favored approaches for the oral reconstruction with acceptable cosmetic and functional outcomes. Our experience in 20 cases has shown a low flap related complications with major flap necrosis in 2 patients and minor partial flap necrosis in 4 patients . In limited resources with heavy patient load PMMC flap is still a workhorse flap for oral reconstruction.

### Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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