

Original Research Article

Evaluation of pectoralis major myocutaneous flap at tertiary care hospital: retrospective study of 60 cases

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ABSTRACT

Background: Reconstruction following advanced oral cancer is a formidable task in developing country, with poor infrastructure and heavy chunk of advanced stage (T3-T4) oral malignancy. Options available for reconstructions are regional pedicle flaps and microvascular free flaps. Pedicle flaps particularly the pectoralis major myocutaneous (PMMC) flap have an easy learning curve for most of surgeons. Pectoralis major myocutaneous flap is regarded as the workhorse for reconstruction in many head and neck surgeries.

Methods: A study was undertaken on patients of soft tissue defects of head and neck region after resection of tumor of oral cavity (squamous cell carcinoma). Total 60 patients, who were managed in ENT department, Sir T hospital, Bhavnagar from 2016-19 were included in this study.

Results: Gingivo-buccal complex was the most common site observed for oral malignancy and majority of patients were in TNM stage-I, II, III in this study. Apart from total flap necrosis observed in 1 patient, in rest all the patients PMMC flap very well survived with some major/minor, flap related and unrelated complications.

Conclusions: The PMMC flap is effective in reconstruction of defect after excision of oral cavity cancers in developing country with heavy chunk of oral cavity cancer patients. In spite of several minor flap related and flap unrelated complications, PMMC flap survival rate is high and total flap necrosis rate is very low.

Keywords: Pectoralis major myocutaneous, Tumor, Node, Metastasis

INTRODUCTION

Reconstruction following advanced oral cancer is a formidable task in developing country, with poor infrastructure and heavy chunk of advanced stage (T3-T4) oral malignancy.¹ Soft tissue defects lead to cosmetic and functional insufficiency which can significantly affect the quality of life of a patient. Reconstruction in head and neck area is of prime importance in order to maintain the function and cosmesis.² Options available for reconstructions are regional pedicle flaps and

microvascular free flaps. In the developed countries, with the advent of increased knowledge, clinical skills and availability of better infrastructure and plastic surgeons, free flap reconstruction remains the gold standard and the first choice of reconstruction of the head and neck surgeon. Pectoralis major myocutaneous flap (PMMC) flaps, however, are kept reserved for salvage procedure in case of failure of free flaps, compromised patient status, or if planned as soft tissue filler in combination with free flaps.^{3,4} Reconstruction with free flaps in developing country is difficult due to high cost, much time, poor infrastructure, advanced learning curve and scarcity of

plastic surgeons. The pedicle flaps can be a deltopectoral flap (fasciocutaneous flap) or a myocutaneous flap that includes pectoralis major, latissimus dorsi, trapezius flaps. Pedicle flaps particularly the PMMC flap have an easy learning curve for most of surgeons. Pectoralis major myocutaneous flap is regarded as the workhorse for reconstruction in many head and neck surgeries. Ariyan and Cuono et al, first described the clinical application of PMMC in head and neck reconstruction.^{1,5}

Advantages of PMMC flap^{1,6,7}

It has both axial and random blood supply, reliable vascularity and good viability, protection of carotid artery, acceptable cosmetic appearance, can be easily used in irradiated areas, even a large cutaneous island of donor site can be closed primarily, can be used as salvage procedure after microvascular free flap, less time consuming, so can be used even in patients with high anesthetic risk and in critically ill patients also.

All recent literature describes complication rate of PMMC flap between 17-63% and total flap necrosis is uncommon.⁸⁻¹⁷ Majority of all complications like wound dehiscence, infection, partial skin necrosis are well managed conservatively, and only in case of total flap necrosis, reconstruction will require forehead or deltopectoral flap.^{11,13,17} So in center where PMMC flap are widely used, it is very important to evaluate the reliability and complications of PMMC flap reconstructions.

Aim

The aim of the study is to evaluate the reliability of PMMC flap in head and neck reconstruction. The technique, complications and the functional as well as aesthetic outcome of the flap utilization were evaluated.

METHODS

Study design

Retrospective analytic study

A study was undertaken on patients of soft tissue defects of head and neck region after resection of tumor of oral cavity (squamous cell carcinoma). Total 60 patients, who were managed in ENT department, Sir T hospital, Bhavnagar from 2016-2019 were included in this study.

Inclusion criteria

Patients of any stage and any subsite of oral cavity of squamous cell carcinoma, operated with wide local excision/hemiglossectomy with modified radical neck dissection with or without hemimandibulectomy and reconstruction with PMMC flap were included in this study.

Exclusion criteria

Patients who had undergone chemoradiation.

Statistical analysis

Simple proportions were calculated

Pre-operative assessment included the biopsy from primary site and staging of disease. The stage of disease was evaluated by clinical examination assisted by radiological (CT scan or MRI) examination. To assess the presence of distant metastasis, a routine chest X-ray and abdominal ultrasound was carried out. Preoperative medical assessment included routine complete blood count, bleeding and coagulation profile, liver and renal function tests and ECG.

All the patients after proven histopathological carcinoma in biopsy from primary site, underwent wide local excision of the tumor (with 2 cm safety margin) with or without hemi-mandibulectomy with modified radical neck dissection. In all cases after tumor resection and neck dissection, reconstruction was made by PMMC flap with standard technique.

All the patients were evaluated in terms of viability of the flap and restoration of function. All PMMC flap related and flap unrelated major and minor complications were analyzed.

Standard technique used for harvesting pectoralis major myocutaneous flap

Landmarks

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 design

The skin paddle was designed and marked over the chest wall caudally-medially to the nipple with sparing of the areola. The shape of the skin paddle matched the defect, mainly elliptically and it is positioned over the pectoralis major muscle along the course of pectoral branch of thoracoacromial artery. The distance between the top of the skin pedicle and inferior edge of the clavicle should equal or exceed the distance between the recipient site for the flap and the inferior edge of the clavicle.

Elevation of skin paddle

The skin is incised around the skin paddle, and the dissection is extended onto the surface of pectoralis major muscle. 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.

Skin tunnel over clavicle

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.

Closure of donor site defect

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.^{18,19}

RESULTS

Among 60 patients, 40 were males and 20 were females with male to female ratio of 2:1 with an average age of thirty-five to fifty years.

Table 1: Distribution of oral cavity malignancy according to site (n=60).

Site of malignancy	N	%
Lower lip	03	05
Buccal mucosa	35	58.33
Gingivo-buccal sulcus	12	20
Lateral border of tongue	04	6.66
Buccal mucosa + gingiva + RMT	06	10

In this study most common site for oral cavity malignancy was alveolar-buccal complex and within its buccal mucosa found the most common site. Lower lip was found least common site for oral malignancy.

In this study majority of patients are from TNM stage 1, 2 and 3. All PMMC flap survived well except one which

developed total flap necrosis. Orocutaneous fistula was noted in four patients. The fistula was spontaneously resolved in most of the cases. Minor wound dehiscence found in majority of patients that healed spontaneously by secondary healing. Very large wound gaping was found in two patients for which resuturing was done under local anaesthesia. Patient survived well after this. Wound infection was found in 10 patients. Hematoma was found in five patients, which resolved spontaneously in two patients and aspiration and drainage was done in rest three patients.

Table 2: Distribution of cases as per disease stage (n=60).

Stage of disease	No. of cases	Percentage (%)
I + II	30	50
III	25	41.66
IV	05	8.33

Table 3: Flap related complications (n=60).

Complications	Complication found in number of patients	Percentage (%)
Total flap necrosis	01	1.66
Partial skin necrosis	04	6.66
Orocutaneous fistula formation	04	6.66
Wound dehiscence	20	33.3
Wound hematoma	05	8.33
Wound infections	30	33.3

Complications observed

Intraoral hair growth was one of the common problems noted in male patients. Flap unrelated complications (related to neck dissection and tumor excision) like minor parotid leak observed in eight patients and managed by pressure dressing and conservatively. Neck seroma was observed in six patients and neck skin dehiscence was observed in 28 patients. Other complications like chyle leak, pleural empyema, parotid fistula was not found in this study.

DISCUSSION

In spite of era of microvascular free flap in developed country, PMMC flap is still regularly used in developing country like India; because of easy learning curve, less procedure time, it covers the great vessels, high survival rate and acceptable cosmetic and functional outcomes.

In this series, PMMC Flap was found to be very reliable in the reconstruction of soft tissue defects in head and neck region following tumor excision in oral cavity.



Figure 1: Total PMMC flap necrosis.



Figure 4: 1 month follow up after suturing of total flap necrosed wound.



Figure 2: Necrosed PMMC flap removed with debridement.



Figure 5: Partial flap necrosis.



Figure 3: Suturing of total PMMC flap necrosis.



Figure 6: Minor wound dehiscence.

According to Brusati et al, PMMC flap have low complication rate and high reliability of survival.²⁰ Several modifications of PMMC flaps have been

introduced by various authors, one of it was reported by Ahmed et al. and they performed a bipedicle PMMC flap in 47 patients with large full thickness cheek defects.²¹ In this study also, reconstruction was done by bipedicle PMMC flap in 30 cases .

In Mehrhof et al, case series of 73 PMMC flap patients, total flap necrosis was reported 4%.²² According to Bruseti et al, 100 PMMC case series, the reported total flap necrosis rate was 2%.²⁰ In this series it was 1.66% and was found near to all other studies. Pinto et al, describes the use of PMMC flaps in post-cancer resection soft tissue defects in head and neck region. They identified the factors causing complications and outcome of reconstruction.²³ Possible reasons behind total necrosis may be elevation beyond the 7th rib, long pedicle, external compression to flap, compression to vascular pedicle by lateral thoracic nerve, overuse of electrocautery, malnourishment or probable infection.

Apart from total flap necrosis observed in one patient, other minor flap related and unrelated complications were observed in 28 patients. Total complication rate including major and minor was 48.33% which was in the range of current literature. So PMMC is a still effective flap in the era of microvascularised free flap and average functional outcome is also achieved with this flap.

CONCLUSION

The PMMC flap is effective in reconstruction of defect after excision of oral cavity cancers in developing country with heavy chunk of oral cavity cancer patients. In spite of several minor flap related and flap unrelated complications, PMMC flap survival rate is high and total flap necrosis rate is very low.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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