

# “Comparison of Pectoralis Major Myocutaneous Flap with and without Lateral Axillary Incision in Reconstruction of Soft Tissue Defect in Head and Neck Region”- A Pilot Study

1) Dr. Manan Gupta,

*Fellow in Oral Oncology, Dept. of Oral & Maxillofacial surgery, Sharad Pawar Dental College and Hospital, Datta Meghe Institute of Medical Sciences (Deemed to be university), Sawangi (M) Wardha, Maharashtra, India. Email: manangupta26@gmail.com*

2) Dr. Nitin Bhola

*Professor & Head, Department of Oral and Maxillofacial Surgery, Sharad Pawar Dental College and Hospital, Datta Meghe Institute of Medical Sciences (Deemed to be university), Sawangi (M) Wardha, Maharashtra, India. Email: drnitinbhola@gmail.com*

**Abstract: Background - Major ablative surgeries leads to soft and hard tissue defects which require reconstruction which gives better functional and aesthetic outcomes. Pectoralis major myocutaneous (PMMC) flap is a workhorse flap for soft tissue reconstruction owing to its merits. The conventional technique of harvesting PMMC flap is associated with donor site complications such as functional deformity and scar contracture. A modified technique without lateral axillary incision for harvesting PMMC flap may provide better results. Aim - To compare the two incision designs of harvesting PMMC flap (with lateral axillary incision and without lateral axillary incision) in soft tissue defect reconstruction in head and neck region. Methodology – A prospective pilot study will be performed on 16 patients diagnosed with OSCC requiring resection, neck dissection and reconstruction with PMMC flap. These patients will be allocated to two groups by alternate randomization, Group A PMMC flap harvest with lateral axillary incision and Group B PMMC flap harvest without lateral axillary incision. The patients will be subjected to General anaesthesia and surgery will be performed by single experienced surgeon. Parameters assessed will be time taken for harvesting the flap, time required for closure of donor site, flap survival, range of motion (ROM) of shoulder (Degree of endorotation and exorotation), complications (hematoma, seroma, dehiscence, marginal necrosis, infection) and scar formation. The obtained data will be filled in MS excel sheet and statistical analysis will be done. Expected result – The modified technique would prove better in terms of function and aesthetic with minimal complications and that it will provide new insight in choosing the best approach with minimal complications for harvesting of PMMC flap. Conclusion - The results if favours the modified technique with respect to time of harvesting, time of closure of donor site and complications, will help in the reconstruction of such defects with minimal donor site complications and improved outcomes.**

**Keywords: Oral squamous cell carcinoma, Pectoralis Major Myocutaneous flap, Postoperative complications.**

## **Introduction:**

Cancer treatment of head and neck region creates large defects requiring reconstruction of all the lost structures and this remains a challenge for the surgeons. Such defects requires functional and aesthetic repair that aids in patients to return to social life and to their capacity of work. Various reconstruction options of these defects are local flaps, pedicle flaps and microvascular flaps. Free flap is considered to be “gold standard” as it enhances the reconstruction of both bone and soft tissue defects. However due to its fewer limitations such as prolonged surgery and exposure to general anaesthesia, surgical expertise, high cost and general health of the patients they are not used in many centres.

Therefore, pedicle flaps play a major role in developing countries. Among all the flaps, the pectoralis major myocutaneous (PMMC) flap, supplied by thoracoacromial artery is the most versatile and reliable flap. It was introduced by Ariyan in 1979 and has since then become a “workhorse” for reconstruction of soft tissue defects. PMMC flap provides adequate soft tissue volume, large skin paddle, proximity to the surgical site, short operating time, ease of execution, and can be performed as a double team approach and also donor site remains away from the normal pathway of spread of HNF cancers. Harvesting PMMC flap with conventional technique using a lateral axillary incision gives good access but is associated with complications such as scar formation, contracture causing deformity of the thoracic wall, functional limitation, and partial to complete necrosis of its skin paddle. The percentage of complications found is 48.9%. Therefore to avoid these complications and safely harvest a PMMC flap, a modified technique of harvesting PMMC flap can be used that eliminates the lateral axillary incision thereby reducing the complication rates.

No studies have yet been reported in literature comparing the harvesting of PMMC flap with and without lateral axillary incision. Hence we intend to compare two incision designs (skin paddle with and without lateral axillary incision) for harvesting PMMC flap in reconstruction of soft tissue defect in head and neck with the hypothesis that the modified technique gives better results in terms of minimal complications than the classical PMMC flap.

## **Objectives:**

1. To compare the time taken for harvesting of flap and closure of donor site in both the groups.
2. To assess and compare the various post operative flap and donor site complications in both the techniques.

## **Methodology:**

The present prospective pilot study will be conducted in the inpatient Department of Oral & Maxillofacial Surgery, Acharya Vinoba Bhave Rural Hospital, Sawangi (Meghe), Wardha during Oct 2019 to April 2020. The study will be conducted in accordance with the Helsinki declaration and its later amendments or comparable ethical standards and after approval by the institutional ethical guidelines prescribed by Central Ethics Committee on Human Research (C.E.C.H.R.) of Datta Meghe Institute of Medical Sciences (**Ref No-DMIMS(DU)/IEC/Dec-2019/8608**).

This study will be conducted on 16 systemically healthy patients diagnosed with oral squamous cell carcinoma (OSCC) requiring cancer resection and reconstruction with PMMC flap, which will be allocated equally in 2 groups by alternate randomization irrespective of age, gender, disease and treatment characteristic and who will be electively posted for ablative tumor resection, neck dissection and reconstruction with PMMC flap.

**Group A (n=8)**, PMMC flap harvesting with lateral axillary incision (Control group).

**Group B (n=8)**, PMMC flap harvesting without lateral axillary incision (Study group).

***Inclusion Criteria:***

1. Defects requiring reconstruction with PMMC flap in patients with OSCC.
2. ASA category I and II

***Exclusion Criteria:***

1. Immuno-compromised patients
2. History of radiotherapy to head, neck & chest region
3. Salvage surgeries
4. Patients with poland syndrome

***Consent:***

Every patient will explained about the procedure and will be asked to give written informed consent. (**Annexure I**)

***Clinical examination:***

Assessment of the cases will be done preoperatively by obtaining case history and clinical examination. Range of motion (ROM) of shoulder (degree of endorotation and exorotation), will be examined preoperatively for each patient in both the groups.

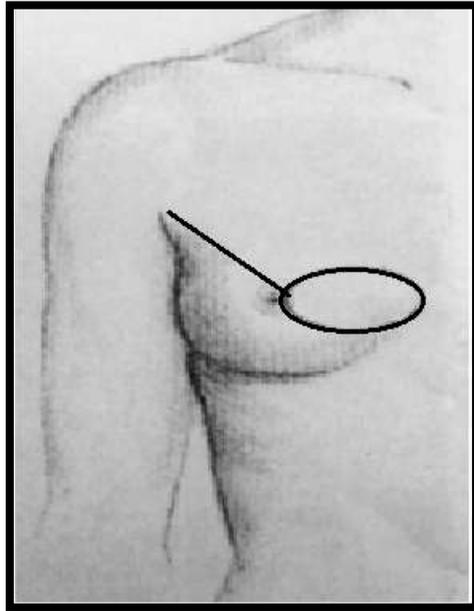
***Surgical Protocol:***

Fitness for all the patients will be obtained following which patients would be subjected to surgery under general anaesthesia. Resection of tumour will be done with a clear soft tissue and bony margins based on clinical and radiographic assessment. Neck dissection will be performed (SND or MRND) as planned for each patient. Spinal accessory nerve will be identified in each case and would be preserved. The specimens will be sent for quick frozen section analysis. After assuring clear margins, defect size will be measured and marking for PMMC flap would be done. Based on the random allocation of patients to respective group, PMMC flap will be harvested. All the surgeries will be performed by a single experienced surgeon. Evaluation of parameters will be done by 1 independent observer. These members will not be further involved in the study analysis.

***Surgical Technique:***

**Harvesting of PMMC flap with lateral axillary incision (Group A)**

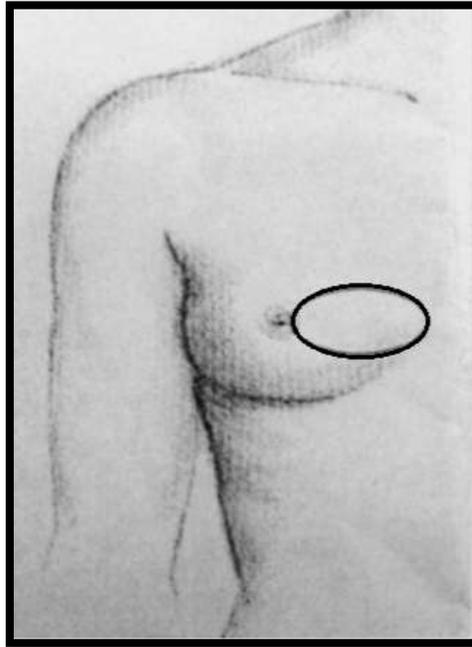
***Figure 1- Harvesting of PMMC flap with lateral axillary incision***



A marking for a skin paddle will be done after measuring the defect size. Lateral axillary incision will be marked from the the skin paddle to the region of insertion of the muscle at the humerus. The incision will be given and dissection would be continued towards the pectoralis fascia. Laterally dissection will be performed to identify the free margin of the muscle. Superiorly and medially the muscle will be indentified at its clavicular and sterna origin. The elevation of entire muscle would be carried leaving 1cm cuff of muscle lateral to sterum and insertion in the humerus. Pedicle on the under surface of the muscle will be identified. The dissection will be carried out till the clavicle followed by identification of deltopectoral groove and cephalic vein. Complete disinsertion will be done by sacrificing the muscle from the humerus. Then a tunnel will be created through the neck to pass and rotate the myocutaneous flap into the recipient bed. Vacuum drains will be placed in the donor site, hemostasis would be achieved and closure will be done in 2 layers using 2-0 vicryl for muscle closure and 2-0 ethilon for skin closure.

#### **Harvesting of PMMC flap without lateral axillary incision (Group B)**

***Figure 2- Harvesting of PMMC flap without lateral axillary incision***



Harvesting of PMMC flap in the modified technique will be without a lateral axillary incision. The size of defect will be measured and skin paddle over chest would be marked. Tunnel will be created through the neck incision into the chest. Skin paddle will be cut till muscle fibers would be seen. The dissection will be performed to expose the muscle upto the clavicle, which will communicate with the tunnel created through neck incision. Large retractors will be used to retract the skin. Laterally the muscle will be identified. The muscle will be raised and vascular pedicle would be visualized, further pectoralis major muscle will be cut on either side of the vessel and then a 1.5-2cms incision will be given, just medial to axillary fold to expose the insertion of pectoralis major muscle then complete disinsertion will be performed by detachment of muscle fibers from its humeral attachment. The myocutaneous flap will then be passed through a tunnel into the neck and rotated into the recipient tissue bed. Vacuum drains will be placed in the donor site, hemostasis would be achieved and closure will be done in 2 layers, 2-0 vicryl for muscle closure and 2-0 ethilon for skin closure.

Following the harvesting of PMMC flap and tunneling through neck to recipient bed, suturing of the flap will be done, mucosa to flap with 3-0 vicryl and skin to flap with 3-0 ethilon. Dressing of the surgical site will be done and patient would be reversed. Overnight nasoendotracheal intubation will be kept to maintain the airway. Regular dressing will be performed for each patient.

***Evaluation:***

Following parameters will be assessed:-

**INTRA OPERATIVE-**

1. Time taken for harvesting of flap
2. Time required for closure of donor site.

**POST OPERATIVE-**

1. Flap survival- 0- No flap loss,  
1- Partial flap loss (<50%) and  
2- Total flap loss (>50%).

2. Range of Motion of the shoulder (ROM) will be observed post operatively at 2 month follow up by 1 single examiner. The **degree of endorotation** will be rated as: reach of dorsal surface of hand  
Coccyx region = 1  
Lower back = 2 and  
Area between the scapulae = 3  
The **degree of exorotation**: palm of hand reaches  
Forehead = 1  
Occipital area =2 and  
Neck = 3
3. Donor Site complications: Hematoma, seroma, infection, marginal necrosis, dehiscence and scar formation

**The Stony Brook Scar Evaluation Scale (SBSES) 2007**

**Table 1- Stony Brook Scar Evaluation Scale (SBSES) 2007**

Scar Category		Score
Width	> 2mm	0
	≤ 2mm	1
Height	Elevated or depressed	0
	Flat	1
Colour	Darker than surrounding skin	0
	Same or lighter than surrounding skin	1
Suture marks	Present	0
	Absent	1
Overall appearance	Poor	0
	Good	1
Total Score	(Out of 5)	

Scar formation over donor site will be examined post operatively at 2 month follow up by 1 single examiner, in accord with Stony Brook Scar Evaluation Scale.

Statistical analysis will be done using descriptive and inferential statistics using chisquare test and student's unpaired t test.

**Expected Outcome:**

PMMC flap is considered the most reliable option for reconstruction of soft defect in head, face and neck region. Conventional technique was commonly practiced however recently minimal access procedures for flap harvest are being increasingly used without compromising the reconstruction goals. If superiority of skin paddle without lateral axillary incision is established, it will provide a new insight in choosing the best approach with minimal complications for harvesting of PMMC flap.

**Discussion:**

In India oral cancer is major concern due to rampant use of tobacco products, failure of legislation to control it and general dental neglect. Treatment of oral cancer is usually surgery and it is challenging due to large defects created after tumor removal that require reconstruction.

Though free tissue transfer is most acceptable option for the reconstruction of complex bone and soft tissue defects in head neck region, PMMC flap still serves as a “workhorse” flap in developing countries owing to its advantages..

Harvesting PMMC flap with conventional technique using a lateral axillary incision gives good access but is associated with complications such as scar formation, contracture causing deformity of the thoracic wall, functional limitation (range of motion of shoulder), and partial to complete necrosis of its skin paddle. Therefore to avoid these complications and safely harvest a PMMC flap, a modified technique of harvesting PMMC flap can be used that eliminates the lateral axillary incision thereby reducing the complication rates.

*El-Marakby HH (2006)* reported time for harvesting flap and inseting to be 80±29 minutes (45-120 minutes). *Coruh A (2006)* **Error! Bookmark not defined.** and *Metgudmath RB et al (2013)* reported 100% flap survival whereas *Gadre KS et al (2013)* reported 14% cases of complete loss and 28 % of partial loss of flap. *Refos JW et al (2016)* **Error! Bookmark not defined.** reported morbidity of shoulder after PMMC flap harvest, after SND. PMMC flap harvesting cause impaired abduction. *Ramakrishnan VR et al (2009)* reported 1.2% (n=1) case of each hematoma and dehiscence in donor site. *Bhola et al* reported on role for bilobed/bipaddled pectoralis major myocutaneous flap for single-stage immediate reconstruction of post ablative oncologic full-thickness defects of the cheek' *NDOUYANG, C. J et al.*

### **Conclusion:**

Major Head and neck soft tissue defects are commonly reconstructed using PMMC flap. This study will compare two techniques for harvesting PMMC flap – the conventional technique with lateral axillary incision and the modified technique without lateral axillary incision. The results if favours the modified technique with respect to time of harvesting, time of closure of donor site, flap survival and complications, will help in the reconstruction of such defects with minimal donor site complications and improved outcomes.

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