

## Research Article

# Pectoralis major myocutaneous flap in head and neck reconstruction: an interesting experience from central India regional cancer center

Ashutosh Gupta<sup>1</sup>, Gunjan Agrawal<sup>1\*</sup>, Santanu Tiwari<sup>1</sup>, Kshitij Verma<sup>1</sup>, Rajesh Agrawal<sup>1</sup>, Vivek Choudhary<sup>2</sup>

<sup>1</sup>Regional cancer center, Pt. JNMC, Raipur (C.G.), Chhattisgarh, India

<sup>2</sup>Department of radiotherapy, Regional cancer center, Pt. JNMC, Raipur (C.G.), Chhattisgarh, India

**Received:** 25 September 2015

**Revised:** 03 October 2015

**Accepted:** 20 October 2015

### \*Correspondence:

Dr. Gunjan Agrawal,

E-mail: [drgunjanagrwal@gmail.com](mailto:drgunjanagrwal@gmail.com)

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## ABSTRACT

**Background:** Head and neck cancer are sixth most common cancers worldwide with cancer of oral cavity most common. The primary treatment modality for oral cavity cancer has been surgery and defects resulting from the ablation of the tumors require reconstruction. the PMMC flap offer an easy, less time consuming with minimal postoperative complication as a reconstructive option in the hands of reconstructive surgeon. The objective of our study was to give a precise description of our experience with the PMMC flap as a reconstructive option in post-ablative head and cancer surgery.

**Methods:** The current prospective study was conducted in the Department of Surgical Oncology, Regional cancer center, Pt. JNMC, Raipur (C.G.), India from the January 2014 to June 2015. Detailed clinical history and examination of the patients were recorded. All Investigations relevant to the study were done before the surgical procedure. Procedure was performed as per standard protocol and reconstruction was made with PMMC flap. Data was compiled in MS Excel and checked for its completeness and correctness. Then it was analyzed.

**Results:** In the present study male to female ratio was 2:1. Most of the patients belongs to the age group of 41-60 (55.55%) followed by 21-40 (30.15%). In the present study majority of patient of oral malignancy presented with lower alveolus malignancy (36.5%) followed by buccal mucosa malignancy (19.06%).

**Conclusions:** Pectoralis major myocutaneous flap was found to be a versatile flap for reconstruction of large defects in Head and Neck region with minimal complication rate.

**Keywords:** Head and neck reconstruction, Head and neck cancer, Oral cancer, PMMC flap, Orocutaneous fistula

## INTRODUCTION

Head and neck cancer are sixth most common cancers worldwide with cancer of oral cavity most common. Worldwide head and neck cancer statics indicate that there are about 640000 cases per year, resulting in approximately 350000 deaths per year. Cancer of the oral cavity are the most common type of head and neck cancer with approximately 48000 cases per year.<sup>3</sup> Oral and oropharyngeal carcinoma are the third most common in

man and fourth most common in females in developing countries.<sup>1,3</sup>

The reconstruction in the head and neck region has improved with the better knowledge and techniques. It is a surgical challenge to perform reconstruction as structure; function and esthetics have to be restored.<sup>2</sup> Defects resulting from ablation in maxillofacial region constitute major functional and esthetic reconstructive challenges due to their complex three dimensional

nature.<sup>3,10</sup> Various pedicle regional flaps such as deltopectoral flap, PMMC flap, forehead flap have been advocated.<sup>3,13</sup> Currently free tissue transfer is being practiced in many centers and therefore considered as first choice for head and neck reconstruction because of the availability of micro vascular surgeon in many centers however, free flap transfer cannot be used for all patients at every institute since it requires special techniques and equipment's for microsurgery.<sup>7,10,12</sup>

The pectoralis major myocutaneous flap was first described by Stephen Ariyan in 1979. The PMMC flap is one of the most commonly used flap for reconstruction in head and neck region.<sup>1,2,4,11,12</sup> This flap easily accepts the challenge of reconstruction in extensive intra and extra oral defect and therefore declared as workshoe for maxillofacial reconstruction.<sup>2,5,6,9</sup> To avoid the bulkiness associated with the flap the pectoralis major may be used as a muscle flap with or without skin grafting.<sup>1,14</sup>

Ariyan showed that the flap can be raised as an myocutaneous flap based on pectoral branch of thoracoaromian artery.<sup>1,8</sup> PMMC flap originate from the medial 1<sup>1/2</sup>-2/3 of clavicle, lateral part of entire sternum, adjacent cartilage of first 6 rib, bony portion of 4<sup>th</sup> 5<sup>th</sup> and 6<sup>th</sup> rib and inserted into intertubercular groove of humerus. The action of the PMMC flap is abducts, flexes, and medially rotates arm.<sup>1,15</sup> The nerve supply to the pm muscle is from the lateral L5 to L7 and medial c8 to t1 pectoral nerve.<sup>9</sup> Tobin advocated method of obtaining two flaps from the same muscle by splitting the skin and muscle vertically and basing one flap on the thoracoacromian artery and another flap on the lateral thoracic artery.<sup>1</sup> This flap can be used for intraoral and pharyngeal lining as well as reconstruction of the esophageous.<sup>2,10</sup>

## METHODS

The current prospective study was conducted in the Department of Surgical Oncology, Regional cancer center, Pt. JNMC, Raipur (C.G.), India from the January 2014 to June 2015. Each patient was informed and consent was taken to participate in the study.

### Inclusion criteria

Patient eligible for the analysis were those with malignant tumors of the head and neck who underwent an immediate reconstruction with use of pectoralis major myocutaneous (PMMC) flap.

### Exclusion criteria

Patient undergone primary closure, free flap surgery and other loco regional flap was excluded from the study.

Detailed clinical history and examination of the patients were recorded. All Investigations relevant to the study were done before the surgical procedure. Procedure was

performed as per standard protocol and reconstruction was made with PMMC flap. Full aseptic precautions were made during the procedure. Outcome of the surgery with complications were noted.

Data was compiled in MS Excel and checked for its completeness and correctness. Then it was analyzed.

## RESULTS

In the present study male to female ratio was 2:1. Most of the patients belongs to the age group of 41-60 (55.55%) followed by 21-40 (30.15%). Youngest patient was 19 yr. old and oldest patient was 80 yrs old. The mean age was found to be 50.14 (Table-1).

**Table 1: Distribution of patients who underwent surgery according to age and sex.**

Age group	Males (n=84)	Female (n=42)	Total	% of patients
0-20	1	0	1	0.80
21-40	23	15	38	30.15
41-60	48	22	70	55.55
61-80	12	5	17	13.48
Total	84	42	126	100

In the present study majority of patient of oral malignancy presented with lower alveolus malignancy (36.5%) followed by buccal mucosa malignancy (19.06%). This study reconstructed the mucosal surface in 65% patients and skin or bipedal use of PMMC flap was lesser as majority of the patient involved was lower alveolus and buccal mucosa without involvement of skin (Table 2, 3 and Figure 1, 2).

In this study we have not found any total flap failure but total complication rate was found to be 48.38% (Table-4).

**Table 2: Distribution of patients who underwent surgery according to site of malignancy in oral cavity.**

Site of the malignancy	No of patients (n= 126 )	% of patients
Buccal mucosa	24	19.06
Tongue	12	9.52
Retromolar trigone	11	8.73
Lip	9	7.14
Upper alveolus	20	15.87
Lower alveolus	46	36.50
Neck + parotid	4	3.17

In this study we have not found any total flap failure but total complication rate was found to be 48.38% (Table-4).

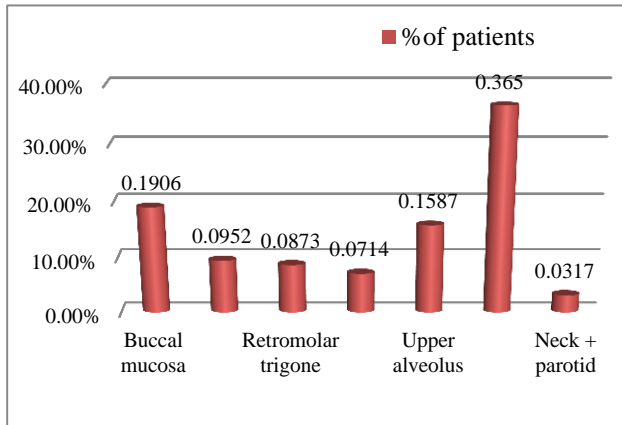


Figure 1: Distribution of patients who underwent surgery according to site of malignancy in oral cavity.

Table 3: Distribution of patients according to site of reconstruction.

Site of reconstruction	No of patients	% of patients
Only mucosal	82	65.07
Only skin	18	14.28
Mucosal+ skin	22	17.46
Neck/parotid	4	3.17

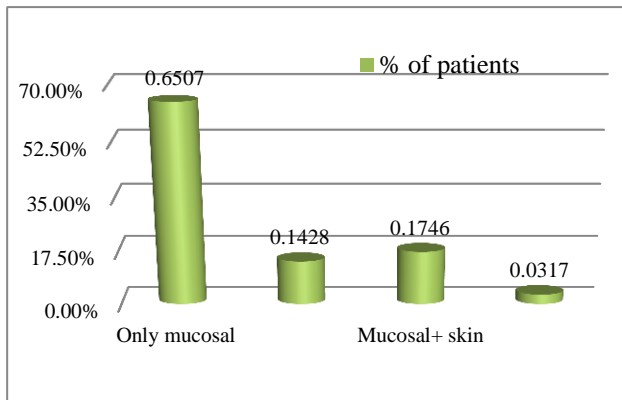


Figure 2: Distribution of patients according to site of reconstruction.

**DISCUSSION**

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 6<sup>th</sup> decade but in our study we have found to be the mid age group to be affected most followed by young age group because of use of tobacco in early age.

Shah JP et al reported the flap related complication to be 63%. Other study done by Wilston et al found 8 failures in 112 flaps four of which were used as extended flaps. Ariyan found only 3 cases of partial skin loss (6.8%), Deazevedo had a failure rate of 8% in 55 cases. Infection and orocutaneous fistula was most common complication in our study which accounts for 23.9% when joined together. Another study done by Kroll et al found a 24.8% incidence of fistula in 105 patients with intraoral defect.<sup>1</sup> Mahammad tahir et al observed infection in 10% patients done PMMC flap after head and neck reconstruction.<sup>11</sup>

Table 4: Distribution of patients according to postoperative complication.

Perioperative complication	No of patients	% of patients
Partial flap necrosis	8	6.34
Wound infection	15	11.90
Dehiscence	12	9.52
Total flap failure	0	0
Dribbling of saliva	8	6.34
Orocutaneous fistula	15	11.9
Hematoma	3	2.38

Inspite of increasing use of microvascular free flap in this era, conventional flap like pectoralis major remains very versatile and reliable myocutaneous for primary and secondary reconstruction.<sup>1,4</sup> PMMC flap is a reliable flap for reconstruction in head and neck due to reliability and versatility.<sup>2,4,11</sup> The main advantage of PMMC flap can be used in very wide range of defects in the head and neck area including the neck, maxilla as well as temporo-orbital area.<sup>6</sup> Skin paddle can be extended as down as rectus abdominal sheath and the beauty of the PMMC is that a very big skin paddle overlying whole of the muscle can be elevated.<sup>8</sup> 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.<sup>2,9</sup>

Like other myocutaneous flap, it is harvested by single stage reconstructive procedure and does not require flap delay or release.<sup>6</sup> The donor site morbidity is surprisingly low and few patients may complain of difficulty in arm movement.<sup>1</sup> It is also very useful in elderly patients or in those with poor clinical conditions.<sup>4</sup> This flap can be used as a salvage procedure after necrosis of free flap and in cases where there are contraindication to free flap such as medical conditions that make the patients unable to tolerate long surgical procedures or inadequate recipient vessels for microanastomosis in the neck of the patients who underwent high dose radiotherapy.<sup>7,10,12</sup>

When PMMC is used to reconstruct mucosal defect the most common complication is dehiscence of the suture which can lead to salivary leakage and formation of orocutaneous fistula and this may lead to prolonged hospital stay, infection, wound dehiscence, vascular rupture with marked increase in morbidity.<sup>2,4,5</sup> The incidence of recurrence at flap harvesting site is less mentioned but few cases are reported in the literature.<sup>5</sup> The presence of chest hair on the flap used in the man is a theoretical disadvantage, most patients who need these flaps have stage 3 or 4 disease. In the women distortion of the breast is a problem that may be overcome by using only a muscle flap, a submammary approach or by placing the incision laterally. The supraclavicular bulge caused by the muscle as it crosses the clavicle can be unaesthetic.<sup>1</sup>

## CONCLUSION

Pectoralis major myocutaneous flap was found to be a versatile flap for reconstruction of large defects in Head and Neck region with minimal complication rate. In today's world of micro vascular flaps, in spite of associated complications, loco regional flaps play a crucial role at oncology centers. PMMC offer an easier, faster, reliable option for reconstruction in post-ablative head and neck surgery.

## ACKNOWLEDGEMENTS

The authors are thankful to all the faculty and technical staff of department of Oncology, Dr. BRAM Hospital, Pt. J. N. M. medical college, Raipur (C.G.) India, for their cooperation and support during the entire study period.

*Funding: No funding sources*

*Conflict of interest: None declared*

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

## REFERENCES

1. Rahamthullah US, Hussain SJ, Nasyam FA, Allareddy S. Pectoralis Major Myocutaneous Flap in Oral and Maxillofacial Reconstruction: A case Report. *J Res Adv Dent.* 2015; :1s2:64-7.
2. Amin MM, Naseer U, Akhtar A, Awan AA. Pectoralis Major Myocutaneous Flap for Reconstruction of Major Neck Defects. *Journal of Surgery Pakistan.* 2014;19(2).
3. Pangam N, Thorawade V, Shah R, Jagade M, Nichalani S. Study of Surgical Management and Locoregional Flap Reconstruction in Oral Malighancies. *Journal of Dental and Medical Science.* 2014;13(5):93-6.
4. Leite AKN, Matos DLL, Belli M, Kulsar MAV, Cernea CR, Brandao LG, et al. Pectoralis Major Myocutaneous Flap for Head and Neck Reconstruction. *Acta Otorhinolaryngologica Italica.* 2014;34:389-93.
5. Reddy VC, Vijaya M, Sabitha, KS, Chris DA, Mahesh K, Jagdish S. Pectoralis Major Myocutaneous (PMMC) Flap Donor Site Recurrence in a Case of Buccal Mucosal Cancer: A Case Report. *International Journal of Health Science and Research.* 2013;3(1):55-7.
6. Lekawale H, Patil B. Pectoralis Major Myocutaneous Flap for Oral Cavity Cancer Reconstruction - Our Experience with 30 Cases. 2012;2(3):159-61.
7. Saitu A, Minakawa H, Saito N, Nagahashi T. Indications and Outcomes for Pedicled Pectoralis Major Myocutaneous Flap at a primary Microvascular head and Neck Reconstructive Center. *Modern Plastic Surgery.* 2012;2:103-7.
8. Rehman QB, Karmakar R, Kumar S. Thoraacromial Vessel Based Pectoralis Major Myocutaneous Flap in Oral and Maxillofacial Soft Tissue Defect Reconstruction. *AKMMC J.* 2012;3(2):23-9.
9. Sathyanarayan GR, Suresh K P, Prabhu V. Pectoralis Major Myocutaneous(PMMC) Flap for Reconstruction of oro Facial Defect. *JIADS.* 2011;2(2):76-8.
10. Rudes M, Bilic M, Jurlina M, Prgomet D. Pectoralis Major Myocutaneous Flap in the Reconstructive Surgery of the Head and Neck-Our Experience. *Coll. Antropol.* 2012;36(2):137-42.
11. Tahir M, Tahmeedullah, Khan AT. Clinical Evaluation of Pectoralis Major Myocutaneous Flap in Head and Neck Reconstruction. *JPMI.* 2005;19(1):71-5.
12. Vartanian JG, Carvalho AL, Solange MT, Carvalho, Mizobe L, Magrin J, et al. Pectoralis Major and Other Myofacial/Myoutaneous Flap in Head and Neck Cancer Reconstruction: Experience with 437 Cases at a Single Institute. *Head and Neck.* 2004;1018-23.
13. Deo SVS, Purkayastha J, Das D, Kar M, Srinivas G, Asthana S, et al. Reconstruction of Complex Oral Defects using Bi-Paddle Pectoralis Major Flap – Technical Modifications and Outcome in 54 Cancer Patients. *Indian Journal of Otolaryngology and Head and Neck Surgery.* 2003;55(1):5-9.
14. Belt PJ, Emmett J. Local Transposition Flap Repair of the Pectoralis Major Myocutaneous Flap Donor Site. *Plastic and Reconstructive Surgery.* 2004;114(3):732-7.
15. Gurbachan I, Gomez AC, Noor N. Pectoralis Major Myocutaneous Flap in Head and Neck Surgery. *Med. J. Malaysia.* 1985;40(2):107-14.

**Cite this article as:** Gupta A, Agrawal G, Tiwari S, Verma K, Agrawal R, Choudhary V. Pectoralis major myocutaneous flap in head and neck reconstruction: an interesting experience from central India regional cancer center. *Int J Res Med Sci* 2015;3:3065-8.