

# HEAD AND NECK RECONSTRUCTION; OUR EXPERIENCE OF PECTORALIS MAJOR MYOCUTANEOUS PEDICLED FLAP

**DR. FIRDOUS KHAN**

Postgraduate Medical Officer,  
Department of Plastic Surgery  
Hayatabad Medical Complex  
Peshawar.

**DR. SYED ASIF SHAH**

Senior Registrar  
Department of Plastic Surgery  
Hayatabad Medical Complex  
Peshawar.

**DR. HIFSA HAMEED**

Trainee Medical Officer  
Khyber College of Dentistry  
Peshawar

**Dr. Najj ullah Khan**

Postgraduate Medical Officer  
Department of Orthopaedic  
Khyber Teaching Hospital,  
Peshawar.

**ABSTRACT... Background:** The pectoralis major myocutaneous pedicle flap (PMMPF) has been considered to be the "workhorse" of pedicled flaps in head and neck reconstruction. Despite the use of free flaps, this flap is still considered the mainstay of head and neck reconstruction. The flap is usually associated with a high incidence of complications compared with the free fasciocutaneous flaps yet its size, viability, and versatility make it a valuable tool for extending the limits of resectability and reconstruction. It is type V muscle flap with the dominant vascular supply from the pectoral branch of thoracoacromial artery. **Objective:** To share our experience of pectoralis major myocutaneous pedicle flap in selected cases of head and neck reconstruction. The indications, type of reconstruction and complications of the flap utilization were evaluated. **Patients and Methods:** Between March 2005 and August 2010, a 37 head and neck reconstructive procedures using the PMMPF were carried out. The indications for the flap use were defects due to resection of stage II-IV cancer in the head and neck region. The site, stage of the disease and the postoperative complications were all documented. **Results:** Pectoralis major myocutaneous pedicled flap reconstructions were used to reconstruct defects in the following sites: oral cavity (25 patients); oropharynx/ hypopharynx, (7 patients); and neck or face (5 patients). Of the 37 PMMPF reconstructions, 30 flaps were carried out as primary reconstructive procedures, whereas 7 flaps were "salvage" procedures. Twentyfive patients (67.59%) had complications. A higher complication rates were associated with the utilization of the flap as a salvage procedure, number of co- morbidities, and in oral cavity reconstructions. **Conclusions:** The pectoralis major myocutaneous pedicled flap is still an acceptable method of head and neck reconstruction. It is fast, reliable, provides safe repair and is indicated especially where bulk is needed.

**Key words:** Pectoralis major myocutaneous flaps – Free flaps - Head and neck reconstruction.

## INTRODUCTION

Reconstruction of head and neck defects after tumor resection is still a challenge to reconstructive surgeons. These complex defects have extensive loss of mucosa, bone, soft tissue and skin. Ideal reconstruction should replace all these structures to achieve acceptable cosmetic and functional outcome<sup>1</sup>.

Pectoralis major myocutaneous pedicled flap (PMMPF) has been considered to be the "workhorse" of pedicled flaps in head and neck reconstruction<sup>2</sup>. It was first described by Hueston<sup>3</sup> and McConchie<sup>4</sup> in 1968. The first published reports of the use of this flap in head and neck reconstruction was that of Ariyan in 1979<sup>5</sup>. The dominant vascular supply is the pectoral branch of thoracoacromial artery<sup>6</sup>. It is type V muscle flap according to Mathes and Neahai classification<sup>7</sup>.

The use of the pectoralis major myocutaneous pedicled flap (PMMPF) for head and neck reconstruction is well established as a result of its mobility, skin paddle for epithelial replacement, and well-vascularized muscular tissue<sup>8</sup>. Despite the increasing use of micro vascular flaps, the pectoralis major flap remains an excellent reconstructive choice for large soft tissue defects in the oral cavity<sup>9</sup>. Its size, viability, and versatility make it a valuable tool for extending the limits of resectability and reconstruction<sup>10</sup>. The versatility of the flap in head and neck reconstruction exceeded its utilization for the oral cavity and in covering a soft tissue defects in the face<sup>2</sup>. The pectoralis major myocutaneous flap is also a very reliable and robust one for single stage immediate head and neck reconstruction<sup>11</sup>.

Regarding the risk of developing complication with PMMF, it was found that there was slight increase in

smokers and in patients with larger tumors resection<sup>12</sup>. However, obesity and previous radiotherapy were found to have no effect on the complication rates<sup>2</sup>. On the other hand women who underwent pectoralis major myocutaneous flaps had a higher rate of flap necrosis than did men, presumably because of the interposition of breast tissue between the muscle and the skin paddle<sup>13</sup>.

## PATIENTS AND METHODS

This descriptive study was carried out between March 2005 and August 2010 at the Departments of Plastic and Reconstructive Surgery, Hayatabad Medical Complex and Khyber Teaching Hospital Peshawar. The inclusion criteria were stage II-IV extirpation, reconstruction with skin and soft-tissue defect, or a defect involving the upper aero digestive tract. A total no. of 37 patients were included. Preoperative assessment included the site, stage of the disease. An open biopsy from the tumor was undertaken for all cases. The stage of the disease was evaluated by clinical examination assisted by radiological (OPG, CT or MRI) examination. To assess the presence of distant metastasis, a routine chest x-ray, and abdominal ultrasound were carried out. Preoperative medical assessment included routine complete blood picture, bleeding and coagulation profile, liver and kidney functions, ECG. The indications for the flap use and the flap design to fit the defect were planned preoperatively. Consent for the operation was taken. Photographs were taken preoperatively, intra-operatively and postoperatively. Follow-up of patients involved a thorough clinical examination aided by radiological assessment for the local recurrence, complications and distant metastasis.

## RESULTS

There were 27 (73%) males and 10 (27%) females with a mean of age 52 years, and a range of 26-67 years. The pathology of the disease included squamous cell carcinoma in the majority of cases (81%). The rest of the cases were sub-mandibular mucoepidermoid carcinoma (8.10%), malignant lymphoma (5%), advanced mucoepidermoid parotid cancer (2.8%) and a mandibular soft tissue sarcoma (2.8%). Reconstructions were completed after ablation of cancer in 25 patients with carcinoma of the oral cavities (8

alveolar margins, 5 retro molar, 5 squamous cell carcinoma of the lip involving the buccal mucosa, 4 tongues, and 3 floors of mouth); oropharynx/hypopharynx in 7 patients and neck or face in 5 patients (2 parotid, 2 mandible, and one neck defect). Out of these 37 patients 18 were stage 2, 12 stage 3, and 7 cases were stage 4 who presented with fungating mass. Out of the 37 PMMPF, 30 (81%) were carried out as primary reconstructive procedures, whereas 7(19%) flaps were done as "salvage" procedures (3 reconstructions after fistula, 2 after free flap failure, and 2 for coverage of mandibular prosthesis). A metal plate prosthesis was used to restore the mandibular continuity in conjunction with PMMPF in 10 (40%) of patients who suffered stage II to III disease of the oral cavity involving the mandible. Twentyfive patients (67.59%) had been affected by complications such as wound dehiscence (13.51%), infection (24.32%), hematoma (5.4%), seroma (8.10%), partial flap failure (40%), total flap failure (8.10%), orocutaneous fistula (9%), dribbling of saliva (19%) and donor site healing problems (35.13%). All the minor complications were treated conservatively with no resulting functional morbidity. On the other hand major complications requiring free flap was undertaken in the 3 flap failures. A higher complication rates were associated with the utilization of the flap as a salvage procedures (100%), the presence of more than one risk factor, heavy smokers (70%), and in oral cavity reconstructions (80%). Most complications were minor and did not require a second salvage procedure. Only in cases who suffered total flap loss, a free antero-lateral thigh flap was used as salvage procedure. Our results are shown in tables 1-3 and figures 1-3.

## DISCUSSION

The pectoralis major myocutaneous pedicled flap (PMMPF) is the most versatile and reliable flap in restoring various defects in the head and neck region<sup>14</sup>. The robust vascularity and the proximity to various defects in the region have made it the standard reconstructive procedure for defects in the head and neck area<sup>2</sup>. With the introduction of free flaps; this flap has lost much of its reputation in reconstruction of the head and neck region<sup>15</sup>. The pliability and the less bulk of the free flaps have superseded the utilization of the

Table-I. Site, stage and pathology of the disease	
Site, stage and pathology	No. and % of pts.
<b>Site of the disease</b>	
Oral cavity	25 (68%)
Pharynx	07 (19%)
Neck	05 (13%)
<b>Stage of the disease</b>	
Stage 1	-
Stage 2	18 (49%)
Stage 3	12 (32%)
Stage 4	07 (19%)
<b>Pathology</b>	
Squamous cell ca.	30 (81%)
Mucoepidermoid ca.	03 (8%)
Malignant lymphoma	02 (5%)
Advanced parotid ca.	01 (3%)
Sarcoma	01 (3%)

Table-II. Type of reconstruction	
Type of reconstruction	No.
Primary reconstruction	30 (81%)
Oral cavity	18 (49%)
Pharynx	07 (19%)
Neck and face	05 (13%)
Salvage procedure	07 (19%)
Orocutaneous fistula	03 (8%)
Free flap failure	02 (5.5%)
Exposed prosthesis	02 (5.5%)

PMMPF in the reconstruction of oral defects<sup>16</sup>.

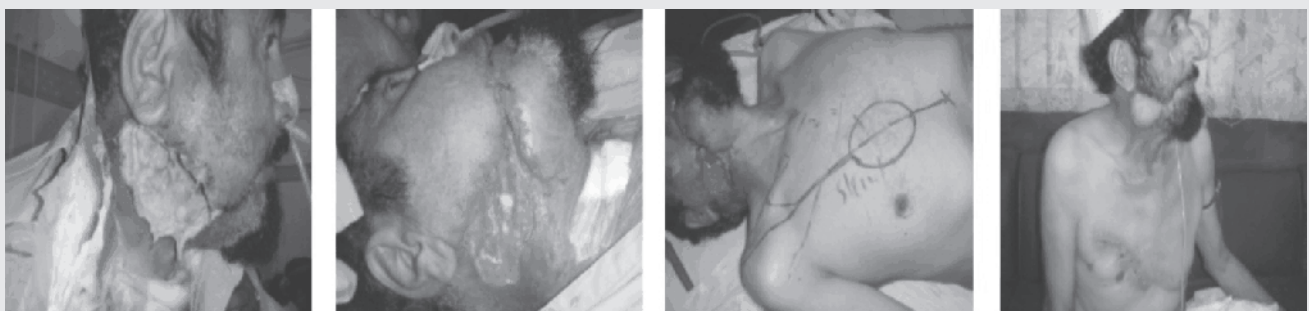
During the last 2 decades, the PMMPF flap has been utilized in extensive deep defects that have resulted from resection of stage III- IV cancer. The advanced or the recurrent disease at presentation has made it the first choice in the reconstructive ladder in these circumstances being much simpler to harvest and less time consuming as compared to the free flaps<sup>17</sup>.

Because of the reported relatively high incidence of complications with the use of PMMPF (67.56% in our series); attention to flap design, operative technique, and post-operative management are mandatory in reducing

Table-III. Postoperative complications	
Postoperative complications	No.
<b>Recipient site</b>	
Partial flap necrosis	15 (40%)
Wound infection	09 (24%)
Dehiscence	05 (13%)
Dribbling of saliva	07 (19%)
Orocutaneous fistula	04 (9%)
Total flap failure	03 (8%)
Hematoma	02 (5%)
<b>Donor site</b>	
Wound infection	06 (16%)
Seroma	03 (8%)
Wound dehiscence	03 (8%)
Hematoma	01 (2.7%)

the incidence of these complications<sup>18</sup>. The overall complication rate in one study was 36.1%, with 2.4% of

Fig-1. Pectoralis major salvage flap after free flap failure for right parotid wound



**Fig-2. Squamous cell carcinoma left side of mouth resection and reconstruction with pectoralis major flap**



**Fig-3. Squamous cell carcinoma left lip resection and reconstruction with pectoralis major flap**



cases involving total flap necrosis<sup>13</sup>. Although the operation time of this reconstructive method was shorter compared with free flap reconstruction, the relatively high complications rate and the inferior functional and aesthetic results limit its indication<sup>17</sup>. Other series have also reported variable but high incidence of complications, 58%<sup>19</sup>, 63%<sup>20</sup>. In spite of the higher overall rate of complications, most of these complications were self limited, and the rate of total flap loss was only 2.4%<sup>20</sup>. Others analyzed some of the individual complications such as wound dehiscence, infection, partial flap failure, total flap failure, and fistula in addition to the donor site complications and reported it in over a third of patients<sup>21</sup>.

The higher complication rates were associated with salvage procedures, number of risk factors, number of cigarettes packs smoked, and in oral cavity reconstructions<sup>22</sup>. Half of these complications were felt to

be major because they prolonged the hospital stay, or they required secondary reconstructive procedures<sup>23</sup>. Our results show a comparable incidence of complications (67.57%) with other series: Shah<sup>24</sup> et al found complication in 63%, Ijsselstein<sup>25</sup> et al 53 %, Kroll<sup>20</sup> et al 63% and Liu<sup>21</sup> et al in 35%. In the published reports by Shah<sup>24</sup> et al and Kroll<sup>20</sup> et al, total flap necrosis occurred extremely seldom (3% and 2.4% respectively vs. 8% in this series). That is of great importance as total flap necrosis is the only complication that requires another flap and in fact another surgical procedure. Partial skin flap necrosis was more frequent (40%). Its incidence in this series was more than in series of Shah<sup>24</sup> et al who reported 29% of partial flap necrosis and Mehta<sup>26</sup> et al with 25% of partial flap necrosis. Fistula and dehiscence incidence were as frequent as in the above mentioned papers. Incidence of donor site complication was 13% in this series which is comparable to previously



published data. Biller<sup>27</sup> et al reported 7%, Baek<sup>28</sup> et al 5% and Ossoff<sup>29</sup> et al 8% of donor site complications. The high incidence of orocutaneous fistula in our series was due to the fact that the majority of our cases had oral cavity defects (100% fistula). These results are comparable to other series<sup>13,19,20</sup> and all have been conservatively treated with satisfactory functional results. In spite of the reported high incidence of secondary surgery for the flap complications (36%- 50%) in recent reports<sup>12,23</sup> a secondary surgery was only required in 19% of our cases to salvage a major complication such as partial or total flap failure.

The versatility of the flap exceeds its utilization in the reconstruction of defects in the oral cavity, face or the neck. It has been used to reconstruct partial or total pharyngeal defect as well the cervical oesophagus<sup>11,30</sup>. In our study, this flap was used to reconstruct similar defects in 20% of cases with no reported major complications. Minor complications such as orocutaneous fistulas were treated conservatively with no major functional impediments.

There are many advantages of this flap. This is a one stage reconstruction, there is no need to change the patient's position, the cutaneous island is large enough to cover practically any defect and it can be used for defects of two epithelial surfaces<sup>2,6,7,9</sup>. The flap with its tissue bulk corrects the neck and face contour and also covers neck structures protecting the carotid artery, especially in previously irradiated patients<sup>31</sup>. Like every other flap it has few disadvantages. Follow-up in the neck area is more complicated because the flap can hide neck recurrences. In women there is breast asymmetry and often the flap might include also breast tissue. In males hairy chest skin is placed intraorally<sup>2,8,17</sup>. When the flap is used as osteomyocutaneous flap, the rib is usually not sufficient for adequate reconstruction of lower jaw and its vascularisation is questionable<sup>16</sup>.

## CONCLUSIONS

The pectoralis major myocutaneous pedicled flap is still an acceptable method of head and neck reconstruction. Although free-tissue transfer has emerged as a safe, reliable means of soft tissue and bony reconstruction in

the head and neck region, pectoralis major flap should still be considered as a source of vascularized soft tissue. It is fast, reliable, provides safe repair and is indicated especially where bulk is needed. It continues to be one of the most universal flaps in head and neck reconstruction.

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**Correspondence Address:**

Dr. Firdous Khan  
Medical Officer  
Department of Plastic Surgery and Burns  
Khyber Teaching Hospital , Peshawar  
[firdous25@yahoo.com](mailto:firdous25@yahoo.com)

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**“If you can’t fly, Run,  
if you can’t run, walk,  
if your can’t walk, Crawl  
but keep moving towards your goal.**

(Unknown)