

A modified PMMC flap with improved vascular supply of random part of the flap

Siddappa K Thammaiah^{1*}, Krishnappa Ramachandrappa²

¹Assistant Professor, ²Associate Professor, Kidwai Memorial Institute of Oncology, M H Marigowda Road, Bangalore-560029, Karnataka, INDIA.

Email: siddappa_t@yahoo.co.in, krishnappa1.322@gmail.com

Abstract

Introduction: Pectoralis major myocutaneous flap is the work horse of head and neck reconstruction. It is still used by many surgeons and place a important role in head and neck reconstruction. The conventional technique of harvesting a PMMC flap can reach up to zygomatic arch and mobilising beyond this point is difficult and the risk of flap necrosis is high. **Material and Methods:** from Jan 2016 to 2016 we did four cases of modified PMMC. In that two patients were maxillectomy with resection of cheek skin and two were temporal bone resections. All patients were males and aged 50 to 80years old. **Results:** We did four consecutive modified PMMC flaps. This modified flap was able to reach parietal bone and floor of orbit. All four patients had primary closure of donor area with adequate mobilisation of chest wall flaps. One out of four flaps had partial flap necrosis. Conclusion: the technique described in the present study was able to improve the blood supply of the random part of PMMC flap as well as its length.


Key Words: Modified PMMC, head and neck reconstruction, random flap mobilization, increases length.

*Address for Correspondence:

Dr. Siddappa K. Thammaiah, Assistant Professor, Kidwai Memorial Institute of Oncology, M H Marigowda Road, Bangalore-560029, Karnataka, INDIA.

Email: siddappa_t@yahoo.co.in

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INTRODUCTION

No doubt PMMC flap has become workhorse of head and neck reconstruction. It was introduced by Ariyan in 1979 and with high success rate¹⁻⁴. Reconstruction with free flap in developing country is difficult due to cost, time, infrastructure and more importantly scarcity of plastic surgeons. Raising the flap is easy and less time consuming compared to freed flaps with acceptable donor site morbidity and least chance of post operative flap necrosis. As for the technique of harvesting the pectoralis major myocutaneous (PMMC) flap, the skin island needs to be designed principally medial to and at the level of the nipple. The pectoralis major muscle is free from the

underlying chest wall, subsequently a subcutaneous tunnel is created into the defect through which the PMMC flap is passed to the claviar area. A head and neck surgeon uses this technique because of its simplicity and less time consumption. Nevertheless, the surgeon who prefers the free flap believes that it not only achieves better functional and cosmetic results, but also has fewer donor-site morbidities, flap necrosis, fistula formation and others⁵⁻¹¹. With standard PMMC harvesting technique covering surgical defects after maxillectomy, orbital exenteration and temporal resection is difficult. The modified technique of harvesting of the PMMC flap allows the flap to reach the entire oral cavity, including the infraorbital region and temporal bone with no risk of vascular insufficiency to the distal skin island.

MATERIALS AND METHODS

We did four consecutive modified PMMC flaps from -Jan 2016 to Dec 2016. Random flap designed over the rectus muscle gets blood supply from the perforator whether direct or indirect perforators which are suited around nipple. This is described well in breast reconstruction by wuringer¹² multiple blood vessels along the mesentery of breast (fig-1). Hence we decided to retain subcutaneous

fat beyond Skin Island marking so that addition subcutaneous blood supply is maintained. Concept of random flap design is applied here i.e. length should not be more than twice of width. This modified technique of harvesting of the PMMC flap has helped to reach the maxilla, floor of orbit, pterygopalatine fossa and temporal bone, with no risk of vascular insufficiency to the distal skin island.

Surgical Steps

1. First we measure the defect and mark it on chest wall medial to nipple. Second, measure the distance from the lower end of defect to clavicle and same distance from clavicle to chest wall along the approximate course of pectoral branch of thoraco-acromial artery. Lower end of marking will be the starting point of flap marking and extends onto the rectus sheath.
2. Once the skin island is marked, skin is incised deeply till subdermal fat is exposed. Further surgery will be carried out using the electrocautery. The skin flap is raised around the skin island above scarpa’s fascia. Around 2cm breast parenchyma and subcutaneous tissue is retained all around the skin island, and then bevelled towards the muscle. We should retain most of subcutaneous fat at subareolar region since most of perforators are present at this site. Muscle is incised at the end of bevelling on pectoralis muscle part. The random part of flap is raised along with rectus sheath (fig-2). Few stay sutures are applied to deep fascia and dermis to prevent shearing.

3. Further flap dissection is similar to standard described procedure. Lateral extension of skin incision given, then skin flap is raised upto clavicle. Dissection done between major and minor muscles and vessels are identified. With adequate amount of muscle around the pedicle, muscle is divided. Lateral and medial pectoral nerves are divided.

Remaining dissection is done from the neck wound. Wide tunnel created. Half centimetre of Tip of flap is excised to confirm the adequate perfusion. With this additional length, flap can reach upto parietal bone, floor of orbit, forehead and occipital area.

RESULTS

All patient four patients were male and aged between 50-83 years. We did four consecutive modified PMMC flaps. In two patients temporal bone resection was done (one total temporal resection and other lateral temporal bone resection long with pinna) and the other two total maxillectomy with resection cheek skin and one case requiring repair of floor of orbit. One patient underwent total temporal resection with resection part of parietal bone with exposure of dura and other lateral temporal bone resection. This modified flap was able to reach up to parietal bone and floor of orbit (fig-3). Two maxillectomy with resection overlying cheek skin reconstructed with flap (fig-4). All four patients had primary closure of donor area with adequate mobilisation of chest wall flaps. One patient had partial skin necrosis because of development of post operative hematoma. One wound dehiscence at primary site which was managed by secondary suturing.



Figure 1: Diagram showing mesentery of breast (breast septum) and multiple blood vessels around it
Figure 2 and 3: Photo and Diagram showing skin Island with random part on rectus muscle (6 to 8 cm). Dotted lines showing extent of subcutaneous fat around skin margin retained around flap (approximately 2cm)



Figure 4:



Figure 5:

DISCUSSION

Although the PMMF technique has got popularity after the original report of Ariyan, some surgeons reported disadvantage of this technique^{4,6}. The major ones were unstable vascular circulation in the skin island, a partial necrosis tendency in comparison with the free flaps¹⁵. With respect to review of literature PMMC flap cannot be mobilised beyond zygomatic arch since the pedicle is the limiting factor, since the flap Skin Island is designed with in the pectoralis muscle border. The incidence of distal flap necrosis is high 4.0% to 29.0%² in standard technique. Previous reports have described major flap necrosis in the 1% to 7% range and partial skin flap necrosis in the 4.0% to 29.0%^{5,6}. The modified technique adds additional vascular network around the island hence the risk of flap necrosis is less. In spite of adequate bleeding at the distal most part of the flap intraoperatively, we encountered one partial flap necrosis due to large hematoma on day one. It needed emergency re-exploration but could not find any active bleeder. Modified techniques of the PMMF with longer pedicle have been reported and some emphasized that there was no significant difference in the incidence of the flap necrosis and/or post-operative complications, regardless of either method if the flap was transferred above or under the clavicle¹⁶. After the pectoralis major muscle is incised, thoraco-acromial vessels can be traced close the branching point of the subclavian artery. It is possible, therefore, to transfer the flap 3 - 5 cm more than the Ariyan's procedure^{7,18}. The under clavicular approach of the procedure requires meticulous tissue dissection, thinning of the flap in order to pass it under the clavicle. Consequently it takes rather prolonged operative time and skill. The advantage in our flap is thick and longer and transferred above the clavicle. It is helpful where bulky flap is required. The PMMF technique is difficult to perform without postoperative complications, particularly in female patients. But in our study there were no females patients.

CONCLUSION

Modified PMMC is easy, simpler and can be used as an alternative to free flap in selected patients. With this technique random part of the flap can be raised 6 to 8cm beyond PMMC muscle safely. It needs further larger studies to confirm its safety.

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