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Reconstruction of Composite and Complex Head and Neck Defect Post Supra Major Oncological Resection by using Bilateral Pectoralis Major Myocutaneous Flap

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Abstract

Aim: The aim of study is to identify the outcome of Bilateral PMMC flaps for major Head and Neck defects following supra major oncological excision of growth.

Study: Hospitals in India get many T4 Head & Neck malignancy. They are operated by Oncosurgeons but its reconstruction becomes challenging for the Plastic surgeons. We present a case series of reconstruction of major Head and Neck composite defect resulting from major post oncological resection where we have used Bilateral pectoralis major Myocutaneous flap to cover the resultant defect. Although microsurgical technique is available, but it's costly. Pectoralis major flap is a robust flap, it requires lesser learning curve and lesser anaesthesia time, so the complications are less and healing is also faster. It is single stage surgery so that after healing Radiotherapy could be started as early as possible.

Method: Fifteen patients since 2013 operated by chief surgeon were included in this study. After supra major excision of growth the inner lining was covered by contralateral PMMC and ipsilateral PMMC was used to cover the external defect.

Conclusion: Bilateral PMMC flap is an answer to cover the defect following supra major excision of T4 Oral Malignancy. It is a pedicled flap, time taken is lesser than Microvascular Reconstruction and it could be done where microsurgical expertise is lacking. It is single stage surgery so radiation could be started early. So it's a good answer to cover major post oncological surgical defect.

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Introduction

The pectoralis major myocutaneous (PMMC) flap has been used as a versatile and reliable flap since its first description by Stephan Ariyan in 1979 [1]. In India head and neck cancer patients usually present in the advanced stage making PMMC flap a viable option for reconstruction. Although free flap using microvascular technique is the standard of care, its use is limited by the availability of resources in developing world. The aim of this study is to identify the outcomes associated with Bilateral PMMC flap reconstruction which is used to cover the major post oncological surgical defect.

Patients and Methods

We present here case series of 15 patients who underwent reconstruction by our chief surgeon for various Oral cancers of

head and neck in our institute and outside hospital from June 2013 onwards till now. Patients had complex defect from post oncological resection. Patients were given the mucosal cover with contralateral pectoral myocutaneous flap and external cover was given with ipsilateral pectoral myocutaneous flap [2]. Standard technique for harvesting the PMMC flap was implemented. In certain cases with large external defect requiring larger skin paddle, the nipple areola complex (5 patient) was harvested with the skin paddle to stabilise the vascularity of the flap [3]. The age of the patients ranged from 40 to 65 years. Three patients were females and twelve were males. The maximal dimension of the flap harvested from the contralateral side was 6 * 8 cm which was used to give inner lining and 15 * 6 cm on the ipsilateral side of chest which was used to give an external cover. In one pt we used it to cover Laryngopharyngotomy defect, both patch pharyngoplasty and outer cover.

Technique for Harvesting Pectoralis Major Myocutaneous Flap During flap elevation, care was taken so as to include as many

myocutaneous perforators as possible. The skin paddle was elevated from medial side of the NAC and 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 and dissection carried out by atraumatic manner in the loose areolar tissue present between the two groups of muscles.

The humeral origin fibres of the pectoralis major muscle was divided lateral to the pedicle while keeping the pedicle in view. The flap was then passed into the neck through a wide subcutaneous tunnel created superficial to the clavicle. Suction drains were placed in the neck and chest, and the wounds were closed in layers. The donor site of contralateral side was always closed primarily. Similar procedure was done on the ipsilateral chest with larger skin paddle marked, incised and raised including the nipple areola complex if required according to the defect size. The donor site of the ipsilateral site may require grafting if the skin paddle elevated is large and primary closure is under excessive tension. The contralateral flap was swung on the opposite side across trachea and tunnelled in the subcutaneous plane to the recipient site giving the inner lining of the defect. While ipsilateral flap is spiralled to reach the external defect.

At the time of reconstruction, patients did not complain the existence of nipple-areola complex on the flap, while it was told them that this important aesthetic unit may be grafted back to its original position on the chest wall later.

Rikimaru demonstrated that if the skin on the fourth intercostal space is not included with the skin island, blood supply to the fifth and sixth intercostal spaces markedly decreases, and circulation in the skin island becomes obviously unstable [4]. Thus in this case series the nipple areola complex was elevated with the flap such that the perforating branches were included in the fourth intercostal space located 1 to 2 cm medial from the edge of the areola with the skin island. The study by Rikimaru et al concluded that skin island of the PMMC can include the areola and nipple complex to stabilize the blood circulation in the skin island in patients with large defects of the head and neck.

Surgical Pointers For the Contralateral Side

Skin paddle of the contralateral side extends over to the anterior rectus sheath with de epithelizing the superior part of the paddle so that we achieve adequate skin cover for buccal mucosa with preserving the sub dermal plexus of the de epithelised part such that the random skin paddle over the rectus sheath survives. There should be Minimal handling and Pedicle width should be narrower so that it does not create excessive bulk in the neck which may compress trachea as well increase the reach and mould-ability of the flap to sit inside the oral cavity.

For Ipsilateral Side

Need to take bigger skin paddle to cover the large external defect over the face. Also to Keep the skin paddle over the muscle to maintain the vascularity. We took nipple areola complex with the skin paddle whenever required, the nipple areola complex stabilizes the vascularity. It can be taken down at a later date. The defect if not closing primarily, we skin grafted the defect. We need to spiral the flap so as to cover the outer area by skin of flap.

Results Demographics

A total of 15 patients underwent PMMC for head and neck defects during the study period. There were 12 male patients and 3 female patients and the range of the age in which procedure was conducted was 40 – 65 years. A smoking history was present in 4 patients (26.6%) of the patients and 12 patients (80%) had history of chronic tobacco chewing. Most of patients underwent primary ablative surgery and reconstruction with PMMC while one patient had history of radiation before reconstructive surgery with PMMC. The average length of the stay of the patient was 9.4 days [range 6-23 days].



Buccal mucosa and cheek reconstruction by Bilateral PMMC



Inner Patch Pharyngoplasty and outer cover for Laryngopharyngectomy by Bilateral PMMC



Hemi face reconstruction by bilat. PMMC flap

Table 1 : LBM- Left buccal mucosa, RBM – Right buccal mucosa, LCR- Left composite resection , RCR – Right composite resection. LPX laryngectomy with Pharyngectomy, PPPM Patch pharyngoplasty with PMMC cover

Sr no	Age	Gender	Site	Surgery	Defect Mucosa & outer lining	Complication Recipient Site	Complication Donor Site	Paddle [cm]		Hospital stay [days]
								Lining	Cover	
1	40	M	LBM	LCR	Cheek	NIL	NIL	5* 5	11*8	7
2	45	M	LBM	LCR	Cheek	NIL	NIL	6*5	9*7	6
3	50	F	RBM	RCR	Cheek	Suture line dehiscence	NIL	5.5 * 5	12*8	15
4	50	M	LPX	PPPM	PHX & Cover	NIL	NIL	5* 5	7*6	10
5	55	M	LBM	LCR	Cheek + lower lip	NIL	NIL	6*6	10*7	9
6	62	M	RBM	RCR	Cheek	NIL	NIL	6*6	9*7	10
7	60	M	LBM	LCR	Cheek	Superficial marginal skin necrosis of the cover	Minor graft loss		8*6	23
8	53	M	LBM	LCR	Cheek + lower lip	NIL	NIL	6*5	9*5	7
9	65	M	RBM	RCR	Cheek	NIL	NIL	5*5	8*6	7
10	44	F	RBM	RCR	Cheek	NIL	NIL	6*5	9*7	9
11	41	M	LBM	LCR	Cheek	NIL	NIL	6*8	16*6	6
12	52	F	RBM	RCR	Cheek	NIL	Minor graft loss	6*8	10*9	7
13	63	M	LBM	LCR	Cheek+lower lip	NIL	NIL	6*8	8*7	6
14	45	M	LBM	LCR	Cheek	NIL	NIL	7*8	10*8	7
15	42	M	LBM	LCR	Cheek+ lower lip	NIL	NIL	6*8	10*8	7

Outcome and Complications

In our case series of 15 patients who underwent reconstruction for various head and neck cancer , 2 patients [13.3%] developed complications one patient[6.6 %] developed superficial partial necrosis of the flap and one [6.6 %] developed dehiscence of the suture line. Both the outcome were managed conservatively, no other secondary surgical intervention was required for the patients. The patient who developed superficial marginal skin necrosis of the skin paddle of outer cover was chronic smoker and received pre operative radiation therapy and the patient who developed suture line dehiscence was a female who was a chronic tobacco chewer. Patient with laryngopharyngeal reconstruction went home uneventfully.

All the donor sites were closed primarily or by skin graft if needed. Two patients had minor loss of grafted ipsilateral chest defect. It also healed primarily. None underwent any complications. Later Patients underwent radiotherapy for further management.

Discussion

Free-tissue transfer remains a broadly accepted method of choice for major reconstruction in patients who undergo major head and neck cancer surgery. However microsurgical reconstructions are not without potential morbidities, it require specialized surgical skills, and are often lengthy procedures and expensive procedures which is not affordable to the class of patients that we come across. Although we actively practice microsurgical reconstruction for head and neck, we have demonstrated in this study that the Bilateral Pectoralis major myocutaneous flap is still a very safe and effective single stage option for the reconstruction of supra major head and neck defects.

Head and neck reconstruction is unique in the demand for complex closures, it requires attention to coverage, support, and lining often in a 3-dimensional nature. The goals are not only functional ie speech, swallowing, and respiration, but aesthetic as well. Many options exist, and we realize that the Bilateral PMMC is also one of the single stage good option for a huge defect. This technique is very versatile and can be used in situations where a free-tissue transfer might be less ideal for medical or technical reasons, or as a salvage procedure for a failed free flap.

The pectoralis major myocutaneous flap has significant advantages:

1. It is located adjacent to the head and neck lesion
2. It can be elevated as a vascular island flap
3. It has the shortest operative time because it does not require complicated manipulations such as body-position change or vascular anastomosis
4. It can be used safely even if no recipient vessels are present and in the event that free flaps are not possible
5. Risks of postoperative infections and other complications are less [7]
6. It not only covers the defects, the muscle cover the exposed major neck vessels, which gives protection in radiotherapy [5]

In our case series we found that even though the resultant defects were composite and complex, with help of bilateral pectoralis major myocutaneous flap we were able to give adequate inner and outer lining.

The question arises why bilateral flap should be raised. One pectoral flap can be raised to give cover to inner lining and to give lining to the external surface we have options like forehead flap

or deltopectoral flap both required staged surgeries and grafting at visible sites over the face and shoulders. The free flap itself is a complex procedure which required expertise and adequate monitoring setup which is not available at many places. Thus keeping all these factor in mind, we used PMMC for both the lining and outer cover. At the same time it is a single stage surgery.

Post operatively the patients were able to take liquids orally, hold the fluid intraorally, phonate in a comprehensible way and time taken for healing is less so radiotherapy could be started early.

Some disadvantages of the PMMC are that it is a pedicled flap and subsequently has some limitations in inset. The skin island can also be relatively bulky and hirsute in men. If bulk prohibits inset, another option would be debulking to fascia or muscle and doing a skin graft. The presence of breast tissue in women patients also presents challenges that could affect perforator status. The skin island is often positioned more medial in women to minimize the amount of breast tissue within the flap [6]. Sometime pt complains of presence of nipple or its part over face, but they understand why it is done.

Complications were all relatively minor in our series, most healing with conservative management. No donor site morbidity is seen despite proximity to the tracheostomy, donor site infection was not observed in our series. However the strength of the function performed by pectoralis major will be reduced and the patient might complain of post operative weakness of activities requiring adduction flexion and internal rotation of humerus.

Perhaps one of the main advantages of this flap is the survival. Even if a free-flap reconstruction is performed by an experienced microsurgeon, total flap loss is still possible. However, a pectoralis major muscle flap can be easily elevated and total loss of the flap rarely occurs. Since it is a single stage surgery, Radiotherapy could be started earlier.

Conclusion

With the increasing improvement in medical facility in India Onco surgeons now we get patients with T4 lesions which were thought to be inoperable few years back. Now they are operated upon by the Cancer surgeon and after post oncological excision huge defect is created. For Onco surgeons these are palliative Onco surgery but for Oncoreconstructive Surgeons, it becomes a challenge to cover up these defects by plastic surgical armamentarium. We present here study using Bilateral Pectoralis Major Myocutaneous flap for coverage of supramajor Head and Neck defects. We found it can be harvested safely and used reliably to reconstruct diverse supra major head and neck defects. It does not require any special infrastructure, it avoids long operating hours of microsurgical reconstruction and complications of longer anaesthesia. It is single stage reconstruction and most of the patients are fit to receive radiation in two weeks postoperative time. The muscle portion of the flap protects the great vessels in the neck, which is a bonus especially for the radiation therapy. Both the PMMC flaps are taken from the chest, such that the donor site is covered and hidden. The flap gives a final outcome which further gives acceptance of the patient at home and in society. So we found reconstruction by single stage bilateral PMMC flap is one of the answer to supra major post oncological defect.

Declaration of Consent

The authors certify that they have obtained all appropriate patient consent forms in patient's language. In the form the patient has given their consent for the images and other clinical information

to be reported in the journal. The patient understands that their name and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

Conflict of interest: There are no conflicts of interest.

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