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Case Series Article

Use of Contralateral PMMC Flap in Head and Neck Onco Reconstruction - Case Series of 25 Patients

Shailendra B Singh[1], Deepanjali Kalra[2], Manisha Singh[3], Himadri Joshi[4]

[1]Associate Professor, Department of Burns and Plastic Surgery, Smt N.H.L Municipal Medical College. Consultant Plastic Surgeon, Zydus Hospital, Ahmedabad, Gujarat, India

[2]Resident Doctor, Department of Burns and Plastic Surgery, Smt. NHL Municipal Medical College and S.V.P Hospital, Ahmedabad, India

[3]Resident Doctor, Department of Burns and Plastic Surgery, Smt. NHL Municipal Medical College and S.V.P Hospital, Ahmedabad, India

[4]Resident Doctor, Department of Burns and Plastic Surgery, Smt. NHL Municipal Medical College and S.V.P Hospital, Ahmedabad, India

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Corresponding Author: Dr Shailendra Singh

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Abstract

Aim: The aim is to study the outcome of Contralateral PMMC flaps for Supramajor Head and Neck Onco-reconstruction, following oncological excision of huge T4 Tumors.

Study: Hospitals in India get many advanced T4 Head & Neck malignancy. They are operated by Oncosurgeons as a palliative Oncosurgery. It creates huge three dimensional defects, its reconstruction is challenging for the Plastic surgeons. We are presenting case series of 25 patients, where Contralateral Pmmc played part in reconstruction of defects.

In major T4 Head and Neck post oncological resection where many times we have to use Bilateralpectoralis major Myo cutaneous flap to cover the resultant defect. Sometimes along with microsurgery contra lateral PMMC could be used for one flap, when more than one flaps are needed. Pectoralis major flap is a workhorse flap, with lesser learning curve. So, the complications are less and healing is also faster. It is single stage surgery so Radiotherapy could be started as early.

Method: It is a retrospective study of twenty-five patients, operated by the chief surgeon in the last ten years. Here Contralateral PMMC was used after major excision of major Head and Neck T4 malignancy. In 11 patients contralateral PMMC was used as a part of oral cavity reconstruction. In four patients for laryngopharynx reconstruction. In five patients it was used to cover the defects in flap failure. In another five patients it was used for recurrence.

In bilateral PMMC one is used to cover the inner lining while outer is covered by another PMMC flap. Sometimes contra lateral PMMC is used along with other pedicled or free flap.

Contra lateral PMMC is a pedicled flap, taken from opposite chest. Time taken to elevate and inset is lesser than Microvascular Reconstruction and it could be done where microsurgical expertise is lacking. It is a single stage surgery so radiation/ Physiotherapy could be started early.

Conclusion: Contralateral PMMC flap is an answer to cover the defect following supra major excision of T4 Oral Malignancy, It could be used when there is flap failure or in recurrence. It could be used alone or along with some pedicled or free flaps. It is a pedicled flap, taken from opposite chest, time taken is lesser than Microvascular Reconstruction and it could be done where microsurgical expertise is lacking. It is single-stage surgery so radiation/ Physiotherapy could be started early.

Keywords: Complex Oral Defect, Contralateral Pectoral Flap, Pectoralis Major Myocutaneous Flap.

Introduction

The pectoralis major myocutaneous (PMMC) flap has been used as a workhorse flap since its first description by Stephan Ariyan in 1979 [1.9]. In India , head and neck cancer patients usually present in the advanced stage making where excision results in major defects. PMMC flap is versatile and viable option for reconstruction. [2]

Although now free flap using microvascular technique is the standard of care, but limited availability, cost factor, palliative oncosurgery, or medically unfit patients for longer duration surgery.

For cases of recurrence or flap contralateral PMMC is a good answer.

Patients and Methods:

We present here case series of 25 patients who underwent reconstruction by our chief surgeon in last ten years for various oral cancers of the head and neck in our institute and outside hospital from June 2013 till today. In this series 19 patients were male (76%) and 6 were female patients (24%) aged between 30 – 65 years. Most of the patients underwent primary excision surgery and reconstruction with contralateral PMMC flap alone (where ipsilateral PMMC flap was used already or contralateral PMMC in combination with other flaps. These Patients had undergone palliative oncosurgicalresection, where dimensional supra major defects was created and required reconstruction using two or more flaps. In certain cases, with large external defect requiring larger skin paddle, the nipple-areola complex (5 patients) was harvested with the skin paddle to stabilize the vascularity of the flap [3]. The average length of the stay of the patient was 14 days.

Aims:

- Difference in reconstruction using ipsilateral PMMC flap and contralateral PMMC flap
- Technical modifications in using contralateral PMMC flap
- Advantages, disadvantages, outcomes, complications and modifications associated with Contralateral PMMC flap reconstruction

Gender

Male	19	76%
Female	6	24%

Age

<30	nil	0%
30 – 40	1	4%
40- 50	9	36%
50-60	8	32%
>60	7	28%
Total	25	100%

Surgical Technique for Harvesting Contra Lateral Pectoralis Major Myocutaneous Flap:

The standard technique for harvesting the PMMC flap was implemented. As per requirement flap is designed on opposite chest. During flap elevation, care was taken to do it with minimum handling. The skin paddle was elevated from the 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. To increase the size and reach of contralateral PMMC, two-third part of the flap was based on the musculocutaneous perforator and one-third flap was random pattern. Anterior rectus sheath along with the flap as it increases the viability of the flap. Skeletonisation of the pedicle was done to increase the flap reach and to decrease the pressure from the flap bulk . Then flap is passed into the neck through a wide subcutaneous tunnel which is created superficial to the clavicle and anterior part of neck to reach to contralateral site of neck . There should be minimal handling and pedicle width should be narrow so that it does not create excessive bulk in the neck which may compress the trachea and thyroid gland. Then it is inserted into its desired place as for inner lining of mucosa, RMT or floor of mouth or outer defect of cheek. Care is to be taken, no structures should compress the flap pedicle which occurs many times if it is used with the bilateral PMMC flap reconstruction or used with Microvascular surgery where both inner and outer defects are present. For outer coverage we have to make the flap in spiral fashion so that skin faces outside. In fact we have to modify the flap as per the requirement, and get it settled into the defects. The donor site of contralateral side was always closed primarily rarely it needs grafting. Donor site of the ipsilateral PMMC may require grafting for bigger skin paddle.

Master Chart

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

Nos	Age	gender	Site	Surgery	Defect Mucosa & outer lining	Flaps inner lining	Flap for outer lining	Paddle [cm]		Hospital stay [days]
								Lining	Cover	
1	40	M	LBM	LCR	Cheek inner + outer	Contra lateral PMMC	Ipsilateral PMMC	5* 5	11*8	7
2	45	M	LBM	LCR	Cheek Inner +outer	Contralateral PMMC	Ipsilateral PMMC	6*5	9*7	6
3	50	F	RMB	RCR	Cheek Inner + Outer	ContralateralPMMC	Ipsilateral PMMC	5.5 * 5	12*8	15
4	50	M	LPX	PPPM	Laryngopharynx Pharynx + skin defect	Pharyngeal by Ipsilateral PMMC	Outer cover by Contralateral PMMC	5* 5	7*6	10
5	55	M	LBM	LCR	Cheek+ lower lip	Contralateral PMMC	Ipsilateral PMMC	6*6	10*7	9
6	62	M	RBM	RCR	Cheek Inner + Outer Layer	Contralateral PMMC	Ipsilateral PMMC	6*6	9*7	10
7	60	M	LBM	LCR	Cheek Inner + outer	Contralateral. PMMC	Ipsilateral PMMC	7*5	8*6	23
8	53	M	LBM	LCR	Cheek+ lnner + outer	Ipsilateral PMMC	Contralateral PMMC	6*5	9*5	7
9	65	M	RBM	RCR	Cheek Inner + Outer	Ipsilateral PMMC	Contralateral PMMC	5*5	8*6	7
10	44	F	RBM	RCR	Cheek Inner + Outer	Ipsilateral PMMC	Contralateral PMMC	6*5	9*7	9
11	41	M	LBM	LCR	Cheek + lower partial Maxilectomy	Fibula osteocutaneous	Contralateral PMMC	16*8	6*6	6
12	52	F	RBM	RCR	Alveolus with chin	Fibula osteocutaneous	contralateral PMMC	10*8	7*9	7
13	63	M	LBM	LCR	Cheek+ lower lip	Contralateral PMMC	ALT Flap	6*8	12*7	10
14	45	M	LBM	LCR	Cheek Inner + outer	Alt Flap	Contralateral PMMC	7*8	6*8	7
15	42	M	LBM	LCR	Cheek+ Neck	ALT Flap	Contralateral PMMC	6*8	5*8	7
16	54	M	LBM	LCR	Hemifacial defects	ForeHead + Ipsilateral PMMC	Contralateral PMMC	6*8	5*7	15
17	65	F	LBM	LCR	Mandible+Maxilla	Osteocutaneous Fibula	Contralateral PMMC	5*6	7*6	12
18	34	M	LPX	PPPM	Laryngectomy with pharyngectomy	Pharynx with Ipsilateral PMMC	Contralateral PMMC for coverage	6*7	8*6	15
19	57	M	LPX	PPPM	Laryngectomy with Pharyngectomy	Pharynx with ALT	Contralateral PMMC	8*6	6*9	20
20	67	F	LPx	PPPM	Laryngectomy with Pharyngectomy	Pharynx with PMMC	Contralateral PMMC	9*6	5*6	18
21	59	M	LBM	LCR	Recurrence	ALT Flap	ContrlateralPMMC	6*7	5*7	25

22	45	F	LBM	LCR	Recurrence	Ipsilateral PMMC	Contralateral PMMC	5*6	6*9	23
23	65	M	LBM	LCR	Flap Loss	ALT loss	Contra Lat PMMC	8*6	8*6	27
24	44	M	RBM	RCR	Flap loss	PMMC Loss	Contralat. PMMC	9*6	6*7	29
25	49	M	RBM	RCR	Open Neck	Fibula Loss	Contralateral PMMC	5*8	7*6	32

Outcome and Complications: In our case series out of 25 patients, 11 patients underwent contralateral PMMC flap as a part of oral cavity reconstruction. In 4patients it was used for laryngopharynx reconstruction. In five patients to cover the defects in flap failure. While In another 5 patients, it was used for recurrence.

Oral cancer	11 patients
Laryngopharynx	4 patients
For Flap Failure	5 patients
Recurrence	5 patients
Total	25

Most of the flaps healed uneventfully. Few developed different complications such as two patients [8%] developed superficial partial necrosis of the flap and one [4 %] developed dehiscence of the suture line. Two patients [8%] had compression over neck both patients were managed conservatively.

The patient who developed superficial marginal skin necrosis of the skin paddle of the outer cover was a chronic smoker and received preoperative radiation therapy and the patient who developed suture line dehiscence was a female who was a chronic tobacco chewer. All the donor sites were closed primarily or by skin graft if needed. Two patients [8%] had minor loss of grafted ipsilateral chest defect. It also healed primarily. None of the patients developed any other major complications. Later Patients underwent radiotherapy for further management.

Superficial flap necrosis	2	8%
Dehiscence of flap	1	4%
Compression over neck	2	8%
Donor site graft loss	2	8%
Difficulty in movement of Shoulder	3	12%

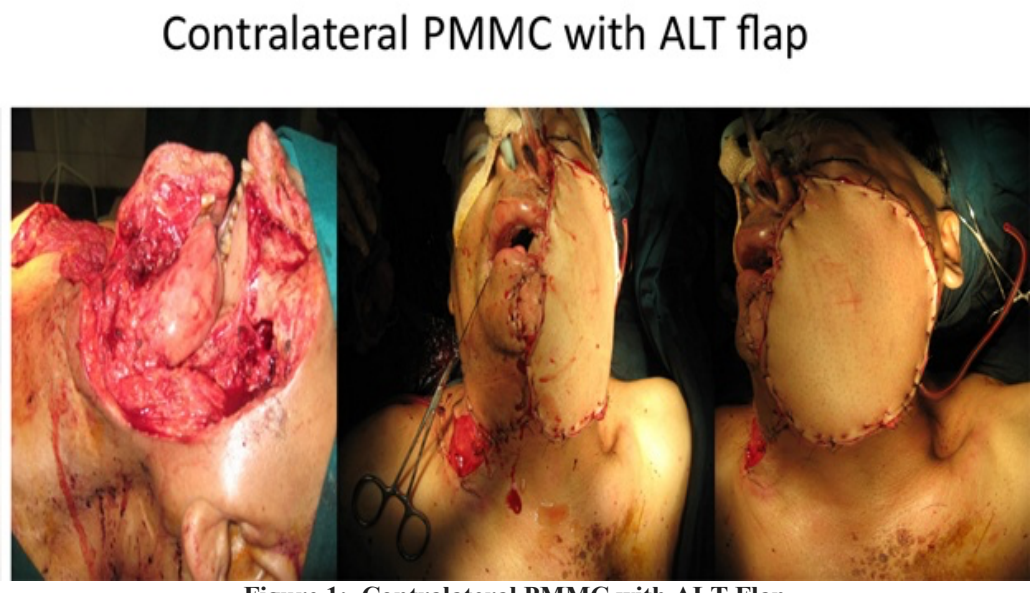

Figure 1: Contralateral PMMC with ALT Flap

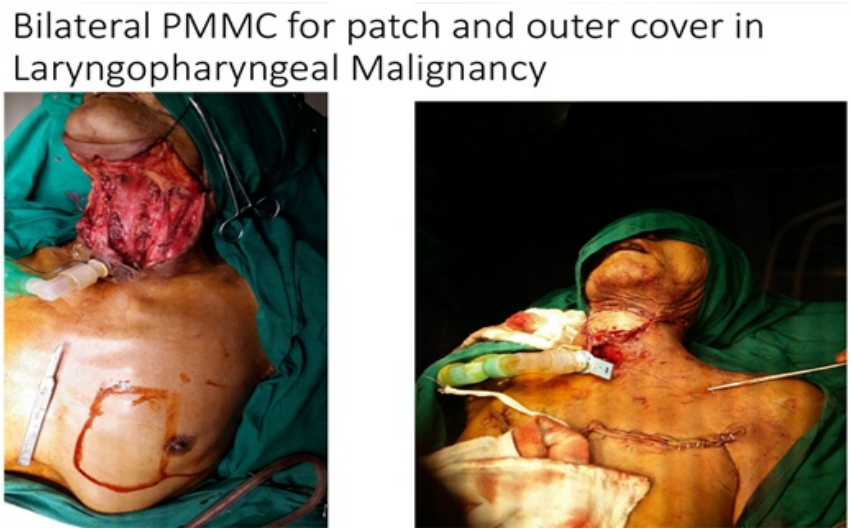

Figure 2: Bilateral PMMC for patch and outer cover in Laryngopharyngeal Malignancy

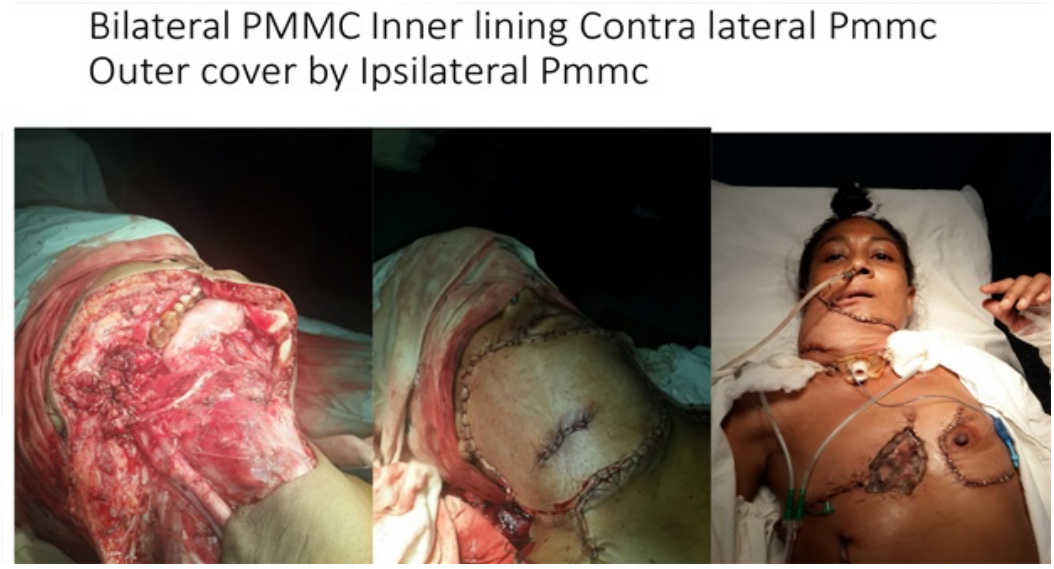

Figure 3: Bilateral PMMC Inner Lining Contralateral PMMC & outer cover by Ipsilateral PMMC

Figure 4: Commando Recon by Bilateral PMMC Inner by Contralateral PMMC and Outer by Ipsilateral PMMC

Figure 5 : Hemifacial defect Reconstructed by Contralateral PMMC and Forehead Flap

Discussion:

Head and neck onco reconstruction needs complex and multiple flaps for closures of huge oncological defects. It requires attention to coverage, support, and lining in a 3-dimensional nature.[8] The goals are functional eg. speech, swallowing, and respiration, but also aesthetic. There are many options of flaps and a combination of pedicled and microvascular flaps is needed for supra-major reconstruction. PMMC, DP forehead flap and Nasolabial flap are the routinely used pedicled flap. While ALT, RAFF, Osteo cutaneous Fibula, MSAP, etc are routinely used pedicled flap. [10,11,12,13,.14,15]

Contralateral PMMC alone or in combination with other free or pedicled flaps is also a way to achieve single-stage good closure option for a huge oncological defect. This technique is very versatile and can be used in situations where we need faster closure of defects so that Radiation could be started as early as possible. Contralateral PMMC could be used as salvage procedure for a failed free flap or in case of recurrence.

Today in the 21st century Free-tissue transfer is the method of choice for major and supra-major Head and Neck Oncoreconstruction. Previously at the beginning of the century most of the supra major reconstructions were done with pedicled flaps like PMMC, DP, Forehead flap Nasolabial However microsurgical reconstructions with ALT, Osteocutaneous Fibula, Forearm flap, and MSAP has taken it over today.[20,21,22]

But still today there are a few reasons like poor general condition of patients, low economic condition, repetitive surgery, cases of recurrence, non-availability of the facility for microsurgical reconstruction and specialized surgical skills. So instead of lengthy and expensive procedures patients relative opt for pedicle flap. So inspite of the availability of microsurgical reconstruction we are forced to cover the defect with a Pedicled flap. Many times economic condition forces us to use pedicled flaps.

In eleven cases we have used bilateral Pectoralis major myocutaneous flap. where contralateral PMMC is used to cover inner lining of the oral cavity while bigger ipsilateral PMMC is used to give outer coverage. In two patient contralateral pmmc is used with forehead flap.

In five cases of recurrence, contralateral PMMC is used along with one more Microvascular flap. In these cases, ipsilateral PMMC was used in previous cases. In case of recurrence, ipsilateral PMMC is already used so we have to use contralateral PMMC and one Microvascular or one pedicled flap. Many times instead of going for a two stage DP flap we prefer a contralateral PMMC flap so the defect is covered early so that radiation can be started early.

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. 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.

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[4].

Bilateral PMMC is one of the single-stage 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.[15,16]

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 contralateral pectoralis major myocutaneous flap we were able to give adequate inner or outer lining.

The question arises as to why the contralateral PMMC flap should be raised. One pectoral flap can be raised to give cover to the inner lining and to give lining to the external surface we have options like forehead flap, deltopectoral flap but 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 hospital setup which is not available at many places. Thus keeping all these factors in mind, we used contra lateral PMMC to reconstruct the defect in single stage.

At the same time, it does not require any special infrastructure, it avoids long operating hours of microsurgical reconstruction and complications of longer anesthesia. 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.

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 contra lateral PMMC flap as one of the answer to supra major head & Neck defects.

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 Contralateral PMMC are, it is a pedicled flap and subsequently has some limitations in its reach. 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]. Sometimes patient complains of the presence of a nipple or its part over the face.

Few complications were there in our series, most healed with conservative management. Minor donor site morbidity was seen in our series. The strength of the function performed by the pectoralis major gets reduced and the patient may complain of post-operative weakness of activities like adduction flexion and internal rotation of the humerus.

The main advantages of this flap is the survival and robustness.[17,18,19] Even if a free-flap reconstruction has a chance of failure. However, a pectoralis major muscle flap can be easily elevated and total loss of the flap rarely occurs.

Conclusion

With the advancement of medical facilities in India, the Oncosurgeons are operating advanced head and neck cancer cases that were not operable a few years back and post excision huge defects are created and Plastic surgeon has to cover those defects. In few of those cases Contra lateral PMMC is helpful. Contralateral PMMC is a versatile flap, locally available for head and Neck region with robust blood supply. Chest weakness following its use is minimal and manageable. So, its a helpful arm in a plastic surgical armamentarium. We present here a study using contralateral 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 head and neck defects in single stage so that Radiotherapy could be given early.

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