Indian J Otolaryngol Head Neck Surg
(July–September 2012) 64(3):270–274; DOI 10.1007/s12070-011-0295-6

ORIGINAL ARTICLE

Island Pectoralis Major Myocutaneous Flap: An Indian Perspective

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Received: 7 February 2011 / Accepted: 12 August 2011 / Published online: 8 September 2011

Abstract The aim of this study is to conceive a method of raising an island PMMC flap, so as to circumvent its drawbacks of bulk, flap length and the difficulty of developing this flap in female patients. And to consider island PMMC flap as a viable reconstructive option in head and neck surgeries, especially in peripheral centres. Ours is an experimental case series. The study was done at Sri Devaraj URS Medical college, Tamaka, Kolar. Between 2009 and 2010, head and neck reconstruction was performed using this method in 20 patients who had oral cancer (18), carcinoma supraglottis (1) and mucoepidermoid carcinoma parotid (1). The patients age ranged from 16 to 75 years, and there were 15 women and 5 men. Nineteen of our patients underwent primary surgery and one patient was operated for residual disease. In (16) patient, island pmmc flap was used for intra oral closure. In (4) patients the flap was spiraled for providing skin cover. Four patients developed complications. Three were minor complications of margin necrosis and wound dehiscence, which were managed conservatively. One patient developed orocutaneous fistula, which required secondary suturing. None of our patients had a total necrosis of the flap. Island PMMC flap is still a very useful and viable option for reconstruction in head and neck surgeries, especially in lateral gingivo buccal tumours and other head and neck tumours. In institutions where microvascular expertise is not available, island PMMC flap can be an alternative with results comparable to that of free tissue transfer.

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Keywords Pectoralis major · Island pmmc · Vascular pedicle · Reconstruction

Introduction

The utility and versatility of Pectoralis major myocutaneous (pmmc) flap in head and neck reconstruction is well established. In fact for a long period of time pmmc flap was considered as the work horse in head and neck reconstruction [1]. However with the advent of micro vascular free flap, off lately the pmmc flap is losing its popularity and falling into disrepute. Donor site deformity, functional disability and bulk are the main disadvantages against its universal use. Though the superiority of a well conceived and executed free micro vascular transfer is unmatched, one can't ignore the short coming of this technique mainly under our circumstances. Need of a well developed plastic and reconstructive department, trained personnel, long learning curve, relatively high incidence of failure, need for specific infrastructure, cost factor and last but not the least is the time constraints. Cancer of the lateral gingivobuccal sulcus constitutes the commonest oral subsite in our patients. Majority of them involve either the skin or mandible, at times requiring through and through excision. Under these circumstances pmmc flap can be a readily available and viable alternative, especially for peripheral centres and economically poor patients, where complex and time consuming microvascular reconstruction is not practical.

We undertook a prospective trial of modifying a standard pmmc flap and create a island pmmc, so as to circumvent the two main disadvantages which is bulk and flap length.

Materials and Methods

Ours is an experimental case series.

The study was done at Sri Devaraj URS Medical college, Tamaka, Kolar. Between 2009 and 2010, head and neck reconstruction was performed using this method in 20 patients who had oral cancer (18), carcinoma supraglottis (1) and mucoepidermoid carcinoma parotid (1).The patients age ranged from 16 to 75 years, and there were 15 women and 5 men. Nineteen of our patients underwent primary surgery and one patient was operated for residual disease. In (16) patients, island pmmc flap were used for intra oral closure. In (4) patients the flap was spiraled for providing skin cover.

Technique

Since none of our team member is a trained plastic and reconstructive surgeon, it was important that we develop a safe and reproducible procedure having minimum failure. Therefore it was important that we keep all our options open in an eventuality of a failure. All patients were examined prior to surgery.

In all our patients the deltopectoral flap was not violated. After surgical excision the resultant defect was carefully examined. The defect was sketched onto a under exposed X ray film and a template was made.

We used either an oblique skin incision extending along the lower limb of the deltopectoral flap, starting from the anterior axillary fold to the superior edge of the proposed skin island or the sub mammary incision in case of female patients with small breast (Fig. 1).

The incision was never taken along its full length. Superior part of the incision was cut and the lateral border of the muscle was identified (Fig. 2). Using blunt dissection the muscle was freed from the anterior chest wall and Pectoralis minor muscle, both cranially and medially. The incision was further extended down and the lateral border of the muscle was delineated completely. Working under the muscle and using blunt dissection the vascular pedicle was identified along its course (Fig. 3).

Once we were sure about the muscle length and territory, the template was placed at the optimum geographical location. The island was usually carved with superior margin near the fourth rib. Inferior margin was the lower limit of the muscle, medially the lateral border of sternum and laterally just beyond the lateral limit of the muscle. The skin island was secured to the muscle with interrupted absorbable sutures to avoid sheering during mobilization. No attempt was made to handle the skin paddle and the entire dissection was carried under the muscle. It was completely necessary to stay close to the thoracic wall and include the perforating intercostal vessels (Fig. 4) with the flap. This was ensured by ablating these perforators using bipolar electrocautery or by ligating them close to the chest wall [2].

The groove between the sternocostal and the clavicular portion of the muscle was identified. The groove was identifiable in most instances, but should it not be obvious, a line leading from the sternoclavicular joint along the muscle fiber will provide a good landmark [3].

The sternal fibers were separated from the clavicular fibers (Fig. 5). The acromio thoracic trunk has four main branches—the acromial, deltoid, clavicular and pectoral branch. The blood supply to the clavicular portion is mainly contributed by the first three branches, that to the sternocostal portion is carried mainly by the pectoral branch, which runs as a continuation of the main trunk [2, 3].

So it was not necessary to include the clavicular fibers in the flap, by doing so we reduced the size of the flap to a significant extent. The lateral pedicle was sacrificed in all our patients.

Fig. 1 Showing oblique and sub mammary incisions with skin paddle

Fig. 2 Intraoperative photograph of lateral border of pmmc being exposed

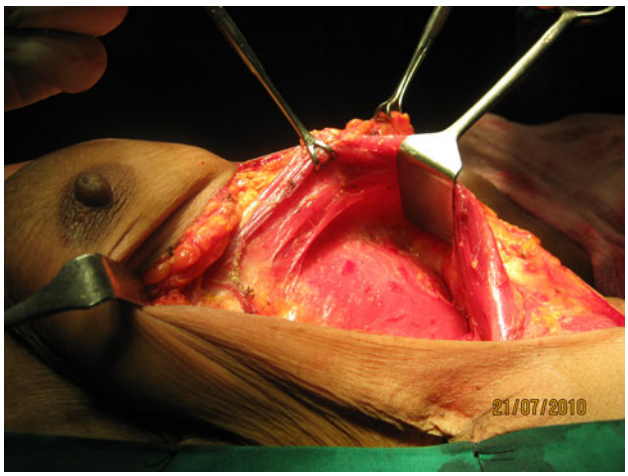

Fig. 3 Intraoperative photograph of under surface of muscle

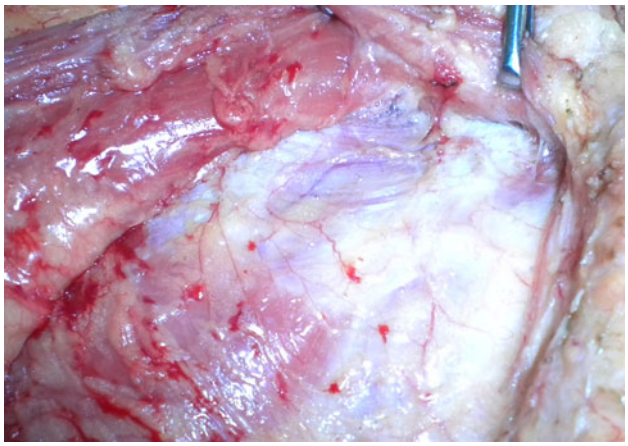

Fig. 4 Intraoperative photograph of perforating intercostal vessels

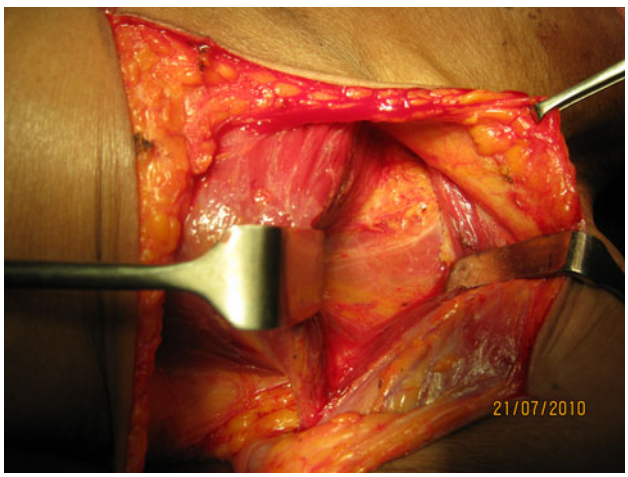

Fig. 5 Intraoperative photograph showing separation of sternocostal and clavicular fibres

The tendinous portion of the sternal fibres were held between the thumb and index finger and cut using electrocautery (Fig. 6). The medial sternal fibres were also cut

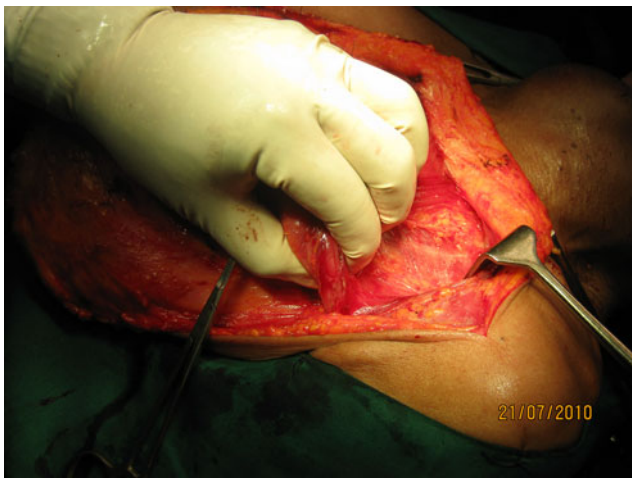

Fig. 6 Intraoperative photograph showing sternocostal fibres being cut at its tendinous portion

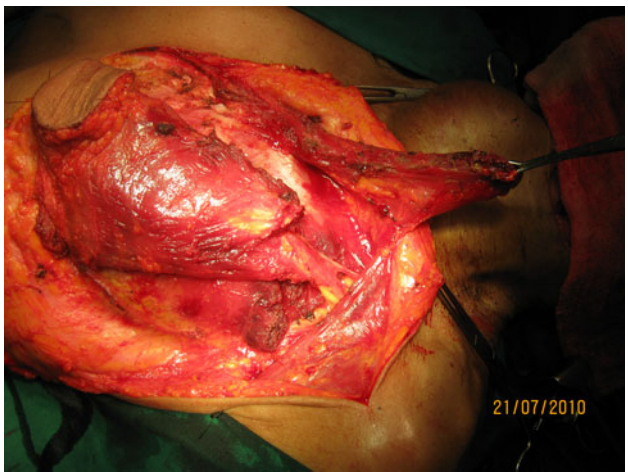

Fig. 7 Intraoperative photograph of a completed island pmmc

using electrocautery. The island flap thus prepared is now attached only by the vascular pedicle running under the clavicular fibers.

The pedicle consisting of the pectoral branches running under the clavicular fibers was seen. The clavicular fibers superior to the pedicle was cut carefully, in the process a number of branches supplying the clavicular fibers are coagulated using bipolar cautery. The pedicle is now traced to the vessel of origin. By doing this we avoid the pedicle being kinked over the clavicular fibers and also gives extra length to the pedicle [3]. The flap was then transferred over the clavicle into the neck. By taking the pedicle over the clavicle, we were able to monitor the pulsation in the immediate post operative period. By adopting this method we were able to create a very compact and far reaching flap based on a long slender pedicle (Figs. 7, 8). Tissue respect, frequent warm saline irrigation at times use of four % lignocaine soaked gauze around the

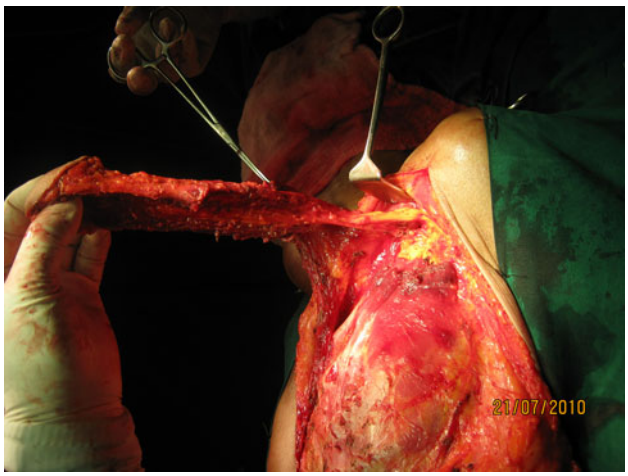

Fig. 8 Island pmmc with thin pedicle

pedicle and also maintaining optimum room temperature facilitated the overall procedure. The donor site was closed primarily under suction drain.

Results

Between 2009 and 2010, head and neck reconstruction was performed using this method in 20 patients who had oral cancer (18), carcinoma supraglottis (1) and mucoepidermoid carcinoma parotid (1) the patients age ranged from 16 to 75 years, and there were 15 women and 5 men. Nineteen of our patients underwent primary surgery and one patient was operated for residual disease.

In (16) patients, island pmmc flap were used for intra oral closure. In (4) patients the flap was spiraled for providing skin cover. Four patients developed complications. Three were minor complications of margin necrosis and wound dehiscence, which were managed conservatively. One patient developed orocutaneous fistula, which required secondary suturing. None of our patients had a total necrosis of the flap (Table 1).

Discussion

In recent times free tissue transfer has been the method of choice for one stage reconstruction in almost all major head and neck defects. Free tissue transfer is a complex technique that requires microvascular expertise, prolonged operative time, often requiring simultaneous two team surgical approach and at times vessel match can be a major issue. Protection of the carotid from the muscle may not be available [4]. Recurrent cases, cases with arteriosclerosis, medical co morbid conditions like uncontrolled diabetes

Table 1 Distribution of cases

SL no.	Age	Gender	Disease	Stage	Reconstruction	Results
1	50	F	CA Buccal mucosa	Stage III	Island PMMC	Complete flap take up
2	50	F	CA Buccal mucosa	Stage III	Island PMMC	Complete flap take up
3	66	F	CA Buccal mucosa	Stage IV a	Island PMMC	Complete flap take up
4	65	F	CA Buccal mucosa	Stage III	Island PMMC	Complete flap take up
5	45	F	CA Buccal mucosa	Stage III	Island PMMC	Wound dehiscence
6	50	F	CA Buccal mucosa	Stage III	Island PMMC	Complete flap take up
7	35	F	CA Buccal mucosa	Stage IVa	Island PMMC	Complete flap take up
8	75	F	CA Buccal mucosa	Stage IVa	Spiral PMMC	Marginal necrosis
9	45	F	CA Buccal mucosa	Stage IVa	Spiral PMMC	Complete flap take up
10	56	F	CA Buccal mucosa	Stage IVa	Island PMMC	Complete flap take up
11	56	M	CA Floor of mouth post rt with residual disease	Stage II	Island PMMC	Orocutaneous fistula
12	60	F	CA Buccal mucosa	Stage III	Spiral PMMC	Marginal necrosis
13	55	F	CA Buccal mucosa	Stage III	Spiral PMMC	Complete flap take up
14	70	F	CA Buccal mucosa	Stage III	Island PMMC	Complete flap take up
15	45	M	CA Oral tongue	Stage IVa	Island PMMC	Complete flap take up
16	16	M	Mucoepidermoid CA parotid		Island PMMC	Complete flap take up
17	45	M	CA Supraglottis island pmmc	Stage IVa	Island PMMC	Complete flap take up
18	45	F	CA Buccal mucosa	Stage IVa	Island PMMC	Complete flap take up
19	45	M	CA Buccal mucosa	Stage IVa	Island PMMC	Complete flap take up
20	55	F	CA Buccal mucosa	Stage Iva	Island PMMC	Complete flap take up

M Male, *F* female, *CA* carcinoma, *PMMC* pectoralis major myocutaneous flap

and the habits of the patient like smoking and alcohol intake can also affect the outcome of these flaps [5].

Pectoralis major myocutaneous flap has fallen into disrepute in the recent past. The difficulty of raising the flap in women, bulk of the flap, restricted range and flexibility, relatively unstable blood circulation giving rise to partial necrosis are few of the reasons against its universal use [5]. However pmmc flap has still got a significant advantage as it is located adjacent to the head and neck region, requires short operative time, no change in body position or vascular anastamosis. It can be safely used even if no recipient vessels are present. It can also provide muscle cover to the carotids and also to the metal prosthesis or to bone grafts [6].

We modified the standard techniques to achieve a long and compact pmmc island flap. We reduced the bulk by including only the sternocostal fibers and also planning the skin island in middle of anterior chest, where the subcutaneous fat and muscle fibers are thin [5]. The skin island designed in the anatomical vascular territory cranial to the choke vessel formed by the true anastomoses between the pectoral branch of thoraco-acromial artery and muscular branches of first, second and third intercostal perforators of internal thoracic artery improved the vascularity of the flap [5]. The length of the flap was improved by designing a slender vascular pedicle and also by cutting the clavicular fibers while transposing the flap to the neck.

In our study majority of patients were females. Among them three patients developed minor complication which was managed conservatively requiring no surgical intervention. One patient who underwent salvage surgery for residual disease, developed orocutaneous fistula and he required surgical intervention. Overall the outcome of island pmmc reconstruction in our institute was encouraging.

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