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KEY WORDS: Folded PMMC flap, Deltopectoral flap, reconstruction.

COMPARISON OF SINGLE FOLDED PECTORALIS MAJOR MYOCUTANEOUS FLAP(PMMC) WITH DUAL PMMC AND DELTOPECTORAL FLAPS FOR RECONSTRUCTION IN LOCALLY ADVANCED HEAD AND NECK CANCER.

Dr. Himanshu Patidar Senior resident, MBBS, MS, Department of Surgical Oncology, SAIMS, Indore

Dr. Sanjay Desai* Professor and Head, MS, MCh, Department of Surgical Oncology, SAIMS, Indore) *Corresponding Author

Dr. Deepak Agrawal Associate professor, MBBS, MS, Department of Surgical Oncology, SAIMS, Indore

ABSTRACT

Aim: The aim of the study is to compare the single Folded Pectoralis major myocutaneous flap (PMMC) flap and dual PMMC and deltopectoral flaps (DP)in the patients with advanced oral malignancy requiring full thickness cheek excision.

Material and methods: This was a prospective study undertaken on patient of full thickness cheek tissue defect (having both skin and mucosal defect) after resection of the tumor. A total of 51 patients were included. After resection, the resultant defect was covered with either single folded pectoralis major myocutaneous flap or dual PMMC and deltopectoral flaps. Outcomes were analyzed in detail.

Results: Number of the patients who developed flap rejection and suture line coaptation defect at the recipient site was same in both the groups. Development of oro-cutaneous fistula post operatively was seen more with the folded PMMC flap (2 patients) whereas collection of serous fluid between flap and overlying skin was more with dual flap group. Flap rejection was the only major complication seen in one patient of each group.

Conclusion: Free flaps are the gold standard for the reconstruction of the locally advanced oral malignancy, but the PMMC and DP flap can be used in various ways for the same purpose whenever the logistics do not favor free flaps.

Introduction: Oral cancer is one of the most common malignancy in India. Patients presenting with carcinoma buccal mucosa with skin involvement are common in India because of the late presentation of the patients. The reconstruction of such composite defects is always a demanding assignment for the surgeon. The ideal modality of reconstruction of such defects is by free tissue transfer (free flaps). When microvascular option is not available or contraindicated the pedicle options are usually pectoralis major myocutaneous (PMMC) flap (1), deltopectoral (DP) flap (2), forehead flap (3), cervicofacial (4) and cervicothoracic flaps(5).

Material and methods: We prospectively followed the patients of oral cavity squamous cell carcinoma requiring full thickness cheek excision, operated by us in between October 2015 to July 2017. Reconstruction was done by either using single folded PMMC flap or dual PMMC and deltopectoral flaps.

Inclusion criteria: All patients who were diagnosed case of Squamous cell carcinoma of oral cavity and were considered fit for the surgery at presentation and who underwent reconstruction of the defect using either of this technique were included for the study and prospectively followed. This included patients undergoing upfront surgery, surgery for recurrence and surgery after neoadjuvant chemotherapy.

Exclusion Criteria: All those patients whose defect was reconstructed using other flaps were excluded from the study.

Procedure: For the purpose of this study, a proforma was prepared which included patient's registration details, details of previous treatment received for the tumor, size of the mucosal tumor and the area of skin involved, the sub-sites of oral cavity involved by the tumor, details of procedure, measurements of the resultant defect after surgery, size of flap harvested, complications arising within fifteen days of surgery were noted, time for surgery and flap was noted, the time to remove suture was noted, also a measurement of pre and post-operative mouth opening and oral competence (which was defined as no drooling) was done, hospital stay was also noted.

Technique of Flap Elevation and preparation: Neck dissection was done in standard fashion as the first part of surgery and modified radical neck dissection type II or radical neck dissection being the most common procedure. Then, the primary was excised which needed hemimandibulectomy in the majority with or without upper alveolectomy or limited maxillectomy. The resultant defect was measured and for the purpose of reconstruction either the appropriate sized folded PMMC flap with tram track de-epithelization or dual PMMC and DP flap was used.

When a folded PMMC flap was used the PMMC flap was harvested in the standard fashion, however due to a need for lengthy flap nipple was always included in the flap. The length of flap harvested was about 1 cm more than the total length required to cover both mucosal and skin defect. The reconstruction was started by suturing the flap to the mucosal defect from posterior anteriorly and when mucosal defect was covered the flap was folded outwards and this folded portion was intended to be utilized for attachment of ipsilateral oral commissure or cut end of lips, to do so the most prominent part of the fold, which was also corresponding to the residual commissure or cut ends of lip, was de-epithelized cranio-caudally in a strip of five to seven millimeter width resembling tram track, remaining part lateral to this de-epithelized area was utilized for cheek skin reconstruction and was sutures to remaining cheek skin.

Patients in whom dual PMMC and DP flap was planned, both the flaps was harvested in the standard fashion. PMMC flap was used to cover the mucosal defect and the deltopectoral flap was used for covering the skin defect. Chest wound (from where the PMMC flap was elevated) was primary closed and the split thickness skin graft(SSG) was used to cover the wound left after harvesting DP flap. Skin graft was harvested from one of the thighs. DP flap division was done on post operative day 21.

Table no I (Range of the Skin and Mucosal defect obtained after resection of the oral malignancy)

Defect size	Range	
	Folded PMMC flap	Dual PMMC and deltopectoral flap
Mucosal defect	4 x 3 cm to 7 x 8 cm	5 x 4 cm to 6 x 9 cm
Skin defect	3 x 3 cm to 8 x 7 cm	4 x 3 cm to 7 x 8 cm

Table no II (Complication at the recipient site)

Complication	Number of patients	
	Folded PMMC flap (n=26)	Dual PMMC and deltopectoral flap (n=25)
Oro-cutaneous fistula	2	1
Collection of serous fluid between flap and overlying skin	1	2
Flap edge necrosis	1	3
Flap rejection	1	1
Suture line coaptation defect	1	1

Results: Of the 51 patients, between the age of 24 years to 86 years, 35 were males while 16 patients were females. All patients underwent modified radical neck dissection or radical neck dissection, if neck was not already addressed previously, with resection of the primary with minimal 1 cm gross margin. In 26 patients, folded PMMC with tram track de epithelization was used to reconstruct the oral mucosa along with outer skin defect. In remaining 25 patients, dual flap was used, PMMC flap for the reconstruction of mucosal defect and DP flap for the skin defect.

In folded PMMC flap group, after resection the mucosal defects (table no 1) ranged from smallest about 4 x 3 centimeters to largest being 7 x 8 centimeters and the skin defects (table no 1) ranged from smallest about 3 x 3 cm to largest 8 x 7 cm in various combinations of both values. PMMC skin paddle size ranged from 8 centimeters in smallest defects to 17 cm in largest length wise and 5 to 8 cm in width. In all cases chest skin defect was closed primarily. The average total operation time calculated from skin incision to skin closure was three and half hours. Average flap raising time was about one hour. In dual PMMC and DP flap the mucosal defect ranged from 5 x 4 cm to 6 x 9 cm and the skin defect ranged from 4 x 3 cm to 7 x 8 cm. The average total operation time with this technique was also around three and half hour.

The complications were studied as donor site and recipient site's complications. The number of the patients who developed flap rejection and suture line coaptation defect at the recipient site was same in both the groups. Development of oro-cutaneous fistula post operatively was seen more with the folded PMMC flap (2 patients) whereas collection of serous fluid between flap and overlying skin was more with dual flap group. Flap edge necrosis was managed by debridement and resuturing. Flap rejection was a major complication and was managed with forehead flap. Rest of the complications mentioned above were successfully managed conservatively.

Patients reconstructed with dual PMMC and DP flap had to undergo another minor surgery after about 21days for the DP flap division. Skin graft uptake was 100% in all the patients where DP flap was used.

Discussion:

The fundamental intent of head and neck cancer surgery is to provide a cure or significant palliation with a dire attempt to recover the patient to the pre-morbid level of functioning and quality of life with the best reconstruction possible. One principle which needs to be kept in mind is that no reconstruction procedure at any cost should bargain on adequate tumor resection. Significant defects of the cheek present a reconstructive challenge due to their extremely visible site, as well as limited local tissue supply. In addition, the cheek abuts several structures of expressive function, such as the eye, mouth, and local facial musculature. To achieve satisfactory functional and aesthetic results, reconstruction of such defects requires careful three-dimensional restoration of all missing components, adequate texture matching, as well as functional restoration. Aesthetic reconstruction of facial defects should adhere to the priority goals of first preserving function and second achieving cosmesis. According to the size of the defect, location on the cheek, relationship to adjacent structures, available donor tissue, and existing skin tension lines, a host of techniques is available for closure.

However, thoughtful reliance upon the "reconstructive ladder," including direct closure, skin grafting, local flap creation, regional flap placement, and free-flap repair, will invariably guide the surgeon in an optimal approach to cheek reconstruction. recently free flaps are considered the gold standard method for reconstruction of major defect following head and neck cancer surgery (6).

The PMMC flap has been considered a miraculous step in the history of head and neck reconstruction since its depiction. The unique anatomy (7,8) of the pectoralis major muscle makes it the most preferred muscle for head and neck reconstruction. The advantages (9,10) of PMMC which still make it the fancied choice even today are that the vascular supply of this muscle is very consistent and it is covered by small amount of soft tissue and is situated clearly along definite tissue planes making its isolation relatively easy. The pectoralis muscle is well vascularized and has abundant perforators to supply the overlying skin hence it can survive under suboptimal conditions even when transferred to an infected bed.

Because of its robust vascularity, the pectoralis major flap provides good quality, pliable chest skin for external coverage as well as cheek lining. A proximal island can be used for intraoral lining, and the distal random portion is folded for the cutaneous portion. In using this double-island technique, the pectoralis major flap can provide excellent reconstruction of substantial full-thickness cheek defects.

Primary blood supply of Deltopectoral flap comes from the perforating branches of the internal mammary artery through the second, third, and fourth intercostal spaces. The proximal part of the flap therefore has an axial blood supply. However, the blood supply to the distal third of the deltopectoral flap is of a random pattern through the subdermal plexus. Therefore, the distal third has got more chances of necrosis.

Above mentioned techniques of using folded PMMC flap or dual PMMC and DP flap can be used for the reconstruction purpose. Folded PMMC flap has got the advantage of covering the skin and mucosal defect by a single flap. It does not require another surgery for flap division and thus after suture removal and complete wound healing patient can start adjuvant treatment early. In contrast, when using dual DP and PMMC flap, DP flap requires flap division after 21 days and thus suture removal and complete wound healing gets delayed which further leads to delay in adjuvant treatment. For the patients in which dual flaps are used and if there occurs DP flap edge necrosis, it requires flap advancement and resuturing which again delays flap division and thus adjuvant treatment.

Patients reconstructed with dual flaps in the immediate post operative period feels uncomfortable because of the DP flap pedicle hanging from the face. This hanging DP flap also causes restriction of the mobility of face and if excessive tension is present, it may hamper the flap. Folded PMMC flap has got the disadvantage of being too bulky and when a very large flap is used in females it causes distortion of the breast and nipple areola complex. In dual flap technique, the donor site overlying the deltoid muscle has to be covered with a split-thickness skin graft, which gives cosmetically bad appearance.

CONCLUSION:

Free flaps are the gold standard for the reconstruction of advanced oral malignancy. However, this flaps comes in the armamentarium when the logistics do not favor a free flap. Both the techniques of reconstruction have got various pros and cons and which technique to be used depends completely upon the preference of patient and surgeon.

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