

ORIGINAL RESEARCH

Use of pedicled bipaddle latissimus dorsi myocutaneous flap in reconstruction of extensive oral cavity defects: A road less travelled; our initial institutional experience

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ABSTRACT

Background: Aim of this study was to evaluate the usefulness of pedicled bipaddle latissimus dorsi myocutaneous flap in the reconstruction of large full thickness oral cavity defects (post cancer resection). **Methods:** This was a retrospective study carried out from October 2021 to Dec 2022, 11 patients (7 females & 4 males) with full thickness cancer resection defects were reconstructed using pedicled bipaddle latissimus dorsi (LD) flap. **Result:** All the flaps survived well and post-operative period was uneventful. Donor-site was closed primarily in two layers in all cases and there were no major complications in post operative period. **Conclusion:** In salvage surgeries, where pectoralis major has been used earlier, pedicled bipaddle latissimus dorsi myocutaneous flap remains the excellent option for single stage reconstruction of large full thickness oral cavity defects. It has emerged as a saviour to workhorse in oral cavity reconstruction.

Keywords: Pedicled bipaddle latissimus dorsi flap, Salvage surgery, PMMC- failure, oral cavity reconstruction

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INTRODUCTION

Oral cavity cancer (most common form of Head and Neck cancer) constitutes a major burden at our institute. Mostly they present to us at advanced stage and reconstruction in such cases remains a major challenge.

In this microvascular era, Free flaps are the gold standard for such defects [4]. Free flap reconstruction may not be feasible in all cases due to patient not getting anaesthesia fitness for prolonged surgeries (uncontrolled co-morbidities) and some resource constraints. Free flap reconstruction requires surgical expertise, good infrastructure and prolonged operating time as compared to pedicled locoregional flaps. Moreover, free flap reconstruction in salvage surgeries in previously operated and radiated necks [frozen neck; unavailability of recipient vessels] becomes even more challenging [6-8].

Due to resource constraints, many surgeons prefer using Pedicled Pectoralis major myocutaneous (PMMC) flap as a first choice for reconstruction of

large oral defects. PMMC is also known as workhorse flap for reconstruction of oral cavity as it provides single stage reconstruction of mucosal lining and skin cover with good amount of soft tissue having reliable vascular supply and excellent reach [4,5]. However, reconstruction becomes even more challenging when this workhorse flap fails. In our institutional experience, such cases can be easily managed with pedicled transaxillary bipaddled latissimus dorsi (LD) flap where free flaps and PMMCs cannot be done.

MATERIALS AND METHODS

Demographic and clinical data of 11 patients (7 females & 4 males) with full thickness cancer resection defects who were reconstructed using pedicled bipaddle latissimus dorsi (LD) flap was reviewed from October 2021 to December 2022. It was mainly performed in salvage cases where PMMC has been used in first surgery [LD flap was used as a saviour to PMMC] or congenital absence of pectoralis major as this rare condition was found in one of our

male patients. The neck dissection was modified radical neck dissection in all cases. All the patients had varying degrees of composite buccal defects requiring reconstruction of mucosa, soft tissues,

bone and skin. All the reconstructions were performed by two surgeons using the same technique. Donor - site was closed primarily in all cases. All the patients required post operative radiotherapy.

Table 1: Demographic data

| Serial No | Age/sex | Diagnosis | Previous treatment | Associated Comorbidity |
|-----------|---------|--|--------------------|--|
| 1 | 56/F | Ca Rt buccal mucosa [T4 N1M0] | Bipaddle PMMC | DM type2 |
| 2 | 55/M | Ca Rt buccal mucosa [T4 N2bM0] | Bipaddle PMMC | CAD, DM type2,Smoker |
| 3 | 60/M | Ca Lt Buccal Mucosa[T4N1M0] | Bipaddle PMMC | COPD,CAD |
| 4 | 52/F | Ca Rt Buccal Mucosa[T4N2aM0] | Bipaddle PMMC | COPD,DM type 2 |
| 5 | 48/M | Ca Rt Buccal mucosa[T4N1M0] | None | Ipsilateral Absent pectoralis major muscle |
| 6 | 58/F | Recurrent SCC Right cheek | Bipaddle PMMC+ RT | COPD,CAD |
| 7 | 65/F | SCC Rt Buccal Mucosa[T4N2bM0] | Bipaddle PMMC | None |
| 8 | 49/F | Ca Lt Buccal Mucosa [T4N2b M0] | Bipaddle PMMC | CAD |
| 9 | 54/M | Ca Rt.Buccal Mucosa [T4N2b M0] | Bipaddle PMMC | DM type2 |
| 10 | 45/F | Adenocarcinoma Left Buccal Mucosa[T4N2aM0] | Bipaddle PMMC | COPD,CAD |
| 11 | 63/F | Ca right Buccal Mucosa[T4N1M0] | Bipaddle PMMC | None |

Table 2: LDMyocutaneousflap variables

| S.No | Operating time[Flap harvest + Insetting] (minutes) | Flap size (cm) Inner Paddle | Outer | Complications | Shoulder morbidity |
|------|--|--------------------------------|-------|--|--------------------|
| 1 | 160[120+40] | 6x5 | 8x7 | Nil | Nil |
| 2 | 155[110+45] | 7x5 | 6x6 | neck skin dehiscence- managed conservatively | Nil |
| 3 | 170[130+40] | 6x5 | 5x4 | Nil | Nil |
| 4 | 165[120+45] | 8x6 | 6x7 | Nil | Nil |
| 5 | 185[140+45] | 6x5 | 6x4.5 | Nil | Nil |
| 6 | 180[130+50] | 7x6 | 5x4 | Distal 1 cm of flap necrosis. Debridement and re-suturing done | Nil |
| 7 | 175[125+50] | 6.5x5 | 6x4.5 | Nil | Nil |
| 8 | 180[125+55] | 7.5x6 | 6x4 | Nil | Nil |
| 9 | 150[105+45] | 6x4 | 5x4.5 | Nil | Nil |
| 10 | 155[115+40] | 5x4.5 | 4x4 | Nil | Nil |
| 11 | 135[95+40] | 6x5 | 5x4.5 | Nil | Nil |

SURGICAL TECHNIQUE OF FLAP HARVEST

Latissimus dorsi flap was harvested in lateral decubitus position in all patients. Marking of pertinent anatomical landmarks [tip of scapula, posterior iliac crest, midline of the back and posterior axillary fold] was done pre-operatively in sitting position.

After resection of malignant tissue (primary case) or debridement of necrotic PMMC (secondary case; in which reconstruction was already done with PMMC) by the oncosurgeon in supine position, the patients

were shifted to lateral decubitus position with the ipsilateral arm abducted to 90° and elbow flexed to 90° and it was included in the operative scrub allowing it to be freely moved during the procedure. skin- pinch test was done to assess the maximal width of the flap to close the donor -site primarily in all cases and flap was marked over the muscle. Flap was marked preferably horizontally in female patients to hide the post-op scar under brassiere strap.

In male patients with large buccal defect, flap was marked obliquely. Planning in reverse was done in each case with the help of lint-piece.

LATISSIMUS DORSI MUSCLE ANATOMY

The latissimus dorsi muscle is a flat, triangular muscle that covers the posterior trunk. It is the largest expendable muscle present in the body and its functions are preserved in its absence by the shoulder girdle muscles [1,2].

Origin-include the external surface of the 3rd or 4th most inferior ribs, the iliac crest, the spinous processes of the lower 6th or 7th thoracic, lumbar, and superior sacral vertebrae, as well as the inferior angle of the scapula.

Insertion-the muscle fibers run towards the axilla, where they insert as the broad tendon into the intertubercular groove of the humerus. The latissimus dorsi muscle fibers form an aponeurotic attachment with the lower border of the serratus anterior and superiorly converge with fibers of the teres major to form the posterior axillary fold.

Function-to adduct, extend, and medially rotate the humerus, as well as secure the tip of the scapula against the posterior chest wall.

Nerve supply-Thoracodorsal nerve (posterior cord of brachial plexus), it closely accompanies the thoracodorsal artery.

Vascular supply-Mathes and Nahai classified the latissimus dorsi muscle as type V[1]; its dominant pedicle is the thoracodorsal artery, and the muscle receives segmental circulation from perforators of the posterior intercostal arteries and the lumbar artery. With a large diameter (1-3mm) and minimal anatomic variation, the thoracodorsal artery provides a highly reliable blood supply. The vessel enters the underside of the latissimus in the posterior axilla, giving off a branch to the serratus muscle, continues into the muscle and bifurcates into a large lateral descending branch and small transverse branch. In addition, numerous musculocutaneous perforators allow for skin island design anywhere on the muscle [1-3].

FLAP HARVESTING

The lateral border of the muscle was palpated and marked. Musculocutaneous perforators were marked with the help of hand-held doppler starting about 6-8 cm below the posterior axillary fold and 2-4 cm inside

the lateral border of the muscle the significant (loudest) one to two perforators were marked in each case. According to the defect, the flap dimensions needed were marked. Muscle fibers were transected beyond the marked skin territory and myocutaneous flap was elevated. Skin-paddle was sutured to the underlying muscle to avoid perforator shearing during flap harvest. The perforators from the intercostal vessels were identified and ligated. As the dissection proceeded proximally, branch of thoracodorsal artery to the serratus anterior muscle was identified and ligated. The thoracodorsal vessels were followed to the axilla to identify the circumflex scapular and subscapular vessels. The thoracodorsal nerve was preserved.

INSET

The flap was delivered into the neck through the axilla. An interpectoral tunnel (between the pectorals major and minor muscles) was made for the flap to reach the defect. Compression of the flap was avoided by sufficiently widening the tunnel.

All donor-sites were closed primarily with suction-drain in-situ. In supine position, flap was inserted into the defect in such a way that the lateral part of the skin paddle was used to reconstruct the buccal mucosal defect and the medial part of the skin paddle to cover the cheek skin defect. After inset of the mucosal lining, de-epithelisation was done and rest of the inset was performed for outer coverage. In some cases depending on the perforators location skin paddle was cut full-thickness for better inset of the flap.

RESULTS

There were no major complications [flap necrosis] observed in any of our patients. All flaps survived well. The mean hospital-stay was 9.6 days (7-12 days). Patients were discharged with drains to avoid nosocomial infections and followed in OPD. Drains were kept for about 2 weeks to avoid seroma formation at donor-site. Sutures were removed after 10 days of surgery, depending upon the wound-healing of every patient. Mean operative time was 164.54 min which includes the flap-harvest time, positioning time and inset-time. Patients were followed for about 9 months. Two patients developed wound dehiscence at the neck suture-line, which was managed with adequate debridement and secondary closure.



Fig.1(a) Fig.1(b)



Fig.1(c) Fig.1(d)



Fig.1(e) Fig.1(f)

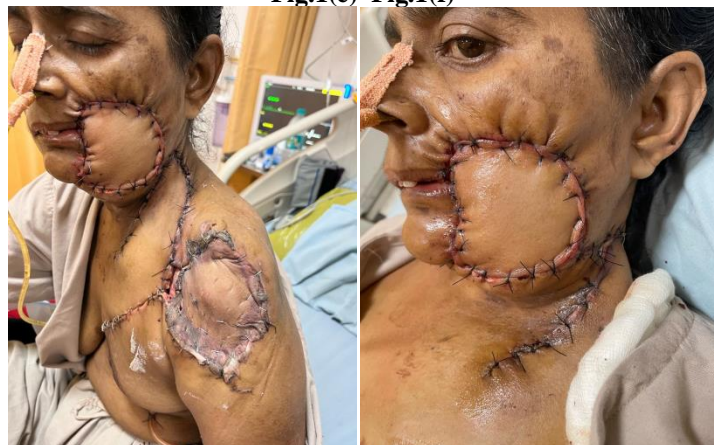


Fig.1(g) Fig.1(h)

**Fig.1(i)**

Figure 1(a) clinical photograph showing advanced disease(T4, N2,Mo)

Figure1(b) PMMC flap donor- site

Figure 1(c) Congested PMMC flap,outer paddle on post op day 5

Figure 1(d) defect after debridement of outer paddle and delayed deltopectoral flap

Figure 1(e) Planning and definitive marking of LD myocutaneous flap according to the defect-size

Figure 1(f) Latissimus dorsi myocutaneous flap elevation

Figure 1(g)After adequate debridement, oral -defect was covered with bipaddle LD flap and deltopectoral (DP)flap was used to cover the neck & secondary defect was covered with split thickness skin graft

*** Deltopectoral flap was not required in other cases, it was needed in this case only as the neck -flaps were ischemic and non-pliable.**

Figure 1(h) Well settled DP flap on post op day 5

Figure 1(i) LD flap donor -site with suction drain in -situ on post op day 5

DISCUSSION

Post cancer resection oral cavity reconstruction with good functional and aesthetic outcome is a challenging task. Microvascular reconstruction with thin and pliable tissue is the gold standard for such defects but it requires expert team and good infrastructure [4-6]. In scarcity of resources, many people still prefer Pedicled flaps for the reconstruction of large oral cavity defects. As pedicled flaps are easy to execute and require less operating time and moreover they do not require any specific flap monitoring in immediate post-operative period as it is essential in case of free flaps [8,12]. Pectoralis major myocutaneous (PMMC) flap is one of the most commonly used flaps for reconstruction of huge through and through oral cancer defects. However, use of this flap in obese-females with bulky breasts is limited by significant donor site morbidity and unreliability of the skin paddle especially when a large flap is harvested [8-9,12]. Most importantly, using this flap for reconstruction as a first option exhausts a good reconstructive option or a salvage situation [life-boat] in case of a recurrence or second primary cancer. The trans axillary pedicled latissimus dorsi flap provides a good reconstructive tool for salvage buccal cancer resections where PMMC flap has been used up previously (Fig 1e & f) as well for primary reconstruction in female patients as the scar is well hidden below the cloths. It owns the benefits of a pedicled flap with the pliability of a free flap. Latissimus dorsi being the largest muscle of the body by surface area incorporates a large skin paddle which

can extend to up to 40 × 20 cm. The thin flat nature of the muscle can easily be tunnelled into the neck through a small trans-axillary window in a plane between the pectoralis major and pectoralis minor muscles [3,12]. The large arc of rotation enables coverage even up to the supraorbital region and central portion of the upper face [9]. The donor site can be closed primarily in most patients with the scar hidden in the back making it an excellent option for female patients as compared to a PMMC flap. The major demerit of the flap is the need for change of patient position from supine to lateral decubitus during harvest which increases the operating time [12]

In salvage surgeries, there are other reconstruction options like combination of pedicled forehead flap for skin defect and pedicled deltopectoral flap for the buccal mucosa defect coverage, but pedicle -division and inset of flap after 3 weeks is the major demerit of this procedure [13,14]. Post-operative wound-care and dressings become cumbersome for the patient and there is a need of prolonged hospital -stay. It is a two-stage procedure with requirement of split thickness skin graft at the donor -sites which increases the operative -time. Scars are visible and adjuvant therapy [radiotherapy] is delayed at least by 1 month. Whereas reconstruction with pedicled LD flap is a one stage procedure and patient can be discharged early with drain in place. Post-operative wound care is easy for the patient and radiotherapy is not much delayed, if needed.

Pedicled latissimus dorsi flap initially described by Tansini in 1896 [9]. It is mainly popular for its use in

breast reconstruction [9-11]. Quillen et al. in 1978 introduced the use of latissimus dorsi flap in head neck reconstruction [9,12]. Single stage reconstruction with LD flap helps in early initiation of adjuvant radiation for these advanced cancer patients. There was no donor related morbidity in our patients. Initiation of early ambulation and shoulder physiotherapy helped in achieving good shoulder function in post-operative period.

CONCLUSION

In cases of salvage surgeries, LD myocutaneous flap is a good option for extensive oral-cavity reconstructions as it has consistent vascular- anatomy, easy to harvest, good soft-tissue coverage, single stage procedure with minimal donor site morbidity. All of these properties make LD flap an excellent option to be used as a saviour flap. In our experience, it has consistently given good results in achieving good functional and aesthetic outcome.

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