

Original Article

Use of Latissimus Dorsi Myocutaneous Flap in Reconstruction of Extensive Soft Tissue Defects of Upper Limb

Saeed Ashraf Cheema

Objective: To evaluate the role of latissimus dorsi myocutaneous flap in providing soft tissue cover for extensive defects of upper limb at shoulder, mid arm amputation stump, arm, elbow joint, forearm and wrist level.

Patients and Methods: An observational study carried out at the Department of Plastic Surgery, Services Hospital, Lahore from January 2004 to June 2007. Patients presenting with extensive soft tissue defects of various areas of upper limb managed with latissimus dorsi myocutaneous flap were included in this study. In all the cases classical pedicled myocutaneous latissimus dorsi flap was used.

Results: Study was carried out on twelve cases. It included nine males and three females. Flap provided soft tissue cover to defects at arm and elbow in three cases. Two cases needed soft tissue cover at arm, forearm region, elbow joint area and shoulder. In one case it covered the mid arm amputation stump. All flaps survived.

Conclusion: Latissimus dorsi myocutaneous flap may be considered as a workable option in extensive soft tissue defects of various areas of upper limb.

Key words: Latissimus dorsi myocutaneous flap, soft tissue reconstruction.

Introduction

Soft tissue defects of upper limb are quite common. A variety of etiologies can lead to extensive soft tissue defects in the area. Burn injuries, road traffic accidents and mechanical trauma especially, may lead to injuries of greater soft tissue loss with exposure of underlying structures and skeletal elements. A variety of options including local and regional flaps are utilized to provide the soft tissue cover.

Latissimus dorsi muscle has been utilized to reconstruct defects in areas of head and neck, trunk, chest wall, breast, and upper limb.^{1,2} As a free tissue transfer, it is also utilized in other areas like lower limb and foot.³ In upper limb reconstruction it can play vital role to cover the defects in all the areas including shoulder, arm, elbow joint, forearm and wrist joint.^{4,7} This paper reviews the utilization of myocutaneous latissimus dorsi flap for defects of upper limb.

Material and Methods

The study was carried out at the Department of Plastic Surgery, Services Hospital Lahore, from January 2004 to Jun 2007. It included all the patients, male and female, who got their soft tissue defects of upper limb covered with myocutaneous latissimus dorsi flap. The study had a total of twelve cases of extensive soft tissue defects covered with this flap. The soft tissue defects were repaired according to

the principle of reconstructive ladder i.e. simpler reconstructive option was given the first priority during selection of various soft tissue modalities. Latissimus dorsi myocutaneous flap was used only in cases where utilization of simpler options like primary closure, skin grafting or use of local or regional flaps was not possible.

In all these cases myocutaneous latissimus dorsi flap based on dominant pedicle of thoracodorsal artery was used. Cutaneous part of flap was taken either parallel to direction of muscle fibers or across this direction depending on the requirements. Skin portion was used as an island in all the cases. Skin pedicle was tunneled to defect site in all but two cases. In these two cases, defect was at wrist level and island flap covered the defect and later on, division of pedicle and flap inseting was done at second stage. In all cases, except one where it was skin grafted, donor site was closed primarily with suction drain inside. Stitches were removed 7-10 days postoperatively.

Results

A total of 12 cases were dealt during period of three and half years. Nine of the patients were males and three females. Five of the defects resulted during road traffic accidents, three from electric burn injuries and two resulted from mechanical trauma and earth quake injuries each. (Table 1)

Table-1: Etiologies.

	Etiology	No. of Cases
1	Road traffic accidents	5
2	Electric burn injuries	3
3	Mechanical trauma	2
4	Earth quake injuries	2
	Total	12

Table-2: Regions.

	Etiology	No. of Cases
1	Elbow	3
2	Arm	2
3	Arm & Elbow	2
4	Shoulder	2
5	Distal Forearm	1
6	Arm Stump	2

In three of the cases cover was provided in region of arm and elbow while in other three cases it was arm which needed cover. In two cases it was elbow joint while in other two cases wrist joint and adjoining forearm needed cover. Anterior aspect of upper end of humerus and shoulder joint needed flap cover in two cases. (**Table 2**)

All flaps healed well. In one case distal most suture line dehiscid. In this case margins were freshened, resutured and recovery was smooth. Another case had epidermolysis at distal most part but flap take went uneventfully.

Discussion

Etiologies like road traffic accidents, mechanical trauma and electric injuries may lead to extensive and full thickness soft tissue defects in upper limb area.⁸ Although upper limb has a galaxy of local flaps available but location, dimensions of wound, injuries to other areas and variety of other reasons may render these options not applicable.

Latissimus dorsi muscle has a wide origin from spinous processes of inferior six thoracic vertebrae, thoracolumbar fascia, iliac crest, and inferior three or four ribs and converges to the floor of inter-tubercular groove of humerus. This wide origin converging to a tendinous insertion gives this muscle a wide arc of rotation and thus makes it possible to reach a number of areas for providing soft tissue

coverage. Moreover, this fan shaped muscle spans from inferior angle of scapula to iliac rim which makes it possible to cover large soft tissue defects. It is for the same reason that it can be very effectively used in scalp, head and neck, oral cavity, back, anterior chest and upper limb areas for soft tissue reconstruction.⁹⁻¹¹ It is also quite frequently used for free tissue transfer as well.^{12,13}

Principle of reconstructive ladder demands the use of distant flaps considered after local and regional flaps. Similarly, although free flap may be a treatment of choice but it requires trained personnel, sophisticated instrumentation, extensive pre-operative evaluation and acquaintance with micro vascular techniques. Moreover it is time consuming and not done routinely.¹⁴ Upper limb defects find use of various local and regional flaps but these may not be quite workable in certain defects. This series included only those cases which were difficult to be covered with the use of local and regional flaps.

Present series reviews the use of latissimus dorsi flap in upper limb only. In majority of soft tissue defects, elbow joint and adjoining area at arm or forearm needed some flap coverage which was not available locally. In two of the cases it was upper end of the arm where the soft tissue loss was occupying whole of the circumference (**Fig 1**). The length of the soft tissue needed to cover whole of the circumference was possible only with the use of this flap (**Fig 2, 3**). In two of the cases there was fracture of upper end of humerus along with exposure of shoulder joint and the plate (in one of the two cases) used to immobilize fracture site. Flap provided soft tissue cover for exposed joint and rest of the defect (**Fig 4, 5**). In two of the cases this flap covered the defect at wrist area. In one of these two cases external fixator made the use of groin or abdominal flaps impossible. In other case this flap was used to salvage the only surviving hand of the patient, where radius, ulna and wrist joint were exposed. The problem with the use of this flap at wrist area is that it converts the reconstruction into a two staged procedure. But, at times it might be the only option available and so must be kept in the armamentarium.

In five of the cases this flap provided cover for the elbow joint. Although radial artery flap may be a very good option for defects at elbow area, it may not cover some of the extensive defects; moreover, this flap also sacrifices one of the two major vessels of the forearm.¹⁵ However, latissimus dorsi flap does not sacrifice any of the major vessels. Another draw back with the use of radial artery flap or any other local flap

Fig-1: An earth quake victim with circumferential soft tissue defect at mid arm level.



Fig-2: Same patient as in fig 1. Soft tissue defect area has been de-epithelialized and flap has been mapped out on back.

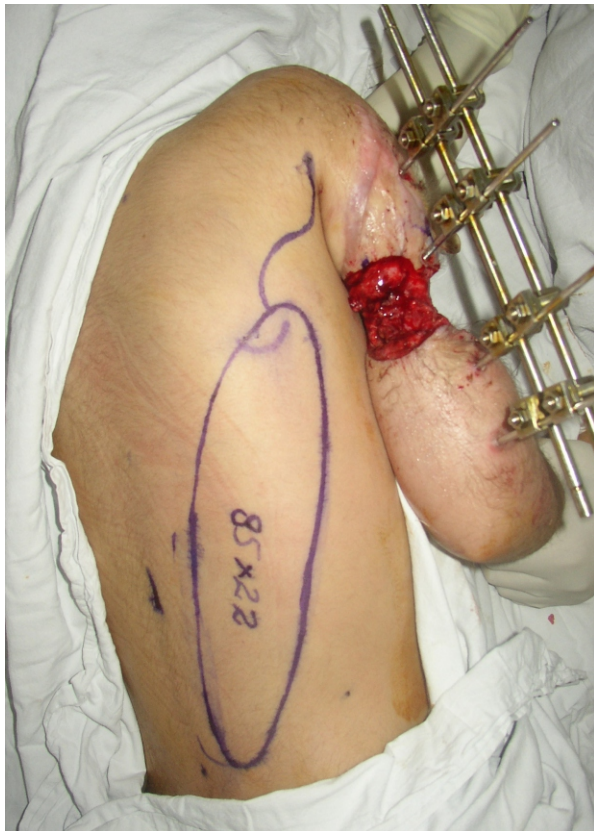


Fig 3. Same patient on fifteenth post operative day regaining the normal contour at mid arm level.



Fig-4: A patient with post traumatic wound at right shoulder with exposed fractured upper end of humerus and shoulder joint.



would be an exposed wide skin grafted donor site.¹⁶ This problem is also avoided with the use of latissimus dorsi flap. Hence this flap, tunneled to the elbow region may be a quite useful option for soft defects of the area.

Series also agrees that this flap can also easily cover the defects at anterior shoulder, and amputations at mid arm level.^{17,18} This series successfully demonstrated that this flap can be safely used for extensive defects of the upper limb starting from the shoulder down to the forearm and wrist level.^{5,6}

Fig -5: Same patient after the wound and exposed bone has been covered with latissimus dorsi myocutaneous



However, use of this flap must only be considered in extensive defects where no other local option is

available. Also use of this flap at forearm and wrist level will make the reconstruction a two stage procedure. This flap is quite a dependable, safe, easily executable option and can prove a wonderful tool in the armamentarium for reconstruction of soft tissue defects of upper limb.

Conclusion

Latissimus dorsi myocutaneous flap may be considered as a workable option in extensive soft tissue defects of various areas of upper limb.

*Department of Plastic Surgery
Services Institute of Medical Sciences, Lahore.
theesculapio@hotmail.com
www.sims.edu.pk/esculapio.html*

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