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Original research article

Versatility, reliability and applications of latissimus dorsi flap in a tertiary care centre in eastern part of India

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Abstract

Introduction: The latissimus dorsi myocutaneous flap or myofascial flap has a variety of applications in the field of reconstructive surgeryranging from head,neck,torso and limb reconstructions. The latissimus dorsi (LD) flap is an excellent option for a large soft tissuedefect of head and neck or torso requiring pliable soft tissue reconstruction.(1,2) It can eitherbe harvested in a pedicled fashion oras a free flap, providing a bulk of pliable soft-tissue. Latissimus dorsi dissection is rapid, easy, and safe because of the reliable anatomy of the thoracodorsal and subscapular vessels, Microvascular transfer is facilitated by the long pedicle and large caliber of the vessels.

Material and Methods: From January 2019 to June 2021 a retrospective study was conducted in Department of Plastic & Reconstructive surgery,Department S.C.B Medical College & Hospital Cuttack. 41 patients were included in the study where both pedicle and free LD muscle flap was done.

Patients age less than 10 years and above 75 years,patients having severe co-morbid condition like severe diabetes mellitus,chronic end stage renal diseases,sepsis were excluded from the study.

Results: Mean age of the study population was 44.8 years. Both pedicle and free LD flap were used for breast reconstruction in 11 (26.82%)cases, post trauma tumor soft tissue defect over upper extremity-17 cases(41.46%) and lower extremity defects in 9 cases (21.95%),one case of post tumor scalp defect and one case of post bear mauling scalp defect(4.87%) and two cases of implant exposure over back(4.87%). Minimum duration of surgery was 90 minutes & maximum duration was 280 minutes. Post-operative complications were seen in 8 patients. Minimum duration of hospital stay was 13 days and maximum was 39 days.

Conclusion: Versatile and reliable LD Flap provides the reconstructive surgeon an excellent option for soft tissue coverage, restoring form andfunction even in complex and challenging scenarios.

Keywords: Defects, LD flap, pedicle flap, Reconstruction

Introduction

Thelatissimus dorsi myocutaneous flap or myofascial flap has a variety of applications in the field of reconstructive surgeryranging from head,neck,torso and limb reconstructionsThe latissimus dorsi (LD) flap is an excellent option for a large soft tissuedefect of head and neck or torso requiring pliable soft tissue reconstruction[1, 2]. It can eitherbe harvested in a pedicled fashion oras a free flap, providing a bulk of pliable soft-tissue.The latissimus dorsi flap, either as pedicle or as microvascular free tissue transfer, is one of the most commonly used flaps in reconstructive surgery owing to largecalibre vessel diameters and a long reliable pedicle. Its size and versatility make it a workhorse in reconstructive surgery since two decades[3].Its has a broadaponeurotic origin fromseventh and lower thoracic vertebrae, the lumbar and sacral spinal processes, the posterior & middle outer rim of the iliac crest via the thoracodorsal fascia. In its superiomedial portion, it is covered by the trapezius & it is a superficial muscle of the back.The middle third of the muscle is attached to the 10th, 11th and 12th ribs and its fibers interdigitate with the fibers of the serratus anterior. Superiorly it is adherent to the inferior border of the teres major muscle.Its triangular large and flat muscle belly converges into a flat, broad tendon that inserts into the lesser tubercle and the medial lip of the intertubercular groove of the humerus. The latissimus dorsi acts as an extender, adductor, and medial rotator of the humerus, stabilizes and elevates the pelvis and aids in coughing. The muscle is perfused by the thoracodorsal vessels and innervated by the thoracodorsal

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nerve[4, 5]. Although many flaps have been described for use in microsurgical scalp reconstruction,latissimus free tissue transfer is one of the most popular flaps for scalp reconstruction due to large bulk of the LD muscle and potential for broad coverage of the entire scalp [6, 7, 8].Pedicled latissimus transfer is frequently employed in breast reconstruction after mastectomy, along with trunk,chest wall,upper extremity reconstruction and free functional muscle transfer of the latissimus can be used in facial reanimation[9, 10].Post-traumatic injuries of the distal lower limb poses a major challenge for reconstruction owing to exposed bone, joints, tendons, nerves, and/or vessels.Historically, muscular flaps are preferred in contaminated as they can obliterate the dead space and decrease the risk of infection by improving vascularity [11, 12].The LD flap, one of the largest flaps in the body can be tailored to almost any size and shape extending from the axilla to almost the iliac crest & may be advantageous in providing bulk for the correction of contour defects. Latissimus dorsi dissection is rapid, easy, and safe because of the reliable anatomy of the thoracodorsal and subscapular vessels, Microvascular transfer is facilitated by the long pedicle and large caliber of the vessels. A skin island can be orientated vertically, obliquely, or transversely as desired or required by the defect. In our study we have described the different applications & advantages of LD muscle free and pedicle flap.As a pedicled flap, it is certainly one of the most versatile flaps for reconstructive problems of the chest wall, the upper arm and back.

Material and Methods

From January 2019 to June 2021 a retrospective study was conducted in Department of Plastic & Reconstructive surgery,Department S.C.B Medical College & Hospital Cuttack. 41 patients were included in the study where both pedicle and free LD muscle flap was done.

Patients age less than 10 years and above 75 years,patients having severe co-morbid condition like severe diabetes mellitus,chronic end stage renal diseases,sepsis were excluded from the study.

Method

The flap axis lies about 2 cm posterior to the anterior edge of the latissimus dorsi muscle.The skin island can be anterior to this edge of the muscle. The first incision exposes the anterior edge of the latissimus dorsi muscle between the axilla and the proximal edge of the flap. The skin island is incised around its circumference and elevated anteriorly from the serratus anterior muscle up to the ventral edge of the latissimus dorsi.The pedicle is easily found in the fatty connective tissue medial to the muscle and exposed up to its entry into the latissimus dorsi muscle.

An incision is made from the posterior axillary fold postero-inferiorly toward the iliac crest, 3-5 cm posterior to the medial border of the muscle. The muscle is then separated from the serratus fibers and the medial border is followed cephalad. The course of the pedicle is relatively constant, about 1–2 cm behind the anterior edge of the muscle. By following this route, the serratus branch can be identified and securely spared. After the pedicle has been identified, dissection proceeds along the medial border distally. The skin island is incised circumferentially and the latissimus dorsi muscle is lifted from the serratus anterior muscle by blunt dissection. Stay sutures are applied to prevent the skin from shearing off the muscle.In pedicled flap transfer, a tunnel is made across the apex of the axilla to pass the flap from the back to the front of the chest or to the upper arm.

In free flap transfer, the vascular pedicle is ligated after the recipient site has been prepared for anastomosis. Before closing the donor site, two suction drains are inserted: one for the axilla and one for the lateral chest.

Results

Mean age of the study population was 44.8 years.The study comprised of 29 male (70.7%) and 12 (29.3%) female patients. Both pedicle and free LD flap were used for breast reconstruction in 11 (26.82%)cases, post trauma tumor soft tissue defect over upper extremity-17 cases(41.46%) and lower extremity defects in 9 cases (21.95%),one case of post tumor scalp defect and one case of post bear mauling scalp defect(4.87%) and two cases of implant exposure over back(4.87%). Among 41 cases, 13 (31.7%) free flaps was done and in 28 cases (68.3%) pedicle flap was done. Minimum duration of surgery was 90 minutes & maximum duration was 280 minutes.Post-operative complications were seen in 8 patients. Two pedicle LD flaps used for upper extremity underwent superficial distal necrosis which was managed by debridement and SSG. In 2 cases,infection managed conservatively. 2 pedicled LD flaps used for breast reconstruction developed seroma and one LD flap used for upper limb reconstruction was complicated by hematoma formation. Among 13 free flap cases; in 2 cases revision arterial anastomosis was done out of which one had complete flap loss which required a bipedicled fascio-cutaneous flap. Minimum duration of hospital stay was 13 days and maximum was 39 days.

Discussion

In 1906, Tansini first described the latissimus dorsi muscle flap[13]. By providing muscle coverage, replacing the breast skin and creating a natural ptosis,the latissimus dorsi helps to restore form and function in breast reconstruction[14]. The LD Flap is preferred for patients who are not candidates for the

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TRAM flap, for autologous breat cancer reconstruction due to previous abdominoplasty, prior TRAM, insufficient abdominal skin or fat, and high-risk comorbidities such as diabetes, obesity, or tobacco use. In irradiated breasts, the LD flap provides a well-vascularized tissue to the ischemic chest wall. Partial mastectomy or lumpectomy defects can also be corrected by LD flap. In our study we used 11 pedicled LD Flap for post mastectomy breast reconstruction. We took Skin Island transversely across the back to conceal the donor area defect. In 9 cases, donor defect was closed primarly & in remaining two cases SSG was employed.

D'Este also described a superiorly based flap of LD muscle and overlying skin based in the axilla for reconstruction of chest wall at the time of radical mastectomy. Hutchins [15]employedlatissimus dorsi muscle for chest wall coverage for lymphedema prevention following mastectomy. The Tansini technique was also described by Muhlbauer & Olbrisch and Olivari[16].

Large soft tissue defects of the upper limb present a challenge to the reconstructive surgeon. For small to medium sized defects local flaps such as pedicled lateral arm flaps are best suited while large defects involving the lateral and posterior parts of the upper limb require the use of free flaps or pedicled flaps from the trunk. We prefer LD flap due to its versatility and reliable vasculature. In a disadvantage, sacrificing the muscle can lead to higher incidences of post-operative seromaand functional disability especially in athletes. We also used two cases of pedicled LD for implant exposure in spine. In lower extremity defects, owing to paucity of local soft tissue and blood supply,methods for reconstruction like direct closure, SSG, and local flaps including the muscle flap, cross-leg flap, and free flaps may be insufficient[17]. Local flaps have the disadvantage of limiting mobility. The cross-leg flap restrict the leg movements and also requires a secondary operation to isolate the pedicle.The free flap requires microsurgical techniques and good vascularity of blood vessels at the recipient sites,prolonging the operation time but has advantages in having agood vascularity, identical tissue texture and almost no limitation on its use as far as size of the defect sites is concerned. Pollak *et al*.[18] reported a better prognosis in reconstruction using a free flap even instead of a local flap for a small sized defects. In our study we used 3 free LD flaps for post traumatic leg defects.We used anterior tibial artery as recipient vessel in two cases and posterior tibial artery in seven cases. It isappropriate to use a free muscle flap in cases of larger sized defects as the muscle has a rich vasculature and resistant to infection. Therefore, we used a muscle flap in the reconstruction ofinfected wound defects. Moreover, a muscle flap has the advantage that its thickness decreases with time due to muscle atrophy.

Larger scalp defects may require multiple or larger rotation flaps, free tissue transfer or tissue expansion. Although tissue expansion enables replacement with local hair bearing skin it was not possible in our case due to limited scalp tissue. Free tissue transfer allowssingle stage scalp reconstruction[19]. In our two cases we used LD muscle free flap(superficial temporal artery as recipient vessel in one case & facial artery in the other).

Conclusion

The latissimus dorsi is the largest muscle in the human body. LD flap is not limited by size of the defect & thus is extremely useful and reliablefor medium to large soft tissue limb defects in complex post traumatic distal lower limb injuries & grossly contaminated wounds, LD flap provides excellent reconstructive outcomes.The easy reach and reliability of LDflap for coverage of trunk region makes it an attractive one stage alternative for coverage of exposed implants in back spine region. The LD flap is also an ideal flap for primary breast reconstruction providing bulk and preserving function. Thusthis versatile and reliable LD Flap provides the reconstructive surgeon an excellent option for soft tissue coverage, restoring form andfunction even in complex and challenging scenarios.

Table 1a: Distribution of cases according to site & cause

Site	Cause of defect	Total no of cases
Breast	Post carcinoma mastectomy	11
Upper Limb	TraumaPost tumor excision	17
Lower Limb	Trauma	09
Scalp	Bear maulingPost tumor excision	02
Back	Trauma	02

Table 1b: Sex distribution and type of flap used

Sex	No of cases
Male	29
Female	12
Type of flap	No of cases
Pedicled flap	28
Free flap	13

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Table 2: Flap complications

Complications	No of cases
Seroma	02
Infection	02
Superficial distal margin necrosis	02
Hematoma	01
Complete flap loss	01

Fig 1: Post mastectomy (ca breast) defect reconstructed with pedicle LD Flap

Fig 2: Right upper limb sarcoma-reconstructed with Pedicle LD Flap

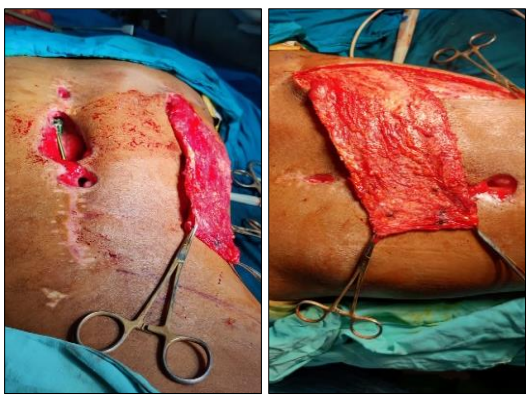

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Fig 3: Implant exposure over the spine covered with pedicled LD Flap

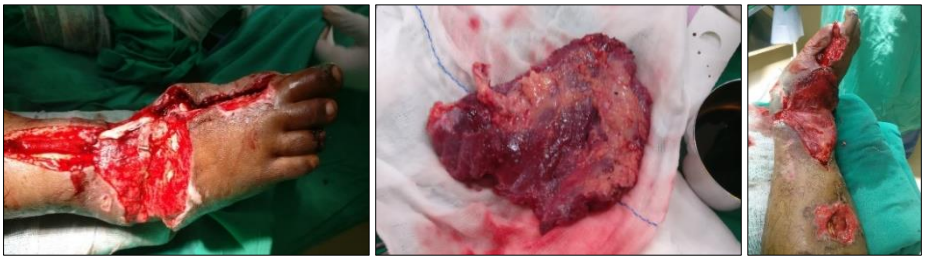

Fig 4: Post traumatic dorsum of foot defect covered with free LD Flap

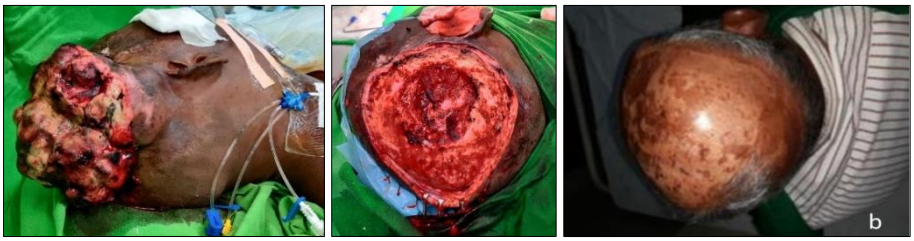

Fig 5: Post tumor excision scalp defect-covered with free LD Flap, follow up after 6 months

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