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Reconstruction of Soft Tissue Defect with Exposed Spine by Latissimus Dorsi Myocutaneous Flap – Reconstructive Challenge and our Experience

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Abstract:

Introduction: The reconstruction of the soft tissue defects with exposed spine poses a challenge to reconstructive surgeons due to the curved contour and strong skin tension of the back. Implant and metal exposure increase the difficulty of covering such defects. Objective**:** The purpose of this study was to share our experience regarding reconstruction of soft tissue defect with exposed spine using Latissimus dorsi (LD) myocutaneous flap. ***Materials and Methods:*** This was a prospective observational study, conducted in the Burn & Plastic Surgery department of Rangpur medical college hospital, Rangpur over a period of three years July 2019 to June 2022. Here 15 patients with soft tissue defect in posterior midline with exposed spine were reconstructed with Pedicled Latissimus dorsi (LD) flap. Outcome following the procedure in these patients was observed. ***Result:*** Among 15 patients, 12 were male and 03 were females, with male to female ratio of 4:1. The lowest age was 18 years and the highest age was 66 years with median 38 year. The major cause (80%) was post operative soft tissue defect and in 20 % case it was due to high voltage electric burn. In 8 cases there was exposed implant. The standard myocutaneous flap was harvested in all cases. The donor site was closed primarily in all cases. In 03 cases skin graft was placed over transferred muscle. The outcome of reconstruction was satisfactory in all cases. Four patients had minor complications which have managed non operatively. One of the patients had surgical site infection which was controlled according to culture-specific antibiotics, and another two patients had partial dehiscence of donor site wound which healed spontaneously. One patient developed seroma in donor site which resolved in time with local care. ***Conclusion:*** Pedicled Latissimus dorsi muscle flap is a straight forward and versatile option for reconstruction of soft tissue defect with exposed spine with minimal donor site morbidity.

Keywords: Latissimus dorsi, exposed spine, soft tissue defect.

INTRODUCTION

Reconstruction of posterior midline soft tissue defect is challenging especially in the cases of exposed vertebral hardware, spinal cord and cerebrospinal fluid leakage due to the low degree of vascularity in this area, strong skin tension, lack of tissue, and the curved contour of the back[1]. Defects can derive from trauma, tumor resection or debridement following postoperative infections or electric burn. The standard procedure for addressing soft tissue defect with exposed spine is wound excision followed by tensionless stable coverage with well padded vascularized muscle flap that obliterates dead space. The Latissimus dorsi (LD) flap as well as the Trapezius myocutaneous flap or sliding paraspinous muscle flaps are common treatment options for posterior midline soft tissue defect[2-3]. To date, there is no gold standard for the treatment of dorsal midline defects with exposed spinal hardware[4]. Considering the bulk, vascularity and arc of rotation, Latissimus dorsi (LD) muscle flap can be a reasonable option for reconstruction of soft tissue defect with exposed spine. It provides sufficient bulk to fill up the dead space, anatomical variation is rare, long pedicle length which favor greater arc of rotation. Moreover, it is easy to harvest with minimum donor sire morbidity.

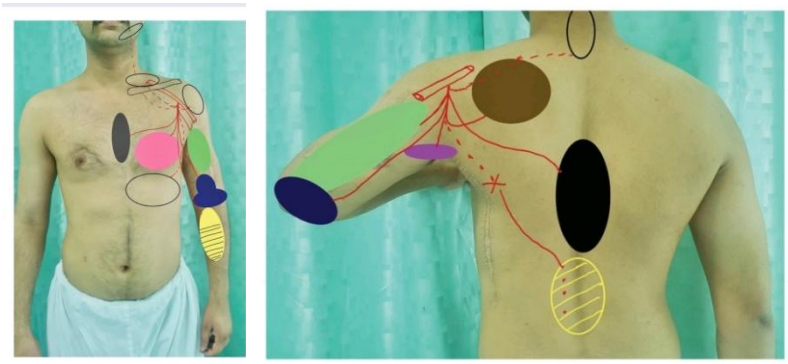
MATERIALS AND METHODS

A prospective, observational study design was used in the Department of Burn & Plastic Surgery, Rangpur medical college hospital, Rangpur over a period of three years July 2019 to June 2022. Here 15 patients with posterior mid line soft tissue defect of variable sizes with exposed spine underwent coverage with pedicled Latissimus dorsi (LD) flap. We have observed the prospectively collected data of the patients who underwent reconstruction of soft tissue defects with pedicled LDMF between July 2019 to June 2022. By considering the clinical scenarios, the location of flap inset, the arc of rotation, reach of the flap, and associated complications, we put forward the significant findings from our experience.

Surgical technique:

Design and Marking: All patients were operated under general anesthesia in the lateral position. Latissimus dorsi (LD) muscle flap is marked in a standard fashion (Fig 2c): the medial border at the mid-line in the back, upper border at the tip of scapula, lower border at the iliac crest, and lateral border at the posterior axillary line. The skin paddle design should overlie the muscle for reliable perfusion. There are two Basic designs depending on the recipient site requirements and donor site scar location. The largest skin island can be harvested in an oblique fashion. The inferior marking of a skin paddle is generally placed 8cm superior to the posterior superior iliac crest.

Flap dissection: After wound excision the defect was measured and skin paddle was designed accordingly. The skin incision was made around the paddle down to dermis. Dissection proceeds over the epimyseum towards the posterior axillary line to identify the lateral border of the muscle. Similar technique was used to identify the medial and inferior border of the muscle. The plane between the LD muscle and Serratus anterior muscle was dissected. The myocutaneous flap was dissected and islanded on all sides (**fig: 2d**). The insertion of LD was divided along with the thoracoacromial vessels & thoracodorsal nerve, the flap made completely islanded based on thoracodorsal vessels. Flap donor-site wound was closed primarily keeping a negative suction drain insitu (fig 2e). Postoperatively, shoulder was immobilized in 45 degrees abduction to avoid pedicle compression.



a b

Fig. 1(a-b); Arc of rotation of LD flap

Case series

a. Exposed implant b. After excision c. Flap design

d. Flap elevation e. immediate post operative f. three weeks after operation

Fig. 2 (a-f): soft tissue defect with exposed implant reconstructed with LD myocutaneous flap.

a b c

Fig.3 (a-c) Post electric burn wound with exposed spine covered with pedicled LDMF

RESULTS

Fifteen patients underwent LDMF for the reconstruction of posterior mid line soft tissue defect of variable sizes with exposed spine between July 2019 and June 2022. The median age was 38 years (range: 18–66 years), male: female ratio was 4:1. The most common cause of the soft tissue defect was post surgical defect (80 %). The flap was used to reconstruct the soft tissue defect over post surgical wound in 12(80%) cases and post electric burn wound in 03(20%) cases (Table I). The LDMF could resurface the defect over cervical spine (Fig.3c). In 80% case the defect was over the dorsolumbar region and in 20 % cases defect was over cervical region (table II). Donor site was closed primarily in all patients. This is due to the fact that these defects are more often longitudinally oriented and skin paddle was designed so as the donor-site closure was facilitated. There was no major complication like partial or total flap necrosis in our study. Four patients (Table III) had minor complications (managed non operatively), one of the patients had surgical site infection which was controlled according to culture-specific antibiotics, and another two patients had partial dehiscence of donor site wound which healed spontaneously. One patient developed seroma in donor site which resolved in time with local care.

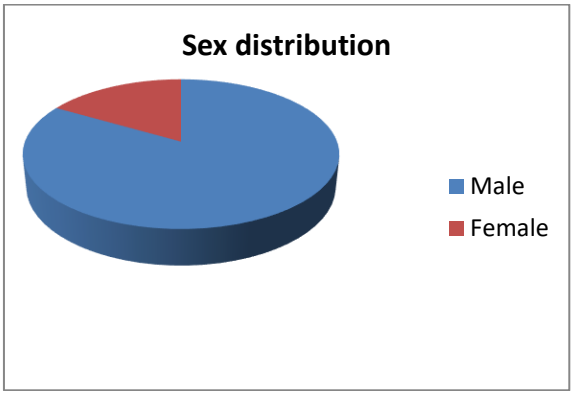


Chart 1. Pie chart showing male female ratio

Table I: Anatomical location of the posterior midline soft tissue defects reconstructed with pedicled LD flap

Sl no	Anatomical location	No patient	% patient
1	Dorsal region	12	80
2	Cervical region	03	20
	Total	15	100

Table II: Causes of soft tissue defect

Cause	No patient	% patient
Post operative	12	80
High voltage electric burn	03	20
Total	15	100

Table III: Complications and management

Name of complication	Number of patients	Management of complication

Surgical site infection	01	Culture specific antibiotics
Partial dehiscence of donor site	02	Secondary healing with regular dressing
Seroma	01	Resolved spontaneously

DISCUSSION

Reconstructive surgery is always a magnificent combination of classical principles of surgical technique, critical anatomical assessment and application with innovative formulation of newer options[5,6]. In these consequences Latissimus dorsi muscle flap is verified with different techniques & combination, in variable body parts with different purposes required by the recipient site[7,8]. A variety of flaps are available for reconstruction of posterior midline soft tissue defects like Latissimus dorsi muscle flap, Trapezius flap, perforator based paraspinal flap and free flaps.[9-12] Latissimus dorsi muscle/myocutaneous flap can provide abundant tissue which can cover extensive soft tissue defects providing stable vascularized cover. The donor-site morbidity is very minimal compared with the other flaps in the region. In fact, Tansini originally described LDMF for resurfacing anterior chest wall deformity following radical mastectomy. To date no concrete reconstructive treatment algorithm is present for this complex defect[13]. Classic approaches for defect coverage of the spine describe flap choice dependent on spine levels, such as upper, middle and lower third. Casas and Lewis et al. reported a successful systematic regionalized approach for the reconstruction of acquired midline defects of the back using Latissimus dorsi, Trapezius, gluteus maximus, and paraspinous muscle flaps[14]. Here we used pedicled Latissimus dorsi muscle flap for reconstruction of soft tissue defect with exposed spine involving upper and middle part of posterior midline. It is important to remember that some defects located within the middle and high thoracic levels could be managed with either the Trapezius or Latissimus dorsi flaps. In our case, we favored the use of the Latissimus dorsi flap because of the greater morbidity reported with functional loss of the trapezius[15].

Very few flap options exist for reconstruction of large midline lower back defects[16]. various perforator based fasciocutaneous flap have been described but these flaps do not provide sufficient bulk to fill in such large defects. When used for an extensive defect in the lumbosacral area the pedicled Latissimus dorsi flap is restricted by its pedicle at the axilla.[17] The reversed Latissimus dorsi flap is not reliable in this situation because the paralumbar perforator vessels might have been destroyed[18]. As an alternative, the Latissimus dorsi flap can be transplanted into the defect by lengthening the pedicle with an interpositional vein graft or by transferring the muscle as a free flap to new recipient vessels[19,20]. Reverse LD has been considered as the first option in reconstructing large lower back composite defect[21]. One of the limitations of our study was we have not use LD flap for this indication. The other limitation is of small sample size.

CONCLUSION

The pedicled Latissimus dorsi muscle flap proved to be a valuable and reliable tool for reconstruction of posterior midline soft tissue defect with exposed spine with minimal complications.

REFERENCES

1. DI Summa PG, Largo RD, Ismail T, et al. Reconstruction of spinal soft tissue defects with perforator flaps from the paraspinal region. In Vivo. 2019;33:827-32.
2. Dumanian GA, Ondra SL, Liu J, et al. Muscle flap salvage of spine wounds with soft tissue defects or infection. Spine (Phila Pa 1976) 2003;28:1203-11. 10.1097/01.BRS.0000067260.22943.48 [PubMed] [CrossRef] [Google Scholar]
3. Hallock GG. Reconstruction of posterior trunk defects. Semin Plast Surg 2011;25:78-85. 10.1055/s-0031-1275174 [PMC free article] [PubMed] [CrossRef] [Google Scholar]
4. Meiners T, Flieger R, Jungclaus M. Use of the reverse latissimus muscle flap for closure of complex back wounds in patients with spinal cord injury. Spine (Phila Pa 1976) 2003;28:1893-8. 10.1097/01.BRS.0000083173.86878.1B [PubMed] [CrossRef] [Google Scholar]
5. Bostwick J, Nahai F, Wallace JG, et al. Sixty latissmus dorsi flaps. Plast Reconstr Surg.1979:63: 31−41
6. Tahseen A. Cheema S et al. Transfer of Latisssimus Dorsi Muscle as as a Myocutaneous Flap.JPMA, 54 -58, March 1991.
7. Buntic R F,Horton K M,Brooks D et al. The free partial superior Latissimus muscle flap: preservation of donor site form and function. Plast Reconstr Surg 121:1659,2008
8. Mohamed EI-Sh, Mohamed M et al. Microsurgical free tissue transfer as a valuable reconstructive procedure in foot reconstruction. Ind J Plast Surg 2007,vol 40,issue 2
9. Cohen M, Ramasastry SS. Reconstruction of complex chest wall defects. Am J Surg 1996;172(1):35–40
10. Ramakrishnan V, Tare M. Post-mastectomy breast reconstruction: microsurgical methods. Indian J Plast Surg 2007;40:82–89

11. Ramakrishnan VV. Microsurgical reconstruction of the breast: 'the versatile lower abdomen' Indian J Plast Surg 2004;37:18–22
12. Raje R, Chepauk R, Shetty K, Prasad R. Breast reconstruction with free anterolateral thigh flap. Indian J Plast Surg 2003;36:84–88
13. Mericli AF, Largo RD, Garvey PB, et al. Immediate Reconstruction of Complex Spinal Wounds Is Associated with Increased Hardware Retention and Fewer Wound-related Complications: A Systematic Review and Meta-analysis. Plast Reconstr Surg Glob Open 2019;7:e2076. 10.1097/GOX.0000000000002076 [PMC free article] [PubMed] [CrossRef] [Google Scholar]
14. Klink BK, Thurman T, Wittpenn GP, Lauerman WC, Cain JE. Muscle flap closure for salvage of complex back wounds. Spine. 1994;19:1467-70.
15. Casas LA, Lewis VL. A reliable approach to the closure of large acquired midline defects of the back. Plast. Reconstr. Surg. 1989;84:632-41.
16. de Fontaine S, Gaede F, Berthe JV. The reverse turnover latissimus dorsi flap for closure of midline lumbar defects. J Plast Reconstr Aesthet Surg 2008;61(8):917–924.
17. Fudem GM, Marble KR. Latissimus dorsi free flap for sacral wound closure: the world's longest vein grafts for free tissue transfer. Microsurgery 1996;17:449-51.
18. Diaz J, McDonald WS, Armstrong M, et al. Reconstruction after extirpation of sacral malignancies. Ann Plast Surg 2003;51:126-9.
19. Biagini R, Ruggieri P, Briccoli A, et al. Use of the trans-abdominal rectus abdominis flap in sacrum surgery. Chir Organi Mov 2001;86:1-5.
20. Giesswein P, Constance CG, Mackay DR, Manders EK. Supercharged latissimus dorsi muscle flap for coverage of the problem wound in the lower back. Plast Reconstr Surg 1994;94:1060-3.
21. Stevenson TR, Rohrich RJ, Pollock RA, Dingman RO, Bostwick J, III. More experience with the "reverse" latissimus dorsi musculocutaneous flap: precise location of blood supply. Plast Reconstr Surg 1984;74(2):237–243.

