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CASE REPORT

Reverse Latissimus Dorsi Turnover Muscle Flap for Coverage of a Secondary Midline Lumbar Defect following Spinal Surgery

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ABSTRACT

The reconstruction of defects located in the midline lumbar region area is difficult, especially when occurring following a neurosurgical procedure. They display a high level of complexity with respect to dural exposure, exposure of implants, deep irregular contours and bacterial contamination of the wound. The difficulty is made more challenging by the fewer possible options of regional flaps available in the vicinity. In order to obtain a well-vascularized tissue, with good resistance to bacterial contamination and easy to shape into such defects, the reverse latissimus dorsi turnover muscle flap is a useful surgical option. In this article, we are reporting a case of post-traumatic spine surgery wound complication resulting in a midline lumar defect that was reconstructed with a reverse latissimus dorsi (LD) turnover muscle flap.

Keywords: Midline lumbar defect, Reverse LD, Turnover flap.

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INTRODUCTION

Large midline defects usually occur after complications in wound healing following surgery of spine.[1] It results in a complex three-dimensional (3D) tissue defect with exposed vertebral bone, duramater and implants[2] with or without cerebrospinal fluid leak. Such defect has to be thoroughly debrided, followed by filling of defect with a well-vascularized flap. The latissimus dorsi (LD) flap is a versatile, large, robust flap[3] supplied by the thoracodorsal artery (dominant pedicle) and perforating vessels from the Intercostal and Lumbar arteries (secondary pedicles).[4,5] It is a type 5 muscle flap,[6] so can be raised over its secondary pedicles, which is the basis for this flap.

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CASE REPORT

A 25-year-old male patient with history of road traffic accident sustained L2 to L4 spine fracture with traumatic paraplegia. Patient was operated by neurosurgeons, who did lumbar spine fracture fixation with transpedicular titanium screws and rods. Postoperatively on day 15, the suture line showed marginal skin necrosis with seropurulent discharge, along with partial wound gaping (Fig. 1). Under general anesthesia, patient was operated in prone position. Necrosed skin and subcutaneous tissue, along with unhealthy lumbosacral fascia and paraspinal muscles were debrided. Thorough debridement and lavage, resulted in a midline lumbar defect measuring approximately 13 × 9 cm, with exposed bone, dura and implants (Fig. 2).

TECHNIQUE

Incision was extended laterally on left side, from the upper end of the defect up to the posterior axillary fold, to expose the muscle at its insertion. This tendinous part of the muscle was then divided close to its insertion. Thoracodorsal pedicle was identified and ligated. The skin incision was then extended to mid-axillary line and the muscle was released from its attachment to

Fig. 1: Operative wound dehiscence with skin edge necrosis

Fig. 2: Defect after debridement with exposed implants and flap raised

Fig. 3: Flap inset done to fill the defect

the inferior angle of scapula, slips to lower four ribs and iliac crest (Fig. 3). The entire muscle was then mobilized and flipped over to fill in the lumber defect. The tendinous part was used for anchoring of the muscle to the lumber fascia (Fig. 4). Suction drain was placed. Skin closure was done in layers, by advancing lumbar skin flaps based laterally on the right side, with excision of Burow's triangle (Fig. 5). Postoperatively, patient was nursed in prone position on air-bed for 14 days. Drain removal was done on day 10 followed by suture removal on day 15. Suture line healed well without any complications.

DISCUSSION

Instrumentation, now an integral component in the treatment of numerous spinal pathologies, is correlated with a 0.7 to 20% infection rate.[7] The ability to manage postoperative wound infections has become, therefore, more critical and challenging, as they are positively associated with extended hospitalizations, increased morbidity and healthcare costs, poorer long-term outcomes, and greater dissatisfaction with the initial operative procedure. Although the type of spinal surgery most significantly correlates with infection rates, there are multiple other factors that also contribute to the risk of infection including: age, male sex, steroid therapy, diabetes, smoking, American Society of Anaesthesiology (ASA) score, obesity, malnutrition, presence of comorbidities and previous surgery.[7] A higher infection rate is also attributed to longer surgical duration, greater soft tissue dissection, and increased muscle/skin retraction.[8]

Large midline defects of the lower lumbar area, fortunately rare, are difficult to treat. Defects in this region are usually secondary to surgery of the spine, after correction of myelomeningocele, tumor removal, lumbar laminectomy, wound healing complication following instrumentation in traumatic spine injuries and postoperative pressure sores.[2] For the reconstruction of such defects, local rotation or transposition skin flaps are available, but are of limited use because they are difficult to mobilize and will not bring into a 3D defect the necessary volume

Fig. 4: Skin cover with lumbar advancement flap

Fig. 5: Final skin closure

of vascularized tissue. Other fasciocutaneous flaps have been described, including the lumbar artery perforator island flap,[9] the scapular flap based on reverse latissimus dorsi flap,[10] and the unipedicled latissimus musculocutaneous flap with a thoracolumbar fasciocutaneous extension.[1] Again these flaps do not provide sufficient tissue to fill in such large defects. A large muscle flap will fill the defect, help control bacterial contamination, provide cover for exposed bones and implants and eventually control cerebrospinal fluid (CSF) leak.

The LD flap is a well-known flap that can be transferred as a muscle only flap, or as a musculocutaneous flap. This flap can be transferred based on its dominant pedicle, or can also be transferred based on its secondary lumbar pedicles,[5] and used in reverse fashion. This type of transfer is called the 'reverse LD flap'. This flap has been successfully used for lumbar defects as a transposition muscular flap or as turnover flap.[2]

In the case reported in this paper, debridement of an infected post-spine surgical wound, resulted in a midline lumbar defect of 13 × 9 cm^2, with exposed bone and implant. A reverse LD muscle turnover flap was used to cover the defect that provided the muscle bulk to fill in the 3D irregularly contoured defect. The ability of the muscular tissue to control infection in a contaminated wound was well-documented by uneventful postoperative wound healing.

Casas et al[1] propose to cover extensive lumbar defects with two distinct layers of muscular tissue. The deep layer is composed of a paraspinous muscle thoracolumbar turnover flap to cover the dura mater. The more superficial layer can be reconstructed in different ways. The "reverse LD transposition flap", or "unipedicled LD myocutaneous flap with a thoracodorsal fasciocutaneous extension". de Fontaine et al[2] used reverse turnover LD flap for closure of midline lumbar defects in his series of four cases of various etiologies.

CONCLUSION

Reconstruction of large midline defects in the lumbar region are a particularly complex challenge for the plastic surgeon. The "reverse LD turnover flap" can fulfill the goals in reconstruction of these defects as a single flap:

- It fills the 3D defect with well vascularized muscle tissue
- Helps in control of the CSF leak if present
- Provides control to the bacterial contamination
- It leaves a low donor site morbidity. In this paper, we report our favorable experience with the reverse LD turnover muscle flap for the coverage of a large post-neurosurgical secondary lumbar defect.

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