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CASE REPORT

V-Y Latissimus Dorsi Musculocutaneous Flap for Coverage of Exposed Spinal Osteosynthesis Hardware Following Corpectomy

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Abstract

Background: Posterior spinal instrumentation carries a significant risk of wound complications, including hardware exposure, which often requires flap coverage due to inadequate local tissue vascularity. The pedicled latissimus dorsi flap is a reliable option for posterior trunk reconstruction, though reports of its use in salvage of exposed spinal osteosynthesis following complex corpectomy remain limited.

Methods: We present the case of a 69-year-old female who developed a persistent cutaneous fistula and exposed spinal hardware following L2 corpectomy and posterior instrumentation from T10 to S1. After partial improvement with debridement and negative pressure wound therapy, a V-Y advancement musculocutaneous latissimus dorsi flap was performed. The surgical technique focused on preservation of the thoracodorsal pedicle, release of muscular insertions, and tension-free closure.

Results: The postoperative course was uneventful, with complete wound healing and stable soft tissue coverage. No flap complications or signs of infection were observed.

Conclusion: The V-Y advancement musculocutaneous latissimus dorsi flap is an effective option for salvage of complex posterior spinal wounds with exposed hardware. Its versatility and robust vascular supply make it a valuable reconstructive tool.

Keywords

Latissimus dorsi flap, Spinal fusion, Prosthesis-related complications, Surgical flap, Reconstructive surgical procedures

Introduction

Posterior spinal instrumentation is a widely employed technique for the management of spinal deformities, including scoliosis, as well as degenerative conditions, trauma, and tumors [1]. While generally effective, these procedures are associated with a significant risk of wound complications, with reported rates ranging from 5% to 15% depending on patient factors, surgical complexity, and the use of hardware [2]. Among the most challenging complications are chronic fistula formation and hardware exposure, which often arise in the context of prior surgical interventions, inadequate soft tissue vascularity, and the presence of foreign material [3].

The management of exposed spinal osteosynthesis hardware requires a multidisciplinary approach, typically involving surgical debridement, negative pressure wound therapy, and definitive soft tissue coverage [4]. Local tissues in the posterior trunk are often compromised due to previous incisions, infection, or scarring, limiting the utility of primary closure or local random flaps. In such scenarios, regional flaps with robust vascular supply become essential to achieve reliable coverage and obliterate dead space. Reconstructive algorithms for posterior trunk defects emphasize the importance of selecting flaps based on defect location, size, and available vascular pedicles [5].

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In this report, we present a case of successful salvage of exposed spinal osteosynthesis hardware following L2 corpectomy and posterior instrumentation using a V-Y advancement musculocutaneous latissimus dorsi flap. We describe the surgical technique and highlight the reconstructive principles that contributed to a favorable outcome.

Case Description

Patient presentation

A 69-year-old female with no relevant allergic or chronic degenerative medical history underwent L2 corpectomy with posterior pedicle instrumentation from T10 to S1 for scoliosis correction. In the early postoperative period, she developed a cutaneous fistula with seropurulent discharge. Initial management consisted of surgical debridement and negative pressure wound therapy (VAC), which resulted in partial improvement but failed to achieve definitive resolution.

The patient was subsequently evaluated by the Plastic and Reconstructive Surgery service. Physical examination revealed a 4 × 4 cm midline defect in the thoracolumbar region with exposed spinal osteosynthesis hardware, including pedicle screws and rods. The surrounding tissue exhibited hypertrophic granulation without erythema, purulent drainage, or clinical signs of active infection or necrosis. Based on these findings, a decision was made to perform an advancement latissimus dorsi musculocutaneous flap for definitive coverage.

Surgical technique

The procedure was performed under general anesthesia with the patient positioned in prone decubitus. A selective debridement was carried out, removing devitalized tissue and hypertrophic granulation, followed by exhaustive irrigation of the wound bed.

A musculocutaneous latissimus dorsi flap was designed with dimensions adequate to cover the defect and obliterate the associated dead space (Figure 1). Dissection began with identification of the lateral border of the latissimus dorsi muscle, proceeding from lateral to medial while preserving the underlying trapezius muscle. Dissection was extended toward the axilla to identify and carefully preserve the thoracodorsal pedicle and its main perforating vessels.

To facilitate advancement of the flap toward the thoracic defect, muscular insertions were released from the vertebral spinous processes, iliac crest, and humeral insertion. The muscular component was positioned directly over the exposed osteosynthesis material to provide protective coverage (Figure 2) and secured to the fascial plane with absorbable sutures. The cutaneous component was closed in a V-Y configuration, effectively eliminating tension at the closure site. A

Figure 1: Intraoperative photograph showing design of the V-Y advancement musculocutaneous latissimus dorsi flap. The skin paddle is outlined over the muscle territory, with the V-Y configuration planned to facilitate tension-free closure.

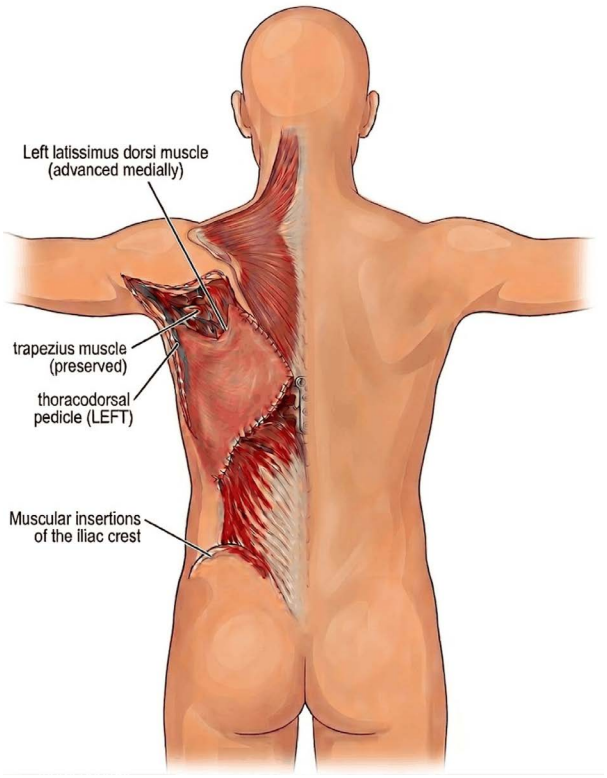

Figure 2: Post-advancement view. The left latissimus dorsi musculocutaneous flap is advanced medially, with the muscle covering the exposed spinal hardware.

Figure 3: Intraoperative view after flap inset. The muscular component is positioned directly over the exposed spinal osteosynthesis hardware, providing protective coverage. The cutaneous component is closed in a V-Y fashion with no residual tension.

subfascial suction drain was placed, and layered closure was completed.

Postoperative course

The flap demonstrated adequate perfusion throughout the postoperative period, providing reliable coverage and protection of the osteosynthesis hardware (Figure 3). The postoperative course was uneventful, with no evidence of flap compromise, ischemia, necrosis, or infection. The patient maintained satisfactory flap thickness and preserved shoulder function. Complete wound healing was achieved prior to discharge.

Discussion

The latissimus dorsi muscle is a large, flat, triangular muscle that covers the posterior and inferior aspects of the thorax. Its extensive origin includes the spinous processes of T7 through L5, the thoracolumbar fascia, the iliac crest, the lower four ribs, and the inferior angle of the scapula. These fibers converge into a single tendon that inserts into the intertubercular groove of the humerus, providing functions of adduction, extension, and internal rotation of the shoulder. Anatomically, the muscle lies in direct contact with the trapezius, external oblique, serratus anterior, and teres major muscles [6].

From a vascular perspective, the latissimus dorsi corresponds to Type V in the Mathes and Nahai classification of muscle flaps, characterized by a dominant vascular pedicle with secondary segmental pedicles [7]. The dominant pedicle is the thoracodorsal artery, a branch of the subscapular artery, which descends approximately 2 to 3 cm lateral to the medial border of the muscle and enters its deep surface about 4 cm distal to the inferior scapular border and 5 cm inferior to the posterior axillary fold. The thoracodorsal artery subsequently divides into a vertical branch running parallel to the lateral border of the muscle and a transverse branch parallel to its superior border. The secondary segmental pedicles arise from the posterior intercostal and lumbar arteries, emerging 5 to 10 cm from the posterior midline [8]. This dual vascular supply confers significant reliability to the flap, allowing for versatile design and safe elevation even in cases where the dominant pedicle may be compromised [9].

In the setting of posterior spinal wounds with exposed hardware, the reconstructive surgeon faces several challenges: the need for well-vascularized tissue to cover foreign material, obliteration of dead space, preservation of shoulder function, and minimization of donor site morbidity. The latissimus dorsi flap addresses these requirements effectively. Its robust vascularity promotes healing in a potentially contaminated field, while its muscle bulk effectively obliterates dead space, reducing the risk of seroma and recurrent infection [10]. In our case, the V-Y advancement configuration allowed for tension-free closure and minimized donor site deformity, an advantage previously highlighted in reconstructive series of large thoracic defects [11].

Alternative reconstructive options for posterior midline defects include paraspinous advancement flaps, local perforator flaps, and free flap reconstruction. Paraspinous flaps may be insufficient for large defects or when local tissues are compromised by prior surgery or infection. Perforator flaps, such as the medial dorsal intercostal artery perforator flap, offer muscle-sparing alternatives but require advanced microsurgical expertise and may not provide adequate bulk for dead space obliteration [5]. Free flaps, while reliable, entail longer operative times, microsurgical complexity, and potential for anastomotic complications. The pedicled latissimus dorsi flap offers a reproducible, single-stage solution with predictable outcomes and minimal donor site morbidity when properly executed [12].

Several technical considerations contributed to the success of this case. First, meticulous identification and preservation of the thoracodorsal pedicle ensured flap viability. Second, release of muscular insertions from the spinous processes, iliac crest, and humerus allowed sufficient advancement to reach the thoracic defect without tension. Third, placement of the muscular component directly over the exposed hardware provided a protective vascularized barrier. Fourth, V-Y closure of the cutaneous component minimized tension and facilitated primary healing. Finally, subfascial drainage reduced the risk of fluid accumulation and infection.

Conclusion

This case demonstrates that the V-Y advancement musculocutaneous latissimus dorsi flap is a reliable and effective solution for salvage of exposed spinal osteosynthesis hardware following complex corpectomy and instrumentation. The flap remained viable throughout the postoperative period, with complete wound healing, no infectious complications, and preserved shoulder function. The dual vascular supply-characterized as Type V in the Mathes and Nahai system-ensures robust perfusion even in compromised wound beds. For the reconstructive surgeon facing hardware exposure after spinal surgery, the latissimus dorsi flap is not merely an option, but a dependable workhorse that transforms a potentially devastating complication into a manageable problem with excellent outcomes.

Statement of Equal Author's Contribution

All authors contributed substantially to the conception, design, acquisition, analysis, and interpretation of data; drafted and critically revised the manuscript; approved the final version; and agree to be accountable for all aspects of the work.

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Declaration of Competing Interest

The authors have no conflict of interest to declare.

Ethical Approval

This case report was exempted from ethical approval by the institutional review board as it describes a single clinical case with no experimental intervention.

Consent

Written informed consent for publication of this case report and accompanying images was obtained from the patient.

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