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Extended Lower Trapezius Myocutaneous Flap in Repair of Lmbosacral Defects (A New Tool)

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ABSTRACT

Lumbosacral defect represents a challenging problem to the plastic surgeon, many techniques have been described for coverage of the defect, including direct closure, local flaps (muscle or fasicocutaneous, either proximally or distally based) with various results. We add a new tool for reconstruction of lumbosacral defects using extended lower trapezius myocutenous flap, the clinical role of extended lower trapezius myocutaneous flap in the literature are variable, many describe it for head and neck reconstruction, others for axillary reconstruction, but no one describe it for lower trunk defects. The advantages of my technique, it provides a thick durable coverage, no scar in the midline avoiding scar on dural sac or on vertebrae, donor site closed primarily, it provides relatively large flap, constant pedicle away from the defect, with minimal donor site morbidity.

INTRODUCTION

Large lumbocosacral defects represents a challenging problem to both neurosurgeon and plastic surgeon especially in babies with lumbocosacral myelomeningocele, due to thin membrane, emergency closure is required to avoid meningitis resulting from ascending infections. In addition placing the neural elements back in the spinal canal and closure with dura to protect the working neural elements and help to keep mobility **[1]**.

The dural sac should be covered with good skin without tension at the edge of the wound, primary wound closure for large defect is impossible. The literatures suggests a number of convincing, clever techniques for closure of such defects, including direct closure, local flaps (muscle or fasicocutaneous) either proximally or distally based, and tissue expander **[2,3,4]**.

The extended lower trapezius island myocutaneous flap described by Tan and Tan **[5]** has been used in this study for coverage of lumbosacral defects.

The extended lower trapezius island myocutaneous flap has been used in head and neck reconstruction, cervical region, and axillary reconstruction **[6,7,8]** however, it has not been previously described for lower trunk reconstruction.

PATIENTS AND METHODS

Eight patients presented with lumbosacral myelomeningocele, were admitted to neurosurgery department at Al-Hussein University Hospital, consultation to the author for combined work. The age of patient ranged from one weak to three months, all patient presented by lumbosacral myelomeningocele, with a large defect.

After stabilization, through examination and documentation of the deficit or other congenital anomalies, patient under general anesthesia in the prone position. Neurosurgeon started operation by exploration, lyses of the tethered cord, reposition of the neurofilament and water tight closure of the dural sac.

Flap design:

The technique described in this study has been described by Tan and Tan **[5]** in their study regarding the extended lower trapezius island myocutaneous flap, with some modification to confirm the new indication.

The flap is designed while the patient in the prone position, the trapezius muscle, scapula, and 10^{th} dorsal spinal process were marked. A strait line was drawn from 10^{th} dorsal spinal process toward the tip of the scapula, extended to the anterior axillary line. This line presents the central axis of the flap (Fig. 1). The skin paddle centered over this line, should have sufficient proximal

overlap over the trapezius muscle to capture perforators supplying the flap, including the fascia above the lateral part of the latissmus dorsi muscle. The axis of the flap extension follows the line from the 10th spinal vertebra to the tip of scapula toward the anterior axillary line.

The blood supply based on the dorsal scapular artery (DSA) and their extension, as the terminal branches of the dorsal scapular artery form a network of choke vessels with the intercostal perforating vessels and thoracodorsal artery (TDA), this design enables the flap to have a wide arc of rotation to reach the lumbosacral area.

Surgical technique:

After neurosurgeon ends his work reevaluation of the defect, so skin paddle size and direction can be modified.

Elevation of the flap begins with an incision along the lateral border of the skin paddle down to the latissmus dorsi muscle including the fascia above it within the skin paddle, these fascia should be included, dissection started from lateral to medial, this methods leading the surgeon directly under the trapezius muscle, preserving the latissmus dorsi muscle intact. Dissection proceeds up to the spinal process releasing trapezius fiber from it to give more release and wide arc of rotation (Fig. 2). It's not important to see the dorsal scapular artery as it emerge between the rhomboid muscle, as the proximal dissection to the trapezius muscle is not important.

The skin paddle is rotated down toward the lumbosacral defect, sometimes release incision may be needed to the lateral edge of skin paddle up to the spine of the scapula to give wider arc of rotation.

The donor site is closed directly after dissection of the upper and lower skin flaps, suction drain is left for 48 hours, prophylactic antibiotics may be given, instruction to the parents as there baby should not lying on his back for 5 days (Figs. 3,4,5).

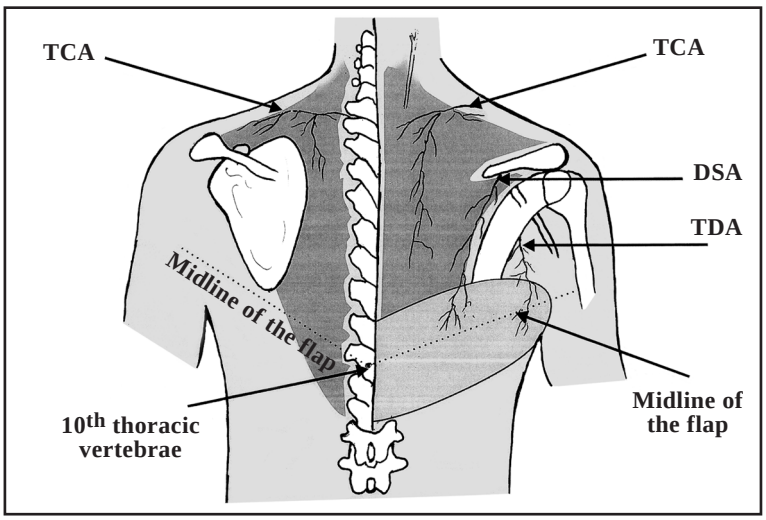

Fig. (1): Diagram showing flap design over a line from 10th thoracic vertebrae toward anterior axillary line, passing by tip of the scapula. Medially skin paddle should overlap the trapezius muscle. (TCA) transverse cervical artery, (DSA) dorsal scapular artery, (TDA) thoracodorsal artery.

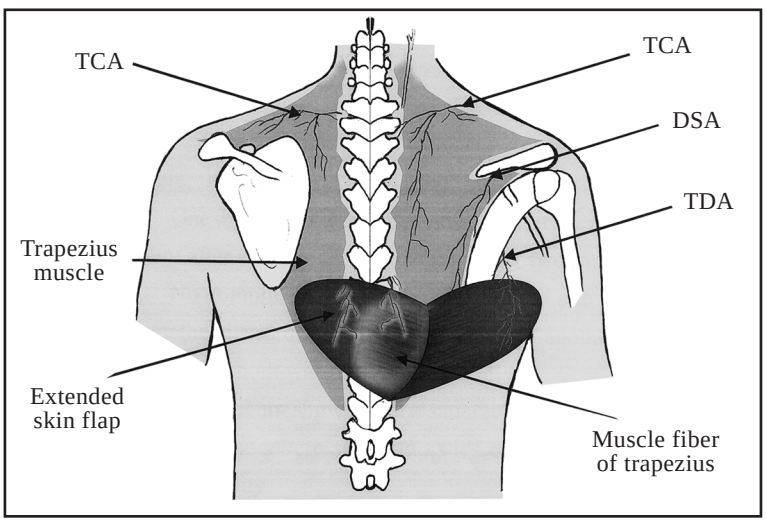

Fig. (2): Diagram showing flap after elevation, the lower fiber of trapezius on the under surface of the flap medially, extended skin including fascia of latissmus laterally. (TCA) transverse cervical artery, (DSA) dorsal scapular artery, (TDA) thoracodorsal artery.

Fig. (3-A): Case (1): Preoperative view.

Fig. (3-B): Case (1): Flap design.

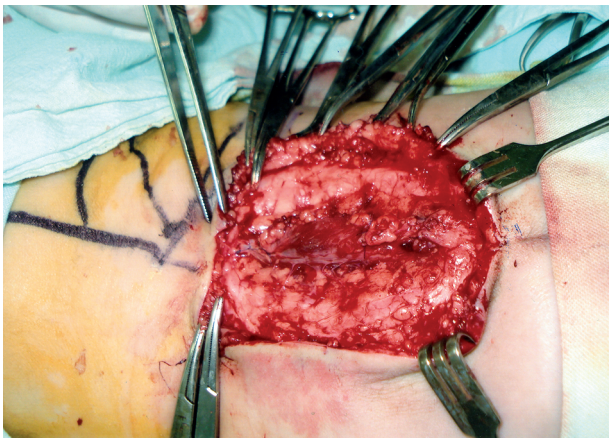

Fig. (3-C): Case (1): Intra operative with water tight closure of dura.

Fig. (3-D): Case (1): Early postoperative with superficial desquamation of distal 1cm which healed spontaneously.

Fig. (3-E): Case (1): Late postoperative view.

Fig. (4-A): Case (2): Preoperative view.

Fig. (4-B): Case (2): Flap in site before transposition.

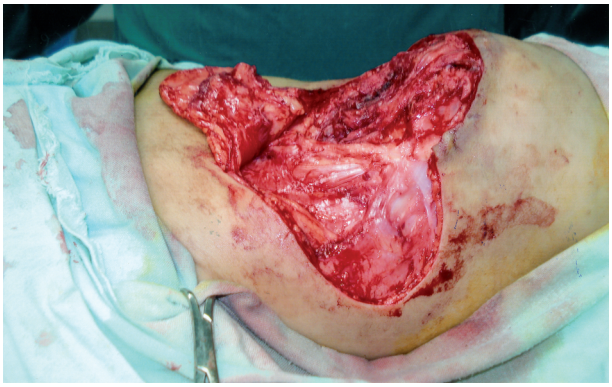

Fig. (4-C): Case (2): Under surface of the flap including muscle fiber.

Fig. (4-D): Case (2): Early postoperative and donor closed directly.

Fig. (4-E): Case (2): Late postoperative.

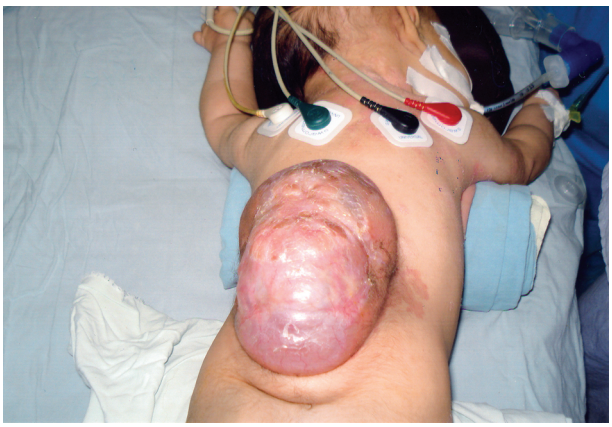

Fig. (5-A): Case (3): Preoperative view.

Fig. (5-B): Case (3): After excesion of sac and flap design.

Fig. (5-C): Case (3): Early postoperative with direct closure of donor site.

Fig. (5-D): Case (3): One week postoperative with minor wound disruption which healed spontaneously.

RESULTS

The extended lower trapezius myocutaneous flap was used to reconstruct eight lumbosacral defects resulting from lumbosacral meningocele, five males and three females.

One baby operated after one week, two patients after two weeks three patients after one month, two patients after two months.

No complications detected a part from one patient with superficial necrosis to the distal one and half centimeter, another one with very mild wound disruption both was treated conservatively.

All patients showed very satisfactory results on discharge and on follow-up, donor site were accepted as it's closed directly with no functional or aesthetic disability.

DISCUSSION

Large myelomeningocele can not be closed directly; the treatment of large defect should be aimed at achieving dural closure and coverage with stable soft tissue. Also direct closure carries the risk of rupture and dural exposure.

To close a large lumbosacral meningocele, Luce et al. **[9]** suggested using a split skin graft after closure of dural sac immediately, and if necessary, later after one year definitive reconstruction with flap coverage. Moore et al. **[10]** used bipedicle latissmus myocutaneous flaps on both sides, sutured together medially. El-Khatib **[11]** reported his experiences with different modalities of latissmus dorsi musculocutaneous flap. Sarifakioglu et al. **[12]** reported using bilateral split latissmus dorsi V-Y based on thoracolumbar perforator for large myelomeningocele. Sheflan et al. **[13]** reported use of distally based latissmus dorsi musculocutaneous island flap. Hayashi and Maruyama **[14]** documented the using of bilateral V-Y laterally based latissmus dorsi musculocutaneous flap.

Gullestad et al. **[15]** successfully used tissue expander for closure of large meningomyelocele. Lapid et al. **[16]** used bilobed flap for closure of myelomeningocele.

In this study, we applied the extended lower trapezius myocutaneous flap to patient with large lumbosacral defect resulting from myelomeningocele, as a new technique for reconstruction of lumbosacral defects, providing a good coverage with local flap consisting of a pliable large flap. Until now no uniform anatomical description of the pedicle of lower trapezius myocutaneous flap, previously this flap used for reconstruction of craniofacial defect **[6,17]**, occipital defect **[7]**, and axillary reconstruction **[8]**.

The lower trapezius muscle flap takes its blood supply from the descending branch of the transverse cervical artery as described by Mathes and Nahai **[18]**.

Tan **[5]**, in his anatomical study found that the dorsal scapular artery is the dominant blood supply to the lower trapezius muscle and extended skin beyond its lateral edge to a distance of about 13cm, and so He described a technique based on the dorsal scapular artery that incorporates an extension of the flap that runs obliquely from the tip of the scapula toward the midaxillary line. He named this flap the extended lower trapezius island myocutaneous flap.

This fasicocutaneous extension of the lower trapezius makes this flap easily reaching the lumbosacral region.

This flap has many advantage for reconstruction of the lumbosacral region, including. (1) The pedicle has a constant anatomical landmarks away from the defect (2) Large skin paddle for large lumbosacral defect (3) Donor site away from the defect so no skin distortion of adjacent skin (4) Donor site can be closed easily and safely with minimal dissection (5) Durable coverage with pliable fasicocutaneous flap (6) Also if there is a problem or complication occurs the flap on the other side is still available.

Conclusion:

The extended lower trapezius myocutaneous flap is a reliable flap with constant pedicle, minimal donor site morbidity, large skin paddle, and wide arc of rotation to fulfill large lumbosacral defect. So this flap can be used successfully and present a new tool and another valuable option for coverage a large lumbosacral defects.

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