

## Large Meningomyeloceles Closure with Proximally Based Fasciocutaneous Flank Flap

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### ABSTRACT

Closure of the skin defect in myelomeningoceles repair is an essential step that determines the quality of the surgical result. We present a modified version of the proximally based fasciocutaneous flap for covering large thoracolumbar or lumbosacral defects. Different types of local flaps (skin or muscle flaps) are widely used for covering skin defects and with various results. We prepare a unilateral long superiorly based fasciocutaneous flank flap with width according to the size of the defect. The donor site closed primarily in most of the cases and grafted from same side gluteal area if closure is difficult. The advantages of our method are: It provides a thick, heavy-duty, skin over the dural sac; the blood circulation of the flap is safe; the need for donor site grafting is not frequent and if needed small thin graft, is taken from adjacent area without disfigurements.

### INTRODUCTION

The large thoracolumbar or lumbosacral meningomyeloceles closure poses a great challenge to the neurosurgeon and especially the plastic surgeon. Due to the thin and vulnerable skin, an emergency closure is required because this is the best way to avoid meningitis originating from the ascending infection. In addition, placing the neural elements back in the spinal canal and closing it with dura protects the working neural elements and helps to keep mobility [1]. The dural sac should be covered with good skin without tension at the edges of the wound. Primary wound closure in such cases is impossible. The efficient redistribution of available tissue by the combined use of transposition and advancement principles resulted in the repair of relatively large skin defects with reduced tension along the closure [2]. As for closure of the large thoracolumbar or lumbosacral defects, the literature suggests a number of convincing, clever, and effective bipedicle and island flap procedures using surrounding skin, subcutis, and most frequently muscle, but periosteum and muscle turnover meth-

ods as well as musculocutaneous advancement and the use of tissue expansion have also been proposed [3,4,5]. The long flank fasciocutaneous flap is another new possibility for the closure of large lumbosacral or thoracolumbar defects which will be discussed.

### PATIENTS AND METHODS

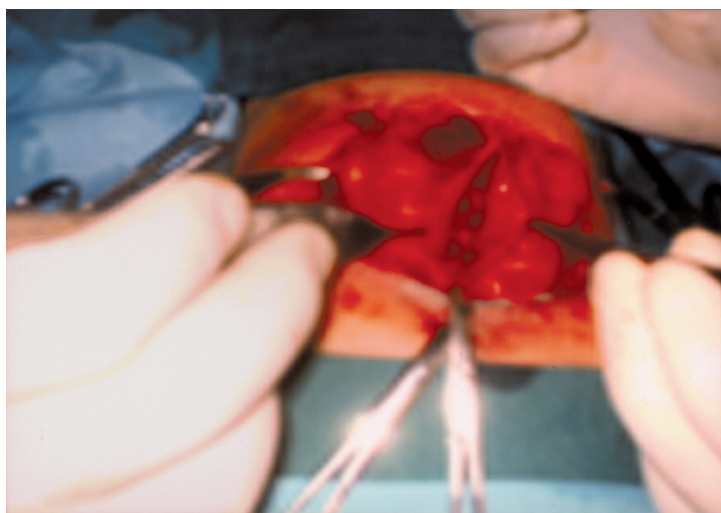
This study was done in King Saoud Hospital, Onayzah, Kingdom of Saudi Arabia (KSA), 16 neonates with large meningomyeloceles (5 lumbosacral and 11 thoracolumbar) were operated upon between August 2001 to April 2004. In all cases the lower limbs showed paraplegia, hypotonia, areflexia, and complete anesthesia; in addition there was rectal and urine incontinence.

#### *Operative Details:*

Most of our patients (9 patients) operated in the first hours of life; 6 with impending rupture of meningocele sac and 3 with CSF leakage, the other (7 patients) operated upon with in the first 24-36 hours after birth and had medium birth weight 2.3kg (range 1.9kg-3.3kg). Defect size was ranged from 7x5-9.5x8cm.

After stabilization, thorough examination and documentation of any deficit or other congenital anomalies of the baby by NICU staff, patient taken immediately to OT, general anaesthesia given, positioning (prone position). Neurosurgeon started exploration, lysis of the tethered cord, repositioning of neurofilaments and water-tight closure of the dural sac (Fig. 1A,B).

Closure of skin defect by proximally based left side flank flap. First the dimensions of the defect measured, the length of our flap equals to 1.5, the width of the defect and the width of the flap equal

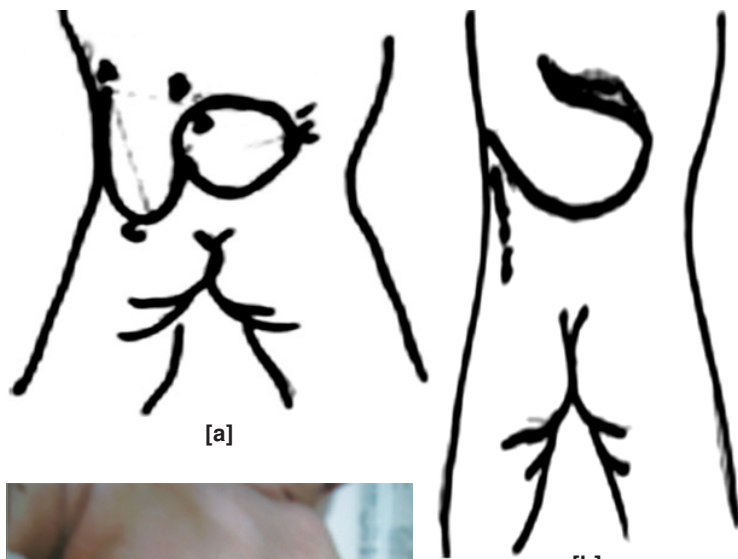


[a]



[b]

Fig. (1-A,B): Large lumbosacral meningocele, and the defect during the dural and neural tube repair.



[a]

[b]



[c]



[d]

Fig. (2-A,B,C,D): Large thoracolumbar meningocele, diagrammatic illustrations and photos before and two weeks after surgery.



[a]



[b]



[c]



[d]

Fig. (3-A,B,C,D): Preoperative and postoperative of some cases.



Fig. (4): Late postoperative of patient in Fig. (2,C).



Fig. (5): Long flap with superficial necrosis of distal part.



to the length of the defect (Fig. 2A,B,C,D). Drawing of the flap boundaries and dissection started from distal to proximal under the thoracolumbar fascia, adequate hemostasis with bipolar diathermy and stitching the fascia to the skin to prevent sheering movement, transposition of the flap to the defect and tension-free skin closure with proline 5/0, we did not use drain under the flap. Donor site closed primarily after undermining all-around, subcutaneous drainage was left in place, if primary closure is difficult we approximate the edges as we can by fixing it to subcutaneous tissues with vicryl 5/0 and grafting the remaining area with thin split thickness skin graft from adjacent gluteal area.

Postoperatively, all patients were maintained in a prone position in NICU for few days, drainage tube was removed on the 3<sup>rd</sup> postoperative day, and stitches usually removed after 10 days, follow up monthly for one year in neurosurgery and plastic surgery OPD.

## RESULTS

This study conducted in the Surgical Department, King Saoud Hospital, Onayzah, KSA, between August 2001 to April 2004. Sixteen neonates with large meningomyeloceles, (5 lumbosacral and 11 thoracolumbar), 9 females and 7 males, 5 operated within 6 hours after delivery, 4 after 16 hours and 7 within 24-36 hours from delivery, operative time ranged from 1.5-2.5 hours. Patients stayed in NICU for 5-13 days.

No complications detected (Fig. 3A,B,C,D and Fig. 4), apart from one patient with superficial necrosis of the distal part of the flap treated conservatively (Fig. 5), and other patient with CSF leak in between the sutures which controlled after insertion of ventriculo-peritoneal shunt.

All patients showed very satisfactory results on discharge and on follow up. All patients scheduled for V-P shunts by the neurosurgeon.

## DISCUSSION

Unfortunately, myelomeningocele repair by direct closure cannot be accomplished in nearly 25% of neonates with large defects, the treatment plan for large myelomeningoceles should be aimed at achieving watertight dural closure and coverage with stable soft tissue [6].

To close a large meningomyelocele Luce and Walsh [7] and Luce et al. [8] have suggested using a split-thickness skin graft after the closure of the dural sac immediately after birth. In the lumbosacral region they consider this to be a final solution in

most cases, but, if necessary, later (at the age of 12 to 18 months) they complete the definitive reconstruction with the latissimus dorsi or gluteus maximus musculocutaneous flaps. Desprez et al. [1] and Moore et al. [9] prepared (latissimus dorsi) bipedicle musculocutaneous flaps on both sides, and these are sutured together medially. El-Khatib [10] reported his experiences with different modalities of latissimus dorsi musculocutaneous flap. Akan et al. [11] reported the use of the bilateral V-Y advancement flap (the slid-in flap) without complications, more recently Sarifakioglu et al. [12] described a new technical method for the reconstruction of large thoracolumbar meningomyelocele defect in which bilateral split latissimus dorsi V-Y flaps based on thoracolumbar perforators inspite of their impressive results, the performance of this repair is technically difficult. Schefflan et al. [13] reported the successful use of the distally based latissimus dorsi musculocutaneous island flap. To close a large lumbar defect, Hayashi and Maruyama [5] documented the reliability of a bilateral latissimus dorsi V-Y musculocutaneous flap for repairing large meningomyeloceles. Yamamoto et al. [14] suggested using a distally based turnover latissimus dorsi muscle flap for the closure of the large lumbar defect. Gullestad et al. [4] have successfully closed the large meningomyelocele using tissue expansion. Iacobucci et al. [15] reported the successful use of bilateral paralumbar fasciocutaneous flaps in 13 cases with no complications. Lapid et al. [16] used bilobed flaps for the closure of meningomyelocele. The advantage of this method is that no suture lines overlie the cord closure. Campobasso et al. [17] suggested that Limberg flap repair may have some advantages in patients with large round or oval lumbosacral myelomeningoceles. Karanas et al. [18] employed a free flap (with 20cm interpositioned vein graft) to close the lumbar defect in an 8-year-old girl, this was done for a complication from a gliding flap to close the large meningomyelocele after her birth. Mangels et al. [19] reported 13 cases of intrauterine meningomyelocele closure by bipedicle advancement flaps. However, this option is available in only a few centers, while closure of myelomeningocele defect is usually carried out in the first hours after birth.

In most of our cases the operation took place in the first 6 hours after birth and within the first 24 hours in the remaining.

*The advantages of our method are:* There is no need for a split skin graft over the cord or the vertebrae; the donor area can be closed primarily in most of the cases; it provides a thick, heavy-duty, skin and subcutaneous tissues over the dural

sac; the flap can be taken 1:3 without compromising the blood circulation of the flap; no suture line overlies the cord closure; no contour deviation occurs; and the result is satisfactory from an esthetic point of view. Using careful preparation and application of electrocautery keeps blood loss to a minimum. So, this flap is long-life definitive procedure that protects the newborn from serious killing infections and allows the neurosurgeon to proceed for shunt operations, in our opinion, the early management of associated hydrocephalus was also important to avoid liquor leakage and consequent wound complications. All patients in our study underwent ventriculoperitoneal shunt application shortly after repair.

### Conclusion:

Surgical repair of large myelomeningoceles may be a challenging problem. The favorable outcomes of the long flank flap indicates that it has a place in the management of large myelomeningoceles whatever the size. Flap complication is almost nil and donor site closed primarily in most of the cases.

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