

# In Situ Skin Tailoring for Myelomeningocele Repair

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## Abstract

**Purpose:** We are presenting a new technique for myelomeningocele repair in children. The currently used technique is associated with occasional difficulty of skin closure and excessive blood loss. Our modifications are meant to eliminate these difficulties.

**Study design:** Thirty children below 6 months of age have been operated upon in the last 5 years, all having meningo/myelomeningoceles of medium to large sizes.

**Methods:** Direct sac opening was used instead of peripheral elliptical skin incision. Skin was approximated at the end of the procedure and excess skin was shaved with scissors.

**Results:** Our technique offers many advantages. Most importantly, is accurate skin tailoring so that ultimate usage of available skin becomes possible. Furthermore, blood loss is significantly reduced.

**Conclusion:** The technique proposed in this work represents a valuable modification of meningo/myelomeningocele repair.  
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**Keys Words:** Myelomeningocele, Meningocele, Repair

## Introduction

Myelomeningocele repair in children is usually an easy straightforward task. However, certain steps make its execution risky or difficult. Particularly, the amount of skin which needs to be left may be underestimated resulting in difficulty with skin closure. Blood loss requiring blood transfusion is not uncommon. Lots of surgical trends have been practiced trying to minimized risks and improve outcome.<sup>1</sup> In the following few lines we are introducing a new technique aimed at solving both problems.

### Patients and Methods

This technique has been used in our institution since 2006 where more than 30 patients with myelomeningocele, or large meningocele were operated upon. All patients were below 1 year of age. All patients were operated upon in the prone position under general endotracheal anesthesia. Careful review of the patient MRI is done first aiming to identify whether or not neural elements exist and their relation to the placode. This help to identify our skin incision which should be more

on the caudal side of the sac to avoid injuring the attached neural tissue.

An elliptical skin incision is made using the monopolar eletrode in coagulation mode (Figure 1). This step is usually very bloody and by using the monopolar it becomes bloodless. The incision is deepened till the bovie penetrates and opens the sac. The elliptical skin flap is discarded and the sac inspected for neural tissue. Usually, the cord end on the placode or passes tangentially just touching the placode and maintaining its continuity. In the first case, the cord is sharply incised from the placode staying as close as possible to preserve neural tissue. After the cord is freed, it is gently pushed inwards inside the canal. Great care should be taken to inspect for any additional arachnoid bands that may tether the cord to the dural sac. These should be severed as well so that the cord can migrate freely cephalad. If the cord is passing tangentially and merely touching the placode, it should be gently dissected thereof, with preservation of its continuity and pushed gently downwards.

### Dural repair:

The dura is circumferentially incised using a combination of cautery and blunt dissection resulting in a cuff of dura surrounding the dural opening. The size of the dural cuff is determined by the distance of the dural incision to the neural canal. This is tailored according to the amount of neural tissues to be covered, the more neural tissue the larger will be the dural flap. The dural edges are sutured together in a line (Figure 2). If the neural contents are voluminous and the cord cannot be pushed inside the neural canal, or if the dural opening is small, we didn't add fascial or muscle flap to enforce the dural closure as described by Fiala et al.,<sup>2</sup>

### Skin closure:

The skin edges are held up with toothed forceps. At the base of the flaps a through and through stitches with heavy silk are taken (Figure 3). The entry and

exit points are preferred to be spaced. The aim of these stitches are both to approximate the skin and for hemostasis. The excess skin is then removed with heavy scissors just above the sutures (Figure 4,5). The skin edges are then approximated with 3-0 vicryl stitches, interrupted and occasionally mattress (Figure 6). Afterwards, the initial heavy stitches are removed. The wound is dressed with antibiotic ointment.

## Results

This method has been employed in 30 cases over 5 years. We were able to approximate the skin in every case without the need for a skin graft or release incisions. We had no wound dehiscence or CSF leaks. Superficial infection occurred in 4 cases and controlled with local and systemic antibiotics. All wounds were esthetically acceptable in the final outcome.



**Figure 1.** Elliptical skin incision on the dome of the sac. The incision is preferred to be caudally oriented to avoid the neural structures which tend to attach cephalad to the sac.



**Figure 2.** Closure of the dural layer with running or interlocking stitches to achieve watertight closure.



**Figure 3.** The edges of the skin flap are held up for alignment. The initial 2-0 vicryl stitches are applied at the base of the flaps, both for alignment, approximation and hemostasis.



**Figure 4.** The excess skin is shaved using heavy scissors.



**Figure 5.** Wound appearance after shaving the excess skin.



**Figure 6.** Final wound appearance after adding the 4-0 interrupted vicryl stitches applied to the skin edges and removal of the initial basal 2-0 stitches. Some blanching is noted between the stitches but usually is well tolerated and resolve promptly.

## Discussion

The technique we are proposing proved to be beneficial and superior in our hands to other techniques. None of our kids required blood transfusion saving the child the associated risks.

Skin incision in the aforementioned classic techniques is usually done in an elliptical fashion around the sac. However, this incision is based on subjective estimate and may prove to be insufficient for closure requiring closure under tension, or the need to add a skin graft. In our technique, skin trimming is postponed till the skin edges are opposed so that no skin shortage or excess results. In our cases, none required skin grafting or even skin undercutting. Some authors described complex skin and muscle flaps.<sup>5,6</sup> These have not been needed in our cases. In few cases, moderate tension was noted as evidenced by mild skin blanching between the sutures. This however was well tolerated.

The older technique consisted of circumferential dissection of the dural sac from the skin. This is usually a tedious and difficult procedure that may be accompanied with blood loss, often necessitating blood transfusion. The sac is usually quite adherent to the skin superficially making its dissection difficult and sac rupture not infrequent. Dissecting the dura directly over the muscle and its fascia is much easier and less bloody. We have the privilege as well of creating dural flaps proportionate to the amount of neural contents and whether or not they are reducible within the

canal. On the contrary, dural dissection more peripherally is more difficult and may result in dural tears.

For patients having hydrocephalus, VP shunt was inserted in the same session. This helps to lessen the likelihood of developing CSF leak. No increase in the incidence of infection was noted from this practice. Other authors follow the same guidelines.<sup>3</sup>

Timing of repair depends on the type of the lesion. For myelomeningoceles, early repair shortly after birth is advocated so as to avoid infection affecting the raw placode with possible neural injury or extension to the central neural structures.<sup>7,8</sup> In our cases this was not applicable however, as most patients came late after 48hrs of birth with already infected placode. Dressings were done till epithelialization of the placode took place before proceeding to sac repair. No untoward effects such as those feared took place following this policy. Actually, we prefer to postpone surgery till 2 months of age as well as the MRI. This results in tissue maturation facilitating handling, closure and better MRI details to visualize the lesion properly.

Cord closure, has been advocated by some authors using 7-0 pial sutures.<sup>4</sup> In our cases, this was not feasible in most cases as the cord tissue ended end-on in the placode. As such, sharp dissection of the cord off the placode was only done followed by gentle cord positioning within the neural canal.

## Conclusion

The technique we are proposing provides an easier alternative for meningocele and myelomeningocele repair. It results in blood and time saving and allows easier, more accurate skin closure.

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## الملخص العربي

في هذا البحث يتم تقديم طريقة جديدة للعلاج الجراحي لازالة الأكياس السحائية بالمنطقة القطنية. تتمثل الطريقة الجديدة في فتح الكيس السحائي من اعلاه وتخليص الاجزاء العصبية من قمة الكيس و ادخالها الي داخل القناة العصبية القطنية، ويتم بعد ذلك حياكة و اغلاق الأم الجافية بغرز متصلة. اغلاق الجلد يتم علي مرحلتين الأولى بغرز خارجية غليظة لتقريب ضفتي الجرح ثم قص الزائد من الجلد عن مستوي الغرز، يعقب ذلك حياكة حرف الجلد بغرز رقيقة، ثم يعقب ذلك ازالة الغرز الغليظة. تؤدي هذه الطريقة إلى الحفاظ على القدر المناسب من الجلد بالاضافة إلى التقليل من الدم الذي يفقد أثناء الجراحة.