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CASE REPORT

# A new approach in the repair of a myelomeningocele using amnion and a sensate perforator flap

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## KEYWORDS

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Myelomeningocele

**Summary** Soft-tissue coverage over the neural repair of a large myelomeningocele was obtained using an autologous amnion graft and a sensate perforator flap. This new technique provides a watertight closure and tension-free, stable, soft-tissue coverage. Protective sensibility in the reconstructed area and minimal donor-site morbidity are additional advantages. © 2012 British Association of Plastic, Reconstructive and Aesthetic Surgeons. Published by Elsevier Ltd. All rights reserved.

Successful surgical treatment of a myelomeningocele (MMC) demands adequate tissue coverage over the neural tissue repair. If skin defects are too large to be closed reliably by simple skin advancement, more sophisticated

techniques are required. We introduce a new approach in the repair of an MMC by covering the neurosurgical repair with an autologous amnion graft and a midline-based sensate perforator flap.

## Case report

A newborn boy with a birth weight of 3046 g was delivered by caesarean section after having been prenatally

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diagnosed with MMC, hydrocephalus and Arnold Chiari malformation. The newborn had spontaneous movements of the lower extremities. The thoracolumbar MMC was associated with a 5 × 6-cm skin defect, which was considered too large to be closed by simple skin undermining.<sup>1</sup> An amnion graft was harvested as described by Hasegawa et al. and stored at 4 °C between saline-soaked gauzes.<sup>2</sup> MMC repair was performed 24 h later.

## Surgical technique

Under general anaesthesia and with the patient in the prone position, a hand-held Doppler (8 MHz, Multi Dopplex II, Huntleigh Healthcare, Cardiff, UK) was used to locate medial dorsal intercostal perforators near the midline and cranially to the MMC. A 6 × 2.5-cm medial dorsal intercostal artery perforator flap was designed with its axis along the course of the intercostal artery. As backup a Limberg flap was designed on the contralateral side (Figure 1). After repair of the neural tube and closure of the dura, a thoracolumbar fascial flap from each side was positioned over the repair. The suture line was covered with the amnion graft which was sutured to the fascial flaps. The perforator flap was harvested from lateral to medial in a subfascial plane until the perforator and its accompanying nerve were identified. The flap was transposed into the defect. The wound edges were closed at fascial and skin levels. A light dressing was applied.

## Result

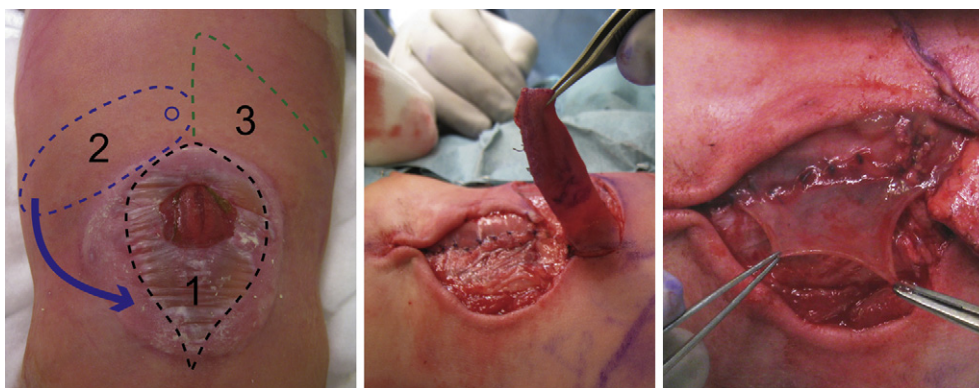
Increased intracranial pressure was diagnosed clinically and by increased ventricle size on magnetic resonance imaging and ultrasound. On the fifth postoperative day cerebrospinal fluid (CSF) leakage occurred through a small opening at the skin repair. At re-operation, the intact amnion graft and the viable flap were sutured back into place and a ventriculo-peritoneal shunt was applied. The post-operative course was uneventful and there was no decrease in lower extremity motor function.

## Discussion

Since Sharrard and colleagues published their study in 1963, repair of MMC has been considered a surgical emergency.<sup>3</sup> Closure of the MMC within 48 h has been shown to maximise neurological salvage and to facilitate CSF shunting by preventing infection and neural desiccation.<sup>1</sup> After the neurosurgical repair stable skin coverage can, in the majority of cases, be obtained by simply undermining the skin edges to allow for a tension-free closure. Mustardé warned against the risk of wide undermining as it may jeopardise skin circulation and lead to sloughing with subsequent infection.<sup>4</sup>

For defects too large to be closed safely by skin undermining, co-operation between the neurosurgeon and the plastic surgeon may be required. A variety of flap techniques have been described. It is, however, crucial that a watertight, tension-free closure with stable skin coverage is obtained over the neurosurgical repair.<sup>1</sup> The flap should be associated with minimal donor-site morbidity and, if possible, provide protective sensibility in the reconstructed area. Recently, we described the use of the sensate medial dorsal intercostal artery perforator flap for closure of complex cervicothoracic midline defects after spinal surgery.<sup>5,6</sup> Flap harvest is straightforward and as no muscle is included, donor-site morbidity is minimal.<sup>5,7</sup> This well-vascularised, pliable flap has shown to provide stable soft-tissue coverage and protective sensibility in the reconstructed area. The newborn showed a shivering reflex each time ultrasound gel was applied on the flap to examine the presence of arterial Doppler sounds. This indicates that protective sensibility was obtained in the reconstructed area.

The harvest of an amnion graft and its use for the closure of an MMC was described in a case report by Hasegawa et al.<sup>2</sup> The amniotic membrane is harvested aseptically at caesarean section. Both layers of the membrane, amnion and chorion, are foetal tissues. To avoid the risk of contamination with maternal blood, the vessel-rich chorion is manually scoured away using an aseptic gauze. The amnion graft provides a watertight closure over the



**Figure 1** Left; the MMC with the planned excision line (1), the perforator flap with its pivot point near the midline (2) and a Limberg flap (3) as backup. Centre; the neural repair is completed and the perforator flap is elevated. Right; the amnion graft positioned over the neural repair.

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