Should children with repaired open spinal dysraphisms have central neuraxial block?

Spinal dysraphism is a spectrum of congenital anomalies of spinal cord development that may cause neurological, urological and orthopaedic disability (Thompson, 2014). Open spinal dysraphism (myelomeningocele or spina bifida aperta) occurs in around 3/10 000 live births, with surgical repair in the neonatal period. By contrast, closed spinal dysraphism (spina bifida occulta) is a range of developmental anomalies without hydrocephalus which require surgery later in childhood. Associated structural malformations of the lower gastrointestinal and urogenital systems are common and patients often need multiple surgeries.

Spinal dysraphism typically affects the lower thoracic, lumbar and sacral segments, which has implications for the use of central neuraxial blockade in these patients.

Advantages of central neuraxial block

While the long-term prognosis has improved (Thompson, 2009), many infants born with myelomeningocele require complex bladder and lower limb procedures throughout childhood and adolescence. For those undergoing bladder repair the primary postoperative pain issue is bladder neck spasm; this can be debilitating and extremely difficult to control with opioid-only based regimens. Following orthopaedic procedures, epidural anaesthesia ensures effective regional pain control, allowing early physiotherapy and mobilization and avoiding opiate side effects (e.g. constipation and urinary retention), a particular advantage in children with spina bifida, most of whom have neurogenic sphincter dysfunction. In adulthood, these patients may need central neuraxial blockade for labour analgesia and/or caesarean section.

If there is a history of spinal dysraphism clinicians tend to avoid central neuraxial block. Many textbooks state that central neuraxial blockade is contraindicated at or below the level of the defect in patients with a tethered cord and any degree of preserved neurological function (Murphy et al, 2015). Moreover, associated vertebral anomalies (congenital or as a result of surgery) result in unpredictable anatomy. However, the evidence to support this is tenuous and best practice should be re-evaluated to ensure that these children receive optimal perioperative analgesia.

Cooper and Sethna (1991) reported using central neuraxial blockade successfully in the presence of repaired spinal dysraphisms. Provided the block is directed above the level of any congenital cutaneous anomaly or site of previous spinal surgery there is no evidence of any increased risk of neurological sequelae.

Why not use central neuraxial block?

Scoliosis occurs in 69% of patients with myelomeningoceles (Murphy et al, 2015) and is an obstacle to successfully siting central neuraxial blockade. Even if the block is satisfactorily positioned, there is some evidence that failure or partial failure rates are higher when used for obstetric anaesthesia in these patients. The dura and epidural space may be abnormal as a result of dural ectasia or scarring from the myelomeningocele, or as a result of its surgical correction. This may affect the spread of drugs, resulting in patchy or unpredictable distribution of anaesthesia. In some case reports postoperative epidurals have had lower infusion rates than would be expected (Cooper and Sethna, 1991). Anaesthetists should be aware that significant dosing changes may be necessary, and should document a plan in case of excessive cranial spread or motor impairment postoperatively.

In patients who had undergone myelomeningocele closure, magnetic resonance imaging studies showed anterior migration of the cord or filum complex in a minority in the prone position (Vernet et al, 1996), compared to the neurologically normal population in whom this anterior migration is normal. This may suggest a reduced safety margin for neuraxial needle placement.

Summary and recommendations

A past history of myelomeningocele is not a contraindication to epidural anaesthesia; indeed these patients may particularly benefit from supplementary regional anaesthesia.

Precise siting of the central neuraxial block should be chosen after review of spinal magnetic resonance imaging. The site should be opposite normal intraspinal anatomy and no less than two spinal levels above the site of previous surgery or spinal cord abnormality. Use of fluoroscopy or preoperative X-ray should be considered to mark the chosen level.

The volume of distribution and the optimal rate of infusion of drugs may be atypical in myelomeningocele patients who have established neurological dysfunction. The potential for uneven distribution of anaesthesia also needs to be recognized. BJHM

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