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Meningovertebral ligaments as a cause for difficult epidural placement in a child: identification using epidurography

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Epidural anesthesia can provide excellent surgical conditions and postoperative pain management. In the event of epidural placement failure, however, the cause must be accurately and efficiently identified and addressed. Having obtained written consent from the patient's parents, we describe the use of epidurography for identifying meningovertbral ligaments as a cause for difficult epidural placement in a child.

A seven-year-old patient with cerebral palsy, central apnea, and a previous thoracic (T3) compression fracture presented for wide resection of a right femoral osteosarcoma. During epidural catheterization (under general anesthesia), difficulty was encountered when inserting the epidural catheter. At the L3/L4 level, the catheter could be threaded in only 2 cm past the needle tip before meeting resistance. In addition, at the L2/L3 level, the catheter threaded in only 0.5 cm, with significant resistance. Hence, both catheters were removed. Epidurography was then performed (through the epidural catheter) with the needle insertion site at L2/L3. It revealed a pattern suggesting caudal spread of the contrast (Figure A). The epidural attempt was repeated at L3/L4 under epidurography guidance, which showed caudally directed coiling of the epidural catheter (Figure B). It also revealed that a horizontal meningovertbral ligament prevented both cephally directed passage of the epidural catheter and spread of the contrast. Concerned that any local anesthetic injected would not spread above the L2/L3 level, we pulled the catheter back until the tip was near the apex of the original coil. Repeated epidurography then showed adequate spread of contrast via the anterior

epidural space (Figure C). We elected to use a low-concentration, high-volume epidural solution (0.0625% bupivacaine with 1:500,000 epinephrine) infused at a rate $0.5 \text{ mL} \cdot \text{kg}^{-1} \cdot \text{hr}^{-1}$ to help facilitate adequate spread. The epidural infusion provided excellent analgesia for up to 80 hr postoperatively in this patient who was not a suitable candidate for patient-controlled analgesia. There were no adverse events related to the epidural technique.

Dorsal meningovertbral ligaments are found between the dural sac and ligamentum flavum or lamina, and up to 44% are reported at the L3/L4 interspace.¹ These ligaments may obstruct the advance of an epidural catheter, resulting in a high incidence of catheter coiling, and causing uneven distribution of local anesthetic solution – all contributing to epidural failure. Epidural hemorrhage during spinal surgery has also been reported in the presence of these placed ligaments.² Despite epidural loss of resistance, failure to advance an epidural catheter has been reported in up to 4.5% of cases.³ Epidurography can be used to assist with the troubleshooting of difficult epidural catheter placement.

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Ethics Written consent was obtained to publish this case report.

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Figure A) Epidurography was conducted with 0.5 mL of the non-ionic contrast agent Omnipaque (Iohexol) 300 (GE Healthcare, Cork, Ireland) injected through an epidural catheter that was advanced through a 18G Touhy needle inserted at L2/L3. The contrast agent is seen to spread caudally. B) Epidurography was conducted with 1.0 mL of contrast agent injected through the epidural catheter to assist with visualization of the epidural catheter. The catheter, advanced

through the epidural needle placed at the L3/4 level, is coiled (multiple arrows) at the L2/L3 level, with the catheter tip located at L3/L4. Contrast agent from the previous epidural placement and epidurography attempt is also seen. C) Epidurography conducted with 1.0 mL of contrast agent depicts the well-delineated horizontal structure of a meningovertebral ligament (open arrow) that blocks cephalad spread of the contrast within the epidural space at L2/L3.

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