Migration of a Caudally Inserted Thoracic Epidural Catheter in a Neonate
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BACKGROUND
- A 7-week-old male with biliary atresia presents for a Kasai portoenterostomy. After induction of general anesthesia, a caudally inserted thoracic epidural catheter was placed under fluoroscopic guidance.

THE PROCEDURE
- The sacrococcygeal ligament was pierced with an 18g angiocatheter and the caudal space was accessed (Figure 1). A radiopaque, styletted epidural catheter was advanced using fluoroscopic spot checks to the level of T7/8. After removal of the wire stylette, an anteroposterior epidurogram showed appropriate midline spread with contrast injection (Figure 2).
- Catheter withdrawn 2cm and bolused with additional ropivicaine. No improvement in analgesia.
- Repeat epidurogram demonstrated the catheter exiting the spinal canal at T5/6 between costovertebral joints with contrast at higher thoracic levels (Figure 3).
- Confirmatory CT obtained and demonstrated the catheter exiting the spinal canal through the T5/6 neural foramen with its tip 5mm beyond the spinal canal. Contrast again appeared in the upper thoracic levels with only small amounts of contrast inferior to the T5 level (Figure 4).
- Catheter withdrawn 4cm based on estimation that this would leave it at T8/9. The epidural was bolused with the neonate quickly demonstrating signs of improved pain control.
- Removal of catheter on postoperative day 5 with subsequent discharge on postoperative day 6.

PAIN CONTROL
- A bolus of bupivicaine and hydromorphone was given through the catheter prior to incision. Vital signs did not respond to surgical stimulation during the procedure, no parenteral opioids were used, and the neonate was extubated at the end of the procedure. In the recovery room, the pain service initiated an opioid-free epidural infusion with ropivicaine and clonidine.
- The patient demonstrated signs of pain three hours after surgery.

DIAGNOSIS AND MANAGEMENT
- Catheter withdrawn 2cm and bolused with additional ropivicaine. No improvement in analgesia.
- Repeat epidurogram demonstrated the catheter exiting the spinal canal at T4/5 between costovertebral joints with contrast at higher thoracic levels (Figure 3).
- Confirmatory CT obtained and demonstrated the catheter exiting the spinal canal through the T5/6 neural foramen with its tip 5mm beyond the spinal canal. Contrast again appeared in the upper thoracic levels with only small amounts of contrast inferior to the T5 level (Figure 4).
- Catheter withdrawn 4cm based on estimation that this would leave it at T8/9. The epidural was bolused with the neonate quickly demonstrating signs of improved pain control.
- Removal of catheter on postoperative day 5 with subsequent discharge on postoperative day 6.

LEARNING POINTS
- The most logical explanation for this finding is that the wire tip of the stylette did not extend to the tip of the epidural catheter, allowing the catheter tip to be distal to what was imaged on fluoroscopy.
- Meticulous attention to clinical findings, knowledge of the intricacies of procedural equipment, and utilization of confirmatory radiography can allow the anesthesiologist to salvage a suboptimal epidural catheter.

CONCLUSION
- Epidural analgesia provides significant benefits to neonates in the perioperative setting, and a trans-caudal approach to thoracic epidural catheter placement mitigates risk of dural puncture and/or thoracic spinal cord injury in this population where the skin to epidural distance can be as little as 5mm. This technique demands advanced knowledge of spinal anatomy as well as fluoroscopic and procedural equipment and procedure.
- The recognition of neonatal pain can be challenging. Early diagnosis demands that the clinician pay attention to a range of physiologic and behavioral responses to noxious stimuli.
- Empircic or ‘blind’ advancement or withdrawal of epidural catheters in this patient population rarely leads to epidural analgesia at the desired dermatomal distribution.

REFERENCES