

## Title: Total Spinal in an Infant: can “dry taps” occur with 20G Tuohy needles?

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**Introduction:** Continuous epidural analgesia via indwelling epidural catheters can provide efficient postoperative pain relief in pediatric patients. The risk for serious complications is low<sup>1</sup> but inadvertent subarachnoid placement can occur and may be difficult to detect when using small needles and thin catheters in anesthetized patients.<sup>2,3</sup> We describe a case of inadvertent total spinal block in an infant undergoing abdominal surgery.

**Case Report:** An 11 month old, 8.3 kg, girl, was scheduled for removal of a large abdominal cyst. She had been fasting for a day and had undergone efficient bowel prep. After induction of general anesthesia with muscle paralysis and endotracheal intubation she was placed in the left lateral position for an epidural catheter placement. A 20G, 5 cm Tuohy-Schliff needle was placed in the L2-L3 interspace and loss of resistance was identified on the second attempt at 1-1.5 cm from the skin. There was no blood or fluid dripping from the needle and a 24G, 75 cm polyamide catheter (Perifix<sup>R</sup>, B. Braun Medical Inc., Bethlehem, PA) was easily inserted. After negative aspiration and test dose administration, 2.5 ml of 0.25% bupivacaine with epinephrine, 5 mcg/ml, was injected through the catheter. There was no reaction to incision but fluid needs seemed disproportional to estimated losses. During skin closure, when the patient was breathing spontaneously with tidal volumes of 45-55 ml and a rate of 25-29 per minute, a repeat bolus of 3 ml 0.25% bupivacaine with epinephrine was administered. Over the next few minutes, spontaneous respirations ceased and the blood pressure decreased. When using a 3 ml syringe and applying very low suction, 1 ml of clear fluid could be aspirated from the catheter. Analysis of the fluid showed a glucose value of 23 mg/dl and a protein value of 50 mg/dl. The postoperative course was uncomplicated. An i.v. morphine infusion was started and the patient was extubated about 4 hours after the last bupivacaine injection.

**Bench test:** Although it is conceivable that the catheter entered the subarachnoid space through a nick in the dura<sup>2</sup>, we think it more likely that the needle was positioned in the subarachnoid space but that CSF leak did not occur because of a combination of low CSF pressure and bubble formation in the Tuohy needle. To test this hypothesis a simple bench test was done: A 20G needle, identical to the one used in the patient, was inserted into a container (a 20 ml syringe with plunger removed) filled to different levels with saline and the time to first drop falling was measured with saline and air in the needle.

Pressure, cm water	Saline in needle. Time to first drop, s	Air in needle. Time to first drop, s
7	0.8	2
6	1	4
5	1.1	5
4	1.3	6
3	1.8	8
2	2.9	11
1	10	44

**Table:** Result of a typical bench test. The time to first “CSF” drop was prolonged for low pressures. If bubbles were trapped in the needle, no “CSF” leakage would sometimes occur for several minutes, even for “CSF pressures” of 7 cmH<sub>2</sub>O.

### Discussion

If undetected, inadvertent subarachnoid placement of an “epidural” catheter might cause serious postoperative complications. Normal infants may have CSF pressures of 3 cmH<sub>2</sub>O or less<sup>4</sup> and it is well recognized among pediatricians that spinal puncture may not result in CSF return (“dry tap”), especially if the patient is anesthetized and hypovolemic. With the larger needles used for epidural blocks, we thought a dry tap unlikely, but this case and the result of the bench test have convinced us that this may indeed happen if the patient has a low CSF pressure and if air bubbles are trapped in the needle. Possibly, avoiding air/saline mixtures and/or aspirating directly from the epidural needle before introducing the catheter or using ultrasound guidance might decrease the risk for inadvertent catheterization of the subarachnoid space. Aspiration from 24G catheters may not reliably exclude subarachnoid placement. Radiographic confirmation of epidural catheter position may be warranted but is currently not routine in our institution.

### References

1. Giafre E et al: Anesth Analg 83:904-12, 1996.
2. Kipnis E et al: Pediatric Anesthesia. 15:54-57, 2005.
3. Taenzer AH. Anesthesiology 98:1014-5, 2003.
4. Kaiser AM and Whitelaw AG. Neuropediatrics, 17:100-2, 1986