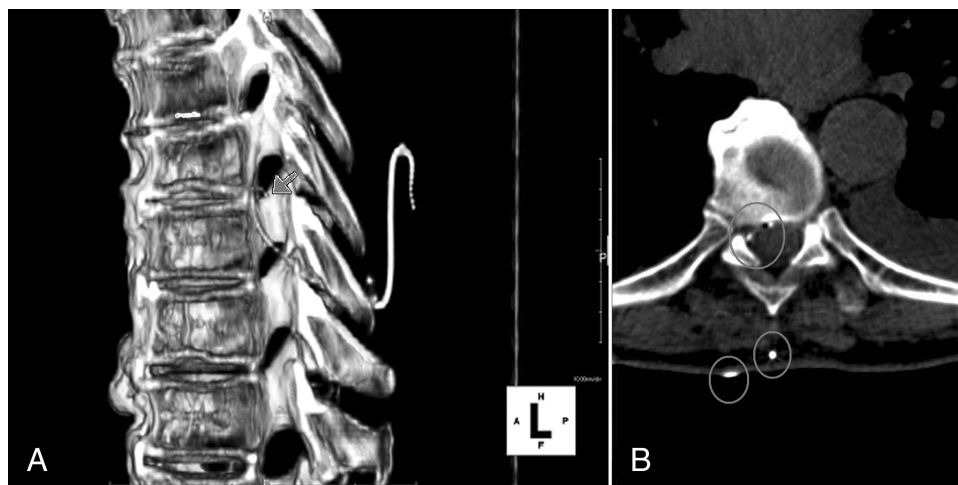


*Hugh C. Hemmings, Jr., M.D., Ph.D., Editor*

## Wandering Epidural Catheter

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**A** MALE patient, 73 yr old, had a Flexitip Plus<sup>®</sup> (Arrow International, Reading, PA) 19-gauge end-hole, wire-reinforced thoracic epidural catheter inserted for post-thoracotomy pain management. He underwent high-resolution spiral computed tomography scan with the catheter *in situ* before its use to evaluate previous bronchoscopic findings. A composite set of sagittal computed tomography images

(figs. A and B) show two- and three-dimensional thoracic spine reconstructions that highlight the track of the epidural catheter in this patient. Figure A shows a three-dimensional reconstruction of the spine sliced down midline, looking toward the right with the catheter looped away from the viewer, and resting adjacent to the pedicle (bold arrow). Figure B is a two-dimensional cross-sectional computed tomography image demonstrating the course of the epidural catheter from outside the skin to within the epidural space, with anterolateral placement of the catheter tip terminating adjacent to the pedicle (circles). The catheter first loops into the anterior and then back into the lateral epidural space terminating adjacent to the pedicle. This is a commonly underappreciated track of an epidural catheter. It is generally assumed that epidural catheters travel cephalad in the posterior epidural space. However, this image shows definitive evidence of the circuitous route often taken by an epidural catheter. Conventional teaching is to insert an epidural catheter 5 cm into the epidural space. Several studies contradict this and show that a low number of catheters are successfully advanced into the epidural space without coiling or deviating from their intended track.<sup>1</sup> Loose areolar tissue, fat, and blood vessels in the epidural space can contribute to deviations in final placement of the catheter tip. Lim *et al.* showed that approximately 65% of epidural catheter tips deviate laterally in the epidural space immediately after leaving the Tuohy needle tip. The catheter tip followed a straight direction in the posterior epidural space for more than 2 cm in only 35% of placements. Further, only 13% of catheter tips could be advanced  $\geq 4$  cm without coiling.<sup>1</sup> Choi *et al.* observed 17.6% of epidural catheters curling in the epidural space. They also reported that 63.5% of cephalad-directed thoracic epidural catheters (Touhy bevel up) were actually advanced as such, and 78% of caudally directed epidural catheters (Touhy bevel down) were advanced that direction.<sup>2</sup> A negative consequence of lateral epidural catheter tip deviation is misplacement into the paravertebral area *via* an intervertebral foramen. Misplacement into the anterior epidural space is one of the most common causes of unilateral epidural block.<sup>3</sup>

The authors thank Jeanine P. Weiner-Kronish, M.D., Ph.D., Anesthetist-in-Chief and Professor of Anesthesia, and Paul Alfilie, M.D., Ph.D., Assistant Professor of Anesthesia (both Massachusetts General Hospital and Harvard Medical School, Boston, Massachusetts), for their guidance and initial review of this manuscript.

### References

1. Lim YJ, Bahk JH, Ahn WS, Lee SC: Coiling of lumbar epidural catheters. *Acta Anaesthesiol Scand* 2002; 46:603–6
2. Choi DH, Lee SM, Cho HS, Ahn HJ: Relationship between the bevel of the Tuohy needle and catheter direction in thoracic epidural anesthesia. *Reg Anesth Pain Med* 2006; 31:105–12
3. Asato F, Goto F: Radiographic findings of unilateral epidural block. *Anesth Analg* 1996; 83:519–22