

Kinked Perifix® FX Springwound epidural catheters

Gillian Hilton, MBChB · Christine G. Jette, MD ·
Yi-Bing Ouyang, PhD · Edward T. Riley, MD

Received: 9 December 2010 / Accepted: 10 January 2011 / Published online: 21 January 2011
© Canadian Anesthesiologists' Society 2011

To the Editor,

We recently experienced problems with post-insertion kinking of a newer epidural catheter, Perifix® FX Springwound (B. Braun Medical Inc., Bethlehem, PA, USA), in three labouring parturients. The open-tip uniport version of the 19-G Perifix® FX Springwound catheter is the standard epidural catheter used in labour and delivery at our institution. A labour epidural was placed without difficulty in two non-obese parturients in the sitting position. In both cases, the epidural space was identified using a saline loss of resistance technique on a single pass. The catheter threaded easily and was withdrawn to the appropriate skin depth to leave 5 cm of catheter within the epidural space. The catheter was taped to the patients' backs, and following negative aspiration, attempts were made to administer an initial dose of 0.125% bupivacaine 5 mL. There was immediate resistance in both instances. The visible parts of the catheters were examined for kinks but none were found. The catheter connectors were changed, but there was still resistance to injection despite using several syringes of differing sizes. Since no reversible cause was found, the catheters were withdrawn. On inspection, a kink was identified close to the distal end of each catheter. New catheters of the same type were placed successfully in both patients.

In a third incident, it was not possible to inject local anesthetic with a 20 mL syringe following uncomplicated catheter placement; however, administration of the dose was possible with a 5 mL syringe. Due to remaining high resistance, the epidural infusion pump would not deliver

correctly and it alarmed continuously. Since the patient was not keen to have the epidural replaced, she received intermittent local anesthetic boluses to maintain analgesia during her labour and delivery. She had an effective block from the epidural catheter placement, confirming that the distal end was in the epidural space. As in the other two cases documented above, upon removal of the catheter, a kinked segment could be identified close to the distal end.

Upon visible inspection of two of the catheters, kinks were visible at 32 mm and 35 mm from the distal end. Microscopic examination of these two catheters revealed that the metal supporting coil had been bent irreversibly (Figure). With the catheters in the unkinked position, it was possible to flush them easily without resistance, thus patency was not an issue. The angle of approach during each catheter placement was approximately perpendicular to the skin; therefore, there is no reason to presume that the catheters were forced into a sharply angled upward direction that caused them to kink.

Previously, we have used the closed-tip multiport version of the Perifix FX Springwound catheters, which were also prone to kinking on occasion. We had assumed they were prone to kinking at one of the catheter ports; however, after withdrawing the catheters and their distal ends, they were observed to kink at the portal sites of structural weakness.

In response, we switched to use of the open-tip version to avoid catheter kinking. With the softer wire-reinforced tubing, it has been shown that open-tip and multiport catheters functioned equally well.¹ Eckmann analyzed bending stiffness of six epidural catheters² and determined that the bending stiffness of the coil-reinforced catheter group was significantly less than that of the stylietted, clear nylon, radiopaque nylon, and polyurethane catheters. The superior bending flexibility of the wire-reinforced catheters

G. Hilton, MBChB (✉) · C. G. Jette, MD ·
Y.-B. Ouyang, PhD · E. T. Riley, MD
Stanford University School of Medicine, Stanford, CA, USA
e-mail: ghilton@stanford.edu

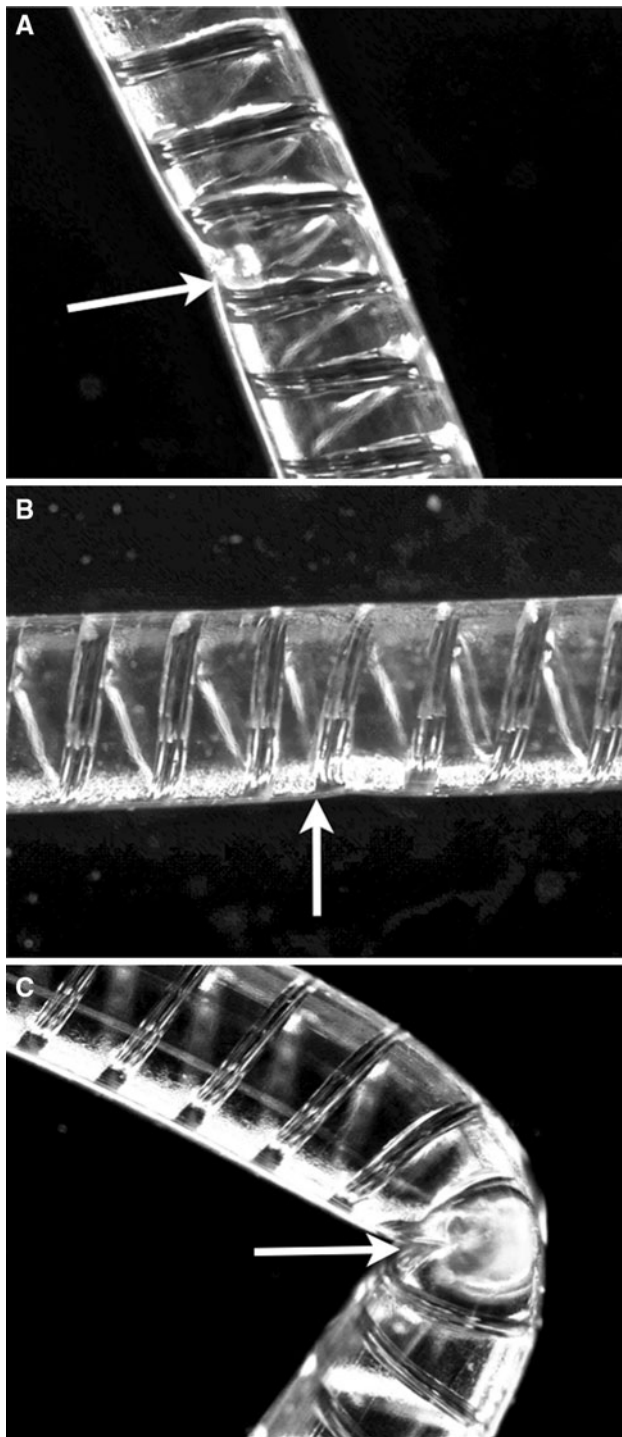


Fig. 1 Images of one of the kinked epidural catheters. Arrows indicate: **a** Distortion visible within the polyamide nylon body. **b** A misaligned stainless steel spring. Unequal distances between loops are visible. **c** Kinking that is easily reproducible with minimal pressure exerted on the catheter

may partly explain why these catheters are associated with fewer intravascular placements, fewer paresthesiae, and fewer catheter re-insertions.^{3,4} Clearly, the wire-reinforced catheters offer advantages, and catheters that kink on occasion present a frustrating problem that made us choose to abandon use of the multiport catheter. Interestingly, we had not experienced kinking with any open-tip uniport catheter over a period of two years until we observed three cases of kinking within a one-month period. It is unlikely that the catheters had been kinked or damaged during shipping and storage as they were macroscopically intact within the epidural kit. The problem may relate to either inherent weakness of the catheter, rendering it prone to kinking during insertion, or a subtle fault in the manufacturing process. Whatever the cause, we alert readers to this potential problem with the Perifix FX Springwound catheter.

Competing interests None declared.

Funding Departmental.

References

1. Spiegel JE, Vasudevan A, Li Y, Hess PE. A randomized prospective study comparing two flexible epidural catheters for labour analgesia. *Br J Anaesth* 2009; 103: 400-5.
2. Eckmann DM. Variations in epidural catheter manufacture: implications for bending and stiffness. *Reg Anesth Pain Med* 2003; 28: 37-42.
3. Jaime F, Mandell GL, Vallejo MC, Ramanathan S. Uniport soft-tip, open-ended catheters versus multiport firm-tipped close-ended catheters for epidural labor analgesia: a quality assurance study. *J Clin Anesth* 2000; 12: 89-93.
4. Banwell BR, Morley-Forster P, Krause R. Decreased incidence of complications in parturients with the arrow (FlexTip Plus) epidural catheter. *Can J Anaesth* 1998; 45: 370-2.