

Peripheral nerve catheter entrapment is not always related to knotting

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To the Editor,

We recently experienced a case of difficult nerve catheter withdrawal, unrelated to knotting or malpositioning, in a young patient who had undergone major shoulder surgery. A 31-yr-old male who was scheduled for arthroscopic shoulder surgery received a right-sided stimulating interscalene catheter (Stimucath[®], Teleflex, Le Faget, France) for postoperative analgesia. Prior to induction of general anesthesia, the catheter was inserted uneventfully using nerve stimulator guidance. A C6 response was sought through the stimulating catheter with a current threshold <0.6 mA (100 μ sec). The catheter was inserted 2 cm beyond the tip of the needle, and then 20 mL of 0.75% ropivacaine was injected slowly. Anesthesia and surgery proceeded uneventfully. Postoperatively, the patient received patient-controlled analgesia through the interscalene catheter (continuous infusion of 0.2% ropivacaine 5 mL \cdot hr⁻¹ with bolus doses of 5 mL every 30 min *prn*).

The patient was pain free during the following 48 hr. On the third postoperative day, the nurse attempted to remove the catheter according to the ward protocol. Unfortunately, she was unable to remove the catheter after several attempts at withdrawal. An anesthesiologist was called who was expert in regional anesthesia techniques. During each attempt at withdrawal, the patient described painful paresthesiae in his first and fifth fingers. A further attempt performed with a slight increase in tension and simultaneous catheter rotation was ineffective and continued to elicit paresthesiae, as did sterile normal saline injection

administered through the catheter. No sensory or motor deficits were observed. An *x-ray* without contrast medium injected through the catheter and ultrasound scanning confirmed the absence of knots, loops, or aberrant positioning of the catheter.

Both the anesthesiologist and the surgeon decided the catheter needed to be surgically withdrawn, and the patient agreed and consented to their advice. The following day, a 10-cm skin incision was made on the lateral part of the patient's neck under general anesthesia. After dissecting through the subcutaneous layers, the surgeon observed an elongation of the distal part of the catheter, which he was able to remove in its entirety. Examination of the catheter tip revealed that the distal part had become elongated to 5 cm (Fig. 1). There were no further complications, and the patient's neurological examination was normal at follow up one month later. The manufacturer of the catheter was notified of the complication.

Nerve catheter entrapment can occur from a variety of mechanisms, including looping, knotting, and kinking (mainly with the epidural catheter). There are few reports of nerve catheter entrapment without knotting or looping after continuous peripheral nerve block. Microscopic visualization of the catheter tip confirmed a major disruption of the flexometallic ring. It is not possible to know if this occurred during catheter insertion (considered a low probability because of the uneventful insertion) or from attempts at catheter removal after surgery. These catheters are designed with high tensile strength and elasticity to ensure the catheter stretches before breaking. In this case, however, the traction applied to the catheter during removal attempts was quite limited, since each attempt at withdrawal elicited symptoms. Given the circumstances, it is probable that the inherent weakness existed at the distal part of the flexometallic ring.

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Fig. 1 Distal portion of the Stimucath[®] stimulating catheter following surgical removal after an otherwise functionally successful interscalene block. Note the partial uncoiling and catheter tip elongation, and absence of knotting

One of the main risks of nerve blocks using catheters is partial catheter retention within the plexus secondary to fracture of the catheter. Fortunately, catheters, such as the Teleflex-Arrow can be stretched to more than 300% of their original length without breaking. That value is ten

times greater than reported values for other types of catheters, e.g., the nylon catheter.¹

X-ray can easily exclude the presence of catheter knotting or looping, and ultrasound can confirm the position of the distal position of the catheter. Magnetic resonance imaging would not be advisable with such a catheter due to the flexometallic ring. Injection of sterile saline and rotation of the catheter were unsuccessful in facilitating withdrawal. Since the patient was symptomatic, we decided to remove the catheter under general anesthesia, as recommended for epidural catheter entrapment.^{2,3}

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