

# The Need for Patient Teaching, Follow Up, and Physician Availability for the Prevention of Outpatient Perineural Catheter Complications

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## Abstract

Perineural catheters have influenced the way we manage postoperative pain and sometimes require us to care for patients beyond the postoperative period on an outpatient basis. We have found that while appropriate instruction, follow up and physician availability are essential in the management of outpatient perineural catheters, patient misunderstanding or noncompliance contributes to complications. Here we report such a misunderstanding with a complication.

## INTRODUCTION

Perineural catheters have begun to influence the way we manage postoperative pain.<sup>1-2</sup> With this approach to pain management, we often find ourselves caring for patients beyond the immediate postoperative period. More recently, the use of perineural catheters in the outpatient setting has extended our role in pain management even further.<sup>3-4</sup> As we implement new techniques in regional anesthesia and expand our role in caring for patients in the days following surgery, we are likely to encounter new complications that result from these advances in regional anesthesia.<sup>5-11</sup> Swenson et al. described their experience with 620 outpatient perineural catheters. Their outpatient management included appropriate discharge instructions, patient follow up, and physician availability for patient contact. Last year, our institution placed 338 outpatient perineural catheters. Through this experience, we have found that while appropriate instruction, follow up and physician availability are essential in the management of outpatient perineural catheters, patient misunderstanding or noncompliance contributes to complications. In this report we highlight the need for the continued effective engagement of the care team through the immediate postoperative period of an outpatient who had been discharged with a perineural catheter.

## CASE REPORT

A 46-year-old ASA I male presented for outpatient left anterior cruciate ligament repair. Following the surgery, he received a femoral perineural catheter in the post-anesthesia care unit (PACU). It was uneventfully placed with a 17 G Tuohy needle in a strict sterile fashion under ultrasound guidance. Twenty ml of 0.2% ropivacaine was injected directly through the Tuohy needle to dilate the perineural space. An in-plane approach was used with the probe just below the femoral crease, providing a cross-sectional view of the femoral vessels and nerve. A 19 G Arrow Stimucath Continuous Nerve Block Catheter (Arrow International, Reading, PA, USA) was inserted approximately 3 cm past the tip of the needle, allowing it to slightly curve posterior to the femoral nerve without forming a loop. An additional 10 ml of .2% ropivacaine was injected through the catheter to verify correct placement with ultrasound guidance. The catheter was secured at the insertion site using a skin adhesive and a sterile dressing was applied. An On-Q elastomeric pump (I-flow, Lake Forest, CA, USA) containing 550 ml of 0.1% ropivacaine was set to deliver 10 ml/hr with a demand button allowing 5 ml of local anesthetic every 30 minutes.

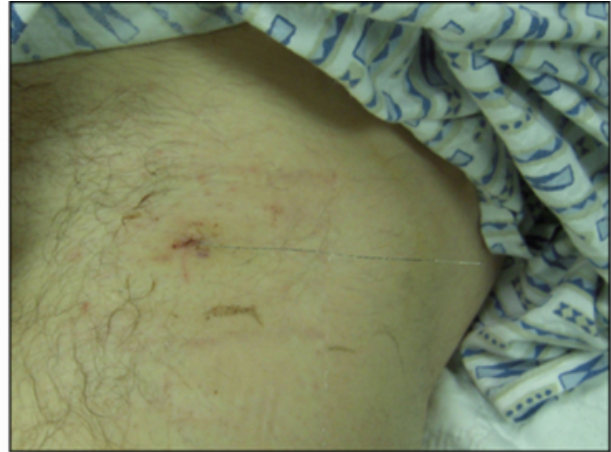
Prior to discharge from the PACU, the patient was given written and verbal instructions on catheter care and

discharged home. The discharge instructions included the manner in which to contact an anesthesiologist if any problems arose. The patient was also instructed to remove the catheter after the pump was depleted of local anesthetic, which should occur no later than postoperative day (POD) #3. On POD #1, the patient began to feel pain in his knee and noticed that his demand button wasn't working correctly. Upon examination of the bag containing the pump, he discovered a severed section of tubing that had resulted in spillage of the local anesthetic into the bag. He disconnected the pump tubing from the catheter and discarded it. Unfortunately, the patient misunderstood the discharge instructions and thought the catheter needed to remain inserted for three full days. A registered nurse followed up with the patient on POD #1 via a message on his answering machine, which he did not return. The catheter was left in place, without infusion of local anesthetic, until POD #3. On POD #3, the patient was unable to remove the catheter when he pulled on it. Pulling on the catheter caused the white insulating sheath to pull off of the coiled metal catheter. The metal catheter uncoiled as he pulled, leaving a thin metal wire sticking out from the insertion site (Fig 1). The patient reported feeling only moderate pain without paresthesia when pulling on the catheter. After multiple unsuccessful attempts, he called the anesthesiology pager number provided to him. He was instructed to promptly return to the hospital.

Ultrasound examination revealed that the catheter tip was imbedded, in a deep fascial layer above the nerve. The next day, the catheter was surgically removed through a 2 cm incision (Fig 2). The patient recovered uneventfully.

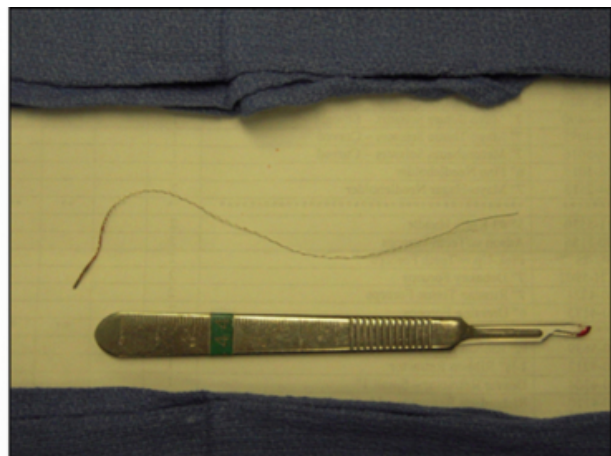
**Figure 1**

Fig 1. The uncoiled femoral perineural catheter remains in the femoral triangle despite multiple attempts to pull on it. Pulling on the catheter resulted in the removal of the plastic sheath and uncoiling of the catheter.



**Figure 2**

Fig 2. The uncoiled perineural catheter after its surgical excision. The plastic sheath is missing and the coiled metal catheter has been pulled into a thin wire.



## DISCUSSION

Appropriate discharge instructions should be provided to all outpatients with perineural catheters.<sup>4</sup> At the surgical center where this catheter was placed, a registered nurse was trained to assist with catheter placement and provide discharge instructions. Each patient is instructed to remove the catheter when the pain pump ball is empty. The patients are told that the 550 ml of local anesthetic should not last longer than the third postoperative day and that the catheter should be removed no later than three days post surgery.

They are also told to call a 24-hour pager, covered by an attending anesthesiologist, if any problems arise. We ask that the person taking the patient home be present to receive the discharge instructions. Despite detailed verbal and written discharge instructions, our extensive efforts did not result in appropriate management of the patient's complication until he called the anesthesiology pager on POD #3.

Following up on outpatients with perineural catheters facilitates screening for complications.<sup>4</sup> Infection, neurological deficits, symptomatic phrenic nerve paralysis, local toxicity, pneumothorax, and knotted or retained catheters are all possible complications.<sup>5-13</sup> As this case illustrates, outpatients with perineural catheters require follow up since they do not always seek timely help with complications. At our institution, the nurse who provides discharge instructions about the catheters also calls the patients on POD #1. If there are any concerns, the patient is asked to come in for evaluation or is followed up with over the phone. In this particular case, a message was left on the patient's answering machine prompting him to call if he had any problems or questions.

The potential for complications and equipment failure in outpatients can be addressed by 24-hour physician pager availability. Our patient did page us on POD #3 when the imbedded catheter uncoiled with his removal attempt. The cause for the leaking pump tubing remains unknown. In addition, the cause of the insulating catheter sheath detachment from the coiled catheter has not been explained. The incident was reported to the catheter manufacturer. Tran et al. describes a similar scenario in which a catheter was cut prior to its becoming uncoiled.<sup>5</sup> As occurred in our case, the outer sheath slid off and the wire uncoiled. Our patient did not report damage to the catheter itself prior to pulling on it. There are case reports in the literature of imbedded (stuck) catheters that have resulted from knotting,<sup>6-9</sup> but the report by Tran et al. is the only example demonstrating a catheter tip adhering to tissue. Our patient disconnected the local anesthetic pump two days before trying to remove it, resulting in a "dry" catheter on POD #3. The report by Tran et al. also mentioned that the local infusion was stopped prior to removal of the catheter to allow for a neurological exam, but the timeframe was not specified. It is unclear if allowing a catheter to remain without infusion increases the incidence of stuck catheters.

As the role of pain management expands into the postoperative period with outpatient perineural catheters,

adequate patient instruction, follow-up contact and 24-hour physician availability for equipment failure or complications should be provided. This should include teaching in both written and verbal form with the patient's caregiver present, a method to follow up with the patient, and a 24-hour physician paging system. However, as this case demonstrates, even after adequate teaching, follow up and availability, misunderstanding or noncompliance can result in complications in the outpatient setting. We encourage our colleagues to be vigilant in their care of perineural catheters in the perioperative period.

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