

To Remove or Not to Remove a Broken Perineural Catheter Fragment?

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Abstract

Fracture of a femoral perineural catheter during insertion is an extremely rare complication of an otherwise low risk procedure. In such a scenario, whether to leave the catheter in situ or extract it by surgical exploration is the dilemma. We present two cases of broken femoral perineural catheter incurred during insertion. Patients may not complain of any kind of immediate pain or discomfort, after shearing of the catheter, the decision making regarding the further management is difficult. Long term complication like femoral neuritis leading to constant dragging pain are known.

Keywords: Femoral perineural catheter, Femoral nerve block, Fractured catheter fragment

Introduction

Regional analgesia with peripheral nerve block is an integral part of Enhanced Recovery after Surgery (ERAS). A femoral perineural catheter is usually inserted following unilateral lower limb surgeries as a continuous and titrated approach towards the postoperative pain relief. This allows pain free early mobilisation of the patient in the immediate postoperative period. Though fracture of this femoral block catheter is an extremely rare, serious adverse event in terms of further pain management can happen.

Here, two different case scenarios with different views towards the broken femoral block catheter fragment, at our hospital are discussed.

Cases

An ultrasound guided right femoral nerve perineural catheter was planned for post-operative analgesia for an 89 years old patient operated for right hip fracture fixation under general anaesthesia. A femoral nerve catheter kit contained a 18 gauge × 50 mm insulated needle with a facet tip bevelled at 20 degrees and a 20 gauge × 35 cm long plexus catheter with a radio opaque 1

cm markings up to 30 cm from its centrally opening tip (the details of the company are withheld). A single shot femoral block was given with 15 ml of Ropivacaine and the catheter was inserted later. A small catheter fragment broke down while placement. It was clearly seen coiled under femoral artery with ultrasound (Figure 1). Following multidisciplinary discussion with primary surgeon, vascular surgery team and anaesthesia team, the joint decision was taken to remove the catheter as it was a foreign body with chances of complications like infection, vascular complications or neuritis. The patient and relatives were consulted. The fractured fragment of the catheter was then removed surgically from under the femoral artery (Figure 2, 3) in the same surgical setting immediately. The procedure of removing the femoral catheter fragment was uneventful without any trauma to the surrounding structures.

A 52 years old patient was planned for a continuous femoral nerve block for post-operative pain relief following a unilateral knee replacement under a spinal anaesthetic. During manipulation of the catheter, a small fragment broke while fixing. However, in this case the fragment could not be visualised with ultrasound.

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Figure 1: Sonosite picture showing broken fragment

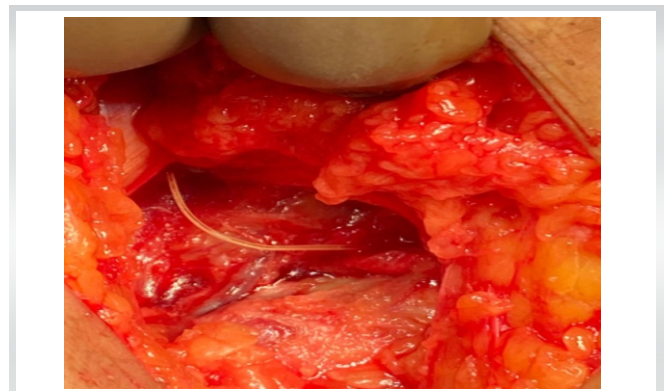


Figure 2: Surgical retrieval of the broken fragment

Computed tomography scan was not done as the patient and didn't give consent. Hence, after discussion with the primary surgeon, it was decided against retrieving the fractured fragment considering the fact that fragment was not visualised under ultrasound. The patient is under follow up with no complaints to date.

In both these cases, a femoral nerve catheter was inserted using a kit containing catheter through the 50 mm insulated stimulating needle assembly.

Discussion

Continuous femoral perineural catheter has unique advantages over single shot femoral block as dose adjustment can be done according to the need of patient. Since it offers a significant longer duration of analgesia, it causes faster movement to phase 2 recovery and/or post-anaesthesia care unit with earlier participation in physiotherapy and thus improves patient satisfaction. It also reduces opioid use and postoperative nausea and vomiting. Avoidance of opioids not

only minimizes the risk of adverse events but also has important public health implications given that opioids prescribed at hospital discharge, which are often in excess of the amount required to manage postoperative pain, may serve as a source for diversion. Other benefits include reduction in hospital resource utilization. Adequate analgesia in postoperative period improves mobility and fasten the discharge readiness [1].

Regardless the technique, there are always possibilities of vascular puncture and bleeding, nerve damage, and local anaesthetic systemic toxicity. But, continuous catheter technique involves risks related to catheter in addition to the drug delivery. There may be catheter obstruction, migration, kinking and leakage of drug, accidental dislodgement of catheters and infectious though rare, can lead to local inflammation. Incidences of bacterial colonization (6%-69%) and inflammation (3%-9.6%) [2, 3] leading to psoas abscess [4] are also been reported. Symptoms such as extreme quadriceps weakness (giving way of the affected extremity) and severe burning, irritation, or neurologic discomfort in the anterior thigh may be seen following single shot block technique and warrant for further neurologic workup, including electromyography/nerve conduction tests [5].

Shearing and breaking of the femoral perineural catheter during removal has been reported by Lee et al [6] leading to femoral neuralgia which resolved only after removal of the sheared fragment by surgical exploration. Though it was not identifiable with X-ray, computerized tomographic scan did clearly reveal it in the region of the femoral nerve, posterolateral to the femoral artery. Factors that may contribute to catheter shearing would include both the sharpness and the bevel angle of the insulated needle. This illustrates the importance of needle removal before withdrawal of the catheter guidewire. P. Guerci et al [7] reported two cases of inadvertent peripheral nerve catheter (PNC) shearing that occurred during placement under ultrasound guidance with their possible causes along with

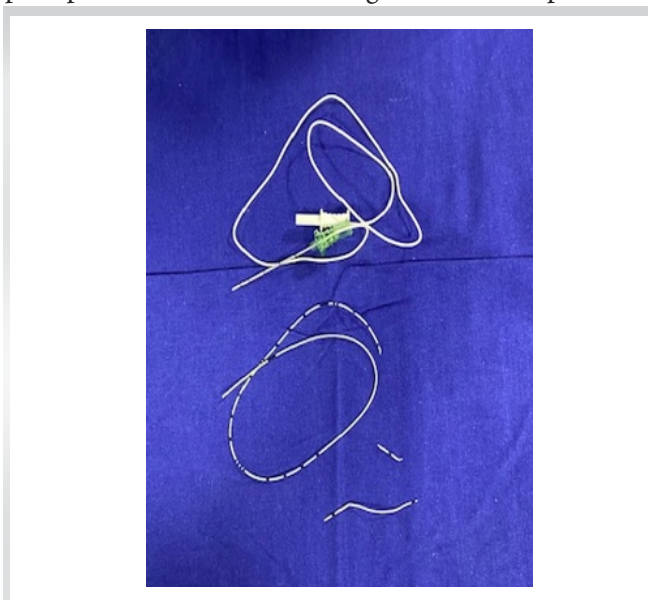


Figure 3: Sheared femoral perineural catheter with broken and retrieved fragment along with the needle

the differences and mechanical properties of different PNC kits. Khabiri et al [8] have advised that bolus sterile saline through the catheter slowly and incrementally to expand the area around the catheter which aid in removal without significant risk of compression neuropathy.

In our hospital, these are the first two cases encountered here where the decision though taken after the discussion with surgical and vascular team, do not match and at the same time are exactly opposite to each other. The joint decision with the treating teams along with the patient's or relative's consent plays a major role in further management. Till now no case has been reported with the broken fragment left in situ, but in such scenario, further follow up with the patient is must to reveal any complaints of pain or neurological deficit in the respective limb.

It is advisable to confirm proper placement of the needle tip followed by smooth insertion of the catheter as the space has been opened by the bolus dose given in advance. Once the catheter is inserted, further manipulation inside the needle is to be avoided to prevent the shearing of the same. The gentle removal of the needle after catheter placement and avoidance of catheter movement to and fro within the needle in situ is important considering the sharpness and acute cutting angle of the bevel.

Though removal of the fragment after visualisation either by ultrasound or computed tomography scan should be attempted to avoid further occurrence of neuralgia, blind

explorations to retrieve the catheter fragment may lead to trauma to surrounding major vessels and nerves, which in turn can cause major blood loss or neural damage.

Conclusion

A broken catheter puts the anaesthesiologist in dilemma to decide whether to retrieve it or not. If it can not be visualised under ultrasound or felt on palpation, further scanning by X-ray and computed tomography is advised. It is always better to retrieve the broken femoral perineural catheter fragment by means of surgical exploration as it may adhere to neural segments and lead to neuritis in future. Also the patient should be informed about this incidence and its further consequences, though very rare, if not retrieved. Perineural catheter sets with needle in the sheath, where catheter can be passed through the sheath may help to reduce the incidence of catheter breaking. Education, practise and refinement of the catheter insertion technique of the operator also is an important factor to help reduce catheter related problems. At the same time, if the catheter is not visualised by the available means, blind explorations should weigh against the trauma to the vital structures. Regular neurologic follow up is a advisable.

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Declaration of patient consent: The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given his/her consent for his/her images and other clinical information to be reported in the Journal. The patient understands that his/her name and initials will not be published, and due efforts will be made to conceal his/her identity, but anonymity cannot be guaranteed.

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