



Neurologic Deficit Following Ultrasound Guided Femoral Nerve Block

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Introduction

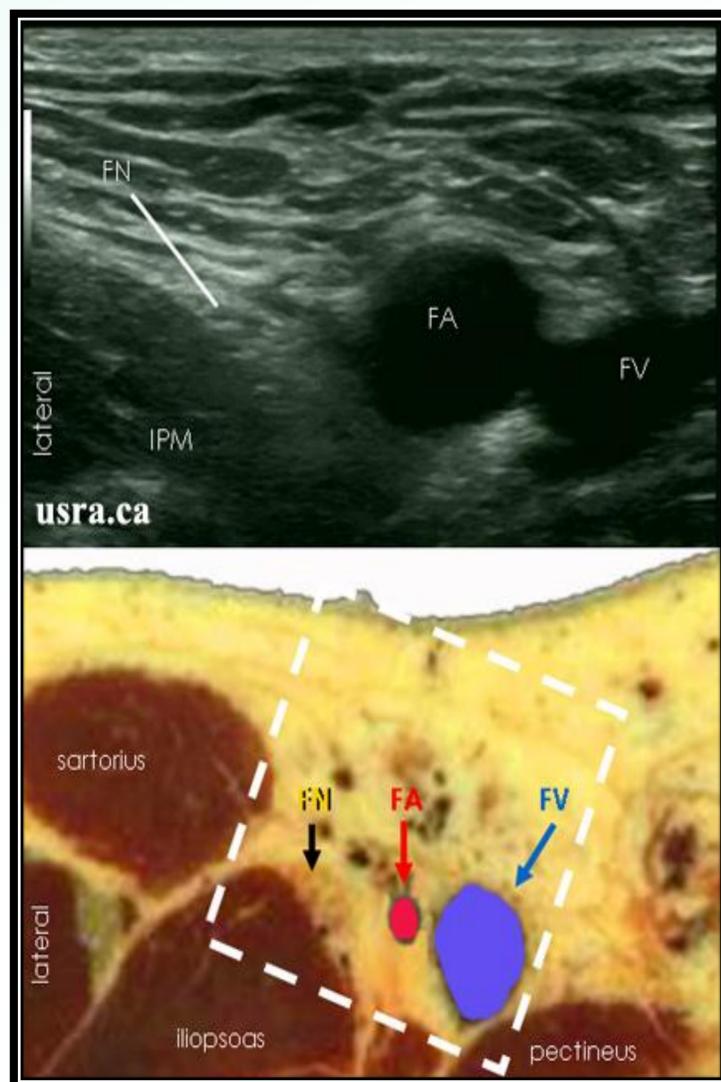
Ultrasound provides real time visualization of peripheral nerves while performing a peripheral nerve block. We present a case of post operative neural dysfunction following ultrasound guided femoral nerve block on a patient undergoing left knee arthroscopy.

Case Report

A 48-yr-old, 68 kg ASA I male with no significant past medical history presented for left knee arthroscopy. As part of the anesthetic management, a femoral nerve block was placed for post operative pain relief. Using ultrasound guidance (Sonosite M-turbo), a 2-inch 22-gauge 30-degree bevel insulated needle (Braun Stimuplex A) was used to identify the femoral nerve using an out of plane technique. Placement was reconfirmed with a peripheral nerve stimulator which elicited a quadriceps response at 0.5 mAmp with the response disappearing at 0.2 mAmp. A total of 30 ml of 0.5% ropivacaine was injected around the nerve from a 30 ml syringe under ultrasound visualization in 5 ml aliquots with little resistance to injection and no complaints of pain from the patient. After the block was placed and prior to surgery, the patient had motor function but reported loss of sensation. The patient underwent an uneventful left knee arthroscopy without the use of a tourniquet. The block was supplemented with sedation using propofol and remifentanyl infusions.

On post operative day 1, the patient complained of loss of motor function and persistent numbness in the left thigh. Five months postoperatively, the patient continued to report loss of sensation of the anterior thigh and medial aspect of the leg below the knee. The physical examination has progressed from complete motor paralysis and dense sensory block the day after the block to 4/5 strength in the left quadriceps muscle and partial return of sensation.

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Discussion

All local anesthetics can be neurotoxic, and a serious complication of regional anesthesia is permanent nerve injury. Toxic plasma concentrations of local anesthetics alter the permeability of the perineurium leading to endoneurial edema which can cause an ischemic neural lesion.¹ Studies have shown that intraneural injection of peripheral nerves often do not lead to neurologic injury.²

Discussion

The nerve usually moves when it comes in contact with the needle and the epineurium swells with injection of local anesthetic.² Hadzic noted that intrafascicular injection of local anesthetic could lead to long term neurologic injury. He showed that permanent neurologic deficit of the sciatic nerve in dogs occurred when high pressures (>20 psi) were obtained with injection intraneurally.³ Injuries included, mechanical disruption of the fascicles, degeneration of axons and myelinated fibers, as well as inflammatory changes. Pressures <20 psi did not cause neurologic injury.

In this case, a manometer was not used, but the local anesthetic was injected in 5 ml aliquots without exerting great pressure on the syringe. The patient also didn't vocalize any discomfort nor was swelling of the nerve observed on ultrasound. But our patient had neurologic injury with sensory deficit suggesting neural puncture with intrafascicular injection of local anesthetic. When placing our block, we often inject some of the local anesthetic on one side of the nerve, and then redirect the needle to place local anesthetic on the other side of the nerve. If the redirected needle was placed intrafascicular, the patient would not have complained of pain if there was already neural blockade from the first injection of local anesthetic. This mechanical disruption could also explain the prolonged neural dysfunction.

Conclusion

The use of ultrasound allows the location of nerves and visualization of spread of local anesthetics. When performing peripheral nerve blocks, it should be noted that intraneural puncture with intrafascicular injection of local anesthetic cannot always be seen on ultrasound and postoperative follow-up should be done.

References

1. Allegri M, Grossi P, et al.: Regional anaesthesia and side effects: is it safe? European Journal of Pain Supplements 2008;1:31-5.
2. Bigeleisen PE. Nerve puncture and apparent intraneural injection during ultrasound-guided axillary block does not invariably result in nerve injury. Anesthesiology 2008 105;779-83.
3. Hadzic A, Dilberovic F, et al.: Combination of intraneural injections and high injection pressure leads to fascicular injury and neurological deficits in dogs. Reg Anesth Pain Med 2004; 29:417-23.