

Critical Use of Sonoanatomy and Alternative Peripheral Nerve Block Techniques Near the Site of ECMO Cannulation: A Case Report

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Introduction

- The femoral and sciatic nerves form the major neural distribution to the lower extremity and are the primary targets for peripheral nerve block for lower extremity amputation surgery.
- These nerve blocks may become challenging in situations where ultrasound scanning is difficult due to altered anatomical landmarks and limitations in patient positioning.
- We present a case of a patient on extracorporeal membrane oxygenation (ECMO) who underwent through-knee amputation under regional anesthesia which was difficult to perform due to the location of the ECMO cannulas.
- This case provides an example of alternative ultrasound techniques and planes of approach that can help facilitate block placement in such cases.

Case Presentation

- Our patient was a 40 year old female hospitalized with methotrexate-induced diffuse alveolar hemorrhage and acute respiratory and cardiac failure requiring ECMO (initial VA ECMO later transitioned to VV ECMO). She developed right lower limb ischemia secondary to complications from ECMO cannulation and required urgent lower limb through-knee amputation.
- The patient was on heparin infusion for ECMO, midazolam infusion for sedation, and morphine infusion for analgesia.
- Considering her cardiopulmonary status, the need for continuous anticoagulation, and increased pain medication requirements, the decision was made to perform amputation in the ICU under regional anesthesia with femoral, sciatic, and obturator nerve blocks.

Case Presentation

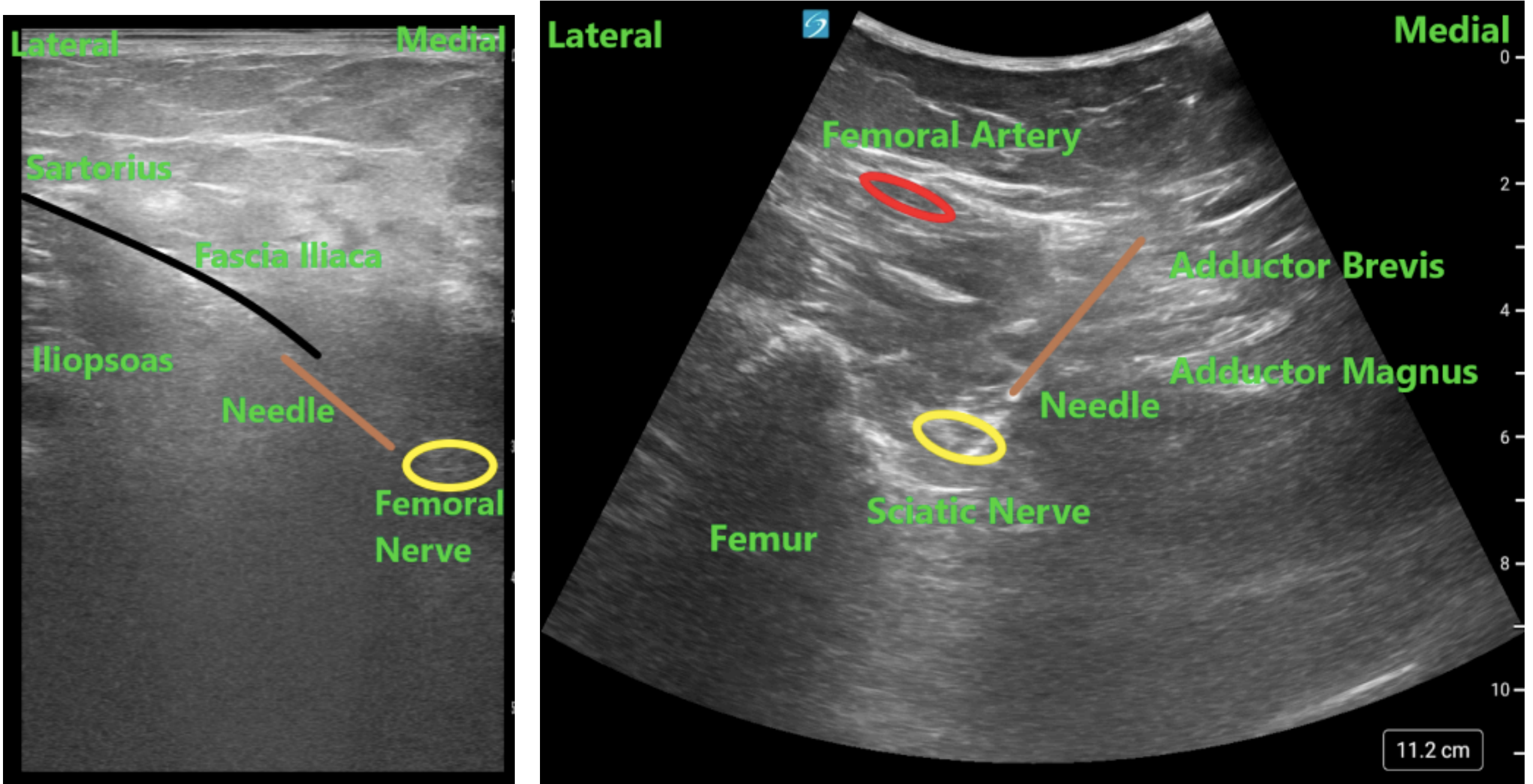


Figure 1A. Trans-fascia iliaca femoral block.
1B Anterior approach sciatic nerve block.

- Due to ECMO cannulation of the femoral vein and tissue edema following prior repair on the surgical side, traditional ultrasound scanning techniques were not possible to help guide block placement.
- Femoral nerve block was performed using a trans-fascia iliaca approach. Fascia iliaca was identified and traced lateral to medial until the point of divergence between iliopsoas and sartorius. A 22 gauge, 80 mm echogenic needle was introduced using an in-plane technique and advanced until twitching of sartorius was elicited with a nerve twitch monitor, at which point 20 ml of 0.5% bupivacaine was deposited.
- To prevent possible interruption of flow through the ECMO cannula, sciatic nerve block was performed from an anterior approach. The sciatic nerve was identified under ultrasound guidance using a curvilinear ultrasound probe approximately 10 cm caudad from the inguinal crease. A needle was introduced in-plane and proximity to the nerve confirmed using nerve twitch monitoring. 15 ml of 0.5% bupivacaine was administered to complete the block.
- At the same ultrasound positioning used for sciatic block, the posterior branch of the obturator nerve was identified above adductor magnus. The needle was withdrawn and redirected towards the nerve, and a further 10 ml of 0.25% bupivacaine was administered.
- The patient did not require any neuromuscular blockade or additional sedation or analgesia throughout surgery. Her 24-hour oral MME reduced from 7704 mg to 4445 mg post-op. There were no complications related to nerve blocks or surgery at 24 hours post-op [1].

Discussion

- What made this case unique was the use of a trans-fascia iliaca approach to femoral nerve block and an anterior approach to sciatic nerve block.
- Fascia iliaca can serve as a useful anatomical landmark when the neurovascular bundle is not readily visible. While needle injection through fascia iliaca and injection above the iliacus muscle is defined as a fascia iliaca block, the femoral nerve can be reached if the space is hydrodissected and the needle advanced medially.
- Similarly, when a posterior approach is not feasible, an anterior approach to sciatic nerve block can be an effective alternative. The addition of obturator nerve block completes surgical anesthesia of the lower extremity.

Conclusion

- Peripheral nerve blocks can provide both surgical anesthesia and post-op analgesia during lower extremity amputation, often with fewer complications than either general or neuraxial anesthesia [2]. This may be especially true in patients with cardiopulmonary compromise.
- A future focus investigating novel techniques and approaches to these nerve blocks in ECMO patients is necessary.

References

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