

Intraneural Blockade for Primary Anesthesia in a Critically Ill Patient to Prevent Local Anesthetic Systemic Toxicity (LAST)

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Background:

- Patients with heart failure and acidosis are at heightened risk for LAST, particularly when high doses or repeated administrations of local anesthetics are used.
- Although the use of ultrasound guidance has reduced the incidence of LAST, critically ill patients require close monitoring to minimize the risk of systemic toxicity.¹
- Election of regional anesthesia via subepineural extrafascicular low volume injection of the nerves of interest ² was deemed a safer primary anesthesia option given the patient's critical illness.

Case:

- A 43-year-old male with pulmonary hypertension presented with lower extremity necrotizing fasciitis, AKI on CRRT, cirrhosis, septic and cardiogenic shock.
- TTE showed severe right ventricular depression and pulmonary hypertension. He additionally had increasing pressor requirements and inotropic support; he was taken to the OR for debridement and possible amputation.
- Plan was to avoid general anesthesia due to high risk of hemodynamic compromise in the context of his comorbidities.
- Primary anesthesia was achieved using deliberate intraneural injections with low doses of local anesthetic to minimize the risk of LAST. The patient tolerated the procedure with minimal sedation.

Methods:

- Intraneural injections were performed of the right sciatic, femoral, obturator, and lateral femoral cutaneous (LFC) nerves.
- The motor response was targeted between 0.2-0.5 mA for subepineural and suprafascicular block location

Ultrasound (US) guidance alone

Femoral (figure 1) → Ropivacaine 0.5%, 10cc

LFC injections → Ropivacaine 0.25%, 7cc (not intraneural)

Combined US and nerve stimulator

Sciatic (Figure 2) → Ropivacaine 0.5%, 20cc

Obturator nerves → Ropivacaine 0.25%, 7cc



Figure 1: Right femoral nerve with noted intraneural injection of local anesthetic

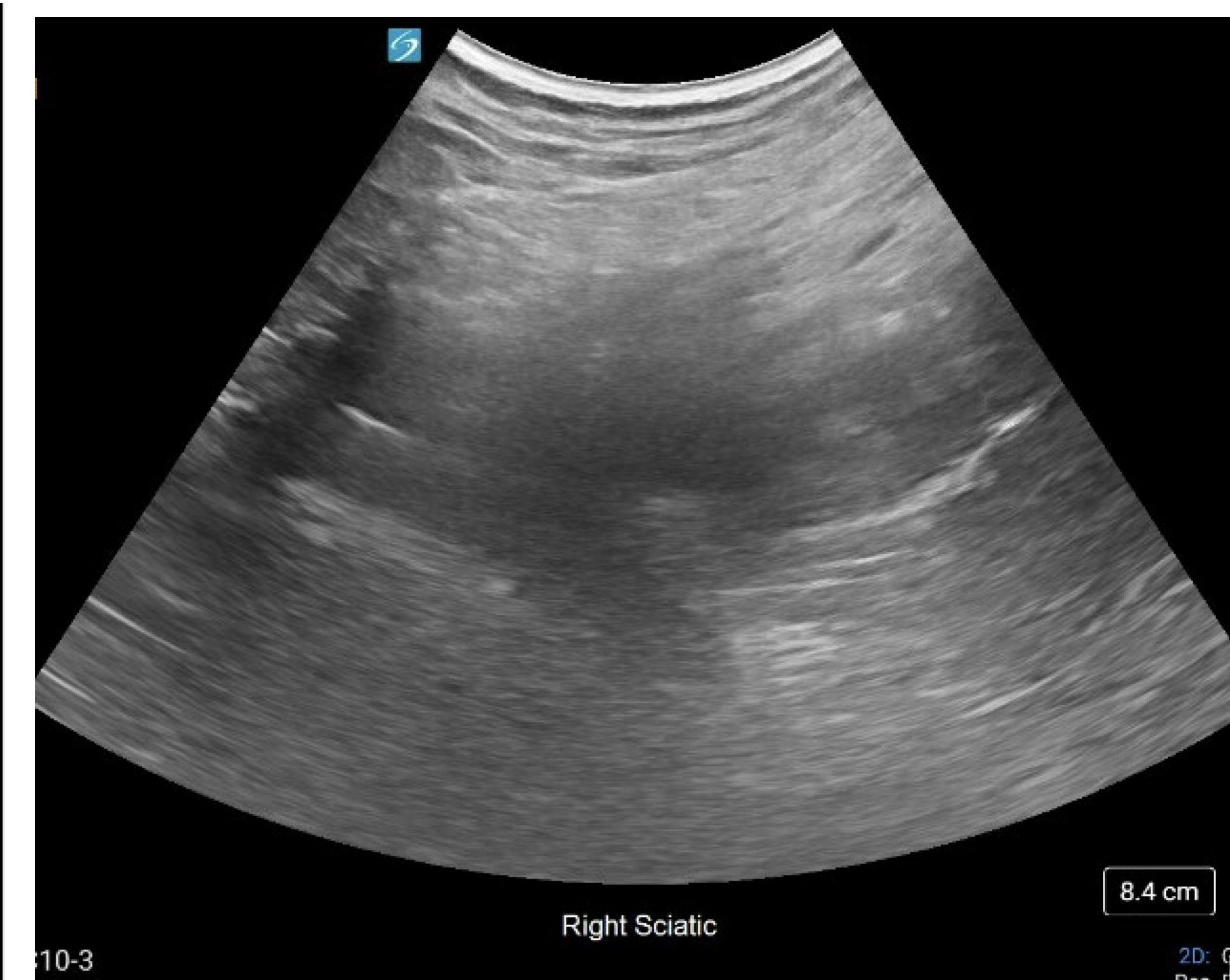


Figure 2: Right Sciatic nerve difficult to visualize via ultrasound due to surrounding edema

Discussion:

- This case underscores the importance of choosing anesthesia techniques carefully in critically ill patients to balance effective pain management with the risks of systemic toxicity and nerve injury.
- Use careful technique to minimize nerve injury, particularly given that high-pressure injections and mechanical trauma can exacerbate risk of nerve injury.³
- However, intraneural injections, when done with proper technique and low-pressure injections, do not necessarily lead to significant neurological deficits.^{4,5}
- Smaller volumes of local anesthetic via intraneural injections can minimize systemic absorption, thus reducing the risk of exacerbating cardiac dysfunction.²

References:

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