

Using regional anesthesia in arteriovenous fistula ligation for neuropathic pain in a patient with ischemic monomelic neuropathy



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Introduction

Ischemic monomelic neuropathy is an uncommon complication of the creation of an arteriovenous (AV) fistula for hemodialysis.

- Risk of AV fistula:
 - Excessively shunting arterial blood away from the distal extremity → ischemic damage to surrounding nerve fibers and acute neurological symptoms
- Most common immediate symptoms:
 - Global muscle pain, weakness, and a warm hand with palpable pulses

Regional anesthesia remains controversial in patients with preexisting nerve damage or concurrent nerve injuries and should be administered cautiously in these patients due to concern for further exacerbation of neurologic complications.

Case Report

A **66-year-old female with past medical history significant for hypertension, type II diabetes mellitus, and end-stage renal disease on dialysis** presented **10 days after left upper extremity brachiocephalic fistula creation with worsening burning left arm pain, numbness, and decreased grip strength.**

On physical exam, a **palpable thrill** was present on the left antecubital fossa and there was notable decreased grip strength of the left hand. Given the timeline of events, her symptoms, and her physical exam, there was a concern for **ischemic monomelic neuropathy**, so she was taken back to the OR for AV fistula ligation.

After a thorough discussion about the risks of regional vs general anesthesia in the setting of various comorbidities, the patient elected **regional anesthesia**, which she had tolerated well for the original fistula creation. An ultrasound-guided supraclavicular nerve block was placed successfully with 18 mL of 1.5% mepivacaine and the patient tolerated the procedure well without complications. No worsening of neurologic symptoms occurred after the block wore off. In the months following the nerve block and AV fistula ligation, her motor and neurologic symptoms have been improving, but some left hand weakness continues.

Key Takeaways

- Ischemic monomelic neuropathy is a complication of AVF creation for hemodialysis that is caused by ischemic nerve damage from excessive shunting of arterial blood and can present with muscle pain, weakness, and a warm hand with palpable pulses.
- Regional anesthesia in patients with preexisting nerve damage should be used carefully due to its risk for further nerve damage or exacerbation.
- To best prevent worsening nerve damage in these patients, providers should use smaller doses of less neurotoxic medications that are shorter acting and avoid vasoconstricting agents.
- Anesthesia providers should have careful discussions with their patients weighing the risks of general anesthesia in patients with many co-morbidities vs the risks of further nerve damage from local anesthesia.

References

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Full
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references

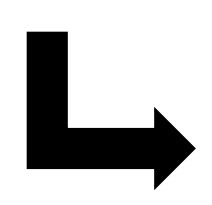


Image 1: a) Angiogram before AVF creation; b) Angiogram after AVF creation showing patent fistula (*note: example image, not our patient*).

Results & Discussion

In patients with pre-existing nerve damage or peripheral neurologic conditions, the administration of regional anesthesia poses a risk of further insult to the nerves. Previous peripheral nerve injury may predispose patients to a higher risk of further nerve damage with the administration of local anesthesia; a concept described as the double-crush phenomenon.

When caring for a patient with previous nerve damage who requires regional anesthesia, the care team should take specific action to decrease further injury risk. This includes using less neurotoxic medications with short or intermediate-acting effects such as bupivacaine or mepivacaine, minimizing the amount of anesthetic administered, and avoiding vasoconstriction agents, such as epinephrine.

To ensure the best patient outcomes, the provider should weigh the risks of general anesthesia, (which are elevated in patients with ESRD), further nerve damage from local anesthesia, and the need for the procedure with a focus on mitigating the most salient risks.