

What's in the Syringe? A case of Inadvertent use of Bupivacaine in a Bier Block

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Introduction

Background: Intravenous Regional Anesthesia (IVRA), or "Bier Block," is a time-efficient technique for short upper extremity procedures.

Standard of Care: Lidocaine (0.5%) is the agent of choice due to its established safety profile and rapid metabolism.

The Risk: **Bupivacaine is contraindicated** for IVRA due to its high affinity for cardiac sodium channels, carrying a significant risk of LAST upon tourniquet deflation.

Objective: We report a case of inadvertent bupivacaine administration during IVRA, detailing the acute clinical management and the subsequent institution-wide quality improvement initiatives.

IVRA/BIER BLOCK TIME OUT	
- ATTENDING INITIATES IMMEDIATELY PRIOR TO PROCEDURE START - ATTENDING & 1 OTHER TEAM MEMBER (RN) MUST BE PRESENT - SUSPEND ALL ACTIVITIES AND FACE THE PATIENT - RN VERIFIES SURGICAL AND ANESTHESIA CONSENT ARE BOTH SIGNED AND CORRECT	
Attending Anesthesiologist	"WE ARE READY FOR TIME OUT" - State patient name, DOB, MRN and surgical procedure (when applicable). Confirm ID band with surgical consent. - Verify patient has been consented for the intended block - Verify block site marking - Verify laterality - State allergies - Verify anticoagulants - Confirm positioning for procedure - Confirm Medications to the administered (MD & CRNA) - Verbalize any concerns if applicable
Team member (pre-op, PACU, intra-op RN)	Verbally confirms: - Verify surgical and anesthesia consents have been signed - Intended block procedure - Intended block laterality - Verify site marking - Verify correct positioning - Verbalize "Timeout Complete"
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Case Presentation

Patient: 25-year-old ASA I male scheduled for excision of a right wrist ganglion cyst.

The Error: Following induction of a standard single-tourniquet IVRA, it was discovered that **0.5% Bupivacaine** had been inadvertently administered instead of 0.5% Lidocaine.

Immediate Management:

- Aspiration:** The IV catheter was immediately aspirated, yielding 8 mL of fluid.
- Containment:** The tourniquet was kept inflated for **2 hours** (far exceeding the surgical time) to allow for tissue binding.
- Pharmacologic Prophylaxis:** The patient was sedated with Midazolam (4 mg) and administered an **Intralipid bolus** prior to cuff release.

Outcome: Tourniquet deflation was performed in a staged manner under continuous cardiac monitoring. The patient remained hemodynamically stable, showed no signs of LAST, and was discharged after 1 hour of PACU observation.

Figure 1 (left): The New IVRA Timeout Protocol Developed post-event, this protocol requires the Attending Anesthesiologist and an RN to explicitly verify the medication and block parameters. This replaces the generic surgical timeout for IVRA cases to prevent medication substitution errors.

Figure 2 (right): Physical Safety Barrier A laminated visual warning placed directly over the tourniquet cuff. This serves as a hard stop to prevent premature or accidental deflation by the surgical team, ensuring anesthesia controls the release time.

Discussion

Clinical Rationale: The decision to prolong tourniquet inflation to 2 hours was based on the theoretical benefit of allowing bupivacaine to bind to local tissues, preventing a peak serum bolus upon release.

Role of Lipids: While Intralipid is typically a rescue therapy, we utilized it prophylactically to sequester free drug in the limb and circulation.

System Fix (The "SAFER" Review): A Root Cause Analysis revealed that the standard surgical timeout did not adequately address regional anesthesia specifics.

Intervention 1 (New Protocol): Implementation of a dedicated **"IVRA Timeout"** requiring two providers to visually verify the medication label.

Intervention 2 (Visual Barrier): Creation of a laminated **"DO NOT DEFLATE"** sign placed physically over the tourniquet to prevent accidental release by OR staff.



Conclusions

Prevention is Key: Human error is inevitable; therefore, systems must be engineered to catch errors before they reach the patient.

Protocol Efficacy: The implementation of specific "Hard Stops", such as the IVRA Timeout and physical tourniquet signs, adds necessary layers of safety to a high-risk procedure.

Unresolved Clinical Questions

While we have established a protocol for prevention, many questions remain regarding the appropriate management following an inadvertent IV injection of Bupivacaine:

Tourniquet Duration: When can the tourniquet be safely deflated?

Lipid Emulsion Therapy: What is the role of intralipid? Should it be injected directly into the affected arm prior to deflation or systemically upon deflation?

Observation Window: What is the appropriate time for monitoring a patient prior to discharge?

References

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