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Letters to the Editor

☐ LOCAL ANESTHETIC SYSTEMIC TOXICITY (LAST), NEEDS TREATMENT

☐ **To the Editor:**

With great interest, we have read the article published in *The Journal of Emergency Medicine* written by Nelson and colleagues (1). They present a case of a 66-year-old man who presented at their Emergency Department (ED). The patient underwent elective rotator cuff surgery of his left shoulder in an outpatient ambulatory setting and developed treatment-resistant bradycardia and hypotension. The symptoms developed soon after an ultrasound-guided interscalene nerve block (ISNB) with 150 mg bupivacaine and 200 mg lidocaine. Soon after arrival at the ED, his symptoms progressed into a hemodynamic collapse and he required endotracheal intubation and ventilation. The patient suffered from multiple comorbidities including diabetes, ischemic heart disease, and sleep apnea.

In the discussion, the question was raised whether these symptoms might be attributed to local anesthetic systemic toxicity (LAST). Although we compliment the authors with this publication, this case report could have been even more informative if the weight of the patient, details of the block procedure, and exact timing of events had been described. This information is crucial to calculate the maximum dose of local anesthetic to be injected, which is based on the choice of local anesthetic, patient weight, injection site, and comorbidities (2).

To avoid LAST, only clinically adequate and safe doses, that are block specific, are justified. To select the right dose, the weight of the patient is of paramount importance. Moreover, when two local anesthetics are combined, their individual toxicity is additive. The ideal volume for an effective ISNB for adequate analgesia with a reduced incidence of diaphragmatic paralysis is between 2.34 and 4.29 mL (3). Furthermore, the comorbidity of this patient would have warranted a 30% dose reduction of the maximum allowed dose of local anesthetic. We may conclude that the dose of local anesthetic was unnecessarily high for a successful ultrasound-guided ISNB and may have caused LAST in this patient.

Classical symptoms of LAST start with central nervous system excitement such as metallic taste, or auditory changes, although these might have been lost due to propofol sedation. Hereafter, seizure and cardiovascular collapse may follow. However, nearly half of the presentations have an atypical manifestation, presenting with cardiovascular symptoms alone or having a delayed presentation (4). Whenever progressive hypotension or bradycardia occurs shortly after the administration of an ISNB with a high volume of local anesthetic, LAST should be considered and the attending physician should react and treat accordingly. This means: the prevention of hypoxia, hypercapnia, and acidosis, which potentiate LAST. The lactate acidosis described in this patient may have contributed to the hemodynamic collapse by increasing the free fraction of local anesthetic, which worsens cardiac function. Instantaneous administration of an intravenous lipid emulsion, such as Intralipid® 20% (Baxter Healthcare Corporation, Deerfield, IL), is needed and advised to counteract the toxicity and clinical symptoms (4).

With respect to the patient's medical history, myocardial ischemia might have occurred simultaneously. Importantly, perioperative myocardial injury after noncardiac surgery is often characterized by the lack of clinical symptoms (5). High-sensitivity cardiac troponin T should be measured as it accurately identifies perioperative myocardial injury and is linked to a worse perioperative short- and long-term outcome (6,7).

In conclusion, when a high-dose local anesthetic is administered, LAST may occur. Immediate recognition and treatment with Intralipid might prevent serious morbidity and mortality. Although hemodynamic stability may be associated with LAST, differential diagnosis as perioperative myocardial ischemia should be considered.

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