

Local Anesthetic Systemic Toxicity (LAST) Complicating Combined Femoral-Sciatic Nerve Block in An Uncontrolled Diabetic Patient: A Case Report

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ABSTRACT: Anesthesiologists often face challenges when administering regional anesthesia in diabetic patients, particularly with concerns about the potential toxicity of local anesthetics to peripheral nerves. This case report details an incident of Local Anesthetic Systemic Toxicity (LAST) following a combined femoral and sciatic nerve block in an uncontrolled diabetic patient scheduled for below knee amputation. Despite careful administration and monitoring, the patient experienced a grand mal seizure, emphasizing the need for heightened awareness of potential complications in this high-risk population.

KEYWORDS: Local Anesthetic Systemic Toxicity (LAST), Combined Femoral-Sciatic Nerve Block, Uncontrolled Diabetes, Below Knee Amputation, Regional Anesthesia Complications.

INTRODUCTION: Lower limb amputations, specifically below knee or above knee procedures, are not uncommon in India, often necessitated by conditions such as uncontrolled sepsis in diabetic patients or peripheral vascular disease leading to gangrene [1]. Emergency situations in these patients pose challenges, particularly in administering general anesthesia due to their precarious health. Neuraxial anesthesia, such as spinal or epidural techniques, is a common alternative, yet it carries its own set of risks, especially in individuals with sepsis and unstable cardiovascular systems, where it may further lower blood pressure [2,3].

In response to these challenges, a regional block of the affected lower limb emerges as an alternative strategy. This involves combining a sciatic nerve block with either a femoral nerve block, a 3-in-1 block, or a psoas compartment lumbar plexus block. While this approach can be advantageous, it necessitates the use of substantial amounts of local anesthetic agents. Practitioners must be mindful of the maximum safe dose of these agents to avoid the risk of local anesthetic systemic toxicity (LAST).

This case report highlights an instance of LAST following a femoral-sciatic nerve block in a patient with uncontrolled diabetes and sepsis who was undergoing below knee amputation. The case underscores the importance of careful consideration and monitoring when employing regional blocks, especially in high-risk patients, to mitigate the potential complications associated with LAST [4].

CASE REPORT

A 35-year-old male, weighing 55 kg with an American Society of Anesthesiologists physical status of III, was urgently scheduled for below right knee amputation due to a right diabetic foot with uncontrolled hyperglycemia. His medical history included type-2 diabetes mellitus for the past 8 years, with non-compliance to oral hypoglycemic drugs. There was no known history of hypertension, seizures, or coronary artery disease, and the patient had not been exposed to anesthesia in the past.

Upon examination, the patient was conscious, oriented, slightly tachypneic, and pale. Airway examination revealed a Modified Mallampati Class of III, while other parameters were normal. The patient presented with uncontrolled hyperglycemia, with a random blood sugar (RBS) level of 380 mg/dl. Despite insulin infusion, blood sugars remained deranged. Laboratory investigations showed Hb of 7.1 gm/dl, TLC of 13,000, platelets of 4.6 lakhs, S. Electrolytes (Na/K) of 131/4.4, INR of 1.2, and negative urine for ketones. Arterial blood gas (ABG) analysis indicated the presence of metabolic acidosis. Preoperative ECG showed Left bundle branch block (LBBB).

Due to the high-risk nature of the case, the patient was taken to the emergency operating room with informed consent. All ASA standard II monitors were attached, and baseline electrocardiogram showed sinus tachycardia at 110 beats/min, non-invasive blood pressure of 110/58 mmHg, and arterial oxygen saturation of 97% on room air. To address uncontrolled hyperglycemia, Dextrose 5% was initiated at 100 ml/hr, and regular insulin infusion was started to maintain blood sugar levels between 120 to 180 mg/dl.

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Given the patient's sepsis and acidosis, and to avoid hemodynamic fluctuations, surgical anesthesia was planned via a right-sided combined femoral and sciatic nerve block. A right-sided femoral nerve block was administered using a peripheral nerve stimulator, with 5 ml of 2% lignocaine with adrenaline and 5 ml of 0.5% bupivacaine. The patient was then placed in the left lateral decubitus position for a right-sided sciatic block with 15ml of 0.5% bupivacaine via the transgluteal approach. However, immediately after the sciatic nerve block, the patient became unresponsive and experienced a grand mal seizure.

Immediate assistance was called for help, and the patient was administered 100% oxygen with a bain circuit. Midazolam 2 mg IV was given, leading to the cessation of seizure activity. The patient was then intubated using rapid sequence intubation and the airway was secured without hypoxic injury. Vital signs remained stable during the procedure. Intraoperative ECG showed LBBB with atrial fibrillation (Fig 1). The patient was monitored for signs of cardiotoxicity for 30-40 minutes, but fortunately, there were no indications of cardiotoxicity due to local anesthetic systemic toxicity except new onset atrial fibrillation which was managed by i/v Metoprolol 2mg. The surgery proceeded without complications, and the patient was extubated after adequate reversal of neuromuscular blockade. Postoperatively, the patient was shifted to the ICU for further monitoring.

DISCUSSION

This case underscores the complexity of anesthetic management in diabetic patients with comorbidities. The use of regional anesthesia in such cases requires meticulous attention to dosages and potential complications, especially when combining multiple nerve blocks. The seizure observed could be attributed to LAST, raising questions about the safety margin of local anesthetics in uncontrolled diabetic patients. Further research is needed to determine optimal dosages and the role of adjuvant drugs in mitigating nerve damage in this population.

In examining the incidence, presentation, and treatment of Local Anesthetic Systemic Toxicity (LAST), it is essential to consider the challenges in accurately determining its prevalence. The reported estimate of clinically significant LAST following peripheral nerve blocks ranges from 7.5 to 20 occurrences per 10,000 blocks performed. However, the true incidence is challenging to establish due to potential underrepresentation of transient neurologic symptoms or cardiovascular effects in published data.

Di Gregorio et al., [5] in a comprehensive review spanning 1979 to 2009, identified only one report of death from LAST among 93 cases. Contrastingly, an analysis of the American Society of Anesthesiologists Closed Claims Database from 1980 to 2000 associated LAST with 7 out of 19 claims for death or brain damage after eye and peripheral nerve blocks. The limitation of closed claims representing only litigated events suggests potential underreporting of adverse outcomes in the literature [6].

When specifically examining the risk of LAST after Psoas Compartment Blockade, Macaire et al. [7] conducted a retrospective study involving 4,319 blocks across 42 centers. Their findings highlighted incidents such as inadvertent spinal anesthesia, intravascular injections, delayed toxicity, and inappropriate catheter paths. Psoas compartment blocks pose a heightened risk of local anesthetic systemic absorption due to the highly vascular nature of the muscle bed housing the lumbar plexus. Additionally, as the paravertebral space is contiguous with the epidural space, injection with high pressures may lead to unintentional bilateral blockade and increase the risk of neuraxial blockade [8,9].

Administration of larger local anesthetic volumes further elevates the likelihood of epidural spread, potentially resulting in hemodynamic instability from sympathetic blockade. Elderly patients, especially those with pre-existing hypovolemia or debilitation, may be at an increased risk of cardiovascular collapse [10,11].

To mitigate these risks, the ASRA Practice Advisory on LAST recommends aspirating the needle or catheter before each injection and administering local anesthetic in 3 to 5ml aliquots. While these precautions aim to limit intravascular injection, it is noteworthy that arrhythmias have been reported after psoas compartment blocks, even with negative aspiration tests and the use of divided doses. This underscores the complexity and challenges associated with preventing and managing LAST in clinical practice.

CONCLUSION: Anesthesiologists should exercise caution when considering regional anesthesia in uncontrolled diabetic patients, as evidenced by this case of LAST following a femoral-sciatic nerve block. Strict adherence to monitoring protocols, careful dosage calculations, and a heightened awareness of potential complications are crucial in optimizing patient safety. Further studies are warranted to refine guidelines for regional anesthesia in this high-risk population.

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