

Local Anesthetic Systemic Toxicity vs. Anaphylaxis Near Miss Event in a Pediatric Patient – Could A Small Change in Protocol Avert Disaster?

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Introduction

- Pediatric nerve blocks are commonly performed under general anesthesia for management of postoperative pain
- Studies on regional techniques have shown many advantages, including lower opioid requirements and lower rates of transition to chronic pain¹
- Anaphylaxis and Local Anesthetic Systemic Toxicity (LAST) are potentially lethal intraoperative complications that require distinct treatments, but may present similarly as hypotension, bradycardia, and respiratory distress
- The fact that there is limited data on these complications in the pediatric population presents additional challenges in procedural planning, diagnosis, and treatment
- Under general anesthesia, common CNS symptoms of LAST are masked and can commonly present primarily as cardiotoxicity in the form of arrhythmias, ECG changes, and hypotension²
- A large prospective study by the French-Language Society of Paediatric Anaesthesiologists reported a rate of local anesthetic cardiac toxicity of 0.05%³
- Anaphylaxis remains the leading cause of primary anesthesia mortality, however rates in children remain reportedly as low as 1:10,000 to 1:20,000^{4,5}

Case Summary

- 13-year-old female with PMHx of Beckwith-Wiedemann syndrome, hemihypertrophy, and limb length discrepancy was scheduled for a right proximal tibial epiphysiodesis and distal femur pannicular resection
- Under combined general and regional anesthesia, anterior sciatic and adductor canal blocks were planned
- The patient had an extensive past surgical history, including multiple prior uneventful general anesthetics administered for surgeries related to her Beckwith-Wiedemann syndrome, including left oophorectomy for ovarian germ cell tumor, right nephrectomy for Wilms tumor and idiopathic scoliosis
- Patient had received cefazolin without incident for surgical site infection prophylaxis on multiple occasions
- A general endotracheal anesthetic was planned given her macroglossia and potential airway difficulty with laryngeal mask airway placement

11:29

- IV induction with propofol and fentanyl
- Endotracheal intubation
- General anesthesia maintained with sevoflurane
- SpO₂ 100%, BP 84/56. HR 88

11:37

- Cefazolin administered at surgeon’s request
- In parallel, lower extremity was prepped and draped for peripheral nerve blocks

11:38

- SpO₂ 42%, BP 34/23. HR 120
- Increased peak airway pressures, loss of capnography waveform

11:39

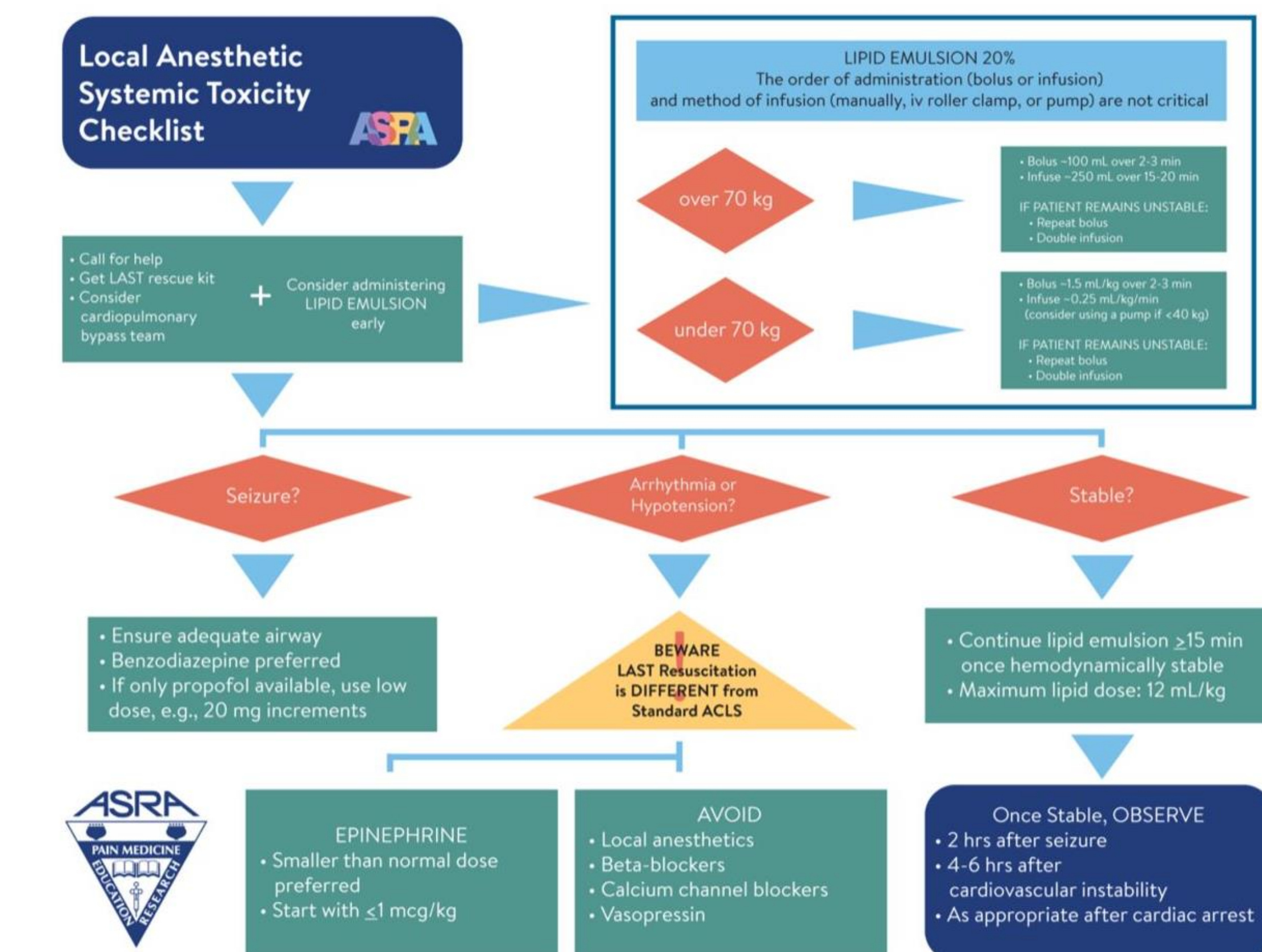
- Resuscitated with 2mg IV epinephrine infusion at 0.5mcg/kg/min, 2.5L lactated ringers
- Given 100mg IV hydrocortisone, 40mg IV famotidine, 25mg IV diphenhydramine
- Right internal jugular central venous access with 7 French 15cm catheter, additional peripheral IV access obtained
- TTE: hyperdynamic underfilled LV in midpapillary short axis view with inferior vena caval collapse
- Serum tryptase drawn

- Surgery was cancelled and patient was transferred to the pediatric ICU with full ventilatory support and continuous central venous infusion of epinephrine
- Over the subsequent 24 hours, the epinephrine infusion was slowly weaned, and the patient was extubated the following day without further respiratory or pressor support
- Patient was discharged home on third hospital day
- Serum tryptase level drawn at the time of the event was reported to be 62.6 ug/L, confirming the diagnosis of anaphylaxis

Discussion

- In the setting of general anesthesia, anaphylaxis and LAST may present similarly as hypotension, bradycardia, and respiratory distress due to masking of neurological symptoms of LAST
- Rapid differentiation of anaphylaxis from LAST is critical because of key differences in their treatment algorithms

- LAST is treated by stopping anesthetic injection, maintenance of the patient’s airway, use of low doses of epinephrine for hypotension, and the early initiation of lipid emulsion rescue
- Importantly, LAST treatment differs from anaphylaxis treatment
- ASRA suggests smaller doses of epinephrine (beginning with <1mcg/kg) and the avoidance of local anesthetics to treat ventricular arrhythmias, beta-blockers, calcium channel blockers, and vasopressin
- In cases with high risk of LAST, consider enforcing a protocol in which commonly allergenic medications are administered with enough delay before performing regional anesthetic blocks
- The anesthesiology division at St. Christopher’s Hospital for Children established an institutional protocol that mandates a 15 min time interval between antibiotic and regional block administration under anesthesia



References

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