

LAST (Local Anesthetic Systemic Toxicity) Protocol

PREVENTION

- a) Minimal dose necessary
- b) Utilize clinically appropriate agents with highest minimum toxic dose (**Box 1**)
- c) Consider avoiding in populations at increased risk (**Box 2**)
- d) Aspirate prior to each injection
- e) Test dose: 1-2ml of anesthetic with epinephrine 1:100,000 (monitor for increase in HR 10bpm or SBP 15mmHg)
- f) Incremental injection 3-5ml q30-45sec
- g) US guidance

MONITORING

(during injection and up to 30min after)

- a) Oxygenation: pulse oximetry
- b) Ventilation: clinical
- c) Circulation: BP and HR q5min, ECG telemetry

Suspect LAST?

- a) Prodromal symptoms: dizziness, tinnitus, metallic taste, perioral numbness
- b) Seizures
- c) Tachycardia/Tachydysrhythmia
- d) Conduction block
- e) Hypertension/Hypotension

YES

PRIMARY GOAL: minimize hypoxia and acidosis

AIRWAY: 100% O2, Intubate if indicated, consider lipid therapy

Dysrhythmia?

Hypotension?

Seizures?

Consider ECMO team alert

YES

YES

YES

YES

Modified ACLS

- A. Epi 10-100mcg titrated to effect (<1mcg/kg)
- B. Amiodarone for persistent ventricular dysrhythmia
- C. AVOID: vasopressin, CCB, BB, lidocaine
- D. Monitor ABG for acidosis and hypoxia
- E. Expect prolonged resuscitation

ECMO team alert 515-1214

Lipid Therapy:
1.5ml/kg lean body mass IV over 1 min (can repeat x1-2)

- 1. Benzodiazepines
- 2. Low dose paralytic

Improvement?

NO

YES

0.25 ml/kg/hr continuous infusion

Hypotension?

YES

0.5 ml/kg/hr continuous infusion

NO

Continue infusion at least 10 min post-ROSC

NO

LAST (Local Anesthetic Systemic Toxicity) Protocol continued

BOX 1. Clinically appropriate agents with highest minimum toxic dose

Local Anesthetic	Onset (min)	Duration (min)	Max Dose (mg/kg)	Max Total Dose (mg)	Total Volume (ml)
Chloroprocaine	6-12	60	11	800	40ml of 2%
Chloro + Epi (1:200,000)	6-12	60	14	1000	50ml of 2%
Lidocaine	2-5	50-120	4-5	300	30ml of 1%
Lido + Epi (1:200,000)	2-5	60-180	5-7	500	50ml of 1%
Bupivacaine	5-10	240-480 (3-8h)	2	175	35ml of 0.5%

BOX 2. Populations at increased risk

- 1) Heart disease (CHF, arrhythmia, ischemic disease, low or high CO states)
- 2) Liver disease
- 3) Pregnancy
- 4) Beta blocker, digoxin, calcium channel blocker, cyp P450 inhibitors
- 5) Acidosis
- 6) Low plasma protein
- 7) Mitochondrial disease



ASRA Checklist for Treatment of Local Anesthetic Systemic Toxicity

See page 3

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Checklist for Treatment of Local Anesthetic Systemic Toxicity

The Pharmacologic Treatment of Local Anesthetic Systemic Toxicity (LAST) is Different from Other Cardiac Arrest Scenarios

- Get Help**
- Initial Focus**
 - Airway management:** ventilate with 100% oxygen
 - Seizure suppression:** benzodiazepines are preferred; **AVOID propofol** in patients having signs of cardiovascular instability
 - Alert** the nearest facility having **cardiopulmonary bypass** capability
- Management of Cardiac Arrhythmias**
 - Basic and Advanced Cardiac Life Support (ACLS)** will require adjustment of medications and perhaps prolonged effort
 - AVOID vasopressin, calcium channel blockers, beta blockers, or local anesthetic**
 - REDUCE** epinephrine dose to **<1 mcg/kg**
- Lipid Emulsion (20%) Therapy** (values in parenthesis are for 70kg patient)
 - Bolus 1.5 mL/kg** (lean body mass) intravenously over 1 minute (~100mL)
 - Continuous infusion 0.25 mL/kg/min** (~18 mL/min; adjust by roller clamp)
 - Repeat bolus once or twice for persistent cardiovascular collapse
 - Double the infusion rate to 0.5 mL/kg/min if blood pressure remains low
 - Continue infusion** for at least 10 minutes after attaining circulatory stability
 - Recommended upper limit: Approximately 10 mL/kg lipid emulsion over the first 30 minutes
- Post LAST events** at www.lipidrescue.org and report use of lipid to www.lipidregistry.org