American Society of Regional Anesthesia and Pain Medicine Checklist for Managing Local Anesthetic Systemic Toxicity: 2012 Version

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Abstract: In 2010, the American Society of Regional Anesthesia and Pain Medicine (ASRA) issued a practice advisory on local anesthetic systemic toxicity (LAST). The executive summary of this work contained a document that was intended to serve as a checklist for the management of LAST. Based on testing the checklist during a simulated episode of LAST, ASRA has issued an updated version that should replace the previous 2010 version. Electronic copies of the ASRA Checklist, suitable for lamination and inclusion in a local anesthetic toxicity kit, are available from the ASRA Web site (www.asra.com).

In 2010, the American Society of Regional Anesthesia and Pain Medicine (ASRA) issued its practice advisory on local anesthetic systemic toxicity (LAST). The practice advisory included a checklist that was intended to guide the management of LAST events. This issue of Regional Anesthesia and Pain Medicine contains a study that used simulation to test the effectiveness and usability of the ASRA Checklist. Based on the results of that study, the 2010 version of the ASRA Checklist has been modified to correct the checklist’s visual prominence defects.

The revised ASRA Checklist is appended. Electronic copies of the checklist can be obtained free of charge from the ASRA Web site (www.asra.com) and are suitable for inclusion in a local anesthetic toxicity kit.

Authors who reference the ASRA practice advisory on LAST and/or the ASRA Checklist are reminded to cite this current version of the checklist along with the original practice advisory when appropriate.

REFERENCES
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 individual epinephrine doses 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
**BE PREPARED**

- We strongly advise that those using local anesthetics (LA) in doses sufficient to produce local anesthetic systemic toxicity (LAST) establish a plan for managing this complication. Making a Local Anesthetic Toxicity Kit and posting instructions for its use are encouraged.

**RISK REDUCTION (BE SENSIBLE)**

- Use the least dose of LA necessary to achieve the desired extent and duration of block.
- Local anesthetic blood levels are influenced by site of injection and dose. Factors that can increase the likelihood of LAST include: advanced age, heart failure, ischemic heart disease, conduction abnormalities, metabolic (e.g., mitochondrial) disease, liver disease, low plasma protein concentration, metabolic or respiratory acidosis, medications that inhibit sodium channels. Patients with severe cardiac dysfunction, particularly very low ejection fraction, are more sensitive to LAST and also more prone to 'stacked' injections (with resulting elevated LA tissue concentrations) due to slowed circulation time.
- Consider using a pharmacologic marker and/or test dose, e.g., epinephrine 5 mcg/mL of LA. Know the expected response, onset, duration, and limitations of "test dose" in identifying intravascular injection.
- Aspirate the syringe prior to each injection while observing for blood.
- Inject incrementally, while observing for signs and querying for symptoms of toxicity between each injection.

**DETECTION (BE VIGILANT)**

- Use standard American Society of Anesthesiologists (ASA) monitors.
- Monitor the patient during and after completing injection as clinical toxicity can be delayed up to 30 minutes.
- Communicate frequently with the patient to query for symptoms of toxicity.
- Consider LAST in any patient with altered mental status, neurological symptoms or cardiovascular instability after a regional anesthetic.
- Central nervous system signs (may be subtle or absent)
  - **Excitation** (agitation, confusion, muscle twitching, seizure)
  - **Depression** (drowsiness, obtundation, coma or apnea)
  - **Non-specific** (metallic taste, circumoral numbness, diplopia, tinnitus, dizziness)
- Cardiovascular signs (often the only manifestation of severe LAST)
  - **Initially may be hyperdynamic** (hypertension, tachycardia, ventricular arrhythmias), then
  - **Progressive hypotension**
  - **Conduction block, bradycardia or asystole**
  - **Ventricular arrhythmia** (ventricular tachycardia, Torsades de Pointes, ventricular fibrillation)
- Sedative hypnotic drugs reduce seizure risk but even light sedation may abolish the patient’s ability to recognize or report symptoms of rising LA concentrations.

**TREATMENT**

- Timing of lipid infusion in LAST is controversial. The most conservative approach, waiting until after ACLS has proven unsuccessful, is unreasonable because early treatment can prevent cardiovascular collapse. Infusing lipid at the earliest sign of LAST can result in unnecessary treatment since only a fraction of patients will progress to severe toxicity. The most reasonable approach is to implement lipid therapy on the basis of clinical severity and rate of progression of LAST.
- There is laboratory evidence that epinephrine can impair resuscitation from LAST and reduce the efficacy of lipid rescue. Therefore it is recommended to avoid high doses of epinephrine and use smaller doses, e.g., <1mcg/kg, for treating hypotension.
- Propofol should not be used when there are signs of cardiovascular instability. Propofol is a cardiovascular depressant with lipid content too low to provide benefit. Its use is discouraged when there is a risk of progression to cardiovascular collapse.
- Prolonged monitoring (> 12 hours) is recommended after any signs of systemic LA toxicity, since cardiovascular depression due to local anesthetics can persist or recur after treatment.