

Local Anesthetic Systemic Toxicity

Intraoperative teaching · CA-2

THE QUESTION

Where the evidence disagrees

Small patient size and sarcopenia are additional factors that increase potential risk for local anesthetic systemic toxicity (LAST).

THE EVIDENCE

What each source contributes, and how strong it is

Study design first — a cohort and a randomised trial do not carry the same weight.

Design	Year	Journal	What it found
Other	2017	Regional anesthesia and pain medic	Small size, sarcopenia increase LAST risk
Other	2022	The American journal of emergency	Ultrasound, Aspiration, Minimal Dose Reduce LAST Risk
Other	2018	Local and regional anesthesia	LAST causes isolated cardiovascular disturbance sometimes

3 resolved citations behind this deck; every point above traces to one of them.

THE NUMBERS

Four in ten cases do not follow the textbook progression

The classic march from tinnitus to seizure to arrest is the majority, not the rule.



A patient who becomes unstable late, or who arrests with no preceding neurologic signs, is still LAST. Waiting for the classic march is how the diagnosis gets missed.

Di Gregorio et al., Reg Anesth Pain Med 2010 · PMID 20301824

IN PRACTICE

What the cohorts and reviews add

3 findings, each on the slide that follows.

REGIONAL ANESTHESIA AND PAIN MEDICINE 2018

Small size, sarcopenia increase LAST risk

Small patient size and sarcopenia are additional factors that increase potential risk for local anesthetic systemic toxicity (LAST).

THE AMERICAN JOURNAL OF EMERGENCY MEDICINE 2022

Ultrasound, Aspiration, Minimal Dose Reduce LAST Risk

Using ultrasound guidance, aspiration before injection

LOCAL AND REGIONAL ANESTHESIA 2018

LAST causes isolated cardiovascular disturbance sometimes

LAST can present with isolated cardiovascular disturbance in one-fifth of reported cases.

IN PRACTICE

Small size, sarcopenia increase LAST risk

Other · Regional anesthesia and pain medicine

Small patient size and sarcopenia are additional factors that increase potential risk for local anesthetic systemic toxicity (LAST).

The Third American Society of Regional Anesthesia and Pain Medicine Practice Advisory on Local Anesthetic Systemic Toxicity: Executive Summary 2017, Regional anesthesia and pain medicine 2018 · PMID 29356773

IN PRACTICE

Ultrasound, Aspiration, Minimal Dose Reduce LAST Risk

Other · The American journal of emergency

Using ultrasound guidance, aspiration before injection, and using the minimal local anesthetic dose needed can reduce the risk of LAST.

Local anesthetic systemic toxicity: A narrative review for emergency clinicians, The American journal of emergency medicine 2022 · PMID 35777259

IN PRACTICE

LAST causes isolated cardiovascular disturbance sometimes

Other · Local and regional anesthesia

LAST can present with isolated cardiovascular disturbance in one-fifth of reported cases.

Local anesthetic systemic toxicity: current perspectives, Local and regional anesthesia 2018 · PMID 30122981

IN THE ROOM

What this changes about the next case

Colour is the strength of the evidence behind each step, not the urgency.

- 1** Small patient size and sarcopenia are additional factors that increase potential risk for local anesthetic systemic toxicity (LAST).
- 2** Using ultrasound guidance, aspiration before injection, and using the minimal local anesthetic dose needed can reduce the risk of LAST.
- 3** LAST can present with isolated cardiovascular disturbance in one-fifth of reported cases.

KEY TAKEAWAYS

What to carry into the next case

Small size, sarcopenia increase LAST risk

Regional anesthesia and pain medicine 2018

Ultrasound, Aspiration, Minimal Dose Reduce LAST Risk

The American journal of emergency medicine 2022

LAST causes isolated cardiovascular disturbance sometimes

Local and regional anesthesia 2018

Use minimal LA doses, aspirate, consider patient size/sarcopenia, and recognize potential isolated cardiac signs to prevent LAST.

QUESTIONS I'LL ASK YOU IN THE ROOM

1. What is the primary mechanism underlying CNS toxicity from local anesthetics?
2. How does lipid solubility relate to the potential for systemic toxicity?
3. What are the key clinical signs differentiating cardiac versus CNS toxicity?
4. Besides epinephrine, what other factors influence the rate of systemic absorption?

ORAL BOARDS STEM

Five minutes after an interscalene block with 20 mL of 0.5% ropivacaine, the patient reports perioral numbness and tinnitus, then becomes confused.

BOARD QUESTIONS

1. In a review of 93 published cases of local anaesthetic systemic toxicity from 1979 to 2009, what proportion followed the classic progression from neurologic prodrome to seizure to cardiovascular collapse?
 - A. About 60%
 - B. About 95%
 - C. About 30%
 - D. Essentially all of them
2. Forty minutes after an uneventful interscalene block with ropivacaine, a patient becomes progressively hypotensive and bradycardic on the ward. There were no neurologic symptoms at any point. Your colleague says this cannot be LAST because it is too late and there was no seizure. How do you answer, using the published case series?
3. What is the main methodological limitation of the 1979-2009 LAST case review, and what does that mean for how you use its numbers when teaching?

ANSWER KEY

1. A. About 60%

Sixty percent followed the classic pattern. In the rest, symptoms were substantially delayed after injection, or involved only cardiovascular compromise with no CNS signs at all. Waiting for the textbook march is how the diagnosis gets missed.

Di Gregorio et al., Clinical presentation of local anesthetic systemic toxicity: a review of published cases 1979-2009, Reg Anesth Pain Med 2010 · PMID 20301824

2. Each feature on its own is within the reported spectrum. In the 1979-2009 review of 93 cases, roughly 40% did not follow the classic picture: symptoms were either substantially delayed after injection, or consisted only of cardiovascular compromise with no CNS toxicity. So neither the delay nor the absence of a seizure is evidence against LAST, and the LAST protocol including lipid emulsion stays on the table.

Timing and the absence of seizure do not exclude LAST. Anchoring on the classic sequence is the specific error this case series was written to correct.

Di Gregorio et al., Clinical presentation of local anesthetic systemic toxicity: a review of published cases 1979-2009, Reg Anesth Pain Med 2010 · PMID 20301824

3. It is a retrospective review of published case reports, so it cannot establish incidence, outcomes, or the comparative efficacy of any treatment. It can only characterise the clinical spectrum of reported cases. The authors themselves argue this makes the case for a prospective registry. So the 60/40 split is a statement about what LAST can look like, not about how often LAST happens or what works.

Publication bias runs through every number in a case-report series. Use it to widen your differential, never to quote a rate.

Di Gregorio et al., Clinical presentation of local anesthetic systemic toxicity: a review of published cases 1979-2009, Reg Anesth Pain Med 2010 · PMID 20301824

Use minimal LA doses, aspirate, consider patient size/sarcopenia, and recognize potential isolated cardiac signs to prevent LAST.

SOURCES

- [1] The Third American Society of Regional Anesthesia and Pain Medicine Practice Advisory on Local Anesthetic Systemic Toxicity: Executive Summary 2017, Regional anesthesia and pain medicine 2018 · PMID 29356773
- [2] Local anesthetic systemic toxicity: A narrative review for emergency clinicians, The American journal of emergency medicine 2022 · PMID 35777259
- [3] Local anesthetic systemic toxicity: current perspectives, Local and regional anesthesia 2018 · PMID 30122981
- [4] Di Gregorio et al., Reg Anesth Pain Med 2010 · PMID 20301824

¹ draft point(s) dropped: no citation resolved.