Paediatric Anaesthesia Guideline for Local Anaesthetic Systemic Toxicity (LAST)

Background

- Incidence approximately 1:1000 peripheral nerve blocks (ultrasound-guided)
- Toxicity occurs due to high plasma concentration of local anaesthetic (LA) by 2 mechanisms
    1. Accidental intravascular injection → rapid onset LAST
    2. Excessive systemic absorption from injection site → delayed LAST
- Systemic absorption dependant on site on injection

Intercostal > caudal > epidural > brachial plexus > femoral/sciatic > subcutaneous > topical

Risk factors for LAST

LA factors	Block factors	Patient factors
• Dose • Choice of LA. Risk of LAST: Bupivacaine > Levobupivacaine > Ropivacaine > Lidocaine	• Site (see above) • Conduct of block. Factors that may reduce risk of LAST: ○ US-guidance ○ Frequent aspiration ○ Incremental dosing ○ Use of vasoconstrictor	• Renal and hepatic impairment - single dose unaffected but infusion rate should be reduced • Acidosis reduces protein binding of LA therefore increases risk of toxicity

LA maximum doses

Bupivacaine / Levobupivacaine	-	2mg/kg
Lidocaine	-	3mg/kg or 7mg/kg with adrenaline
Ropivacaine	-	3mg/kg

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LAST - Presenting features

CNS

Excitatory

- Perioral tingling
- Tinnitus
- Slurred speech
- Confusion / Agitation
- Convulsions

Depressive

- Respiratory depression
- Coma

CVS

- Tachycardia
- Hypertension

- Myocardial depression
- Hypotension

- Vasodilatation
- Severe hypotension
- Arrhythmias

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LAST Management

Immediate

- STOP injecting LA
- Call for help
- ABC supportive care - BLS + CPR as required
- Establish IV access
- Manage seizures - usual protocol
- Assess CVS status throughout + manage arrhythmias using standard protocols
  - Expect refractory arrhythmias
  - Avoid Lidocaine
  - Recovery from LA-induced cardiac arrest may take > 1h

Treatment

Intravenous Lipid Emulsion (Intralipid 20%)

- **1.5 ml/kg** bolus over 1 minute
- Continuous infusion 0.25 ml/kg/min

Wait 5 min then

- Give maximum 2 repeated doses for persistent CVS collapse
- Increase infusion to 0.5 ml/kg/min
- Continue infusion until recovered or maximum dose of lipid emulsion given (12ml/kg)

Propofol is NOT a suitable substitute for lipid emulsion

Ongoing care

High dependency of Intensive Care

Intralipid 20% dosing example for 30kg patient:

- Bolus 45ml over 1 minute
- Continuous infusion at 7.5ml/min

References:

1. The Association of Anaesthetists of Great Britain and Ireland (2010). Management of severe local anaesthetic toxicity. http://www.aagbi.org/sites/default/files/la_toxicity_2010_0.pdf
2. Brighton and Sussex University Hospitals paediatric clinical practice guidelines on local anaesthetic toxicity. https://www.bsuh.nhs.uk/library/wp-content/uploads/sites/8/2020/06/Paediatric-guidelines-local-anaesthetic-toxicity.pdf
3. Christie L, Picard J, Weinberg G. Local anaesthetic systemic toxicity. BJA Education 2015, 15: 136-142
4. Royal Children's Hospital Melbourne clinical guideline on local anaesthetic poisoning. https://www.rch.org.au/clinicalguide/guideline_index/Local_anaesthetic_poisoning/