THE ASSOCIATION OF ANAESTHETISTS

of Great Britain & Ireland

Guidelines for the Management of Severe Local Anaesthetic Toxicity

Signs of severe toxicity:

- Sudden loss of consciousness, with or without tonic-clonic convulsions
- Cardiovascular collapse: sinus bradycardia, conduction blocks, asystole and ventricular tachyarrhythmias may all occur
- Local anaesthetic (LA) toxicity may occur some time after the initial injection

Immediate management:

- Stop injecting the LA
- **Call for help**
- Maintain the airway and, if necessary, secure it with a tracheal tube
- Give 100% oxygen and ensure adequate lung ventilation (hyperventilation may help by increasing pH in the presence of metabolic acidosis)
- Confirm or establish intravenous access
- Control seizures: give a benzodiazepine, thiopental or propofol in small incremental doses
- Assess cardiovascular status throughout

Management of cardiac arrest associated with LA injection:

- Start cardiopulmonary resuscitation (CPR) using standard protocols
- Manage arrhythmias using the same protocols, recognising that they may be very refractory to treatment
- Prolonged resuscitation may be necessary; it may be appropriate to consider other options:
  - **Consider the use of cardiopulmonary bypass if available**
  - **Consider treatment with lipid emulsion**

Treatment of cardiac arrest with lipid emulsion: (approximate doses are given in red for a 70-kg patient)

- Give an intravenous bolus injection of Intralipid® 20% 1.5 ml.kg^{-1} over 1 min
  - Give a bolus of 100 ml
- Continue CPR
- Start an intravenous infusion of Intralipid® 20% at 0.25 ml.kg^{-1}.min^{-1}
  - Give at a rate of 400 ml over 20 min
- Repeat the bolus injection twice at 5 min intervals if an adequate circulation has not been restored
  - Give two further boluses of 100 ml at 5 min intervals
- After another 5 min, increase the rate to 0.5 ml.kg^{-1}.min^{-1} if an adequate circulation has not been restored
  - Give at a rate of 400 ml over 10 min
- Continue infusion until a stable and adequate circulation has been restored

Remember:

- Continue CPR throughout treatment with lipid emulsion
- Recovery from LA-induced cardiac arrest may take >1 h
- Propofol is not a suitable substitute for Intralipid®
- Replace your supply of Intralipid® 20% after use

Follow-up action:

- Report cases from the United Kingdom to the National Patient Safety Agency (via www.npsa.nhs.uk). Cases from the Republic of Ireland should be reported to the Irish Medicines Board. Whether or not lipid emulsion is administered, please also report cases to the LipidRescue™ site: www.lipidrescue.org.
- If possible, take blood samples into a plain tube and a heparinised tube before and after lipid emulsion administration and at 1 h intervals afterwards. Ask your laboratory to measure LA and triglyceride levels (these have not yet been reported in a human case of LA intoxication treated with lipid).
- Please read the notes overleaf

Your nearest bag of Intralipid® is kept .....

Notes

- Intralipid® 20% has been shown to reverse LA-induced cardiac arrest in animal models [1,2] and in human case reports [3,4], and its use has been reported in the treatment of life-threatening toxicity without cardiac arrest [5]. Its therapeutic potential has been highlighted by the National Patient Safety Agency [6].
- Intralipid® 20% 1000 ml should be immediately available in all areas where potentially cardiotoxic doses of local anaesthetics are given, along with guidelines for its use.
- In the UK, Intralipid® is distributed by Fresenius Kabi Ltd. It is distributed in the Republic of Ireland by Cahill May Roberts.
- Intralipid® is readily available from most hospital pharmacies, which may also be able to help departments with timely replacement of bags nearing expiry.
- The usefulness of other lipid emulsions is not known, as published work to date has only used Intralipid®.
- Although some propofol preparations are provided in Intralipid®, e.g. Diprivan®, these are not a suitable alternative, due to the significant cardiovascular depression caused by the propofol. This does not preclude the use of small, incremental doses of propofol to control seizures.
- The use of Intralipid® in this way is relatively novel. Therefore, future laboratory and clinical experiences are likely to dictate further refinement of the method.
- This guideline document will be reviewed regularly and updated when necessary. Updated versions will be available on http://www.aagbi.org and http://www.lipidrescue.org.
- Further educational matter is available at http://www.lipidrescue.org.

References

1. Weinberg G et al. Lipid emulsion infusion rescues dogs from bupivacaine-induced cardiac toxicity. *Regional Anesthesia and Pain Medicine* 2003; **28**: 198-202
2. Weinberg GL et al. Pretreatment or resuscitation with a lipid infusion shifts the dose-response to bupivacaine-induced asystole in rats. *Anesthesiology* 1998; **88**: 1071-5
3. Rosenblatt MA et al. Successful use of a 20% Lipid emulsion to resuscitate a patient after a presumed bupivacaine-related cardiac arrest. *Anesthesiology* 2006; **105**: 217-8
4. Litz RJ et al. Successful resuscitation of a patient with ropivacaine-induced asystole after axillary plexus block using lipid infusion. *Anaesthesia* 2006; **61**: 800-1
5. Foxall G et al. Levobupivacaine-induced seizures and cardiovascular collapse treated with Intralipid. *Anaesthesia* 2007; **62**: 516-8.
6. Patient Safety Alert 21 (28 March 2007) – Safer practice with epidural injections and infusions. London: National Patient Safety Agency (www.npsa.nhs.uk)

This guideline is not a standard of medical care. The ultimate judgement with regard to a particular clinical procedure or treatment plan must be made by the clinician in the light of the clinical data presented and the diagnostic and treatment options available.