AAEM Clinical Practice Statement

Use of Intravenous Fat Emulsion in the Emergency Department for Cardiovascular Collapse in the Poisoned Patient (2/28/2015)

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Introduction

The successful use of intravenous fat emulsion (IFE) for the adverse effects associated with local anesthetics has led to its consideration as an effective antidote for multiple xenobiotics/substances (1, 2, 3, 4, 5, 6) . Similar to most toxicology research, the evidence is completely reliant on animal experiments and human case reports. In addition to lack of definitive efficacy, there is the question of safety. Fat emboli, acute lung injury, lipemia, pancreatitis, interference with standard medication therapies, and hypersensitivity are all concerns of unproven clinical significance (7, 8). In addition, IFE has been shown to result in analytical interference with certain laboratory assays (9). However, our goal was to supply the emergency physician a practical guideline for the use of IFE in critically poisoned patients.

Executive Summary

In critically ill patients with refractory shock or cardiac arrest following a suspected overdose of local anesthetics, IFE should be considered as a potentially beneficial adjunctive treatment. Administration in the setting of other substances should be performed in consultation with a medical toxicologist.

Discussion

The clinical application of IFE requires consideration of 3 significant questions:

1-When should IFE be administered?

The timing of administration oftentimes is dependent on the clinical scenario and the xenobiotic involved. The recommendations provided are with the understanding that the optimal timing of administration of IFE is unclear and has not been studied adequately. For local anesthetics, IFE should be considered concomitantly with standard CPR and ACLS (1, 4, 5, 6). Early administration following signs of cardiovascular collapse seems logical. However, for all other xenobiotics, consider the use of IFE for cases of cardiac arrest or refractory shock where standard resuscitation therapies have failed or would not be considered efficacious.

2-What dose should be used?

The dosing of 20% IFE based on that used for local anesthetics is 1.5 mL/kg bolus every 5 minutes until cardiovascular stability is achieved. This may be followed by an infusion of 0.25-0.5 mL/kg/min for up to 60 minutes with a maximum dose of 12 mL/kg (4, 10). Other lipid formulations exist with varying

concentrations and though 20% IFE has been the most commonly studied, these other formulations should be just as effective with adjustment of dosing based on their individual concentrations (4).

3-For which substances are there potential benefits when IFE is administered?

Animal studies and human case reports have increasingly shown variable responses to IFE with regards to multiple different xenobiotics. Multiple limitations exist with regards to these studies and definitive applicability to patients. There is no preferable way to identify the optimal treatment with IFE for all of these substances considering the lack of double-blinded placebo controlled human studies. It is also understood that there are likely unstudied xenobiotics which may be effectively treated with IFE. We will not mention these but rather focus on those xenobiotics with some published evidence for beneficial effects of IFE. As a result, we created 2 categories: 1- Probable benefit and 2- Possible benefit

Probable benefit

All local anesthetics including (1, 2, 3, 4, 5, 6):
Bupivicaine
Mepivicaine
Ropivicaine
Levobupivicaine
Prilocaine
Lignocaine
Lidocaine

Possible benefit

Amitriptyline
Amlodipine
Atenolol
Baclofen
Bupropion
Carbamazepine
Carvedilol
Chlorpromazine
Clomipramine
Cocaine
Diltiazem
Diphenhydramine
Dosulepin
Doxepin
Felodipine
Flecainide
Glyphosate/Polyoxyethyleneamine surfactant
Haloperidol
Hydroxychloroquine
Imipramine
Lamotrigine
Metoprolol
Nebivolol
Olanzapine

Pentobarbitol
Phenobarbitol
Propafenone
Propranolol
Quetiapine
Thiopental
Venlafaxine
Verapamil

Conclusion

Reporting bias limits the definitive interpretation of the existing literature. In addition, human evidence is limited to case reports and provides most of our current knowledge beyond animal studies regarding the efficacy of IFE. However, in critically ill patients with refractory shock or cardiac arrest following a suspected overdose of the listed agents, IFE may be considered as a potentially beneficial adjunctive treatment. Early consultation with a medical toxicologist for all critically ill poisoned patients should be considered. IFE deserves more rigorous human studies. International databases such as those of the Toxicology Investigators Consortium (ToxIC) show promise to provide more answers in the future (8).