



PIC QUESTION OF THE WEEK: 5/10/10

Q: What is the basis for administering lipids to someone suffering cardiac arrest from local anesthetic toxicity?

A: The use of local anesthetics such as bupivacaine and ropivacaine during peripheral and epidural nerve block can rarely result in systemic toxicity. Initial complications include seizures and hypotension followed by arrhythmias and cardiac arrest. Epidemiologic studies reveal that the rate of systemic toxicity to local anesthetics is approximately 7.5-20 per 10,000 peripheral nerve blocks and 4 per 10,000 epidural injections. Local anesthetics reversibly block ligand and voltage-gated channels throughout the nervous system. Bupivacaine is particularly directed at myocardial tissue and can produce cardiotoxicity. Acyl carnitine, a mitochondrial transport molecule that transfers fatty acids, is also possibly inhibited by local anesthetics. The exact mechanism by which lipid emulsions reverse cardiotoxicity due to local anesthetics is unknown. One proposed mechanism is based on the concept that systemically administered lipids draw local anesthetics from tissue sites. Another possibility is that lipids overcome the inhibition of acyl carnitine induced by anesthetics, thus promoting fatty acid oxidation. Lipid rescue in conjunction with local anesthetic toxicity was originally identified by Weinberg in rat studies, and then reinforced by positive observations in dogs. The first successful use of 20% lipid emulsion for local anesthetic toxicity in humans was published in 2006. After receiving bupivacaine, a 58-year-old male undergoing rotator cuff surgery developed seizures before suffering cardiac arrest. After twenty minutes of advanced cardiac life support (ACLS) with no improvement, lipid emulsion was administered and, fifteen seconds later, the patient returned to normal sinus rhythm. Numerous case reports now substantiate the benefit of lipid emulsion in reversing systemic toxicities associated with local anesthetics. Doses have ranged from boluses of 1.2 – 2 ml/kg followed by infusions of 0.25 – 0.5 ml/kg/min. Additional information on lipid rescue and dosage may be obtained at www.lipidrescue.org. It is generally recommended that hospital anesthesia departments stock intravenous lipid emulsions for use in conjunction with ACLS for management of systemic toxicity associated with the administration of local anesthetics.

References

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