

Asystole, To Shock Or Not To Shock That Is The Question

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Abstract

Cardiotoxicity due to local anesthesia is a well known complication that ranges from mild manifestation to severe collapse. Cardiac toxicity to bupivacaine is recognized to resist conventional resuscitation techniques. We report a case of cardiac arrest due to bupivacaine infiltration resuscitated for 100 minutes at the end of which asystole was successfully converted to sinus rhythm after three consecutive DC shocks.

INTRODUCTION

All advanced life support algorithms do not support cardioversion to treat asystole but rather advocating to search for and treat identified reversible causes and to consider the quality of resuscitation. The following case report shows a dissimilar approach and favorable outcome in a case of cardiac arrest after bupivacaine injection.

CASE REPORT

A 46- year, female, BW 85 kg, Height 156 cm with a history of hypertension for one year, on ACE- inhibitor and Thiazide diuretic was scheduled for hemorrhoidectomy.

Anaesthesia was induced with fentanyl 200 mcg, Propofol 200 mg and Cis-atracurium 4 mg, laryngeal mask airway (LMA) size four was inserted, and anaesthesia was maintained on Air/O₂, sevoflurane and remifenatnil infusion. Anaesthesia and surgery were uneventful. At the end of the procedure, the patient opened her eyes and started to breath spontaneously, the LMA was removed when the anaesthetists noticed that the ECG suddenly changed to ventricular fibrillation. CPR was instituted immediately; the trachea intubated and called for help. DC shock applied once and the rhythm was converted to ventricular tachycardia with no output, a second shock was applied and the ECG displayed asystole, 3 mgs adrenaline were given. During the next 100 minutes of resuscitation, the patient received a total of: adrenaline 31 mg, NaHCO₃ 300 mmol, Ca Cl₂ 10% 10 ml, atropine 3 mg and dopamine 400 mg infusion through a central venous catheter, the heart did not show any response but rather noticed to have a pink froth secretion through the endotracheal tube. Chest X-ray showed bilateral lungs congestion with no signs of pneumothorax.

After failure of all of efforts, asystole was ultimately converted to sinus rhythm by means of three consecutive biphasic shocks of 200 joules. After the return of sinus rhythm and peripheral pulse, infusion of adrenaline and noradrenaline initiated and the patient was transferred to the intensive care unit for further care.

The patient remained on inotropic support for three days during which she was assessed neurologically and was able to elicit positive responses to speech and to command by opening her eyes. Echocardiogram findings were within normal values, cardiac markers were negative for ischemia. The tracheal tube was removed on the fifth postoperative day. Her urine output remained within normal despite deteriorating renal function as demonstrated by rising serum Creatinine, BUN and the serum myoglobin level. During the course of her stay in the hospital, she had three sessions of hemodialysis. Kidney functions remarkably returned back to normal before discharging her home.

After the incidence and upon reviewing the case, the resuscitation team discovered that at the end of surgery, the patient had received 20 ml of 0.25% bupivacaine to infiltrate the perineal area; aspiration during injection of local anesthetic was not documented. In addition, the resuscitative medications were reviewed, too and noticed that verapamil (Isoptine®) 5 mg was erroneously given instead of Isoprenaline, as ordered.

DISCUSSION

This case demonstrated important lessons:

- (1) Hypoxia was suspected as the cause of arrest due to the unawareness of the resuscitating staff to the real cause of

cardiac arrest, otherwise Intralipid could have been used earlier (2) Asystole was successfully converted to sinus rhythm after three trials of biphasic DC shocks of 200 joules (3) The injected Verapamil (Isoptine ®) instead of isoprenaline as ordered was not verified. Both drugs' names sound almost the same. Calcium channel blockers may have lead to the delay in recovering the patient (4) the intact neurological status of the patient reflects an adequate and effective cardiopulmonary resuscitation.

Points number one and three showed the importance of good communication between the surgical and the anaesthesia teams and within the same team.

Two foremost books in Advanced Life Support have not recommended the use of DC shock in their algorithms to cardiovert an asystolic heart [1-2].

Vasopressin and noradrenaline have been seen as a good alternative to adrenaline in resuscitating animal models intoxicated by bupivacaine but yet to be established in human models [3-6] however, Intralipid has replaced other resuscitative medication modalities in this kind of toxicity.

Use of calcium channel blockers in the setting of toxicity to local anesthesia in mice can increase the chances of mortality compared with local anaesthetic alone [7], this patient had mistakenly received Verapamil 5 mg instead of Isoprenaline which can be claimed as one of the reasons of

delayed recovery.

With the emergence of conflicting opinions regarding discontinuation of resuscitation, cardioversion was applied as a last attempt after exhausting all means to salvage this patient. We do not know the mechanism behind this success and think that cardioversion is worth considering in situations when there is medication toxicity related cardiac arrest. To our knowledge, this practice had never been reported and does not correspond to conventional resuscitation measures.

References

1. European resuscitation council, advanced life support, 5th edition, April 2006
2. American heart association, advanced cardiovascular life support, 2006
3. Groban L, Deal DD, Vernon JC, James RL, Butterworth J. Cardiac resuscitation after incremental over-dosage with lidocaine, bupivacaine, levobupivacaine, and ropivacaine in anesthetized dogs. *Anesth Analg* 2001; 92:37-43.
4. Heavner JE, Pitkanen MT, Shi B, Rosenberg PH. Resuscitation from bupivacaine-induced asystole in rats: comparison of different cardioactive drugs. *Anesth Analg* 1995; 80:1134-1139.
5. Bernards CM, Carpenter RL, Kenter ME, Brown DL, Rupp SM, Thompson GE. Effect of epinephrine on central nervous system and cardiovascular system toxicity of Bupivacaine in pigs. *Anesthesiology* 1989; 71:711-717.
6. Brown CG, Werman HA: Adrenergic agonists during cardiopulmonary resuscitation. *Resuscitation* 1990; 19:1-16.
7. Tallman RD Jr, Rosenblatt RM, Weaver JM, Wang YL, Verapamil increases the toxicity of local anesthetics. *J Clin Pharmacol* 1988; 28:317-321.

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