Michael Pearson
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Bebarta, VS, Tanen, DA et al. Intravenous Cobinamide Versus Hydroxocobalamin for Acute Treatment of Severe Cyanide Poisoning in a Swine Model. Annals of Emergency Medicine 64:6 Dec 2014.

Background: Currently B12 is an FDA approved antidote for acute cyanide poisoning, but its use is limited as it is poorly soluble and requires a large volume to administer. A smaller-volume medication with the potential for IM administration is thus desirable for the prehospital setting. Cobinamide has a higher affinity and solubility than hydroxocobalamin but its effects in critically ill cyanide-poisoned circumstances had yet to be studied. Thus this study's goal was to compare the time until return of spontaneous breathing in a swine model of cyanide-induced apnea.

Methods: Animals were assigned to 3 interventions: hydroxocobalamin administration, cobinamide administration and normal saline administration (positive, experimental and negative control, respectively). The pigs were given ketamine for sedation and induced/intubated/vented. After an initial period of assisted ventilation the vent was turned off allowing the pigs to breath spontaneously, after which time they were given potassium cyanide to induce apnea. After 1 minute of apnea the pigs were given the IV treatment medication according to the experimental group, and monitored for return of spontaneous breathing. Other parameters studied included hemodynamics, pH, lactate, BE, cyanide concentration.

Results: The time of return to spontaneous respiration was similar in the groups given hydroxocobalamin and cobinamide (1 minute 49 secs vs 1 minute 18 secs) which was significantly different than the control group. 1 animal died in each study arm and 10 died in the negative control arm (from 11 total in each arm). During an hour of observation after administering the antidotes and return of breathing there was no statistical differences in hemodynamics between the treatment groups, though those treated with hydroxocobalamin had transiently higher MAPs and pulses. There were no significant differences between groups regarding lactate, bicarbonate, pH or cyanide concentration.

Limitations: The authors acknowledge that a pig model does not reproduce human physiology. Also, the pigs were given IV cyanide (as opposed to the likely inhalation exposure of most victims human victims). Finally, the route of antidote administration was IV which is not ultimately helpful in a prehospital setting.

Discussion: This study warrants a follow up study to determine if an IM administration of cobinamide is noninferior to hydroxocobalamin for cyanide poisoning. Once patients arrive to the hospital the gold standard FDA approved treatment is still what they should receive if they have a likely cyanide exposure.