Intravenous Lipid Emulsion Does Not Resuscitate Cocaine Induced Cardiovascular Arrest in a Rat Model

Peter R Chai MD MMS, and Jason B Hack MD

Divison of Medical Toxicology, Department of Emergency Medicine, University of Massachsetts Medical School, Worcester, MA and Division of Medical Toxicology, Department of Emergency Medicne, Alpert Medical School at Brown University, Providence, RI

Introduction:

Cocaine use and overdose can precipitate dangerous cardiac dysrhythmias. Because of its lipid soluble nature, the use of intravenous lipid emulsion (ILE) has been reported as a potential antidote in the face of cardiovascular collapse from cocaine use.

Methods:

A total of 12 male Sprague Dawley rats pre-cannualized with central arterial and venous cathethers were induced with isoflurane. We gave 9 rats cocaine (6 at 10mg/kg cocaine and 3 at 5mg/kg cocaine). All rats experienced cardiac arrest. Closed chest compressions (CPR) was performed using a compression device. 9 rats were given a 15mg/kg bolus of ILE over the course of 7 minutes. Three additional rats were given cocaine and then normal saline in an equivalent volume to the ILE. Closed chest compressions were continued for 15 minutes with pauses to check for a perfusing cardiac rhythm. At the end of the study, rats were euthanized.

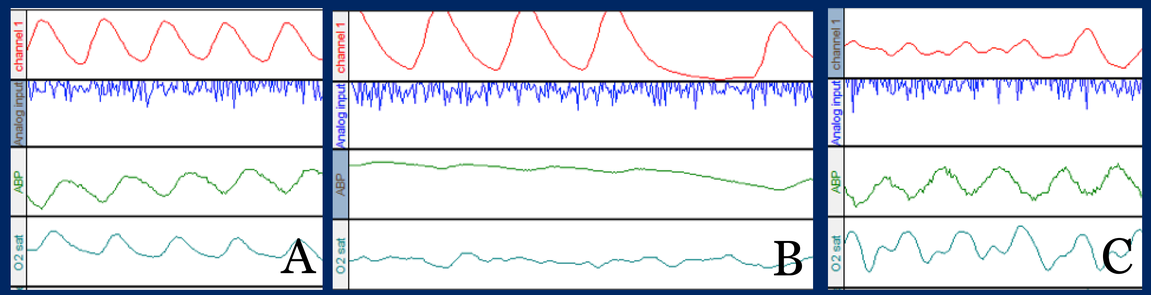

FIGURE 1: Mean Arterial Pressure (ABP), pulse oximetry (O2 sat), and telemetry (channel 1) of a rat at baseline (A). A degeneration of blood pressure and spirometry tracing precludes complete cardiovascular collapse after administration of a 10mg/kg Cocaine bolus (B). Return of MAP and spirometry during closed chest compressions (C).

Results:

Cocaine dose--treatment/Rat	Baseline heart rate (Beats/min)	Time to asystole after cocaine bolus (seconds)	ROSC
10mg/kg--ILE			
1	314	2	No
2	314	8	No
3	314	3	No
4	309	3	Yes
5	330	5	No
6	350	4	No
5mg/kg--ILE			
7	339	5	No
8	336	4	No
9	370	3	No
10mg/kg--NS			
1	281	6	No
5mg/kg--NS			
2	318	7	No
3	370	3	No

Conclusion:

Administration of intravenous lipid emulsion to cocaine-induced cardiac arrested rats had no affect on terminal outcome. With one exception, all rats that underwent cocaine induced cardiac arrest were unable to be resuscitated despite administration of ILE. Further study is needed to delineate the use of ILE in cocaine induced cardiovascular toxicity.

Limitations:

Our study did not include advanced airway management and administration of ACLS medication. Infusions of ILE and normal saline were administered by hand without an infusion pump and may have led to trainsient fluid overload in rats.

Future Directions:

Future studies should investigate the addition of ILE in cocaine induced cardiac arrest in a better controlled setting utilizing airway management, and ACLS drugs. Post arrest necropsy may be helpful in ruling out other sources of cardiac arrest.

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