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TITLE: COMPARISON OF DOPAMINE, DOBUTAMINE AND EPINEPHRINE IN CPR

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Introduction

Previous investigations have demonstrated the importance of alpha adrenergic receptor stimulation in restarting the arrested heart.[1,2,3,4] The traditional drug of choice is epinephrine although phenylephrine, metaraminol, and methoxamine have been tested and recommended as equally effective alternatives[2]. Two new catecholamines have recently become available for clinical use. Dopamine possesses a wide spectrum of alpha, beta and dopaminergic receptor activity depending on dose administered. Dobutamine is primarily a beta one adrenergic receptor agonist that augments ventricular contractility with little effect on vascular resistance. This study compares the results of cardiopulmonary resuscitation (CPR) from either asphyxial arrest (AA) or fibrillatory arrest (FA) using dopamine (DOP), dobutamine (DOB) and epinephrine (EPI).

Methods

Mongrel dogs weighing 12-20 kg were anesthetized with 35 mg/kg sodium pentobarbital, intubated and ventilated with a Bird Mark VII ventilator driven by oxygen. The femoral artery was cannulated to record aortic blood pressure via a Statham P23db pressure gauge; the adjacent femoral vein was cannulated to permit drug and fluid administration. Lead II of the electrocardiogram was continuously monitored. Data were charted on a Hewlett-Packard 7700 recorder. Two groups of 40 dogs each underwent AA or FA. AA was induced by clamping the endotracheal tube at end expiration. Arrest was defined as that point at which aortic pulse pressure had decreased to zero. FA was induced by applying an AC current through the heart with an epicardial electrode.

Ten dogs in each arrest group were randomly assigned to receive EPI 1 mg, DOP 40 mg, DOB 50 mg, or no drug. Following five minutes of AA or FA, artificial ventilation and closed chest cardiac massage (AV/CCCM) were instituted and 30 seconds later one of the drugs was administered by iv bolus. In the AA group, AV/CCCM were continued for five minutes or until resumption of spontaneous circulation. In the FA group, AV/CCCM were continued and external defibrillation was attempted 90 seconds following drug injection. The initial countershock was 7 watt sec/kg body weight. If unsuccessful, AV/CCCM were continued and a further shock of 10 watt sec/kg was delivered every 90 seconds until defibrillation occurred or 12 minutes of resuscitation elapsed. Successful defibrillation was defined as conversion to any electrical pattern other than ventricular fibrillation. If successful defibrillation was not accompanied by resumption of spontaneous circulation, AV/CCCM was continued until the pulse returned or for a maximum period of 12 minutes. Successful resuscitation in both groups was defined as the presence of an unassisted pulse with a systolic pressure of at least 50 torr persisting for at least 60 seconds.

Results

DOP or EPI treatment resulted in 90-100% successful resuscitation from either AA or FA (see Table) while DOB or no drug resulted in 0-30% success, a statistically significant difference ($p \leq 0.01$). There were no significant differences among drug groups in success of defibrillation, time for resuscitation, or diastolic blood pressure at resuscitation.

	DOP	DOB	EPI	No Drug
ASPHYXIAL ARREST				
# Resuscitated	10	2	9	0
N	10	10	10	10
FIBRILLATORY ARREST				
# Resuscitated	9	2	10	3
N	10	10	10	10

Discussion

The importance of alpha receptor stimulation for resuscitation from either asphyxial or fibrillatory arrest is again demonstrated. Dopamine, in a single 40 mg iv bolus, exerts sufficient alpha receptor activity to render an incidence of resuscitation much like that obtained with epinephrine. Dobutamine appears to be valueless for the initial therapy of cardiopulmonary arrest.

References

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