A Case of Three Patients with Severe Hypothermia Rewarmed with ECMO

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A Case Series of Three Patients with Severe Hypothermia Rewarmed with ECMO

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Introduction

Severe accidental hypothermia, defined as a core body temperature <28°C, is associated with multiple neurologic, cardiac, and metabolic complications.[1] Here we report outcomes of three patients with severe hypothermia and cardiovascular collapse rewarmed and supported on ECMO.

Title

	PATIENT 1	PATIENT 2	PATIENT 3
Etiology of Hypothermia	Intoxicated, found in woods	Intoxicated, found in snow bank	Heroin overdose, found outside his house
Gender	F	M	M
Age	25 yo	26 yo	21 yo
Initial Temperature	26°C	21.7°C	27.2°C
Initial Presentation	Cardiac arrest	Cardiac arrest	Refractory shock
Rhythm in ED	Ventricular fibrillation	Asystole	Atrial fibrillation
Total Time of CPR	37 min	265 min.	NA
Type of ECMO	VA	VA	VV
Cannula Site	Single Lumen Fem-Fem	Single Lumen Fem-Fem	Dual Lumen R U
Time to Target Temperature	Attained 36°C in 30 min	Attained 28.6°C in 46 min	Attained 37°C in 360 min
Total Time on ECMO	10 hours	36 hours	120 hours
Complications	• Rhabdomyolysis • Bilateral transmetatarsal amputations	• Acute renal failures • Transmetatarsal/finger amputations • Tracheostomy • PEG tube placement	• Aspiration pneumonia • ARDS • Tracheostomy • PEG tube placement
Length of Stay	37 days	57 days	45 days
Outcome	Neurologically intact	Neurologically intact	Neurologically intact

Discussion

Rewarming therapies are classified as either passive (warm blankets, overhead heaters) or active (infusion of warm fluids, lavage of the peritoneal and thoracic cavities),[2] with active methods recommended for severe hypothermia. In hypothermic cardiac arrest, the time to regain normal body temperature is the most influential parameter for a good recovery.[1]

The most common cause of death from severe hypothermia is cardiac arrest, resulting from slowing of conduction velocity in the myocardium and subsequent ventricular fibrillation (VF).[2] The myocardium will quickly recover normal, organized electrical activity when rewarmed; consequently, aggressive warming techniques should accompany standard CPR in hypothermic cardiac arrest. While body temperature can be raised 2-4^0 C using warm saline infusion, increases as high as 12^0 C per hour have been noted with the use of extracorporeal membrane oxygenation (ECMO).[1,3]

In hypothermic cardiac arrest, the time to regain normal body temperature is the most influential parameter for a good recovery.[1] A recent study found an association between ECMO in CPR and higher survival rates with good neurologic outcomes.[4]

In two of our cases, the use veno-arterial of ECMO rapidly rewarmed our patient's core body temperature and provided hemodynamic support in the peri-arrest period. In our third case, veno-venous ECMO was used to rewarm our patient and prevent continued cardiac deterioration.

ECMO should be considered early on as a primary means for rewarming in patients who present with severe accidental hypothermia.

References:

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