Emergency Department Extra-Corporeal Life Support in Cardiac Arrest

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Introduction

Despite advances in resuscitation, outcomes in cardiac arrest patients still remains poor. There are large regional variations in survival to hospital discharge (3.4%–22.0%) and survival with neurologic recovery (0.8%–20.1%) that have been observed throughout the United States. Recent studies have shown that utilization of VA ECMO during CPR has been associated with improved survival and neurologic outcome compared to conventional CPR in adult cardiac arrest patients.

Objectives

Our goal was to identify a population of BUMC Emergency Department patients in refractory cardiac arrest that would benefit from VA ECMO as a bridge to definitive therapy or recovery and track neurologic outcomes.

Methods

This is a prospective registry study on cardiac arrest patients presenting to Baylor University Medical Center. An ECPR protocol was formulated with emergency medicine, general surgery, cardiothoracic surgery, and perfusionist participants. Upon presentation of an ED patient in cardiac arrest, determined inclusion and exclusion criteria are confirmed. The protocol is then activated and the ECMO team is mobilized to the ED. Data has been collected from the first cardiac arrest patient to undergo ECPR since initiation of the protocol (June 8, 2018) until present. Neurologic recovery is measured using Cerebral Performance Category scoring.

Results

Of the cardiac arrest patients that presented to BUMC during the study period, ten patients met ECPR criteria and were placed on ECMO. Average ED CPR time until ECPR initiation was 62.1 minutes. Initial rhythms included V fib, PEA, and asystole. Etiology of arrest included STEMI, hypothermia, HOCM, refractory VF, and myocarditis. 4/5 patients identified with STEMI went to the cath lab and underwent PCI. 2/10 patients presented in asystole and did not survive. 8/10 patients presented in VF and 6/10 patients survived to hospital discharge. All 6 survivors returned to CPC 1 or their baseline neurologic functional status.

ECPR Protocol

**MEDICAL CRITERIA**

- Age 18-70
- Sustained arrest
- Shockable rhythms
- Unintended CPR > 15 min
- Shocked 1/1 or higher

**INCLUSION CRITERIA**

- STEMI, hypothermia, HOCM, refractory VF, and myocarditis
- Age 18-70
- Sustained arrest
- Shockable rhythms
- Unintended CPR > 15 min
- Shocked 1/1 or higher

**Preparation Phase**

- ED provider confirms with each short rhythm that patient meets criteria
- ED provider acquires femoral 12-leads and arterial with standard ultrasound guidance
- Hold chest compressions during needle insertion access (10 sec)
- Insert short wire in each vessel
- Once hemodynamic is achieved, ED provider sees critical coronary

**Cannulation Phase**

- ED provider accesses femoral vein and artery with standard ultrasound guidance
- Hold chest compressions during needle insertion access (10 sec)
- Insert short wire in each vessel
- Once hemodynamic is achieved, ED provider sees critical coronary

**DURING ECMO**

- ECMO specialist activates Surgeons and medical team, team comes to bedside

**Deactivation Phase**

- ED provider confirms with each short rhythm that patient meets criteria
- ECMO specialist activates Surgeons and medical team, team comes to bedside

**DICLUSION CRITERIA**

- Medical decision to discontinue ECMO
- Persistent organ failure
- Unintended CPR > 15 min
- Shocked 1/1 or higher

**Conclusions**

Utilization of ECMO in a select population of BUMC Emergency Department cardiac arrest patients has shown to have favorable neurologic outcomes.

References