Does Pre-Procedural pH Affect Outcomes in Veno-Arterial Extracorporeal Membrane Oxygenation Patients with Myocardial Infarction?

Michael Healy

Niharika Boinpally

Kennedy Gallagher

James K. Wu MD
Lehigh Valley Health Network, james.wu@lvhn.org

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Does Pre-Procedural pH Affect Outcomes in Veno-Arterial Extracorporeal Membrane Oxygenation Patients with Myocardial Infarction?

Michael Healy, Niharika Boinpally, Kennedy Gallagher, James K. Wu, MD
Division of Cardiothoracic Surgery
Lehigh Valley Health Network, Allentown, Pennsylvania

BACKGROUND

- Myocardial infarction (MI) occurs when blockage of blood to the heart muscle leads to decreased cardiac output and delivery of oxygen to the body [1]
- Metabolic acidosis is found to occur in patients with MI [1]
- Veno-arterial extracorporeal membrane oxygenation (VA-ECMO) is an effective form of mechanical circulatory support for patients with cardiac failure [2]
- In cases of cardiac arrest, extracorporeal cardiopulmonary resuscitation (ECPR) is administered [3]

OBJECTIVE

- To identify the relationship between initial pH levels and survival in patients who presented with MI and required VA-ECMO treatment

METHODS

- Retrospective chart review of all VA-ECMO patients with MI from 2013-2018 at the Lehigh Valley Health Network
- Data collection and analysis of 34 patients: 15 patients who received ECPR and 19 patients with non-ECPR related incidences
- Comparison of results to previous research studies conducted in the field

OUTCOMES

Table 1. Demographic Characteristics of VA-ECMO-Treated MI Patients	
Characteristic	No. (% of n or mean ± SD)
Men	76%
Women	24%
Age	57.8 ± 15.4
Survival	35%
ECPR	44%
Non-ECPR	56%
Characteristics of ECPR Patients	
Men	80%
Women	20%
Age	52.3 ± 16.2
Survival	6.7%
Characteristics of Non-ECPR Patients	
Men	74%
Women	26%
Age	62.1 ± 13.6
Survival	58%

Figure 1: Demographics of VA-ECMO treated MI patient cohort, as well as subdivisions for ECPR and Non-ECPR groups.

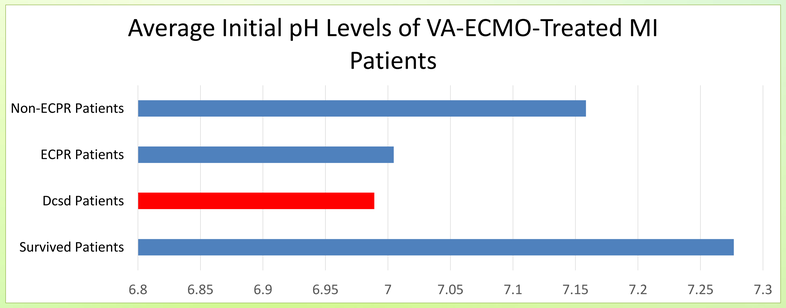

Figure 2: Patient blood pH levels at admission by classification of patients who survived, did not survive (red), and patients who did or did not undergo ECPR.

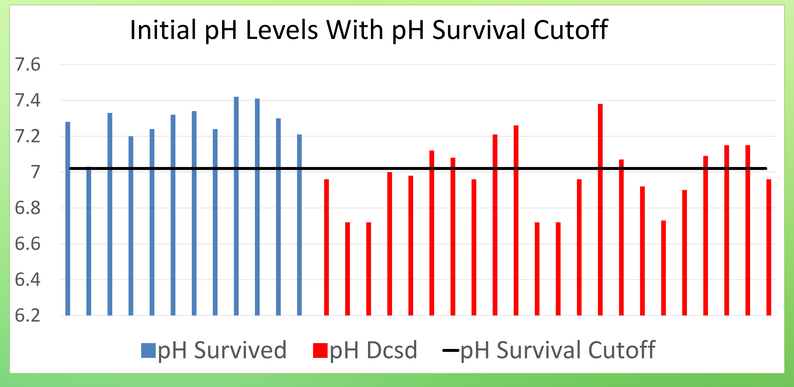

Figure 3: Initial pH levels of each patient were listed in accordance with Survival (blue) and Death (red). Any pH level below cutoff provided showed a 100% outcome of mortality.

RESULTS

- Of the 34 VA-ECMO treated MI patients, 35% had an outcome of survival to discharge
  - Of the 15 ECPR patients, only 6.7% of patients survived
  - Of the 19 non-ECPR patients, 58% of patients survived
- Survival outcomes with ECPR is very poor (6.7%), in accordance with significantly lower pH levels (pH = 7.00)
- Patients with a pH lower than 7.02 within 24 hours prior to ECMO cannulation did not survive

CONCLUSIONS

- On average, patients who survived had a higher, initial pH than those who died.
- These results are consistent with previous studies that have found a decrease in survival outside of the normal pH range [7.35-7.45]

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