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Mass General Research Institute

Extracorporeal Membrane Oxygenation in Trauma Patients with Major Pulmonary Contusion: A Controversial Contraindication

Emanuele Lagazzi MD[1], Wardah Rafaqat MD[1], Mathew K. Simpson BS[1], Ikemsinachi C. Nzenwa MD[1], Vahe S. Panossian MD[1], May Abiad MD[1], Suzanne C. Arnold BSc[1], George C. Velmahos MD PhD[1], Michael P. DeWane MD[1], Benjamin C. Renne MD[1]

[1] Division of Trauma, Emergency Surgery, and Surgical Critical Care, Department of Surgery, Massachusetts General Hospital, Boston, MA

Background

Patients with pulmonary contusion (PC) may require extracorporeal membrane oxygenation (ECMO) due to respiratory failure refractory to conventional management. The use of ECMO remains controversial in PC patients due to the perceived risks of bleeding complications due to systemic anticoagulation.

Objective

Evaluate the safety of ECMO compared to traditional management in PC patients.

Study Design

We used the Trauma Quality Improvement Program Database (2017-2020) to identify adult patients with major PC who underwent ECMO or had respiratory failure and received mechanical ventilation. We excluded patients who

Statistical Analysis

We used 1:1 propensity matching to adjust for patient and injury characteristics. We used stepwise logistic regression to identify predictors of survival among PC patients undergoing ECMO.

Results

We included 611 patients, of whom 106 (17.3%) underwent ECMO. Among patients undergoing ECMO, 67(63.2%) survived to discharge. After matching, 103 well-balanced pairs were formed.

There was no difference in the rate of mortality, pulmonary embolism, or stroke. The rate of ventilator-associated pneumonia was significantly lower in ECMO patients.

Outcomes	**Traditional Management** N=103	**ECMO** N=103	**p-value**
In-Hospital Mortality, n (%)	28 (27.2%)	38 (36.9%)	0.14
Unplanned Intubation, n (%)	12 (11.7%)	12 (11.7%)	1.00
Deep Vein Thrombosis, n (%)	17 (17%)	19 (18%)	0.71
Pulmonary Embolism, n (%)	5 (5%)	5 (5%)	1.00
Cerebrovascular Accident, n (%)	5 (5%)	7 (7%)	0.55
Unplanned ICU Admission, n (%)	7 (7%)	7 (7%)	1.00
Ventilator-associated Pneumonia, n (%)	30 (29%)	15 (15%)	**0.011**
ICU LOS (days), median (IQR)	24 (16-34)	20 (8-34)	0.092
Ventilation duration (days), median (IQR)	20 (12-30)	18 (8-28)	0.21

We evaluated predictors of survival to discharge among major pulmonary contusions undergoing ECMO. In-hospital cardiac arrest, severe head injury, and age>50 years were associated with lower survival, while anticoagulant use was associated with higher odds of survival.

Survival to Discharge	**Odds Ratio**	**95% Confidence Interval**	**p-value**
Severe Head Injury	0.17	0.04 — 0.66	**0.01**
Anticoagulant Use	3.49	1.18 — 10.34	**0.02**
Age≤35 years	Reference		
Age >50 years	0.26	0.07 — 0.99	**0.048**
Blunt Injury	Reference		
Penetrating Injury	4.27	0.72 — 25.28	0.11
Minor pulmonary laceration	0.26	0.07 — 0.99	**0.048**
Tracheostomy	4.16	1.41 — 12.29	**0.01**
In-hospital Cardiac Arrest	0.21	0.06 — 0.75	**0.02**

Conclusions

ECMO is safe in trauma patients with major PC and may be associated with lower morbidity. Young patients without severe head injuries, cardiac arrest, and contraindications to anticoagulation may benefit most from ECMO.

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