

Available online at [www.sciencedirect.com](http://www.sciencedirect.com)

ScienceDirect

journal homepage: [www.elsevier.com/locate/burns](http://www.elsevier.com/locate/burns)

## Revisiting extracorporeal membrane oxygenation for ARDS in burns: A case series and review of the literature<sup>☆</sup>

Craig R. Ainsworth<sup>a,d,\*</sup>, Jeffrey Dellavolpe<sup>b</sup>, Kevin K. Chung<sup>b,d</sup>, Leopoldo C. Cancio<sup>a</sup>, Phillip Mason<sup>c</sup>

<sup>a</sup> Burn Center, US Army Institute of Surgical Research, Fort Sam Houston, TX, United States

<sup>b</sup> Department of Medicine, Brooke Army Medical Center, Fort Sam Houston, TX, United States

<sup>c</sup> Department of Surgery, Brooke Army Medical Center, Fort Sam Houston, TX, United States

<sup>d</sup> Uniformed Services University of the Health Sciences, Bethesda, MD, United States

### ARTICLE INFO

#### Article history:

Accepted 16 May 2018

Available online xxx

#### Keywords:

ECMO

ARDS

Respiratory failure

Inhalation injury

### ABSTRACT

**Introduction:** Recent reports on the use of extracorporeal membrane oxygenation (ECMO) in critically ill burn patients with Acute Respiratory Distress Syndrome (ARDS) recommended against the use of ECMO. The authors cited the high mortality rates associated with the use of ECMO in these patients with no appreciable benefit. Accumulating evidence from referral centers suggests improved survival in patients with ARDS receiving ECMO. We report our recent experience treating patients with severe ARDS with ECMO in a burn intensive care unit. **Methods:** This is a case series of consecutive patients placed on ECMO at our burn center from the initiation of our program in September 2012 to September 2017. We included only adult patients who had been placed on ECMO with burn injury, TEN, or inhalation injury and severe ARDS.

**Results:** Fourteen patients with burn injury, inhalation injury or TEN were placed on ECMO from the initiation of the ECMO program to September 1st 2017. The average total body surface area burned in the 11 patients with burn injury was 27% (range 0.25-76%). The cause of ARDS in these patients included inhalation injury, airway trauma and bacterial pneumonia. Four patients had an inhalation injury and 1 patient had a grade 3 inhalation injury but no burn injury.

In the majority of cases, prone positioning and use of neuromuscular blockade was also used in an attempt to improve oxygenation and patient synchrony with mechanical ventilation. The average time on ECMO was 276h (range 63-539h). Ten of the 14 patients survived to decanulation from ECMO (71%) and eight of 14 patients (57%) survived to hospital discharge. **Conclusions:** To our knowledge, this is the lowest mortality rate reported to date in burn patients with ARDS place on ECMO. ECMO is a viable therapy that can be utilized successfully as a rescue modality when conventional interventions are unsuccessful.

© 2018 Elsevier Ltd and ISBI. All rights reserved.

<sup>☆</sup> The opinions or assertions contained herein are the private views of the author and are not to be construed as official or as reflecting the views of the Department of the Army, Air Force or the Department of Defense.

\* Corresponding author at: Burn Center, US Army Institute of Surgical Research, Fort Sam Houston, TX, United States.

E-mail address: [craig.r.ainsworth.mil@mail.mil](mailto:craig.r.ainsworth.mil@mail.mil) (C.R. Ainsworth).

<https://doi.org/10.1016/j.burns.2018.05.008>

0305-4179/© 2018 Elsevier Ltd and ISBI. All rights reserved.

## 1. Introduction

Recent reports have recommended against the use of extracorporeal membrane oxygenation (ECMO) in critically ill burn patients with acute respiratory distress syndrome (ARDS) [1,2]. Soussi et al. cited the high mortality rates associated with the use of ECMO in burn patients with severe ARDS to “suggest that the use of ECMO in this setting should not be advised until multicenter randomized controlled trials of ECMO versus conventional therapy are undertaken”. In support of this recommendation, they cited a 50% in-hospital mortality rate among 82 burn-injured patients with severe ARDS not treated with ECMO and a 91% in-hospital mortality rate among 11 patients with burn injury treated with ECMO. Adjunct therapies for refractory hypoxemia in patients with severe ARDS such as prone positioning, neuromuscular blockade and low tidal volume ventilation have also been shown to be effective in patients with burn injury and severe ARDS [3,4]. However, not all patients respond to these interventions and ECMO is usually the next intervention considered in severe ARDS patients with refractory hypoxemia [5,6].

Mortality rates in adults with severe respiratory failure undergoing ECMO have improved over time. Released in 2009, the CESAR randomized controlled trial demonstrated that the use of ECMO in patients with severe ARDS improved the rate of 6-month survival without disability from 47% in those treated with standard critical care to 63% in those referred to an ECMO center [7]. The Extracorporeal Life Support Organization (ELSO) tracks the outcomes of all ECMO cases internationally. They report a survival to hospital discharge rate for patients with severe respiratory failure treated with ECMO of 59% [8]. We created an ECMO program in September of 2012 located in the US Army Burn Center at Brooke Army Medical Center. Our first patient developed severe ARDS while being treated for Toxic Epidermal Necrolysis Syndrome (TENS) [9]. Since then, 13 additional patients in the burn center have been placed on ECMO. We report our experience treating patients with burn injury, inhalation injury, or toxic epidermal necrolysis (TEN) with severe ARDS with ECMO in a burn intensive care unit.

## 2. Methods

We performed a retrospective case series in consecutive patients placed on ECMO in the burn center followed by a review of the literature. We have included in this case series patients placed on ECMO at our medical center from the initiation of our program in 2012 to April 2017. We included only adult patients who had been placed on ECMO for severe ARDS with burn injury, TENS, or inhalation injury.

We report patient demographics, clinical data, details of their ECMO treatment and complications. We defined a bleeding complication as the need for a transfusion of 2 or more units of blood products at the time of ECMO cannulation or complications of heparin usage while on ECMO such as post-operative bleeding benefiting from blood transfusion, gastrointestinal bleeding or intracerebral hemorrhage.

For the systematic review of the literature we searched PubMed, Ovid and Embase for case reports, case series, retrospective reviews and randomized controlled trials published in English that presented data on patient outcomes on adult burn patients with ARDS treated with ECMO.

Our patients have all been treated with veno-venous (VV) ECMO. We use the CARDIOHELP System (Maquet, Rastatt, Germany) to deliver ECMO to our patients. Our ECMO team consists of the patient’s burn surgeon, bedside nurse, ECMO specialist nurse, an intensivist trained in ECMO, a respiratory therapist, a physical therapist and a dietician. We have multidisciplinary rounds twice daily on our ECMO patients.

## 3. Results

During the study period, there were 14 patients with burn injury, inhalation injury or TENS who were placed on ECMO. Patient demographic data and clinical information can be found in Table 1. One patient had a grade 3 inhalation injury with no burn injury, two patients had TENS and 11 patients had thermal burn injuries. The average age was 36 (range 19-59) years old. Ten of the patients were men and four were women. The average total

**Table 1 – Patient demographics and clinical information.**

Patient number	Initial injury/illness	Age	Gender	Inhalation injury grade	Survived to hospital discharge	TBSA burned or affected by TEN	ECMO duration
1	TEN	42	Female		Yes	46%	23 days
2	Thermal burn	59	Male		No	11.5%	9 days
3	Inhalation injury	31	Male	3	Yes		6 days
4	Thermal burn	19	Male		No	24%	23 days
5	Thermal burn	26	Female	1	No	19%	14 days
6	TEN	27	Female		Yes	47%	14 days
7	Thermal burn	19	Male	2	No	76%	6 days
8	Thermal burn	48	Male		Yes	10%	4 days
9	Thermal burn	31	Male	1	Yes	51%	14 days
10	Thermal burn	28	Female		Yes	30%	19 days
11	Thermal burn	25	Male		Yes	25%	5 days
12	Thermal burn	45	Male		No	35%	6 days
13	Thermal burn	54	Male		No	17%	19 days
14	Thermal burn	58	Male		Yes	0.25%	8 days

Download English Version:

<https://daneshyari.com/en/article/10215844>

Download Persian Version:

<https://daneshyari.com/article/10215844>

[Daneshyari.com](https://daneshyari.com)