Case Report
Volume 14:02, 2024

Journal of Clinical Case Reports

ISSN: 2165-7939 Open Access

Successful Use of Extracorporeal Life Support in Obesity with COVID-19

Heidi Dalton[1*], Osborn E[2], Desai M[2], Lantry J[2], King C[3], Moran P[3], Ryan L[2] and Speir A[2]

[1]*Department of* Pulmonary/ Lung Transplant, *Heart and Vascular Institute, Falls Church, Ethiopia*

[2]*Department of* Critical Care, *Heart and Vascular Institute, Falls Church, Ethiopia*

[3]*Department of* Heart and Vascular *Surgery, Heart and Vascular Institute, Falls Church, Ethiopia*

Abstract

Background: The COVID-19 pandemic can lead to severe respiratory failure and hypoxia. Extracorporeal life support or ECMO, has been successful in treating patients with respiratory disease from a variety of causes but its' use in COVID-19 is controversial. While it may be helpful, concern over heavy resource use when personnel and equipment may be limited raises caution. Concurrent obesity and secondary organ failure have also been cited as poor prognostic indicators.

Case summary: We present our first COVID-19 patient with both obesity and acute kidney injury who received ECMO support at a large, experienced ECMO center and survived to discharge.

Conclusion: ECMO can provide life-saving support for patients with severe respiratory failure, concurrent obesity and renal failure in selected patients.

Keywords: Extracorporeal • Obesity • COVID-19 • Prognostic indicators • Respiratory failure

Introduction

As the COVID pandemic continues to rise, those most severely stricken develop respiratory failure which is often refractory to conventional mechanical ventilation. The use of extracorporeal life support in such circumstances is controversial as some clinicians perceive this to be an excessive use of limited resources while others do not [1]. As the disease is novel, little data exists on appropriate candidacy and outcome to guide clinical practice. Obesity has been reported by some as an underlying condition with poor prognosis in COVID-19 individuals.

We report our first experience with venovenous ECMO support in a COVID-19 patient with severe respiratory failure and obesity [2].

Case Presentation

A 44-year-old male presented to the emergency department with fever, chills, headache, loose stools, mild dry cough, shortness of breath, fatigue and decreased appetite for 1 week. Past medical history was positive for hypertension and obesity (weight 129.6 kg, BMI 41 kg/m^2) [3]. He had recently returned from travel to New York City (1 week prior) without known ill exposures. He was initially prescribed Tamiflu for 2 days by his PCP until influenza testing returned negative. He had no history of lung disease or smoking. Symptoms persisted as above and as he fell within guidelines for testing for COVID-19, he was directed to the emergency department at our center. Initial vital signs revealed fever of 101.5, pulse 81, respiratory rate 31 and oxygen saturation of 92% on room air. Physical exam revealed course breath sounds but was otherwise noncontributory. Chest radiography revealed bilateral infiltrates (Figure 1) [4]. A repeat influenza PCR was negative and blood culture was also negative. He was begun on antibiotics of azithromycin and ceftriaxone. Testing for COVID-19 was performed on admission and positive result was obtained on hospital day 4. He was treated with a 10-day course of remdesivir [5].

***Address for Correspondence:** Dalton HJ, Department of Heart and Vascular Surgery, Heart and Vascular Institute, Falls Church, Ethiopia; E-mail: heidi.dalton26@gmail.com*

Received: 14 February, 2024, Manuscript No. JCCR-23-9777; **Editor assigned:** 16 February, 2024, Pre QC No. P-9777; **Reviewed:** 01 March, 2024, QC No. Q-9777; **Revised:** 06 March, 2024, Manuscript No. R-9777; **Published:** 14 March, 2024, DOI: 10.37421/2165-7920.2024.14.1573

Figure 1. Admission chest radiograph.

Within 24 hours from admission, respiratory status deteriorated despite hi flow nasal cannula of 100% FiO_2 and 60 L and he was intubated. CT angiogram revealed no intrapulmonary thrombus but diffuse bilateral infiltrates (Figure 2) [6]. Echocardiogram was normal for left and right ventricular function. The patient also developed oliguric acute kidney injury with creatinine 3.1, although some urine output was maintained with intravenous diuretics. He was maintained on lung protective ventilation (tidal volume <6 cc/kg, plateau pressure 28-30 cm H_2O, PEEP 14-18, driving pressure 10-13 [7]. Static compliance 31-37 cc/cm H_2O). While initial prone positioning and neuromuscular blockade improved oxygenation, over the ensuing 4 days, no major improvements in ventilator weaning or oxygenation occurred. A trial of inhaled veletri failed to improve oxygenation (Figures 2-4) [8].

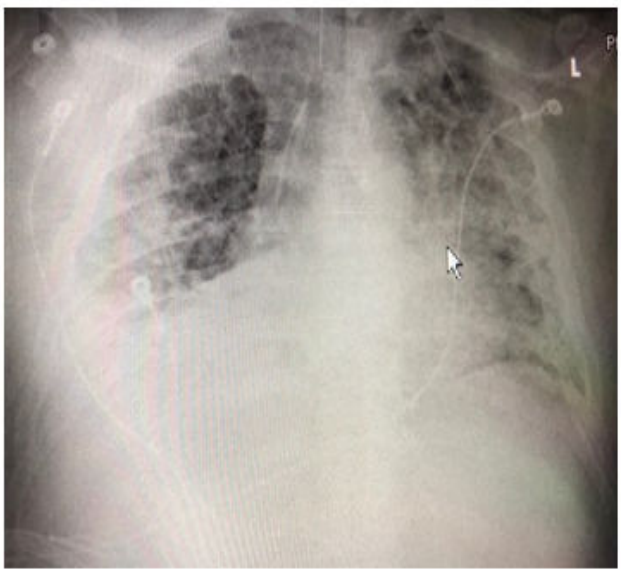

Figure 2. Chest radiograph Pre ECMO.

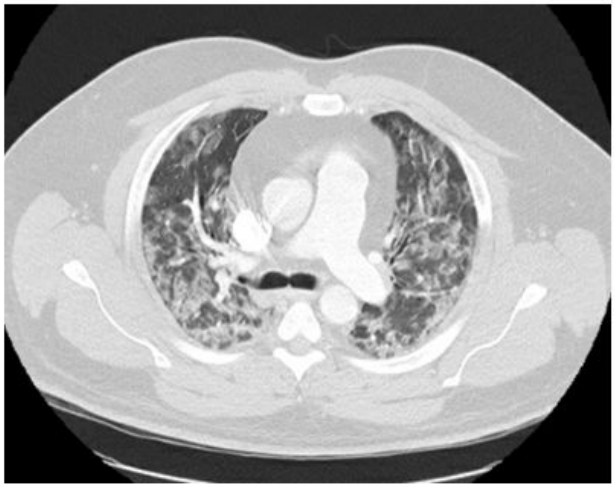

Figure 3. Chest radiograph ECMO decannulation.

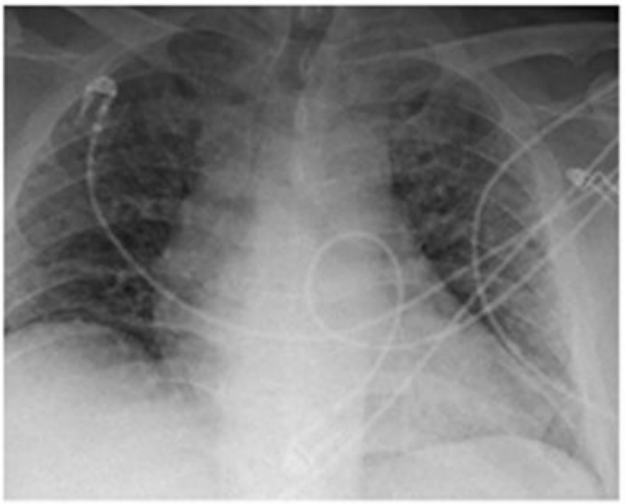

Figure 4. Selected computed tomography angiogram (pre-ECMO).

Results and Discussion

On day 6 of intubation and after 4 days of proning, oxygenation removed poor with no improvement with prone positioning. Decision for venovenous ECMO cannulation was made by the clinical team in conjunction with family [9]. He was cannulated via the left femoral vein (21 FR) and right femoral vein (25 Fr) and placed on a Cardiohelp system (Maquet), with flows of 3.5 L, 2905 rpm and blender gas flow of FiO2 100% 4.5 L. He was also transitioned to a verticalization bed. He was awake and followed commands on ECMO and was able to maintain vertical positioning for several hours each day. Tracheostomy was not performed due to surgical concerns of aerosolization of virus. Anticoagulation was maintained with heparin infusion with goal aPTT of 60-80 sec. Continuous renal replacement therapy was begun in conjunction with ECMO to maintain fluid and acid-base balance. Pseudomonas pneumonia was diagnosed during the ECMO run and he was MRSA positive as well. He received appropriate antibiotics including vancomycin, ceftriaxone and meropenem [10]. Her remained intermittently febrile. Improvement in compliance and gas exchange led to successful decannulation at bedside after 7 days of ECMO support (Figure 3). Respiratory status continued to improve and he was extubated 3 days later, 22 days

after initial symptoms began. Renal insufficiency remained but gradual improvement with diuretics negated need for dialysis.

Selected labs over his course are shown in Table 1. While periods of delirium occurred, the patient was often lucid and following commands, talking to family on phone [11].

Variables	Admission	ECMO	Post ECMO
WBC (× 10^3 uL)	8.81	9.45	10.17
Neutrophil (%)	82	64	66
Lymph (%)	13	14	16
D-dimer (ug/mL FEU)	1.38	1.95	-
CRP (mg/dL)	45	25	8.2
Ferritin (ng/mL)	-	2237	1896
AST (U/L)	85	47	29
ALT (U/L)	58	38	39
BUN (mg/mL)	13	50	61
Creatinine (mg/dL)	1.1	3	3.1
Fibrinogen (mg/dL)	809	>1200	651

Table 1. Selected labs.

Conclusion

The use of ECMO in COVID-19+patients is controversial. While some patients may benefit, resource use is high and concern over ECMO support limiting care for other patients is also a concern. Patients with obesity have been noted to have poor prognosis in some anecdotal reports in COVID 19. Our patient, despite his high BMI and concurrent acute kidney injury, responded well to ECMO support. As we learn more about COVID-19 and patient characteristics, further guidance for optimal patient selection and support will occur. In this case, use of VV ECMO was associated with good outcome.

Enclosed find our case report of an obese, COVID-19+patient treated successfully with venovenous extracorporeal life support. There is controversy on use of ECMO in these pandemic times for these critically ill patients, especially those with large BMI. Concerns of heavy resource use is quoted as another reason to not offer ECMO support. Centers with capacity, experience and appropriate patient volume may be able to offer ECMO successfully, however, and information on use of ECMO may help guide the field.

We offer some information on successful use of ECMO in obese patients (this patient is the first of 12 ECMO patients to date receiving ECMO in our center). Of note, although I have no conflicts of interest, I do receive consultant fees for medical director services during transport of ECMO patients for innovative ECMO Concepts, Inc. This has no impact on this report.

References

1. Zhang, Cantong, Shaoying H, Fengping Z and Yong D. "Controversial Treatments: An Updated Understanding of the Coronavirus Disease 2019." *J Med Virol* 92 (2020): 1441-1448.
2. Ramanathan, Kollengode, David A, Alain C and Matthew P, et al. "Planning and Provision of ECMO Services for Severe ARDS during the COVID-19 Pandemic and other Outbreaks of Emerging Infectious Diseases." *Lancet Resp Med* 8 (2020): 518-526.
3. MacLaren, Graeme, Dale Fisher and Daniel Brodie. "Preparing for the Most Critically Ill Patients with COVID-19: The Potential Role of Extracorporeal Membrane Oxygenation." *Jama* 323 (2020): 1245-1246.
4. Byun, Joung Hun, Dong HK, Jong WK and Sung HK, et al. "Veno-Arterial-Venous Extracorporeal Membrane Oxygenation in a Critically Ill Patient with Coronavirus Disease 2019." *Medicina* 56 (2020): 510.
5. Llerena-Velastegui, Jordan, Sofia Guevara-Espinoza and Cecibel Villacis-Lopez. "Extracorporeal Membrane Oxygenation (ECMO) for Critically Ill Patients with Coronavirus Disease 2019 (COVID-19): A Retrospective Cohort Study." *J Cardiac Surg* 37(2022): 4005.
6. Ma, Xiaochun, Menglin L, Min D and Weiming Liu, et al. "Extracorporeal Membrane Oxygenation (ECMO) in Critically Ill Patients with Coronavirus Disease 2019 (COVID-19) Pneumonia and Acute Respiratory Distress Syndrome (ARDS)." *Med Sci Monit* 26 (2020): e925364-1.
7. Prekker, Matthew E, Melissa E Brunsvold, J Kyle Bohman and Gwenyth F, et al. "Regional Planning for Extracorporeal Membrane Oxygenation Allocation During Coronavirus Disease 2019." *Chest* 158 (2020): 603-607.
8. Martel, Marc L and Robert F Reardon. "Aerosol Barrier Hood for Use in the Management of Critically Ill Adults with COVID-19." *Ann Emerg Med* 76 (2020): 370-371.
9. Gopal, Palepu B, Vijayalakshmi S, Deb SN and Nidhi Ba, et al. "Recent Advances in Critical Care: Part II." *Ind J Anaest* 67 (2023): 110.
10. Xue, Bing, Neel S, Hanqing Y and Thomas K, et al. "Multi-Horizon Predictive Models for Guiding Extracorporeal Resource Allocation in Critically Ill COVID-19 patients." *J Am Med Inform Assoc* 30 (2023): 656-667.
11. Hong, Liwei, Chunyi H, Lihua C and Xiaoqun H, et al. "Developing a Competency Framework for Extracorporeal Membrane Oxygenation Nurses: A Qualitative Study." *Nursing Open* 10 (2023): 2449-2463.

How to cite this article: Dalton, Heidi, Osborn E, Desai M and Lantry J, et al. "Successful Use of Extracorporeal Life Support in Obesity with COVID-19." *J Clin Case Rep* 14 (2024): 1573.