

Peripartum ECMO for COVID-19

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1. Lapinsky SE et al. Am J Respir Crit Care Med. 1995;152(2):427-455. 2. Moore SA et al. J Thorac Cardiovasc Surg. 2016;151(4):1154-1160. 3. Ashokka B et al. Am J Obstet Gynecol. 2020;223(1):66-74.e3. 4. Hanka R et al. J Physiol. 1975;247(2):447-460. 5. Tomlinson MW et al. Obstetrics & Gynecology. 1998;91(1):108-111. 6. RECOVERY Collaborative Group. N Engl J Med. 2020 Jul 17;NEJMoa2021436. 7. Roberts D et al. Cochrane Database Syst Rev. 2017 Mar 21;3(3):CD004454

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Disclosures available upon request

Introduction:

Here we present four cases demonstrating the utility and challenges of ECMO support for severe ARDS due to COVID-19 in the peripartum period.

Methods:

Case 1:

A 27 yo G3P0020 at 30w5d with obesity and COVID-19 ARDS was transferred to our center and placed on VV ECMO. She received supportive care per ARDSnet, anticoagulation, and steroids for COVID-19 and fetal lung maturity. Her ECMO course was complicated by flow issues secondary to contractions and caval compression. She was persistently hypertensive with elevated UPC, and on ECMO day 8 a cesarean delivery was performed

due to worsening thrombocytopenia concerning for PEC and DIC. Her postoperative course was complicated by DIC and AKI. She was removed from ECMO POD2, and following tracheostomy-assisted ventilator wean, was discharged 1 month after admission. The baby was discharged following a stay in NICU.

Case 2:

A 42 yo G2P0101 at 26w5d with chronic HTN, gDM, and COVID-19 ARDS was transferred to our center and placed on VV ECMO. On ECMO day 1 she went into preterm labor requiring cesarean delivery. Despite initiation of heparin infusion on POD1, a DVT was discovered on POD2. She was weaned from VV ECMO on POD7 and extubated POD8. Her post-ICU course was complicated by PE, but she was ultimately discharged 16 days after admission while her baby remained in the NICU.

Case 3:

A 33 yo G3P3003 presented postpartum day 2 following full term NSVD of a healthy infant for severe dyspnea due to COVID-19. Following a cardiac arrest in the ambulance with subsequent ROSC and seizure-like activity she was placed on VV-ECMO, but transitioned to VV-A ECMO due to hemodynamic instability. Initial studies were negative for PE and demonstrated an LVEF 20-25% that subsequently recovered. She experienced severe anoxic brain injury that did not improve. Her course was otherwise complicated by pneumothoraces, renal failure, and sepsis. With support of the ethics committee, care was not escalated for continued decompensation, and the patient passed away 33 days after initiation of ECMO.

Case 4:

A 31 y.o. G4P1122 at 33w3d was admitted with COVID-19 pneumonia requiring HFNC and BiPAP, and had NSVD at 35 weeks following induction of labor. On postpartum day 2 she was intubated, transferred to our center, and placed on VV ECMO. Following 16 days of supportive care she was successfully weaned from ECMO and discharged to home 9 days later.

Results:

Not Applicable – Medically Challenging Case Report

Conclusion:

The peripartum period presents unique hemodynamic and ventilatory challenges in ARDS and for ECMO management, some previously described[1,2]. Given the logistical challenges of proning with a gravid uterus, ECMO allowed us to achieve a higher SpO₂ goal of >92% for fetal oxygen delivery[3] while maintaining lung protective ventilation supine. We took care to minimize sweep to avoid hypocapnia as pCO₂ is a potent driver of placental perfusion[4]. As with other hyperdynamic states, these patients were prone to hypoxemia with increases in cardiac output due to increased shunt fraction on ECMO. We experienced challenges with device flow due to caval compression and contractions that were responsive to fluid resuscitation and left lateral positioning. In discussion with our obstetric colleagues, we learned that preterm delivery has not been shown to improve maternal oxygenation in ARDS[5] and thus planned for delivery in the OR only for fetal indications, or bedside cesarean for maternal arrest. In two cases we saw marked improvement in lung compliance following delivery, however in two others, respiratory failure worsened within 48 hours postpartum. Steroids provided dual benefit in COVID-19 pneumonia and fetal lung maturity[6,7]. While anticoagulation was necessary due to thrombotic risk of ECMO, pregnancy, and COVID-19, at times it was contraindicated due to postoperative state and DIC, requiring careful attention to bleeding and thrombosis.

We encountered ethical dilemmas unique to the peripartum population. In one case a conscious decision was made to forgo continuous fetal monitoring to prioritize maternal outcomes. In another case, peri-arrest hypoperfusion led to severe anoxic brain injury, but the emotional weight of facing a motherless newborn led to a prolonged ECMO course and an end-of-life ethical standoff.

These experiences at our center highlighted the ability of ECMO to enhance peripartum supportive care in COVID-19, and the importance of multidisciplinary teamwork and careful patient selection.

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