Successful use of extracorporeal membrane oxygenation support in a postpartum patient with severe sepsis and associated cardiomyopathy

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Background

- Myocardial dysfunction is one of the main predictors of poor outcome in septic patients, with mortality rates near 70%
- Sepsis induced cardiomyopathy usually resolves if the patient survives the septic event
- VA ECMO improves survival outcomes in patients with severe sepsis induced cardiomyopathy
  - Up to 70% of patients may recover cardiac function

Clinical Presentation

A 23-year-old G1P1 female was transferred to the medical intensive care unit from an outside hospital due to concerns for sepsis and rapid hemodynamic decompensation

Delivery:
- Occurred 20 days prior to admission
- 42 weeks pregnant with no pre-natal care, unaware she was pregnant
- Cesarean delivery for arrest of descent after 1.5 hours of pushing complicated by delayed post-partum hemorrhage requiring uterotonics and eventual hysterectomy
- Discharged home from the OSH on post-partum day 5 with a wound vacuum in place for unclear reasons

Readmission at outside hospital:
- Post partum day 10 admission for wound dehiscence, bowel evisceration, vesicovaginal fistula
- To OR for reduction of the bowel, fascial closure, and cystoscopy
- Discharged home 3 days later with wound vacuum in place

ICU transfer:
- Postpartum day 20
- Transferred from OSH due to new abdominal pain, nausea, vomiting with renal dysfunction and DIC

Vitals: HR 140bpm, T 38.5 C, RR 40, BP 83/44
Pertinent Labs: Fibrinogen 130, INR 2.4, Plt 53, Hg 7.2, WBC 1.6, CO2 12, BUN 29, Cr 3.2, Lactate 6.5.
Bedside echo by anesthesiologist: LV ejection fraction of ~ 25-30% with global hypokinesis
Formal TTE (Fig 1.): EF 35%, moderately reduced global LV systolic dysfunction, moderately reduced RV function, moderately dilated RV

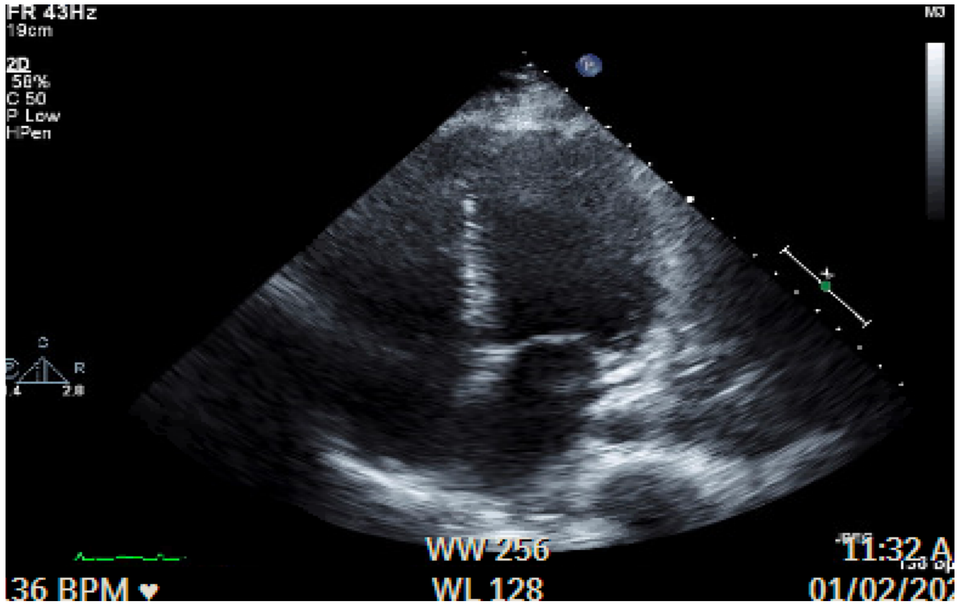

Figure 1. Formal TTE

Clinical Course

- Broad spectrum antibiotics: vancomycin, cefepime, metronidazole, fluconazole
- Volume resuscitation with red blood cells, plasma, cryoprecipitate, platelets
- Maximal doses of norepinephrine, vasopressin, epinephrine, phenylephrine, dobutamine, and angiotensin II within several hours
- CVVHD initiated due to metabolic acidosis
- Intubated due to respiratory failure

Despite all efforts, the patient's metabolic acidosis worsened with ABG showing 7.19/29/141/12 and lactate 9.8.

- Urgently cannulated to veno-arterial ECMO
- hypotension, DIC, and metabolic lactic acidosis improved, and patient weaned off of all vasoactive medications except dobutamine within 48 hours of ECMO cannulation
- CT abdomen: asymmetrically enlarged left kidney and dilated collecting system concerning for pyelonephritis
- Patient underwent percutaneous nephrostomy tube placement
- Successfully decannulated from VA ECMO after 5 days and extubated after 7 days

Follow up

The patient has a normal mental status. Her acute renal failure resolved and she is no longer requiring dialysis. Her ejection fraction has improved to 55%. She will require follow up with plastic surgery due to several ischemic digits.

Discussion

- Severe sepsis with hypotension and organ dysfunction have mortality rates of 25-45%
- Severe sepsis-induced cardiomyopathy can greatly increase mortality
- Sepsis induced cardiomyopathy can be detected via bedside echo
- Given the rapid resolution of sepsis induced cardiomyopathy, it is reasonable to use VA ECMO to support perfusion in patients who have the potential for reversible multi-organ dysfunction
- ECMO cannulation can allow for temporary hemodynamic stabilization for procedural interventions to provide source control in septic patients

References

1. Romero-Bermejo FJ, Ruiz-Bailen M, Gil-Cebrian J, et al. Sepsis-induced cardiomyopathy. Curr Cardiol Rev. 2011;7:163–183.

2. Jennifer Banayan, Sarosh Rana, Ariel Mueller, Avery Tung, Hadi Ramadan, Zoltan Arany, Junaid Nizamuddin, Victor Novack, Barbara Scavone, Samuel M. Brown & Sajid Shahul (2017)Cardiogenic shock in pregnancy: Analysis from the National Inpatient Sample, Hypertension in Pregnancy, 36:2, 117-123, DOI: 10.1080/10641955.2016.1242606

3. Perdue SM, Poore BJ, Babu AN, Stribling WK. Successful use of extracorporeal membrane oxygenation support in severe septic shock with associated acute cardiomyopathy. Journal of cardiac surgery. 2018;33(1):50-52.

4. Combes A. Role of VA ECMO in septic shock: does it work? Qatar Med J. 2017; 4th Annual 4th ELSO-SWAC Conference Proceedings 2017:1–2.