Obstetric Critical Care Symposium

Saturday, April 11, 2026
Dallas, Texas

Breathing for Two

VV ECMO Support in Pregnancy

UT Southwestern Medical Center

Objectives

- Explain maternal and fetal considerations in patient selection for ECMO.
- Review risks and complications of ECMO that are unique to or amplified in pregnant postpartum patients.

Case Presentation

A 24-year-old G1P0 woman with a past medical history of severe asthma at 26w gestational age presents with a severe asthma exacerbation. She has perioral cyanosis with minimal air movement, which does not improve after continuous bronchodilator therapy and NIPPV. She is intubated and started on continuous neuromuscular blockade and bronchodilators. Despite optimal ventilator management, the patient remains acidemic (pH 7.18) with elevated pCO_2; plateau pressures are 32 cmH_2O.

Case Presentation

A 32-year-old G3P2 woman with a past medical history of diet-controlled diabetes at 28w gestational age presents with acute hypoxic respiratory failure secondary to influenza B. Saturations remain ~85% on maximal heated high-flow oxygen support and the patient is unable to tolerate NIPPV due to nausea and retching. She is intubated, placed on 6 mL/kg IBW tidal volumes, optimal PEEP for body habitus, neuromuscular blockade, and in prone position. Despite these interventions, ABG is 7.30/52/60.

Patient Selection for VV ECMO in Pregnancy

- Indications for VV ECMO in pregnancy similar to general population
  - Multidisciplinary discussion paramount
  - Suggested modified criteria
    - $PaCO_2$ >50 mmHg (vs >60 mmHg)
    - Plateau pressure >30 cmH_2O (vs >32 cmH_2O)
- Contraindications unchanged

Physiologic Changes in Pregnancy Relevant to ECMO

System	Parameter	Normal nonpregnant	Normal pregnant	Relevance to ECMO
Respiratory	pH $PaCO_2$	7.35 – 7.45 35 – 45 mmHg	7.40 – 7.45 28 – 32 mmHg	Target higher pH and lower $PaCO_2$ by adjusting sweep gas flow on ECMO
	PaO_2	80 – 100 mmHg	100 – 110 mmHg	Adjust FdO_2 and blood flow rate for higher PaO_2 and oxygen delivery
	HCO_3^-	22 – 26 mEq/L	18 – 21 mEq/L	Reduced bicarbonate limits buffering capacity
Cardiovascular	Cardiac output	4 – 6 L/min	↑ 30% – 50%	Higher ECMO flow rates needed to ensure adequate maternal-fetal perfusion
	Heart rate	60 – 100 bpm	80 – 100 bpm	Recognize higher heart rate as normal
Mechanical	Aortocaval compression	None	Present after 20w gestational age	Compression can affect femoral cannulation and flows during support

https://doi.org/10.1053/j.jvca.2025.08.030
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Initiation of VV ECMO in Pregnancy

- Cannulation
  - Left uterine displacement may ease guidewire advancement
  - Consider fetal heart rate monitoring to monitor uterine blood flow
- Cardiovascular
  - Initial ECMO flows 5 – 6 L/m^2/min
- Acid-base
  - Consider sodium bicarbonate infusion as temporizing measure

https://doi.org/10.1155/2013/274814

ECMO Management Considerations in Pregnant Patients

System	Parameter	Target in nonpregnant patient	Considerations in pregnant patient
Cardiovascular	Cardiac output	Initial ECMO flow 3 – 4 L/m^2/min	Initial ECMO flow 5 – 6 L/m^2/min
	Heart rate		Conflicting recommendations re: beta-blockade

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Respiratory	PaO_2	Maintain 55 – 60 mmHg	Maintain >70 mmHg
	SpO_2	Maintain >80%	Maintain >90%
	pH	Maintain >7.30	Maintain >7.40
	$PaCO_2$	Maintain 35 – 45 mmHg	Maintain 28 – 32 mmHg
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Renal	Creatinine		Lower baseline creatinine can mask early AKI
	eGFR		Increased eGFR alters drug clearance

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Hematologic	Clotting factors, platelet function		Hypercoagulable state increases thrombosis risk

Fetal Monitoring during VV ECMO

- Fetal well-being assessed by heart rate monitoring, ultrasound, umbilical artery Doppler velocimetry
- Nonreassuring tracings may indicate fetal hypoxia, hypercarbia, or uteroplacental insufficiency
  - Interpretation must also account for maternal sedation
- Frequency and method institution-dependent
  - Intermittent monitoring sufficient during pre-viability
  - Clinical scenario determines intermittent vs continuous monitoring post-viability

Delivery Planning of Pregnant Patients on VV ECMO

- Decisions re: timing and mode of delivery must be individualized
- Routine delivery prior to 32 weeks may not have benefits
  - Studies show no improvement in respiratory parameters
  - Risks of iatrogenic prematurity
- Both vaginal and cesarean deliveries feasible
  - Cesarean deliveries associated with increased hemodynamic fluctuations, hemorrhage, infection
  - Vaginal delivery less predictable, lithotomy positioning may impede return

Complications of VV ECMO in Pregnancy

- Maternal complications
  - Hemorrhage: surgical / procedural and nontraumatic
  - Venous thromboembolism
- Fetal complications
  - Preterm delivery
  - Fetal death

Outcomes of VV ECMO in Pregnancy

- Maternal survival ~75%
  - Exceeds general adult population
- Fetal survival 55 – 100%
  - Mostly single-center case series
  - Systematic review aggregate fetal survival ~65%

Case Presentation

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Case Questions

- Is VV ECMO indicated as a rescue therapy in these cases?
- Should the fetus be delivered prior to ECMO initiation?
- What are the goal pH, $PaCO_2$, PaO_2, and SpO_2 while on ECMO?
- What is the anticoagulation strategy in these cases?
- Should fetal monitoring be performed?
- What are the common complications of VV ECMO during pregnancy?
- How should next-of-kin be counseled regarding prognosis?

Summary

- VV ECMO is a viable rescue therapy in pregnant women with respiratory failure refractory to standard treatments.
- Modified selection criteria should be considered ($PaCO_2$, plateau pressures).
- Acid-base and oxygenation goals during VV ECMO should reflect physiologic demands of pregnancy (higher pH, PaO_2, SpO_2; lower $PaCO_2$).
- Anticoagulation is not contraindicated but must be individualized.
- Fetal monitoring may be considered post-viability.
- Prior to 32w GA, delivery should be pursued for obstetric indications.
- Monitor closely for both hemorrhagic and thrombotic complications.
- Maternal and fetal prognoses are better than the general population.
- Robust multidisciplinary teamwork is necessary for success.

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