

ECMO is in the Birth Plan: Peripartum Management of Severe Pulmonary Hypertension Requiring Preterm Cesarean Delivery

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Background:

Clinical Problem: Severe Pulmonary Hypertension in Pregnancy

- WHO Class IV → Pregnancy Contraindicated
- Maternal mortality: **12-16% despite modern therapies**
- Majority of deaths: **postpartum RV failure**

Why Pregnancy is Dangerous:

- **Physiology:** Higher cardiac output, higher plasma volume
- Delivery:
 - **Autotransfusion:** Abrupt preload increase (~500ml)
 - Relatively fixed increase in pulmonary vascular resistance
 - RV unable to compensate → **acute RV failure**

Gap in Care:

- No standardized delivery strategy
- High-risk periods (delivery/postpartum)
- Anticipation of hemodynamic collapse
- Rapid access to advanced support

Case:

27F, G5P004, 28w EGA, severe PH (Groups 1, 4 PA 118/39 mmHg), protein S deficiency, PE, BMI 50

- Admitted for medical optimization prior to **scheduled CD for breech** presentation
- **Failed** initiation of IV and inhaled epoprostenol, drug-related hypoxic respiratory failure
- **Worsening RV failure** → Uteroplacental insufficiency → Decreasing amniotic fluid index

1) Delivery Planning:

- Pre-term CD in cardiac OR
- Low Dose CSE

2) ECMO-Standby Strategy:

- Femoral arterial and venous access
- Cardiac surgeon and ECMO available

3) Advanced Monitoring

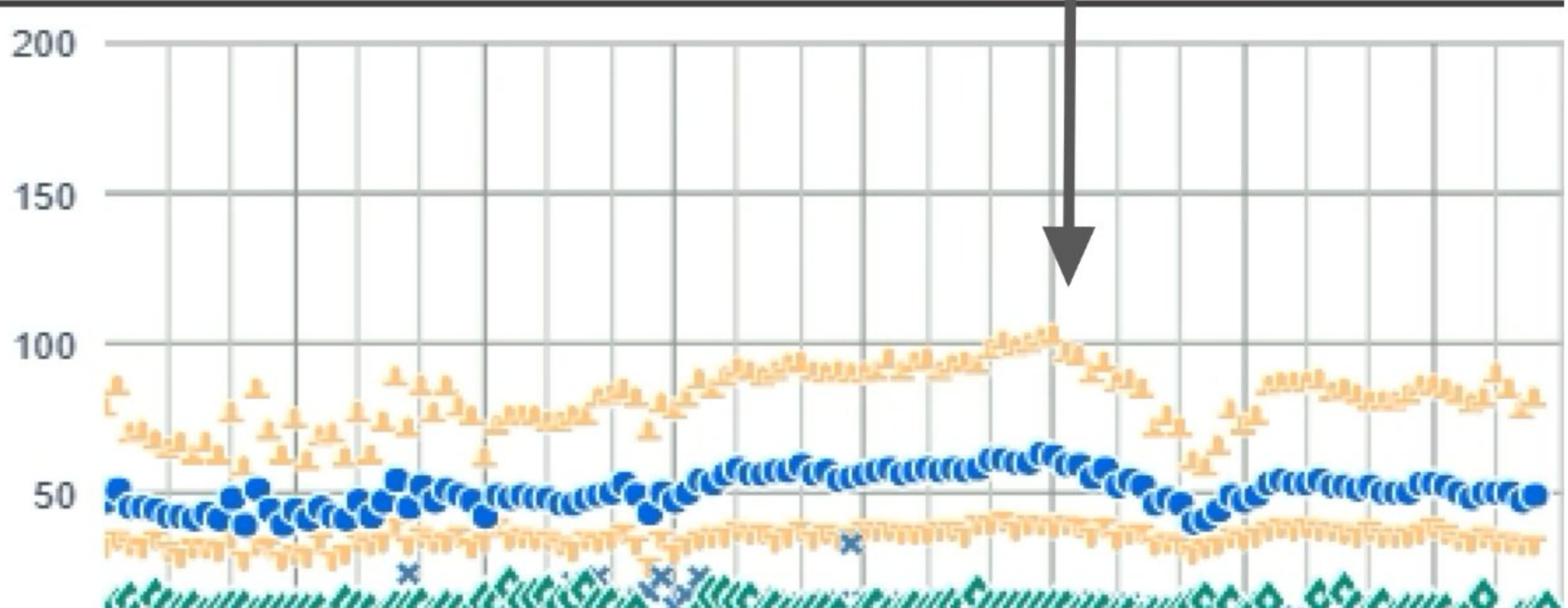
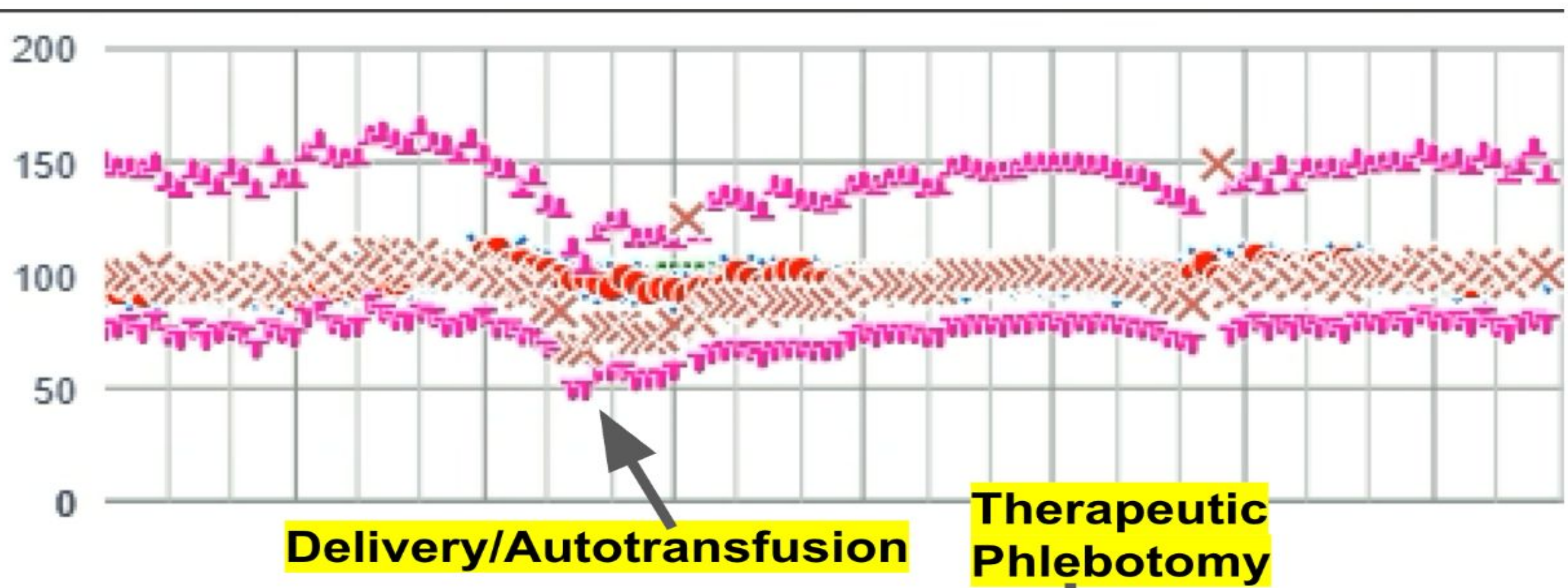
- Pulmonary artery catheter (PAC)
- Continuous transthoracic echocardiography (TTE)

4) RV-Protective Hemodynamic Management

- Inotropy: dobutamine and epinephrine
- Preload optimization:
 - Diuresis (Furosemide IV), therapeutic phlebotomy (800 mL via CVC)

NIBP mmHg	⌵
NIBP (Mean)	●
SpO2 %	+
Pulse (SpO2) bpm	×
HR	●
Art Line #1 mmHg	⌵
MAP Art Line #1	×

PAP mmHg	⌵
PAP (Mean) mmHg	●
CVP (Mean) mmHg	×
PPV	◇



Teaching Points:

Outcome:

- Hemodynamic stability without ECMO, post-operative diuresis and inhaled NO in CVICU
- Successful maternal recovery
- Neonatal survival
- Discharged with plan for definitive PH therapy

Impact:

1) Utilize a Tier-Based System for ECMO Care

- Planning for worst-case (ECMO) improves safety and time-to-support in decompensation
- ECMO *Aware*, ECMO *Standby*, and ECMO *Deployed*
- Helps streamline personnel available for delivery, location of delivery, and where patient will recover

2) Physiology-Guided Care is Critical

- **PAC + TTE + Awake Patient** enable real-time feedback and RV optimization
- Tailored inotrope/volume management

3) Delivery = Hemodynamic Inflection Point

- Postpartum period carries highest mortality risk
- Requires aggressive, proactive management

4) Novel Strategy: Therapeutic Phlebotomy

- Rapid preload reduction in immediate postpartum period
- Feasible via existing femoral access, hemostatic delivery, and adequate starting hct
- Potential adjunct for **RV offloading**

References:

- 1.Hemnes: PMID: 26401246
- 2.Meng: PMID: 28178055
- 3.Naoum: PMID: 37637356
- 4.Monagle: PMID: 25849682

Thank you!