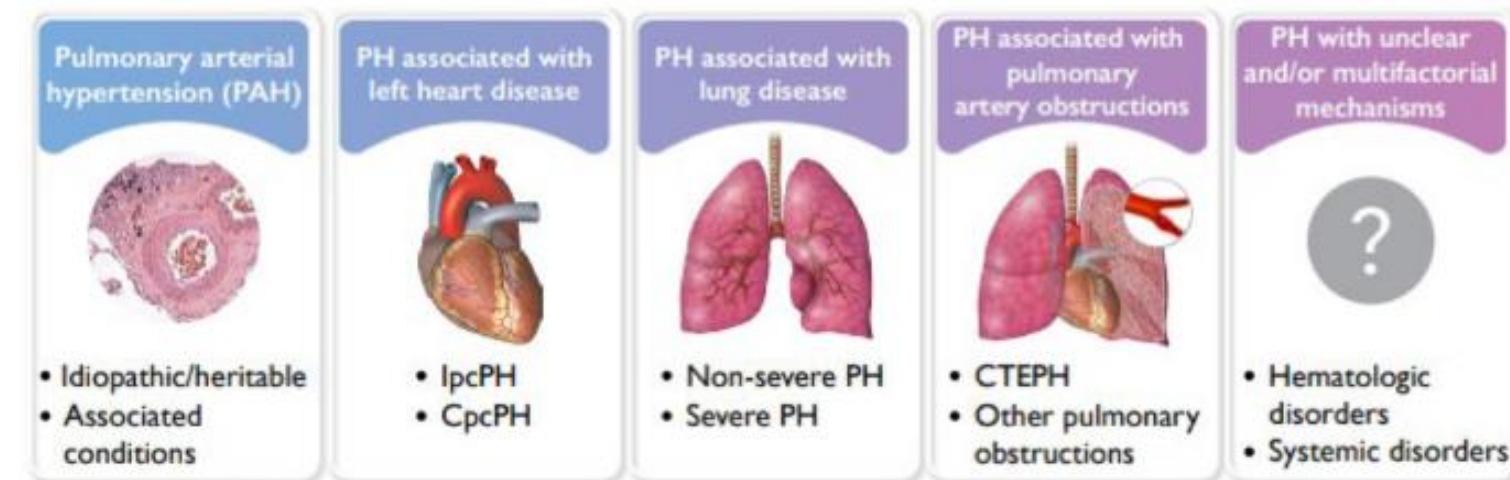
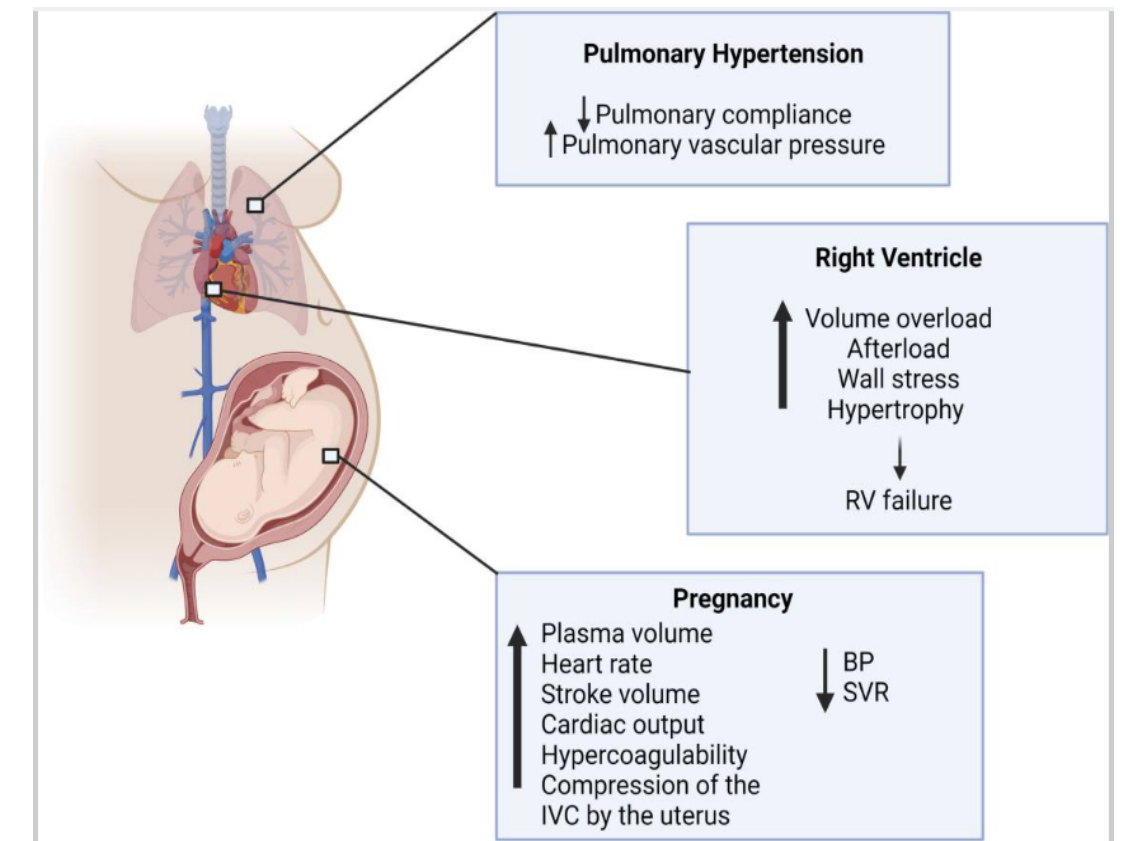


# Pressure's On: Cesarean Delivery in Severe Pulmonary Hypertension: A Case Report

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- Pulmonary hypertension (PH) is a rare but serious disease characterized by elevated pulmonary artery pressure:
  - Classification is based on the underlying cause of abnormal pulmonary artery pressure<sup>1</sup>
  - Modified World Health Organization (mWHO) class IV disease
    - Morbidity and mortality in parturients with PH can reach >50%
    - Pregnancy considered contraindicated due to extremely high risk of poor maternal outcomes<sup>2</sup>
  - Physiological changes of pregnancy present challenges in PH patients<sup>3,4,5</sup>
    - Failure of right ventricle to adapt to the increased volume and cardiac output
    - Risk of hypercoagulability-related thromboembolic events
- We present a case that highlights anesthetic management during the high-risk delivery and postpartum period of a parturient with severe PH secondary to fibrosing mediastinitis



1. Maron BA. *JAHA*. 2023;12(8):e029024.
2. Weiss BM et al. *JACC*. 1998;31(7):1650-7.
2. Thomas E et al. *JAHA*. 2017;6(10):e006144.
3. Meng ML et al. *Obstet Gynecol*. 2017;129(3):511-20.
4. Pieper et al. *Neth Heart J*. 2011;19:504-8.

## Patient

- 26-year-old G1P0 with history of severe pulmonary hypertension (Group 5) secondary to fibrosing mediastinitis
- Received pre-conception and early conception counseling with maternal fetal medicine (MFM)
  - 31 week: small D-shaped LV with an ejection fraction of 65%, severely enlarged RV with severely reduced systolic function, and RVSP 114 mmHg (RA 15 mmHg)
  - Functionally, NYHA Class II prior to and throughout pregnancy
    - Dyspnea with walking up one flight of stairs, orthopnea requiring 2 pillows to sleep
  - Case was discussed with transplant and ECMO teams
    - *Not* transplant candidate
    - ECMO offered only as a bridge to recovery related to pregnancy physiology
  - Proceeded with pregnancy as this was “God’s plan”
- History of pulmonary embolism (PE) in 2022
  - On prophylactic enoxaparin during pregnancy

## Anesthetic Plan

### Multidisciplinary planning

- Cesarean delivery at 32 weeks gestation
- Cardiac operating room, ECMO team on standby

### Pre-medication

- None, patient utilized her phone and headphones to alleviate anxiety

### Primary Anesthetic

- Combined spinal-epidural (CSE) at L3-4
  - Intrathecal dose: 0.5ml of 0.5% isobaric bupivacaine, 15mcg fentanyl, 150mcg morphine
  - Lidocaine 2% without epinephrine administered through the epidural in 3-4ml boluses to achieve T5 dermatome level

### Monitors

- Standard ASA monitors, right radial arterial line (prior to CSE placement)

### Access

- Fibrosis prohibited upper body central access
- 20-gauge peripheral intravenous (IV) x2
- Bilateral arterial femoral 4-Fr catheters and right venous femoral 5-Fr catheter
- L femoral 9-Fr single side port introducer with a clip-in triple lumen

### Inopressors

- Norepinephrine at 0.02mcg/kg/min initiated at the time of intrathecal medication administration, titrated to maintain MAPs > 80 consistent with baseline
- Ephedrine 15mg bolus and epinephrine infusion at 0.02mcg/kg/min initiated at time of uterine incision

### Uterotonics

- Low-dose oxytocin infusion initiated at 3.75U/hr

### Disposition

- Direct ICU admission with femoral sheaths in place for 24 hours



# Teaching Points

## Pre-conception

- Facilitate early multi-disciplinary planning
  - Stakeholders include patient and family, MFM, anesthesia, ICU, and transplant or ECMO (if applicable)
- Assess patient goals
  - Patients may have severe anxiety related to delivery and expected prognosis
  - If possible, help facilitate patient desire to be awake for delivery and to meet baby/receive updates as soon as possible

## Antepartum

- Understand pulmonary hypertension pathophysiology and classification
  - Review patient records to assess functional status, cardiac function, and whether inhaled nitric oxide (or other vasodilators) could decrease pulmonary artery pressure

## Intrapartum

- Goal is to maintain normal sinus rhythm, inotropy, SVR
  - Recognize that single-shot spinal injection or general anesthesia would cause significant hemodynamic instability
  - Consider limitations in access due to patient anatomy and pathophysiology
  - Avoid worsening pulmonary hypertension related to hypoxia, hypercarbia, acidosis, hypothermia, high PEEP
  - Consider additional inotropic support with ephedrine and epinephrine at the time of delivery
  - Expect autotransfusion of approximately 500ml of blood immediately after delivery that may be poorly tolerated
  - Consider that boluses of uterotonics (oxytocin, carboprost, methergine) could increase pulmonary artery pressure

## Postpartum

- Plan for ICU-level cares for 48-72 hours postpartum
- Consider transplant or ECMO candidacy

