Anesthetic Management of a Parturient with Severe Pulmonary Hypertension and Right Ventricular Failure

Christopher Lee MD, Tina Yu MD, Catherine Cha MD
Department of Anesthesiology & Perioperative Medicine, UCLA Health, Los Angeles, CA

UCLA Health

Background

- **Pulmonary hypertension** in the parturient carries a mortality risk of up to 20%

Diagnostic Criteria
Increase in PAP >20 mmHg at rest assessed by RHC

Initial workup:
- Transthoracic echocardiogram
  - Severely dilated right ventricle and right atrium
- Right Heart Catheterization
  - PA systolic pressure 72 mmHg

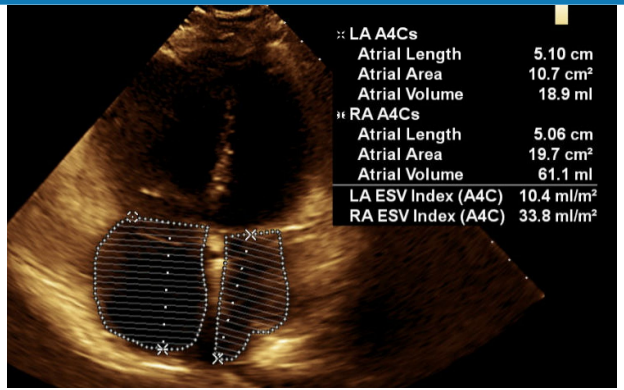


Figure 1. TTE 4 chamber view illustrating significant right atrial dilation

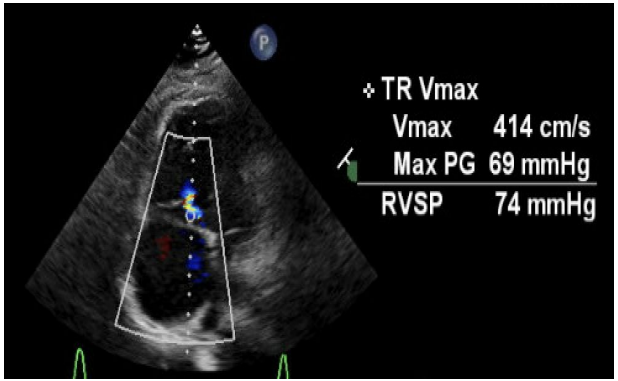


Figure 2. TTE RV 2 chamber view demonstrating elevated RV systolic pressures

Hospital course

A G5P20022 at 34 weeks gestation w/ pmhx asthma, gHTN and CS x1 presents from OSH with significant **dyspnea** with increased O2 requirement

Dx: **RV failure 2/2 idiopathic pulmonary HTN

Admitted to CTICU prior to delivery for optimization:
- Swan-Ganz catheter and arterial line for close monitoring
- Nitric oxide, epoprostenol, and sildenafil for pHTN

Patient Care

Preoperative planning

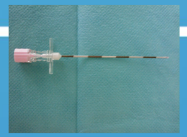
- Delivery plan: main OR with ECMO sheaths in place and CT surgery standby
- Access: Swan-ganz, arterial line, large bore IVs
-Patient on high flow nasal cannula with nitric oxide, epoprostenol, and sildenafil

1

Day of Surgery

- Dural Puncture Epidural (DPE) was performedand loaded slowly with lidocaine HCl 1.8% with epinepherine 5mcg/ml and sodium bicarbonate without incident

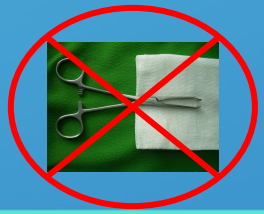
2



Prior to Incision

- Despite having T4 sensory level to cold and bilateral LE motor blockade, patient failed allis test

3



Conversion to GA

- Decision made to convert to general anesthesia
- Patient induced with 50mg ketamine, 50mg propofol, and 100mg succinylcholine with vasopressor support

4

Intraoperative events

- Cesarean Delivery occurred without complication
-Patient maintained throughout case on vasopressin and phenylepherine infusions
- Extuabted at end of case

5

Postoperative care

- patient transported back to CTICU for recovery
- weaned off nitric oxide and started on **macitentan, tadalafil and lasix**
- discharged on POD 7

6

Anesthetic Management of a Parturient with Severe Pulmonary Hypertension and Right Ventricular Failure

Christopher Lee MD, Tina Yu MD, Catherine Cha MD
Department of Anesthesiology & Perioperative Medicine, UCLA Health, Los Angeles, CA

UCLA Health

Pathophysiology

- **Increased pulmonary vascular resistance & venous pressure**
  - ⬆️ thromboxane and endothelin-1 (vasoconstrictors)
  - ⬇️prostacyclin and nitric oxide (vasodilators)

Subclassified into 5 groups

1. Pulmonary arterial hypertension
2. PH d/t cardiac disease
3. PH d/t lung disease
4. Thromboembolic causes
5. Miscellaneous causes

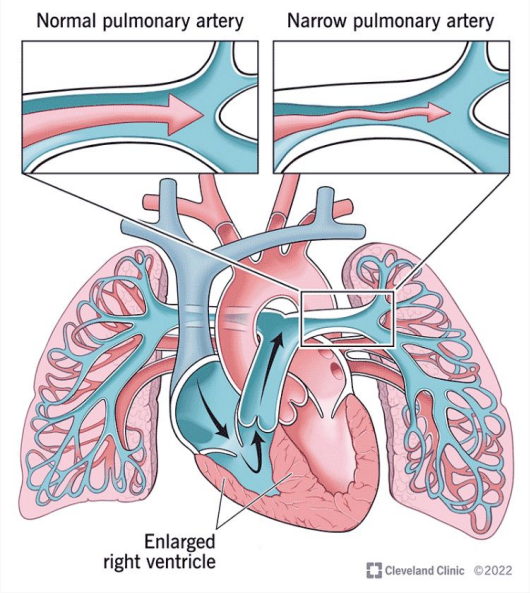


Figure 3. Graphic depicting pathophysiology of pulmonary hypertension from Cleveland Clinic

Management Goals

- Avoid increases in PVR

- Hypercapnia
- Hypoxia
- Acidosis
- Valsalva and pain

- Pharmacologic

- Prostacyclins, phosphodiesterase type-5 inhibitors, endothelin-receptor antagonists, guanylate cyclase stimulators

-Contraception planning

- BTL, IUD, OCPs

Citations

Afify H, Kong A, Bernal J, Elgendy IY. Pulmonary Hypertension in Pregnancy: Challenges and Solutions. Integr Blood Press Control. 2022 Apr 2;15:33-41. doi: 10.2147/IBPC.S242242. PMID: 35401013; PMCID: PMC8985908.
Low TT, Guron N, Ducas R, Yamamura K, Charla P, Granton J, Silversides CK. Pulmonary arterial hypertension in pregnancy-a systematic review of outcomes in the modern era. Pulm Circ. 2021 May 14;11(2):20458940211013671. doi: 10.1177/20458940211013671. PMID: 34104423; PMCID: PMC8172332.
Wang J, Lu J. Anesthesia for Pregnant Women with Pulmonary Hypertension. J Cardiothorac Vasc Anesth. 2021 Jul;35(7):2201-2211. doi: 10.1053/j.jvca.2020.06.062. Epub 2020 Jun 24. PMID: 32736999.