Easing the Tension: A Multidisciplinary Approach to Pulmonary Hypertension

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Background

- Pulmonary hypertension (PH) is characterized by elevated (>20 mmHg) pulmonary arterial pressure (PAP) and pulmonary vascular resistance (PVR)
- Incidence: 1% of the global population
- Maternal mortality rates of 30-50% due to poor tolerance of the physiological change (e.g., increased plasma volume and cardiac output)
- Pregnancy is contraindicated in PH due to the high risk of maternal cardiac events
- Despite counseling, patients with PH may elect to continue their pregnancies

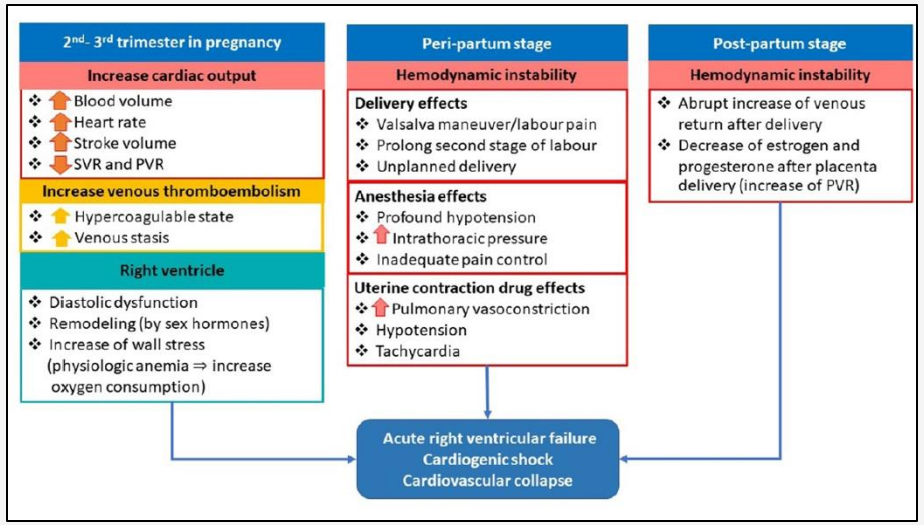

Figure 1. Pathophysiology of cardiovascular collapse in pregnant patients with PH during pregnancy. SVR: systemic vascular resistance; PVR: pulmonary vascular resistance. (Phoophiboon 2021)

Table 1. Clinical classification of pulmonary hypertension

Classification	*Targeted treatment available?*
Group 1*: Pulmonary arterial hypertension	Yes
Including idiopathic, heritable, and HIV-associated; systemic sclerosis and other connective tissue disease; congenital heart disease; schistosomiasis; drug- and toxin-induced	
Group 2: Pulmonary hypertension due to left heart disease	No
Including systolic and diastolic dysfunction and valvular heart disease	
Group 3: Pulmonary hypertension due to lung diseases and/or hypoxia	No
Including chronic obstructive pulmonary disease, sleep-disordered breathing, and interstitial lung disease	
Group 4: Chronic thromboembolic pulmonary hypertension	Yes
Group 5: Multifactorial pulmonary hypertension	No
Including metabolic, systemic, and hematologic disorders (sickle cell disease), and others	

HIV = human immunodeficiency virus.

**—Also includes 1' (pulmonary venoocclusive disease and/or pulmonary capillary hemangiomatosis) and 1" (persistent pulmonary hypertension of the newborn).*

Information from references 3, 4, and 6.

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Case

- 31F G2P0010 at 33 weeks 2 days gestational age with PH as a sequelae of severe obstructive sleep apnea, obesity hypoventilation syndrome, and chronic thromboembolic disease was diagnosed with pre-eclampsia with severe features (PEC with SF) in triage
    - Other medical history: hypertension, asthma, morbid obesity (BMI 55), type 2 diabetes mellitus
    - TTE: normal left ventricular size and function, dilated right ventricle, mild PH
    - Right Heart Catheterization (RHC): PAP 53/25, mean PAP 34
- Monitors: standard ASA monitors and pre-induction arterial line
- Anesthetic: prophylactic vasopressin prior to CSE at L3-4 with 1cc 0.75% bupivacaine-8.25% dextrose, 15mcg fentanyl, and 0.15mg morphine; epidural slowly dosed with 8cc 2% lidocaine-1:200,000 epinephrine
- High flow nasal cannula, titrated to PaO_2
- Infusions: magnesium for PEC with SF, insulin for hyperglycemia
- Pitocin initiated after delivery of anterior shoulder
- Transferred to cardiac intensive care unit for recovery
    - Required diuresis for worsening PH and volume overload
- Discharged post-op day 7, with resolution of PH on RHC

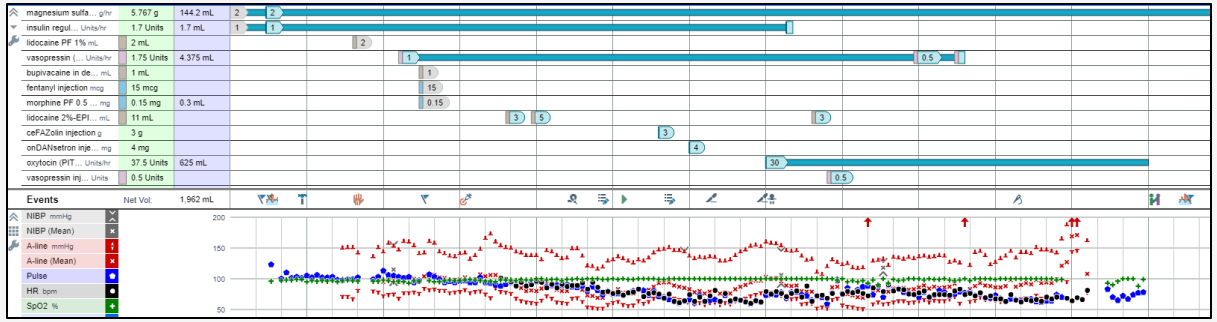

Figure 2. Intraoperative anesthetic record of the patient's Cesarean delivery

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Discussion

- Recent studies have shown a decline in maternal mortality among pregnant women with well controlled PH, ranging 9-25%[1]
- Management: supplemental oxygen, diuretics, and anticoagulation. Targeted therapy may include endothelin receptor antagonists, prostacyclin analogs, and phosphodiesterase-5 inhibitors
- CD preferred over labor to avoid acute increases in PVR
- Neuraxial anesthesia preferred over general anesthesia
- ICU should be available for recovery
- Contingency planning for acute decompensation: central access with pulmonary artery catheter (PAC) placement, escalation of respiratory support, inotropic support, and pulmonary dilators
- Multidisciplinary planning between maternal fetal medicine, obstetric anesthesiology, cardiology, and neonatology is imperative for safe delivery

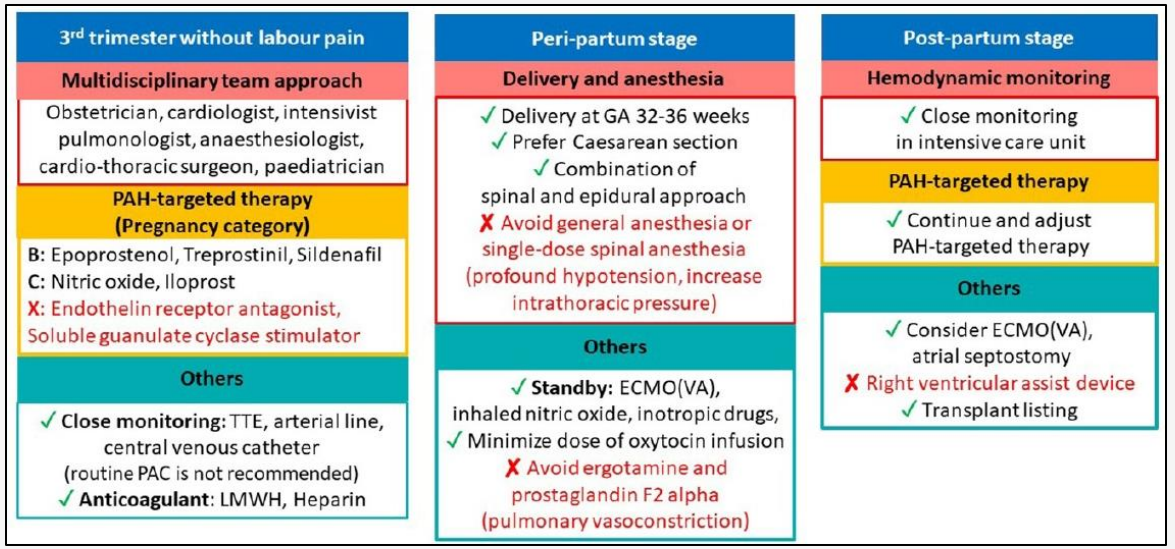

Figure 3. Critical care management for pregnant patients with pulmonary arterial hypertension (PAH) TTE: transthoracic echocardiography; LMWH: low molecular weight heparin; ECMO: extracorporeal membrane oxygenation; VA: veno-arterial. (Phoophiboon 2021)

References

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