

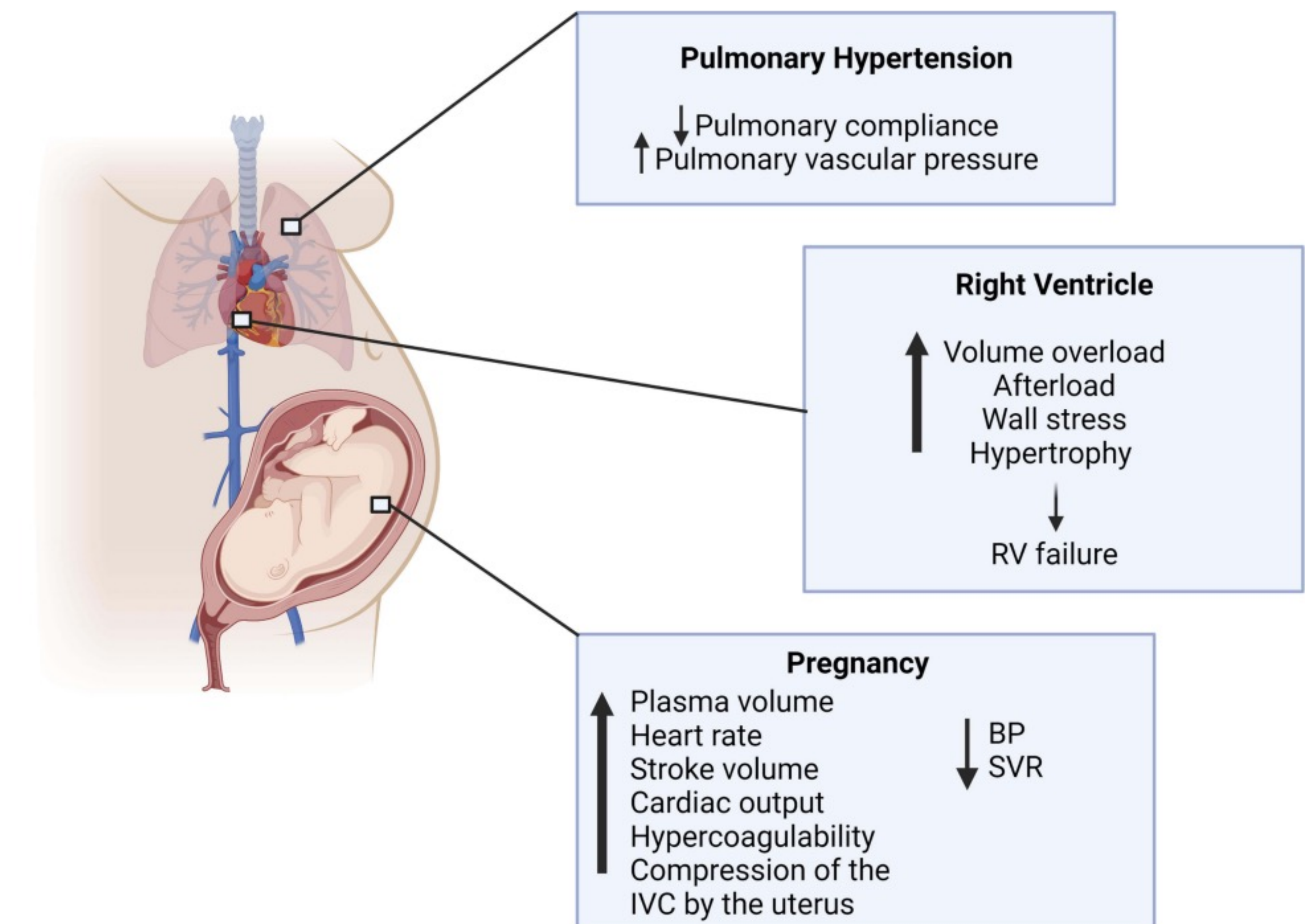
Anesthetic Management of a Parturient with Pulmonary Hypertension for Cesarean Delivery

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- Pulmonary arterial hypertension during pregnancy is an extremely high-risk comorbidity, with mortality rates between 30 and 56%.
- Increased blood volume and cardiac output leads to worsening pulmonary pressures, as the underlying vascular disease prevents the fall in pulmonary vascular resistance that normally accompanies pregnancy.
- The increased pulmonary pressures and volume load can strain the right ventricle, putting the woman at risk for heart failure with the increases in preload during labor and with postpartum uterine contraction.

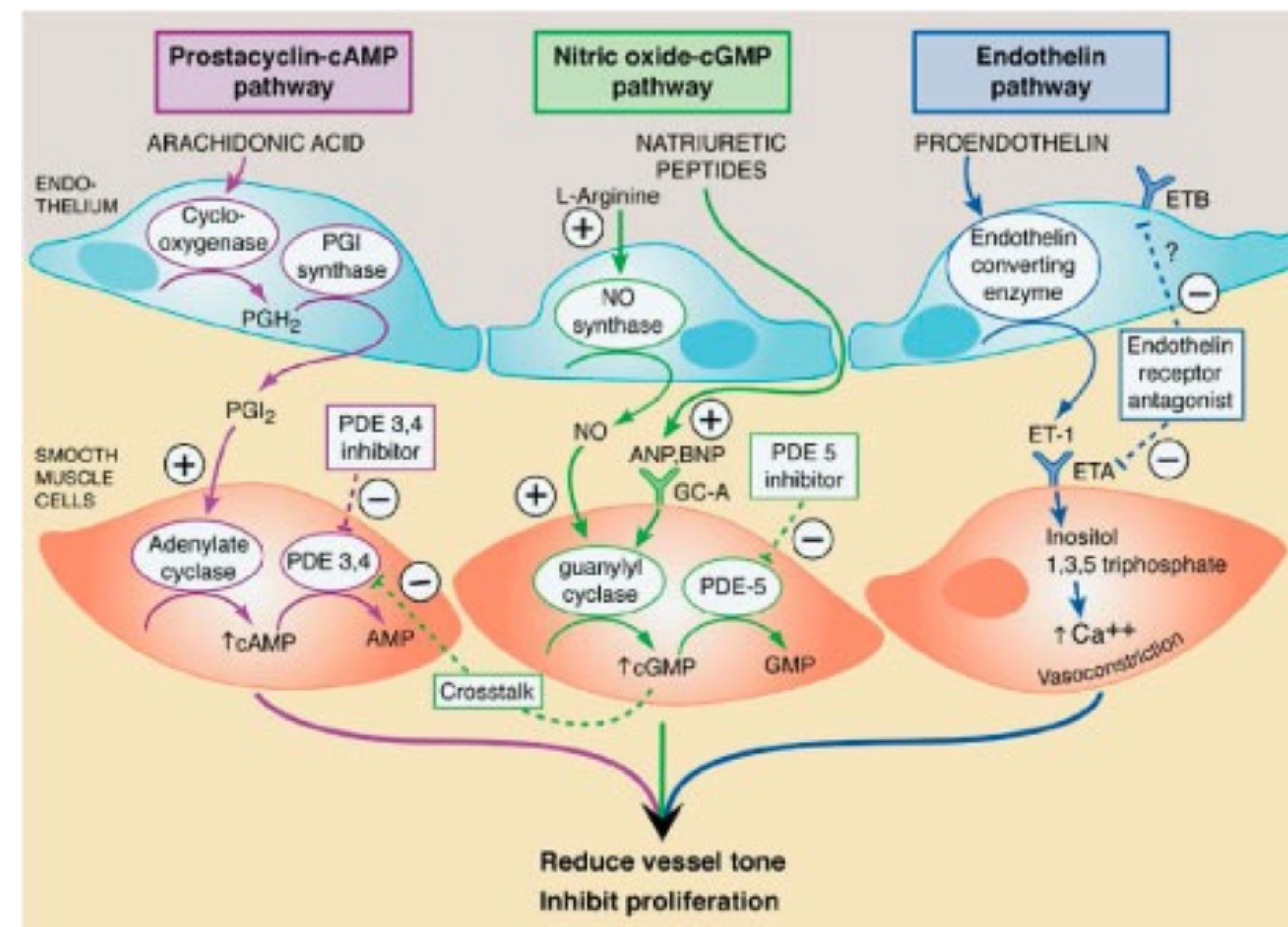
WHO Classification of Pulmonary Hypertension

Class I	Pulmonary Arterial Hypertension
Class II	PH due to left heart disease
Class III	PH due to pulmonary disease
Class IV	PH due to chronic thromboembolic disease
Class V	PH with unclear/complex mechanism



Case Presentation and Past Medical History

- The patient is a 25-year-old G1P0 with idiopathic vasoreactive pulmonary HTN chronically managed with **amlodipine** and **sildenafil**.
- At 9 weeks gestation, right heart catheterization and echocardiogram demonstrated moderate pulmonary HTN, with RV systolic pressure of 59 mm/Hg and mean PA pressure of 40 mm/Hg.
- Anticipating clinical deterioration with continued pregnancy, the patient was admitted for initiation of intravenous **epoprostenol** for further pulmonary vasodilation.
- She tolerated the infusion, which was eventually up-titrated to *20 ng/kg/minute*. She was scheduled for controlled Cesarean delivery at 38 weeks gestation.



Drug Name	Drug Class	Mechanism in PAH
Amlodipine	Calcium channel blocker	Causes pulmonary vascular vasodilation in select PAH patients (based on diagnostic vasodilator testing during RHC)
Sildenafil	Selective PDE-5 inhibitor	Inhibits the degradation of cGMP by PDE-5 which mediates vascular smooth muscle relaxation
Epoprostenol	Prostacyclin analog	Causes direct vasodilation of systemic and pulmonary vascular beds via G-protein coupled receptors

Anesthetic Goals and Intraoperative Management

Anesthetic goals for pulmonary HTN:

- Optimize pre-operative medical management and maintain baseline meds throughout peripartum period (especially epoprostenol infusion)
- Avoiding conditions that increase pulmonary vascular resistance (*hypercarbia, hypoxia, acidosis, pain*)
- Limiting myocardial depression
- Maintaining systemic vascular resistance and blood pressure to ensure myocardial and fetal perfusion.
- Mitigate the effects of autotransfusion following delivery
- Avoid oxytocin bolus in favor of slow infusion
- Minimize fluids in the peripartum period so as not to increase preload prior to uterine contraction
- Provide inotropic support to the right ventricle as needed (epinephrine, milrinone, dobutamine)

Anesthetic Management

- An *arterial line* was placed for continuous BP monitoring
- *Combined spinal epidural* was placed at L2-L3 interspace
 - Spinal *bupivacaine 0.75% 0.8 cc*, fentanyl 15 mcg, and morphine 0.1 mg
 - The patient *remained seated for several minutes to mitigate sympathetic block* and allow saddle block for comfortable vaginal prep and foley insertion
 - *Phenylephrine* infusion was started to maintain blood pressure
 - *Right IJ introducer* was placed during foley catheter insertion
 - in case central inotropes or a PA catheter were needed postpartum.
 - Epidural lidocaine 2% was titrated to achieve a T-3 sensory level, case proceeded smoothly
- Following delivery, *quadruple concentrated oxytocin* was slowly infused to minimize fluid administration and mitigate the effect of uterine contraction on preload.
- Patient had an uneventful post-op course and was discharged on her baseline pulmonary HTN medications.

Conclusion: Pulmonary HTN is a dangerous comorbidity during pregnancy, as the stresses placed on the cardiovascular system place the parturient at risk for peripartum heart failure. It is important to understand the goals in caring for these patients, and a multidisciplinary team approach is essential in contributing to safe outcomes. In this case, the patient's medical management was optimized and continued through delivery, allowing for successful delivery with a carefully titrated, hemodynamically stable, neuraxial anesthetic.

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