Background

Pathophysiology of concurrent Atrial Septal Defect (ASD) and Pulmonary Hypertension (PH)

• ASD \rightarrow Left-to-right shunt \rightarrow Chronic RV volume overload.

Overtime \rightarrow Pulmonary hypertension (PH) due to high cardiac output (not \uparrow pulmonary vascular resistance) through several interconnected mechanisms: Shear Stress, Endothelial Dysfunction, Pulmonary Vascular Remodeling:

Impact of physiological state of pregnancy

- Increased blood volume & cardiac output exacerbate RV stress.
- Risks: RV dysfunction, arrhythmias, paradoxical embolism.

SVR Management Challenge

Managing gestational hypertension requires precise systemic vascular resistance (SVR) control

- \downarrow SVR \rightarrow Reduces L-to-R shunt but risks reversal (R-to-L) if RA > LA pressure.
- \uparrow SVR \rightarrow Increases L-to-R gradient, worsening RV overload & PH.

Case

Clinical Profile

- 29 year old with large secundum ASD, moderate-to-severe RV dilation, tricuspid regurgitation.
- RV systolic pressure: 51 mmHg → indicative of significant PH. Normal Systolic RV pressure: 15–30 mmHg
- Presentation at term with gestational hypertension. Otherwise asymptomatic.

Management

- Maintain adequate SVR to prevent R-to-L shunt; also avoid excessive L-to-R flow.
- **Phenylephrine** used to stabilize BP without substantially increasing pulmonary pressures.
- Early incremental-dose epidural: minimize hemodynamic swings, reduce paininduced catecholamine surges, avoid Valsalva-driven *TRA* pressure.
- Restrictive fluid management: prevent RV volume overload.
- Air filters on IV lines & loss of resistance to saline method for epidural placement: decrease paradoxical embolism risk.
- Avoid Building up Pulmonary Artery Pressure- avoid uterotonics i.e. Carboprost and methergine, if possible. Prefer methergine over Carboprost in dire need.
- Patient has failed labor induction → controlled cesarean delivery with strict SVR and preload monitoring leading to uneventful outcome.

Conclusion

ASD with PH Dual Hemodynamic Hazards

- Excessive SVR Reduction: \downarrow L-to-R shunt but may cause RA pressure to exceed LA pressure leading to R-to-L shunt (hypoxemia).
- Excessive SVR Elevation: ↑ L-to-R gradient, worsening RV volume overload & PH.

Balancing SVR

- **Phenylephrine**: selective α_1 -mediated vasoconstriction maintains SVR with minimal \uparrow in pulmonary pressures.
- Early Epidural Analgesia: Reduces pain-induced sympathetic surges and RA pressure spikes.
- **Restrictive Fluids**: Prevents RV overload and excessive preload.

Multidisciplinary Approach

- Obstetricians, anesthesiologists, cardiologists, and critical care teams must collaborate.
- **Postpartum ASD Repair**: Crucial to reduce long-term morbidity.
- **Research Needs**: Optimize vasopressor choice, fluid protocols, safety of uterotonics and neuraxial anesthesia techniques for this high-risk group.