Vasopressor Choice in Neuraxial Anaesthesia for Caesarean Delivery in Severe Left Ventricular Dysfunction: A Case Report

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Background

Hypotension following neuraxial anaesthesia is common and typically managed with phenylephrine. In patients with **severely reduced left ventricular ejection fraction (LVEF)**, pure α-agonists may:

- Increase afterload
- Reduce cardiac output
- Trigger reflex bradycardia
- Worsen haemodynamic instability

Noradrenaline provides **α-vasoconstriction with modest β_1 inotropy**, potentially offering a more favourable profile in cardiac disease. (Fig 1)

Case Summary

Peripartum Cardiomyopathy with Superimposed Pre-eclampsia

Presentation: 37yo G3P0, 36+2 Weeks (BMI 57)
•**Symptoms:** Severe dyspnea, orthopnea, peripheral edema.
•**Signs:** Tachycardia (140–170 bpm), BP 146/100, Proteinuria 3+.
Diagnostics
•**Echo:** Dilated LV; LVEF ~35%.
•**NT-proBNP:** 1348 ng/L.
•**Diagnosis:** PPCM with superimposed pre-eclampsia.

Management
•**Critical Care:** Diuretics, antihypertensives, $MgSO_4$, anticoagulation.
•**Delivery:** Planned within 12–24 hours.

Anaesthetic Technique

A combined spinal–epidural (CSE):

- Spinal: 1 mL 0.5% hyperbaric bupivacaine + fentanyl + morphine
- Epidural: Incremental levobupivacaine
- Arterial line inserted pre-operatively
- Difficult spinal (3 attempts)

Caesarean delivery proceeded under CSE.

Vasopressor Response

Following neuraxial block, the patient developed **significant hypotension**.
Phenylephrine (first-line)

- Initiated as per standard obstetric practice
- **Failed to maintain MAP ≥65 mmHg**
- Concern for reduced cardiac output due to reflex bradycardia and increased afterload

Switch to Noradrenaline (16mcg/ml) (Alpha v Beta)

- MAP stabilised between **65–80 mmHg**
- HR maintained at **90–100 bpm**
- Oxygen saturation remained ≥99%
- Marked improvement in haemodynamic stability

Estimated blood loss: **933 mL** Delivery was uncomplicated; neonate well.

Postoperative Course

- Epidural retained for 24 hours for analgesia (Morphine allergy)
- Continued diuresis and cardiac optimisation
- Persistent LV dysfunction postpartum (EF 34–35%)
- No further hypotensive episodes
- Ongoing heart failure therapy and cardiology follow-up

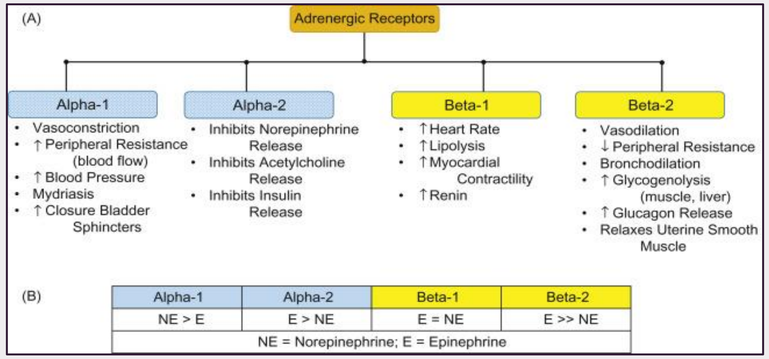

Fig 1. Location of adrenergic receptors and their actions (1)

References
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2) Campbell JP, Stocks GM. Management of hypotension with vasopressors at caesarean section under spinal anaesthesia e have we found the Holy Grail of obstetric anaesthesia? Anaesthesia 2018; 73: 3e6
3) Heesen M, Rijs K, Hilber N, et al. Ephedrine versus phenylephrine as a vasopressor for spinal anaesthesia- induced hypotension in parturients undergoing high-risk caesarean section: meta-analysis, meta-regression and trial sequential analysis. Int J Obstet Anesth 2019; 37: 16e28

Discussion

Haemodynamic physiology & vasopressor choice

- Neuraxial anaesthesia → ↓SVR and preload
- Healthy parturients maintain CO via ↑HR and stroke volume
- In severe LV dysfunction, **compensation is limited → vasopressor choice critical**

Why phenylephrine underperforms

- Pure α_1-agonist → ↑afterload
- Dilated LV → ↓stroke volume
- Reflex bradycardia → ↓CO (Fig 2 and 3)
- May worsen perfusion
- *Observed in this case: inadequate MAP despite escalation*

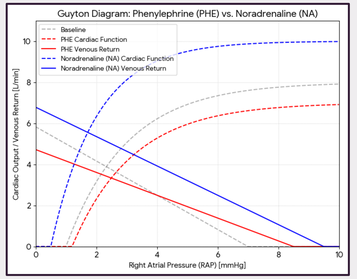

Fig 2. Vasopressor response in Normal heart

Why noradrenaline is preferable

- α_1 vasoconstriction restores MAP
- β_1 effect supports contractility and HR
- Better CO preservation
- Less reflex bradycardia
- Evidence: ↑CO, more stable HR, similar foetal outcomes (Fig 2 and 3)

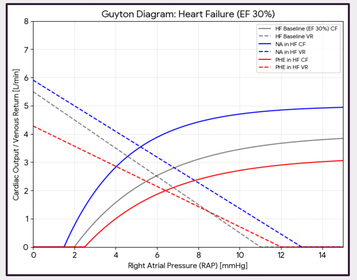

Fig 3. Vasopressor response with EF 30%

Clinical implications

- Individualise vasopressor choice in cardiac disease
- Avoid phenylephrine in severe LV dysfunction
- Noradrenaline provides **balanced haemodynamics**
- Use invasive monitoring + cautious neuraxial dosing
- Multidisciplinary planning essential

Conclusion

Norepinephrine provided superior haemodynamic stability compared with phenylephrine in this patient with severe LV systolic dysfunction. This case supports growing evidence that **norepinephrine should be considered first-line** for managing neuraxial-induced hypotension in parturients with cardiomyopathy.