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Case Report

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Important considerations in hemodynamic control during low dose combined spinal epidural anesthesia for caesarean section in a parturient with suprasystemic pulmonary hypertension and right ventricular ischaemia

Keywords: arterial blood pressure, combined spinal epidural anesthesia, anesthesia, arterial blood pressure, hospital, phenylephrine, norepinephrine

Abbreviations: SPAH, suprasystemic PAH; RVID, right ventricular ischemia and dysfunction; CSE, combined spinal epidural anesthesia; ABP, artery systolic pressure; PASP, pulmonary artery systolic pressure; TTE, Transthoracic echocardiography; GA, gestational age; RVI, right ventricular ischaemia; CVP, central venous pressure; PAH, pulmonary arterial hypertension; PE, phenylephrine; PAP, pulmonary arterial pressure; NE, norepinephrine

Volume 10 Issue 3 - 2018

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Received: June 14, 2018 | **Published:** June 18, 2018

Case report

Anesthetic management of parturients with suprasystemic PAH (SPAH) and right ventricular ischemia and dysfunction (RVID) for caesarean section is challenging because systemic arterial hypotension can precipitate refractory right heart failure risking maternal mortality. Cesarean section under a graded epidural anesthesia or low dose combined spinal epidural anesthesia (CSE) is recommended as the optimal mode of delivery[1] but it is uncertain which vasoconstrictor to use for maintaining systemic vascular resistance and blood pressure in patients with SPAH and RVID.

A 31-year-old primigravida, height 164cm, weight 59.2kg presented at 26weeks gestational age (GA) with worsening exertional breathlessness. On examination, she was dyspnec on mild exertion, with SpO_2 92% in air, heart rate 75/minute and ABP (ABP) of 99/56mmHg. Electrocardiogram showed ST and T wave changes in V3-4. Routine laboratory investigations were within normal limits. Transthoracic echocardiography (TTE) revealed a pulmonary artery systolic pressure (PASP) of 103mmHg), ASD secundum with a right to left shunt at rest, severe tricuspid regurgitation and D-shaped LV with a small cavity but normal systolic function. She improved clinically after receiving sildenafil 20mg thrice daily, nebulised iloprost 10mcg 6hourly, oxygen therapy and thromboprophylaxis with clexane 60mg sc 12hourly in hospital.

At 32 weeks GA, she was scheduled for elective cesarean section. Betamethasone was administered for fetal lung maturation. Subcutaneous Clexane was stopped for 24hours preoperatively and laboratory investigations were within normal limits. A low dose combined spinal epidural anesthesia (CSE) with invasive haemodynamic monitoring was planned. In the operating room, pulse oximeter, 5-lead ECG, and non-invasive blood pressure monitor were applied. A 16g cannula was inserted and a preload of 1000mls of 0.9% sodium chloride solution was started, taking meticulous care to avoid air bubbles in the intravenous line and syringes. The left brachial artery and the right internal jugular vein were cannulated and systemic ABP and central venous pressure (CVP) were monitored continuously. Her baseline vital signs were heart rate-86/min, systemic ABP -108/65mmHg, SpO_2–96% with 6L/min O_2 by face mask, respiratory rate-17/min and CVP–4mmHg. Norepinephrine infusion was primed ready for use following the CSE.

The patient was sat up and after antiseptic skin preparation, the epidural space was located at L3/L4interspace and a 27guage spinal needle was inserted through it into the subarachnoid space. 1ml of 0.75% hyperbaric bupivacaine plus 100mcg of morphine was injected slowly. An epidural catheter was then inserted up to 4cm in the epidural space and epidural boluses of 2.5 to 5ml of a mixture of 0.5% bupivacaine with fentanyl 2mcg/ml were administered every 5-10minutes to achieve a sensory block level of T6 using a total of 10mls. A synchronous infusion of norepinephrine commenced at 0.03mcg/kg/min was titrated to maintain systemic vascular tone and systemic ABP at/above baseline values.

She was then placed supine with left lateral tilt and 6L/min oxygen by face mask was administered perioperatively. A lower segment caesarean section was carried out uneventfully and a 2300g girl was delivered with Apgar scores of 6 and 8 at 1min and 5min respectively. Post-delivery, cabetocin 50mcg was injected slowly. Diastolic arterial pressure dropped to 50mmHg but increased to 65mmHg with an increase in noradrenaline infusion rate to 0.07mcg/kg/min. CVP increased to 13mmHg but dropped 11mmHg after about 15minutes. Total blood loss during surgery was 400mls and she received 1000mls of 0.9% sodium chloride solution intraoperatively. Postoperatively she was admitted to the intensive care unit and managed with oxygen therapy, inhaled iloprost and oral sildenafil. Clexane sc. was used for thromboprophylaxis. Her postoperative course was uneventful and she was discharged to the ward on the 5th postoperative day. She was

discharged home on the 10th postoperative day. Her PASP measured by right heart catheterization 6months post delivery was 118mmHg with a femoral systolic arterial BP of 106mmHg. There was no reversibility with Nitric Oxide administration.

Pregnancy in women with severe pulmonary arterial hypertension (PAH) (defined as mean pulmonary arterial pressure (PAP) of>45mmHg or peak systolic PAP>60mmHg)[2] complicated by right ventricular ischaemia (RVI)carries a high risk of maternal death.[1] Although both regional and general anesthetic techniques have been used successfully, regional anesthesia is now recommended.[3]

Thus, we used low spinal anaesthesia with graded epidural anesthesia avoiding systemic arterial hypotension, tachycardia, decreased ventricular contractility and increased right ventricular afterload. We used norepinephrine (NE) infusion rather than phenylephrine (PE) as PE has been shown to worsen right ventricular function in patients with PH.[4] Kwak et al.[5] showed that norepinephrine increased systolic blood pressure to a greater extent and increased pulmonary artery pressure to a lesser extent compared to phenylephrine. They recommended norepinephrine for the treatment of hypotension in patients with chronic pulmonary hypotension.[5] However, if refractory systemic hypotension develops, addition of vasopressin infusion which works through V1 receptor induced nitric oxide production to dilate vasoconstricted pulmonary arteries, may increase arterial blood pressure.[6]

In summary, we successfully managed a patient with suprasystemic pulmonary hypertension with right ventricular ischaemia and dysfunction with graded low dose CSE for elective caesarean section. Critical to successful management is careful and gradual extension of CSE block height with incremental epidural doses of bupivacaine and fentanyl and avoidance of systemic hypotension, tachycardia and increased right ventricular afterload with low dose norepinephrine infusion.

Acknowledgements

None.

Conflict of interest

The author declares no conflict of interest.

References

1. Kiery DG, Condliffe R, Webster V, et al. Improved survival in pregnancy and pulmonary hypertension using a multiprofessional approach. *BJOG*. 2010;117(5):565–574.
2. Strange G, Playford D, Stewart S, et al. Pulmonary hypertension: prevalence and mortality in the Armadale echocardiography cohort. *Heart*. 2012; 98(24):1805–1811.
3. Hemnes AR, Kiely DG, Cockrill BA, et al. Statement on pregnancy in pulmonary hypertension from the pulmonary vascular research institute. *Pulm Circ*. 2015;5(3):435–465.
4. Rich S, Gubin S, Hart K. The effects of phenylephrine on right ventricular performance in patients with pulmonary hypertension. *Chest*. 1990;98(5):1102–11 06.
5. Kwak YL, Lee CS, Park YH, et al. The effects of phenylephrine and norepinephrine in patients with chronic pulmonary hypertension. *Anaesthesia*. 2002;57(1):9–14.
6. Price LC, Forrest P, Sodhi V, et al. Use of vasopressin after Cesarean section in idiopathic pulmonary hypertension. *BJA*. 2007;99(4):552–555.