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Case report

Vasopressin infusion during combine spinal epidural anesthesia for cesarean section in a patient with severe mitral stenosis with pulmonary hypertension☆

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Abstract Presence of mitral stenosis deteriorates the already compromised cardiac status of a pregnant female. Decision between regional and general anesthesia can be crucial in such cases. Our patient a 20-year-old, and primigravida scheduled for emergency cesarean section due to acute fetal distress was a diagnosed case of severe mitral stenosis and pulmonary hypertension (48 mmHg). During antenatal she was on anticoagulants and was monitored regularly. In the operation theater she was monitored for heart rate, invasive blood pressure, central venous pressure, SpO_2 and urine output. We gave combined spinal epidural anesthesia (CSEA) at L3–4, using 7.5 mg 0.5% bupivacaine with 8% dextrose. Immediately after CSEA a continuous vasopressin infusion at 2–4 units/h was started, which took care of hypotension and pulmonary hypertension and it was stopped at the end of the surgery. The patient was stable hemodynamically intra and postoperatively. A baby of 2.2 kg was delivered with an APGAR score 7, 8, 9.

1. Introduction

Heart disease is found in 0.4–4.0% pregnant females, and the maternal mortality rate in these patients is 7.8% [1]. Mitral stenosis is the most common valvular lesion in a parturient especially in the under developed countries. Pregnancy is detrimental to cardiac function in a patient with mitral stenosis (MS) due to expanded blood volume, which increases the risk of pulmonary congestion and edema. The physiological tachycardia in pregnancy decreases the left ventricular filling time

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Table 1 ABG Findings.

Parameters	Preop mother ABG	Immediate post-op mother ABG	2 h post-op mother ABG	2 h post-op child ABG
pH	7.43	7.46	7.43	7.5
pCO_2 (mmHg)	32.2	27.7	31.9	18.2
HCO_3 (mmol/L)	20.7	19.5	20.9	14.4
PO_2 (mmHg) O_2@6 lits facemask	146	161	98.5	160
SpO_2	99.3	99.5	97.7	99.6
Base excess	−2.4	−2.6	−2.7	−5.3
Na +	132	129.5	131.2	131.8
K +	3.77	3.77	3.98	5.5
Ca ++	4.19	3.31	3.82	4.95
Cl−	99.4	98.4	101	99.4

and results in elevated left atrial and pulmonary arterial pressure. This can lead to edema and decreased onward flow of blood, resulting in hypotension. We present a case of a pregnant female with multiple valvular lesions, who underwent cesarean section under spinal anesthesia, and received continuous infusion of vasopressin for hemodynamic stability.

2. Case report

A 20-year-old, 49 kg primigravida, with rheumatic heart disease was scheduled for emergency cesarean section due to acute fetal distress. She had severe MS (0.9 cm^2), moderate mitral regurgitation (MR), mild aortic regurgitation and tricuspid regurgitation and pulmonary arterial hypertension (PAH) (48 mmHg), which was diagnosed 5 years back. On clinical examination, pre-operatively the pulse rate was 80/min, blood pressure 100/60 mmHg with complaints of dyspnoea, and she was catagorized as NYHA grade III. She had slurred speech, which was remnant of past cerebrovascular accident, with power in the right side 4/5 both limbs and left side 5/5 with bilateral plantar flexion. Her auscultatory findings were mid-diastolic murmur and pan-systolic murmur with bilateral clear chest.

The preoperative echocardiography showed dilated left atrium and right ventricular hypertrophy, with left ventricle ejection fraction of 66% and atrial fibrillation. On ultrasonography right sided pleural effusion was reported to be 600 ml. The CT scan report of head showed chronic infarct in the fronto-parietal region with diffuse cortical atrophy. She was taking metoprolol 75 mg/day, frusemide 20 mg + spironolactone 50 mg twice daily, digoxin 0.25 mg daily, diltiazem 60 mg three times in a day, heparin 6000 U s/c QID, and benzathine penicillin 1.2 MU i/m once in 21 days. Her medical history included a cerebral vascular attack with right sided hemiparesis, and aphasia in the 8th week of pregnancy. The neurological status improved gradually during pregnancy.

Patient when wheeled in the operation theater had a triple lumen 7.5 fr central venous line in situ. SpO_2, electrocardiogram, central venous pressure (CVP), urine output and temperature were monitored. Her right radial artery was cannulated using 22 g canula for monitoring the invasive BP. The blood investigations were within normal limits, and the last dose of unfractionated heparin was given 5 h back, hence ACT was checked bedside, which was 100 s. The patient was given combined spinal epidural anesthesia by single needle technique at L3–4 level in sitting position, using 7.5 mg 0.5% bupivacaine with 8% dextrose. Immediately then vasopressin infusion was begun @ 2 units/h and the patient was made supine using a wedge. This resulted in bilateral block till T5 dermatome. O_2 was given by facemask at 4 L/min. Intraoperatively the arterial BP was maintained between (b/w) 90–110 mmHg, HR b/w 70–90/min, SpO_2 98–100, and CVP 12–15 cm H_2O. Vasopressin was infused at the rate of 2–4 units/h in order to maintain BP within 20% of baseline. Surgery continued for 1 h following which vasopressin infusion was gradually stopped after 15 min. She was then shifted to the postanesthesia care unit. Intraop 500 ml of colloid was given and there was 100 ml urine output and about 600 ml blood loss. Post-op pain relief was achieved using epidural top up using ropivacaine 0.2% @ 7 ml/hr using patient controlled analgesia. Patient was kept in the hospital for 4 days. Baby at the time of birth weighed 2.2 kg with APGAR score 7, 8, 9. Their ABG findings have been shown in Table 1.

3. Discussion

Pregnant patient with heart disease is a unique challenge to the anesthesiologist and requires a thorough understanding of the impact of pregnancy and anesthesia on the hemodynamic response. There are also potential hazards of marked fluid shifts secondary to anesthesia technique and operative blood loss. Anesthetic considerations for mitral stenosis are to maintain a controlled heart rate, venous return and SVR, avoid aorto-caval compression, treat atrial fibrillation (AF) aggressively, try and maintain sinus rhythm, and prevent pain, hypoxemia, hypercarbia and acidosis as these can increase peripheral vascular resistance.

Epidural is the most preferred technique in a case of mild to moderate MS due to its propensity to cause gradual hemodynamic fluctuations [2] but takes longer time to act. General anesthesia is considered anesthesia of choice for cardiac patients, but causes severe hemodynamic fluctuations during intubation, incision and extubation. Opioids are avoided due to risk of neonatal respiratory depression, N_2O as inhalational analgesic exaggerates the PAH. Secondary PAH has a reported 60% perinatal mortality and any parturient with this condition should be regarded as critically ill [3]. Bilateral transversus abdominis plane block for pain relief is not an alternative during emergency. Inhalational anesthetics lead to hypotension and changes in the heart rate. Moreover general anesthesia

has been seen to cause sixteen times greater mortality in obstetric cases in comparison with regional anesthesia [4].

Spinal anesthesia is fast to perform and act, but leads to sudden hemodynamic compromises in the form of hypotension and tachycardia. In patients with pulmonary hypertension, a reduction in systemic blood pressure and coronary perfusion pressure can precipitate acute cardiovascular decompensation resulting in cardiac arrest. IV administration of conventional vasopressors to treat hypotension during spinal anesthesia could potentially increase pulmonary vascular resistance precipitating acute cor pulmonale.

Considering the above mentioned advantages and disadvantages, we chose to give spinal anesthesia to this patient, using infusion of vasopressin preemptively to limit hypotension.

Vasopressin is secreted from the posterior pituitary in response to reduced plasma volume and/or increased serum osmolality. It is also released, along with other stress hormones, during general and regional anesthesia. Vasopressin increases systemic vascular resistance by binding to V1 receptors but, experimentally, it leads to pulmonary vasodilatation, most likely as a result of stimulation of endothelial nitric oxide release. Additionally, by affecting resistance vessels to a much larger degree than capacitance vessels, vasopressin decreases venous capacitance less than sympathetic agonists [5].

Case reports have been documented in the past, where vasopressin has been given to the patients for the treatment of post-spinal hypotension after cesarean section in idiopathic pulmonary arterial hypertension [6]. In our case IV infusion of vasopressin was associated with hemodynamic stability during cesarean section without evidence of any untoward effects on the mother as well as the child.

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Nil.

Conflict of interest

The authors declare that there is no conflict of interest in this article.

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