

Epidural volume extension for caesarean section in a patient with severe pulmonary stenosis and moderate tricuspid regurgitation

Sir,

Various anaesthetic techniques used for caesarean section and cardiocirculatory changes associated with pregnancy result in significant haemodynamic changes that can lead to increased morbidity and mortality in parturients with cardiac diseases.

A 23-year-old, 60-kg second gravida parturient who was a known case of congenital acyanotic heart disease was referred to obstetric anaesthesia services at 37 weeks 6 days of gestation for assessment before elective caesarean section. She gave history of dyspnoea of New York Heart Association (NYHA) class II after 24th week of gestation. In previous pregnancy too, she had a history of exertional dyspnoea and palpitation during the third trimester of pregnancy. Previous caesarean section was performed under graded epidural anaesthesia and was uneventful except for pain sensation during the delivery of the baby. Echocardiography was done at 18th week of gestation which showed moderate pulmonary stenosis and no other anomaly. Repeat echocardiography at 37 weeks of gestation revealed severe pulmonary stenosis (peak gradient across valve of 66 mmHg), moderate tricuspid regurgitation (maximum pressure gradient of 61.54 mmHg, regurgitant jet area 7 cm²) and right ventricular dilatation (basal internal diameter of 54 mm) with normal left ventricular systolic function. At this time, the patient had dyspnoea of NYHA class III. There was no other positive finding, and haematological and serial fetal ultrasounds were within normal limits.

In the operating room, heart rate was 90/min, blood pressure was 146/88 mmHg and oxygen saturation on room air was 96%. Intravenous Ringer's lactate was started, and left radial artery cannulation was done under local anaesthesia. Anaesthesia was planned with combined spinal epidural (CSE) technique with epidural volume extension. The patient was co-loaded with 300 mL of Ringer's lactate, and

CSE (18G/27G) was inserted in L3–L4 intervertebral space. About 3 mg of bupivacaine 0.5% heavy with fentanyl 25 µg making a total volume of 1.1 mL was given intrathecally, and epidural catheter was fixed at 9 cm at skin. A 15° wedge was given for left uterine displacement after making the patient supine. After 5 min of intrathecal injection of local anaesthetic, sensory level to pinprick was achieved up to T10 level. Epidural volume extension was then given with 10 mL of normal saline in the epidural space to increase the level of block. After 10 min, sensory level of T6 on pinprick and motor blockage of Bromage score 3 were achieved. The surgery was started, and after the delivery of the baby, 10 units of oxytocin were started in infusion. The total duration of surgery was 25 min. Intraoperative period was uneventful with adequate muscle relaxation, and there was blood loss of approximately 300 mL. About 1200 mL of fluid was given intraoperatively, and there was no requirement of vasopressors as the patient was haemodynamically stable throughout the course with lowest recorded blood pressure of 110/70 mmHg. Postoperative analgesia was given with epidural infusion of 0.1% ropivacaine with 2 µg/mL of fentanyl at a rate of 5 mL/h for 2 days. She remained in the postanesthesia care unit for observation overnight. She was discharged home, in good condition, on the fourth day after surgery.

Pulmonary stenosis accounts for 10%–12% of congenital heart disease in adults, and there is a high probability of survival to child-bearing age.^[1] Women with pulmonary stenosis may remain asymptomatic and undiagnosed unless the lesion is severe and pregnancy may precipitate right heart failure, atrial arrhythmias or tricuspid regurgitation.^[2] The goals of anaesthetic management in pulmonary stenosis are maintenance of right ventricular preload, left ventricular afterload, right ventricular contractility and avoidance of increase in pulmonary vascular resistance.^[3] Morbidity and mortality in a pregnant patient with underlying cardiac disease correlate strongly with functional status; NYHA classes III and IV are considered as high-risk factors for maternal mortality (5%–30%).^[4,5]

No anaesthetic technique is ideal in these types of patients, and both general and regional anaesthesia have their own limitations. Regional anaesthesia in these cases avoids hazards related to the management of a difficult airway, haemodynamic responses associated with laryngoscopy and adverse effects of

anaesthetic agents on haemodynamics and neonate. A major concern in regional anaesthesia is the decrease in preload. As the right ventricle in these patients is volume-dependent, assessment of fluid status before regional anaesthesia is of utmost importance. We relied on clinical parameters and ultrasonographic assessment of the inferior vena cava for the same. Various techniques of regional anaesthesia have been tried to decrease the haemodynamic changes. CSE with small volume of spinal and graded epidural have been tried with varied success. Epidural volume extension has not been used for severe valvular diseases in parturients. We were able to achieve a higher level of block with low dose of local anaesthetic with little haemodynamic changes by this technique which was the requirement in this patient.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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