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A challenging case of a successful outcome of cesarean section with combined spinal–epidural technique in a parturient with Eisenmenger syndrome

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Abstract

Background: Eisenmenger syndrome belongs to the 0.4–4.1% (incidence) rarely encountered congenital cardiac lesions in pregnancy. Management of a pregnant patient with Eisenmenger syndrome is a challenging task for the anesthesiologist.

Case presentation: Here, we report the successful outcome with the use of low-dose sequential combined spinal–epidural (CSE) anesthesia in a patient with Eisenmenger syndrome posted for cesarean section. Low-dose sequential CSE anesthesia was adequate for the performance of cesarean section with minimal hemodynamic changes and good fetal outcome.

Conclusion: Low-dose sequential CSE can be a safe alternative to achieve good anesthesia with hemodynamic stability in such case.

Keywords: Cesarean section, Combined spinal–epidural anesthesia, Eisenmenger syndrome, Pregnancy

Background

The prevalence of heart disease in pregnancy has remained relatively constant over the last several decades; the reported incidence is between 0.4 and 4.1% (Chestnut 2004). Eisenmenger syndrome is characterized by elevated pulmonary vascular resistance and right-to-left shunting of blood through a systemic-to-pulmonary circulation connection (Vongpatanasin et al. 1998). Management of a pregnant patient with Eisenmenger syndrome is a challenging task for the anesthesiologist, dealing with the hemodynamic response to the patient's cardiac problem. Here, we report a successful anesthetic management of a parturient with Eisenmenger syndrome posted for elective cesarean section.

Case presentation

A 24-year-old primigravida with Eisenmenger syndrome presented to the obstetric and gynecological department, MB hospital, of our institute; she had 30 weeks amenorrhea with a sporadic history of dyspnea, and the dyspnea progressively increased in the last 15 days. On preanesthetic examination, her weight and height were 34 kg and 137.5 cm, respectively. Her PR was 82/min, BP 130/80 mmHg, SpO_2 78% on room air, and RR 26/min. On auscultation, normal S1 and S2 with ejection systolic murmur were present and bilateral air entry over the lung field was equal. Her Mallampati grading was grade II with adequate neck movement and mouth opening. Her blood investigations were hemoglobin 10.6 g/dl, platelet count 64,000/mm^3, PT/INR 22.2 s/2.05, and total leukocyte count $14.01 \times 10^3/mm^3$. Serum biochemistry and renal and liver function tests were within the normal limit. ECG showed right atrial enlargement and right ventricular hypertrophy. Echocardiography revealed a

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non-restrictive perimembranous ventricular septal defect (VSD) with a size of 32 mm with bidirectional shunt, severe MR, severe TR, and moderate PR. The ultrasonography finding was suggestive of a single viable intrauterine fetus of 29 weeks and 6 days duration and in cephalic presentation with central placenta previa with likely acute abruption. Due to raised PT/INR and low platelet counts, the patient was advised to have vitamin K i.m. injection, to have platelet transfusion, and to arrange for 2 units of random donor platelet (RDP) on the day of surgery. The patient was admitted to the ICU for further monitoring.

Continuous vitals monitoring and serial ultrasonography were done so that the pregnancy could reach up to 34 weeks. We optimized and monitored this case from 30 weeks of gestation (at the time of admission), but at 32 weeks during optimization, the patient's ultrasonography showed retroplacental hemorrhage. Hence, the patient was taken to an emergency operation theater for termination of pregnancy at 32 weeks to manage this case. Her recent hemoglobin was 10.8 g/dl, PT/INR 17.5 s/1.62, and platelet count 110,000/mm^3. ECG, non-invasive BP, and pulse oximetry apparatus were attached. Heart rate was 86 beats per min, BP was 128/79 mmHg, and SpO_2 was 72% on room air. Oxygen supplementation was given via venti mask at 5 L/min, and then SpO_2 increased up to 96%. Left radial artery and right internal jugular vein cannulations were done to measure invasive blood pressure and central venous pressure. The patient was placed in the left lateral position, and a 20-G epidural catheter was inserted in the L2-L3 space using an 18-G Tuohy needle with all aseptic precautions. Ropivacaine 0.5% (0.5 ml) and fentanyl (25 μg) were given intrathecally in the L3-L4 subarachnoid space via a 25-G Quincke needle. The patient was subsequently placed in the supine position. An epidural bolus of 3 ml ropivacaine 0.5% was given, and then incremental doses of ropivacaine were given via the epidural catheter with a 2-min time interval (total dose 10 ml) (Fig. 1). A T8 level (checked by pin prick method) was achieved after 8 min, and T4 level was achieved after 18 min of the first epidural dose. Her vitals were PR 91/min, Invasive BP 98/72 mmHg, and SpO_2 96%, and surgery was started. A prophylactic phenylephrine infusion was started at 20 μg/min before skin incision. Vitals remained stable perioperatively. She received a total of 1000 ml of Hartmann's solution, given as a slow intravenous infusion throughout the surgery, and her CVP was maintained between 12 and 15 cm H_2O. A very low birth weight 1200-g baby boy was delivered. The APGAR score was 8 and 9 at 1 min and 5 min, respectively. The uterus contracted well, so injection of oxytocin was avoided. Postoperatively, the patient was transferred to the ICU and her vitals were monitored for further 24 h in the ICU. The epidural catheter was removed after 48 h postoperatively. After 7 days, the patient was comfortable and she was discharged.

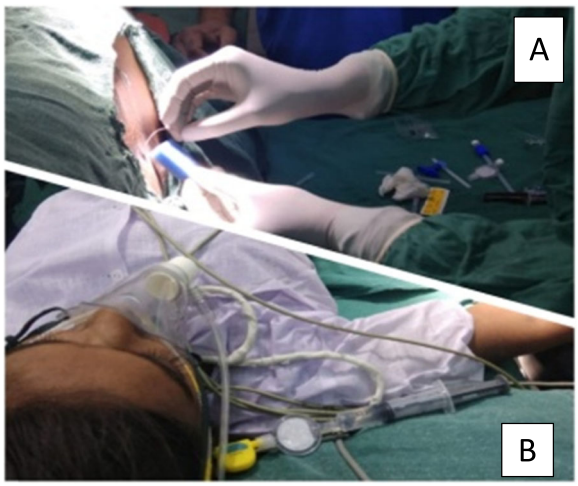

Fig. 1 a Insertion of epidural catheter in the left lateral position. **b** Syringe attached to the epidural catheter with filter for incremental dose in the supine position

Discussion

Eisenmenger syndrome is a complex combination of cardiovascular abnormalities. It consists of pulmonary hypertension, a right-to-left extra cardiac shunt, and arterial hypoxemia (Kuczhowski 2004). The pathophysiology of Eisenmenger syndrome is described as a chronic, uncorrected right-to-left shunt and leads to right ventricular hypertrophy (RVH), elevated pulmonary artery pressure, and right ventricular (RV) dysfunction. The primary lesion may be either an ASD, VSD, or PDA. When pulmonary artery pressure exceeds the level of systemic pressure, reversal of shunt flow occurs (Biswas et al. 2003).

Pregnancy is not well tolerated by patients with this condition. When pregnancy occurs in women with Eisenmenger syndrome, medical termination is considered safer than any mode of delivery (Biswas et al. 2003). Thus, the anesthetic management of pregnancy in such a patient is primarily based on the know-how of physiological modifications that appear throughout pregnancy, evaluation of the current cardiovascular status, and a detailed know-how of the current pathophysiology of pregnancy. Consequently, the anesthetic consideration should be targeted on limiting the hemodynamic modifications that would increase left shunting. Decrease in systemic vascular resistance (SVR), decrease in venous return, tachycardia, and myocardial depression must be avoided.

General anesthesia has been used for cesarean section in these patients, and it offered the benefit of better oxygenation but with the attended risk of adverse responses

associated with laryngoscopy and difficult intubation (Solanki et al. 2010).

Spinal anesthesia causes sympathetic blockade and may reduce SVR; for this reason, single-shot anesthesia is not encouraged in such patient. A steadily titrated dose of local anesthetic mixed with epidural opioids is required because it keeps away from the unexpected fall in SVR (Chohan et al. 2006).

Invasive vital sign and central venous pressure (CVP) monitoring were performed to encourage early recognition of vital sign changes and to maintain right ventricular filling pressures, respectively. As the right ventricle is primarily in danger of dysfunction in such patient, CVP monitoring is really helpful (Solanki et al. 2011).

Although epidural anesthesia is given in a patient with an INR of less than or equal to 1.5, but on the basis of benefits versus risks of epidural anesthesia over general anesthesia and INR of 1.6 with vitamin K injection, we choose to do a sequential CSE technique with low-level block with further extension of the block using the epidural catheter in this case. This technique has shown to produce better analgesia and muscle relaxation and is associated with decreased total drug usage and less hypotension when compared to single-shot epidural anesthesia for cesarean section (Hamlyn et al. 2005). Further, we used a very small dose of ropivacaine (0.5% of 0.5 ml) intrathecally in order to minimize hypotension. After careful induction, we administered a prophylactic infusion of phenylephrine to maintain the preload and SVR.

Conclusion

Pregnant patients with Eisenmenger syndrome require special care while undergoing cesarean section, directed towards ameliorating their preoperative status and successful outcome with low-dose sequential combined spinal–epidural technique.

Abbreviations

PR: Pulse rate; BP: Blood pressure; RR: Respiratory rate; SpO_2: Saturation of oxygen; PT/INR: Prothrombin time/international normalized ratio; ECG: Electrocardiogram; USD: Ultrasound; RDP: Random donor platelets; G: Gauze; CVP: Central venous pressure; CSE: Combined spinal–epidural

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Authors' contributions

RKG is the primary author (wrote most of the manuscript or drafted the manuscript), DV provided revisions to the scientific content of the manuscript, and LKR is the advisor or provided grammatical revisions to the manuscript. All authors read and approved the final case report (manuscript).

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Consent for publication

Written informed consent for the publication of this case report was obtained from the patient.

Competing interests

The authors declare that they have no competing interests.

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