



Anesthesia Management for Cesarean Section in a Twin Pregnant with Severe Mitral Stenosis, Pulmonary Hypertension and Placenta Accrete

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Abstract

Maternal mortality rises up to 15% in patients with Mitral Stenosis (MS) complicated with Pulmonary Hypertension (PH). The cardiac output in a twin pregnancy is known to be 15% higher than singleton pregnancy. Placenta Accrete (PA) may increase maternal mortality and morbidity because of the risk of massive hemorrhage. Perioperative management of these patients requires a multidisciplinary approach with careful planning regarding appropriate anesthetic technique, intraoperative bleeding and postoperative care. We present a case of a twin pregnancy in a patient with MS and PH that was complicated by PA.

Keywords: Twin pregnancy; Placenta accrete; Mitral stenosis; Pulmonary hypertension

Introduction

Clinically significant cardiac disease accompanying pregnancy can cause serious maternal and fetal complications. Mitral Stenosis (MS) is the most frequently seen valvular heart disease during pregnancy [1,2]. The cardiovascular hemodynamics extensively change during pregnancy because of high-flow, low-resistance state changes [2]. Unsurprisingly, these changes are poorly tolerated in twin pregnancies with MS due to restricted left ventricular inflow and increased left atrial and pulmonary pressures.

Placenta Accrete (PA) may further increase maternal mortality and morbidity risks in MS patients with twin pregnancies because of the risk of massive hemorrhage and the resultant decrease in intravascular volume and cardiac output [3].

In this case report, we present our anesthesia management in a twin pregnant patient with MS, Pulmonary Hypertension (PH) and PA for caesarean section.

Case Presentation

A 36-years-old multigravida parturient with a dichorionic diamniotic pregnancy at 24-weeks' gestation was presented to the anesthetic department for caesarean section with a diagnosis of severe MS, PH and PA. She was diagnosed with PA at 20 weeks' gestation and rheumatic heart disease at 23 weeks' gestation. Although she has shortness of breath for 10 years, she has not had cardiac problems in the previous 2 pregnancies. However, she experienced palpitations and dyspnea at 23 weeks' gestation, so she was referred to the university hospital.

The patient's management was discussed by a multidisciplinary team including obstetricians, anesthesiologists, and cardiologists. The team proposed an elective caesarean section and hysterectomy at the 24 weeks' pregnancy, considering that maternal and fetal mortality would increase due to increased cardiac workload in twin pregnancy, the severity of cardiac pathology, and PA.

In the preoperative physical examination, she had mild tachypnea, dyspnea and pedal edema. No rales and rhonchi, but a systolic murmur (grade 2/6) was heard with auscultation of the lungs bilaterally. The Electrocardiogram (ECG) showed a sinus rhythm of 112 beats.min⁻¹. The transthoracic echocardiography revealed severe MS with a mitral valve area of 1 cm², ¼ mitral regurgitation, ¾ tricuspid regurgitation, and PH with a systolic pulmonary artery pressure of 88 mmHg. The left atrium was dilated and the left ventricular ejection fraction was 65%. The laboratory test results showed a normal hemostatic profile (hemoglobin 10.7 g/dL, platelets 296 × 10⁹/L, Prothrombin Time (PT) 9.4 sec and activated Partial Thromboplastin Time (aPTT) 31.2 sec).

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She was admitted to the coronary Intensive Care Unit (ICU) and treated with β -blocker (metoprolol) and diuretic (furosemide) for cardiac stability.

General anesthesia was planned for the cesarean section. On the next day, the patient was transferred to the operation room. Standard monitoring included the peripheral Oxygen Saturation (SaO₂: 95%), non-invasive blood pressure, ECG and body temperature. An invasive arterial line was placed under local anesthesia. The patient's initial systemic arterial blood pressure was 110/70 mmHg, and heart rate was 85 beats/min. Anesthesia was induced by 250 mg pentothal and 100 mcg fentanyl, and maintained with 1% to 1.5% sevoflurane and 50% oxygen in air mixture. Neuromuscular relaxation was provided by 40 mg rocuronium. Following the intubation, central venous catheterization was applied through right internal jugular vein and the initial central venous pressure was 13 mmHg.

The placenta was found to invade the bladder prior to uterine incision. The bladder was ruptured during the surgery to remove the placenta and repaired by the urologic surgeons after babies' delivery. The first female twin was delivered with an Apgar score of 0 at the 1st and 5th minutes. The second female twin was delivered with an Apgar score of 3, 5, 7 at the 1st, 5th, 10th minutes, respectively, and intubated immediately after delivery. Following the babies' delivery, 5 IU oxytocin diluted with 10 ml 0.9% of saline was administered no faster than 30 sec and followed by an oxytocin infusion at a rate of 250 ml/h (10 IU oxytocin+1000 ml 0.9% saline).

During the hysterectomy, the patient experienced transient hypotensive episodes due to extensive blood loss. To compensate for blood, lose and maintain the hemodynamic, the fluid and blood products were infused rapidly. Dopamine was administered to prevent low Mean Artery Pressure (MAP) by titrating at 5 μ g/kg/min to 10 μ g/kg/min dopamine doses to maintain MAP higher than 65 mmHg. A total of 4,500 ml crystalloid and a 1,000 ml colloid were given to restore the intravascular volume. Seven units of packed red cells, 4 units of Fresh Frozen Plasma (FFP), 1 unit platelet concentrate, and 8 units of cryoprecipitate were transfused intraoperatively. The surgery lasted at 4 h and the estimated blood loss was around 5,000 ml.

Intraoperative PT, aPTT, fibrinogen and D-dimer levels were 15.7 sec, 23.1 sec, 121.3 mg/dl, and 1.62 (normally 0-0.5), respectively. One (1) g of tranexamic acid infusion was started after babies' delivery in addition to eight units of cryoprecipitate. We could not use cell salvage because of its unavailability at our institute.

As hemostasis was achieved and the patient was hemodynamically stable, dopamine was discontinued at the end of the surgery. Two mg/kg tramadol and 1 gr paracetamol were administered intravenously for the postoperative pain.

She was extubated and transferred to the ICU in the stable condition. Postoperative care was unremarkable. She was observed for 24 h with continuous monitorization in the ICU.

Discussion

Pregnancy places a high physiologic demand on the cardiovascular system. During pregnancy, systolic blood pressure and heart rate rise slightly. While the Cardiac Output (CO) increases by 50% during a singleton pregnancy, it is 15% higher throughout a twin pregnancy [4]. MS is the most frequently encountered valve lesion in pregnancy and commonly leads to PH [5]. The mortality risk is at the highest in the early postpartum period and maternal mortality rate rises up to

16% to 30% in women with PH [6,7].

Our patient had a PA, which significantly complicated the management of anesthesia. The care for such pregnancies requires a multidisciplinary team including obstetricians, anesthesiologists, and cardiologists in an expert center [8]. In this case, the patient was referred to the university hospital at 24 weeks' gestation because of invasive placenta accrete and rheumatic heart disease symptoms.

As described by Moore [9], five hemodynamic factors (preload, pulmonary vascular resistance, systemic vascular resistance, heart rate, and myocardial contractility) are related to patient's cardiac status and can be managed by manipulating the anesthetic technique or by the use of volumes and specific drugs. In this case, invasive arterial and central venous catheterization was applied for hemodynamic monitoring [10,11]. We didn't monitor CO, pulmonary and systemic vascular resistance, as the cardiovascular and respiratory status were stable in the supine position.

General anesthesia is known to depress cardiac contractility, increase pulmonary vascular resistance via positive-pressure ventilation, and increase pulmonary arterial pressure during laryngoscopy and intubation [12]. However, these results should be interpreted carefully, as a selection bias may be shown toward the sicker parturient receiving general anesthesia. In fact, regional anesthesia is highly recommended rather than general anesthesia for pregnant women with cardiac disease [8]. However, the choice of the anesthetic technique should be individualized according to the cardiovascular status and accompanying anomalies of the patient [10]. In this case, general anesthesia was chosen because of the long surgery time and perioperative hemorrhage expectations due to invasive PA. Pathologic placentas prolong surgery, lead to massive transfusion requirement, and significantly increase morbidity and mortality rate [13].

The laryngoscopy and intubation can stimulate the sympathetic system and lead to increased heart rate and blood pressure. We used 100 μ g fentanyl at anesthesia induction to abolish hemodynamic discrepancy during the laryngoscopy and the surgery. As stated in the case presentation section, Apgar score of the second female twin was 3, 5, 7 at the 1st, 5th, 10th minutes, respectively. Low Apgar scores might be related with the early gestational age and use of fentanyl at induction.

Other hemodynamic goals are the maintenance of normal to high preload, afterload and contractility. Massive hemorrhage and transient hypotensive periods were experienced because of PA during surgery. These periods were corrected with rapid fluid replacements and blood transfusions conducted by direct measurements of anthropometric and hematological parameters. In the case of hemodynamic restoration failure despite the volume therapy, dopamine was added to restore the blood pressure during these periods. FFP was given empirically (6:4:1) in the case of massive hemorrhage and to avoid dilution coagulopathy [14]. Fibrinogen <200 mg/dl at the time of hemorrhage has a 100% positive predictive value of severe hemorrhage [15]. Measured intraoperative fibrinogen level was 121.3 mg/dl and 8 units of cryoprecipitate were infused to correct hypofibrinogenemia.

Because of the high morbidity and mortality risks, the patients should be followed in the ICU during the first 24 h of puerperium and early postpartum period. Our patient was transferred to the ICU postoperatively, the next day she was sent to the cardiology

department and discharged to home after 8 days.

Therefore, anesthesia management for cesarean section in a twin pregnancy with severe MS, PH and PA should begin with preoperative assessment that needs to continue through the surgery and the postpartum period. Choosing intraoperative suitable hemodynamic monitoring, tailoring the anesthetic technique, and optimizing cardiovascular and respiratory functions using appropriate drugs and fluids are the crucial factors for the management of anesthesia during cesarean delivery in this patient population.

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