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CASE REPORT

Anesthesia Management During Emergency Cesarean Section of A Pregnant Woman with Severe Pulmonary Valve Disease and Previous Surgery Due to Tetralogy of Fallot: A Case Report

ABSTRACT

Tetralogy of Fallot (TOF) consists of four main components: pulmonary stenosis, ventricular septal defect, right ventricular hypertrophy, and dextroposition and overriding of the aorta. In this presentation, we aim to present the perioperative anesthetic approach to a cesarean section performed under emergency conditions due to preterm labor in a 32-year-old pregnant woman who had undergone surgery for tetralogy of Fallot in childhood. We learned that our patient had surgery at the age of four for tetralogy of Fallot. A previous echocardiogram showed tricuspid annular plane systolic excursion of 18 mm and third-degree tricuspid insufficiency. The patient had severe pulmonary valve insufficiency, with a maximum gradient across the pulmonary valve of 39 mmHg. Spinal anesthesia was administered using 12.5 mg of 0.5% heavy bupivacaine. In addition to standard monitoring, invasive blood pressure monitoring from the left radial artery and central venous pressure monitoring from the left cephalic vein were initiated immediately after spinal anesthesia. No hemodynamic disturbances or adverse events were observed in our patient. In summary, neuraxial analgesia and anesthesia can be safely applied to patients with repaired TOF, and it was the preferred technique for labor analgesia and surgical anesthesia in our patient.

Keywords: Cesarean section, congenital heart disease, tetralogy of Fallot, spinal anesthesia

Tetralogy of Fallot (TOF) consists of four main components: pulmonary stenosis, ventricular septal defect, right ventricular hypertrophy, and dextroposition and overriding of the aorta. Surgical repair includes the reconstruction of the right ventricular outflow tract and closure of the ventricular septal defect (VSD) (1). Today, the long-term survival rate is up to 95% for these patients, allowing them to reach gestational age. Corrected congenital heart defects and pregnancy-related cardiovascular changes may affect pregnancy outcomes (2). Pregnant women with a history of TOF surgery are at high risk for dysrhythmias, embolism, increased fetal loss, ventricular damage, and congenital fetal anomalies. The anesthesia method and monitoring approach should consider these risks (1).

We aim to present the perioperative anesthetic approach to a cesarean section performed under emergency conditions due to preterm labor in a patient who had undergone surgery for TOF in childhood.

CASE PRESENTATION

A 32-year-old patient was admitted to our center with preterm labor at 31 weeks of gestation. We learned that the patient had undergone surgery for tetralogy of Fallot at the age of four. A previous electrocardiogram showed sinus rhythm and right bundle branch block, and an echocardiogram (performed four months before the cesarean section) showed a 55% ejection fraction, tricuspid annular plane systolic excursion of 18 mm, dilated atria, and third-degree tricuspid insufficiency. The patient also had severe pulmonary valve insufficiency, with a maximum gradient across the pulmonary valve of 39 mmHg. All laboratory findings were within normal ranges.

The patient, who had oral intake approximately two hours before the cesarean section, was administered 50 mg of ranitidine and 10 mg of metoclopramide HCl. Spinal anesthesia was administered with 12.5 mg of 0.5% heavy bupivacaine (Bustesin®) at the L3-L4

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Table 1. Hemodynamic follow-up

	0. min	5. min	10. min	15. min	20.min	25. min	30.min	35. min	40. min	45. min
Invasive blood pressure	81/40	95/45	105/43	105/45	95/45	105/45	95/45	100/45	95/50	105/45
Heart rate	105	118	108	113	100	95	90	105	115	100
Right ventricule pressure		64/10					37/2			66/13

segment using an atraumatic spinal needle (Atraucan®). In addition to standard monitoring (noninvasive blood pressure, electrocardiography [leads II, V], and pulse oximetry), invasive blood pressure monitoring from the left radial artery and central venous pressure monitoring from the left cephalic vein (Cavafix®) were performed within two minutes. Surgical procedures were initiated while additional monitoring was being performed.

Since the initial noninvasive blood pressure measurement, taken before the administration of spinal anesthesia, was 70/32 mmHg (Table 1), a dobutamine infusion was started at 10 mcg/kg/min and reduced to 5 mcg/kg/min by the end of the case. Nineteen minutes and 38 seconds after the administration of spinal anesthesia, the first baby, a girl, was born alive with an APGAR score of 7 at the first minute and a body weight of 1,515 g. At 10 minutes and 50 seconds, the second baby, which had undergone a foeticide procedure due to tetralogy of Fallot, was delivered. Oxytocin (Synpitan fort®) 5 IU/L was given as a bolus over five minutes, followed by 10 IU/L as an infusion. No colloids, blood, or blood products were used. The patient was discharged from the hospital on the second day. After five months of follow-up, the patient is doing well, and cardiac magnetic resonance imaging results were unchanged from before the cesarean section.

DISCUSSION

The risk during pregnancy is mostly related to the success of previous open-heart surgery (3). Although patients with fully corrected TOF generally tolerate pregnancy well, dysrhythmias and thromboembolic events may complicate pregnancy (4). According to the World Health Organization's classification for pregnant women with heart disease, women with repaired TOF fall into group II (5). However, severe pulmonary insufficiency after TOF repair has been reported as a maternal risk factor during pregnancy (6). Our patient had previously undergone corrective surgery in infancy and developed severe pulmonary valve insufficiency afterward.

Significant maternal hemodynamic changes occur during pregnancy (7). Neuraxial anesthesia is the preferred method for cesarean sections in most pregnant women with cardiac disease (8). Spinal, epidural, or combined spinal-epidural anesthesia offers advantages, such as allowing the mother to remain awake during childbirth and avoiding the risks associated with general anesthesia and positive pressure ventilation. However, neuraxial anesthesia can cause hypotension by decreasing preload and systemic vascular resistance (SVR). Intrathecal local anesthesia can lead to cardiopulmonary decompensation due to a rapid drop in SVR, which occurs more quickly with spinal anesthesia than with epidural anesthesia. Bishop et al. (2) reported that if the anesthesiologist believes the patient can tolerate spinal anesthesia, they may prefer it along with arterial blood pressure monitoring and prophylactic phenylephrine infusion.

Combined spinal-epidural anesthesia is often used, with gradual reinforcement through low-dose spinal and epidural anesthesia to minimize hemodynamic instability (2). In our patient's case, we did not have sufficient time to wait for epidural anesthesia, so we used spinal anesthesia alone. Intrathecal opioids could have been added, but our priority was hemodynamic stability in this emergency situation.

In Bishop et al.'s (2) review on adult congenital heart disease and pregnancy, noninvasive blood pressure monitoring was performed for all patients who underwent planned vaginal delivery. However, there is no clear guidance for cases requiring emergency surgical deliveries. For our patient, who underwent emergency surgery, we monitored blood pressure invasively and assessed volume status by checking central venous pressure. Although this monitoring may seem excessive for a cesarean section, it was essential to detect hypotension in this complex case, monitor beat-to-beat blood pressure, and assess intravascular volume.

CONCLUSION

We know that careful monitoring, adequate analgesia, and cautious surgical anesthesia can be successfully applied to most patients with surgically repaired congenital heart disease. Surgically treated patients with TOF typically tolerate pregnancy, labor, and delivery well, though they may still face significant peripartum complications. Neuraxial analgesia and anesthesia can be safely applied to patients with repaired TOF, as it was in our case. Continuous monitoring should be considered during delivery in patients with a history of arrhythmias leading to hemodynamic instability. Patients with a history of congenital heart disease require meticulous fluid management, and central venous pressure monitoring should be performed.

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