CHINESE MEDICAL SCIENCES JOURNAL

CASE REPORT

Emergency Cesarean Delivery in a Parturient with Fontan Circulation and Reduced Platelets: A Case Report

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Key words: Fontan circulation; cesarean delivery; reduced platelet

Chin Med Sci J 2017; 32(3):204-205. DOI: 10.24920/J1001-9294.2017.029

NOWADAYS, Fontan circulation always refers to the hemodynamic status after total cavo-pulmonary connection, which was first created in the 1990s. There are two modern surgery forms,¹ one creating a channel within the right atrium and another making an extra-cardiac channel to connect inferior vena cava directly to the right pulmonary artery. Parturients with Fontan circulation are at increased risk of cardiac morbidity and thrombotic complications. We presented a parturient with reduced platelet status of unknown reason undergoing an emergent cesarean delivery.

CASE DESCRIPTION

A 27-year-old primipara, presented at 37⁺⁶w of gestation, was in labor and sent to our hospital. Emergency cesarean section was scheduled with obstetric indications. She was born with atrial and ventricular septal defect, right heart dysplasia and tricuspid atresia. Seven years earlier, she received an extra-cardiac conduit Fontan surgery that the superior vena cava was directly connected to the right pulmonary artery, and the inferior cavo-pulmonary connection was made by an extra-cardiac channel. Her New

York Heart Association (NYHA) status was class I before pregnancy, and declined to class II in the last few weeks of the pregnancy. She had been on aspirin 50 mg once a day for 7 years. After admission, echocardiography showed left ventricular ejection fraction 69%, Fontan circulation, ventricular and atrial septal defects, right heart dysplasia, and mild aortic regurgitation. Blood test showed a reduced platelet count at $73 \times 10^9/L$.

General anesthesia was selected. Before the surgery, peripheral/central intravenous catheters were inserted to facilitate the central vein pressure (CVP) and invasive arterial blood pressure (ABP) monitoring. CVP and ABP measured before anesthesia were 1.08 kPa (11 cmH₂O) and 143/70 mm Hg, respectively. A rapid-sequence induction with etomidate and rocuronium was performed, and then the surgery began immediately while intubating. Anesthesia was maintained with 2% sevoflurane and fraction of inspired oxygen (FiO₂) of 0.50. Tidal volume was set at 420 ml, and respiratory frequency at 14. Three minutes later, a healthy neonate was delivered, and intravenous fentanyl 75 µg and oxytocin 10 U were slowly given to the puerpera. Then her ABP dropped to 90/50 mm Hg, and CVP to 0.59 kPa (6 cmH₂O). After the patient was placed in Trendelenburg position and treated with 1000 ml fluid as fluid replacement, her CVP

returned to 1.37 kPa (14 cmH₂O), and ABP to 140/70 mm Hg. The indwelling catheter was pulled out soon after the surgery, and she was discharged on postoperative day seven.

DISCUSSION

This case requires anesthesiologists to have a thorough understanding of the complex Fontan physiology.² How to make quick decisions and take judicious management while dealing with emergency Fontan parturients with complicated blood coagulation status is also challenging. No evidence has shown that caesarian section is a better choice than vaginal delivery for well-tolerated pregnancy. Thus timing and the mode of delivery should follow obstetric indications.

She was maintained on aspirin because of the hypercoagulable state caused by stagnant blood flow and pregnancy. The reduced platelet status may be associated with the long-term use of aspirin. There were two main perioperative considerations related to the platelet status. First of all, decreased platelet count and aggregation rate lead to higher risk of bleeding, therefore, fresh frozen plasma 800 ml and apheresis platelets 1 U were prepared. Second, main anesthetic management consideration includes maintaining the preload and preventing the increase of pulmonary vascular resistance in order to keep hemodynamic values similar to baseline. Spinal anesthesia was precluded for the reason that it may bring down preload rapidly and produce substantial hemodynamic fluctuation, although neuraxial anesthesia preserves spontaneous ventilation that is proper for Fontan patients. The decreased platelet status left us no choice but general anesthesia.

As positive pressure ventilation is sometimes necessary in general anesthesia, management such as using lowest tidal volume and positive end expiratory pressure should be taken to minimize complications in parturients with Fontan circulation, for it often results in a decreased cardiac output and increased pulmonary vascular resistance.³ If positive end expiratory pressure is required for oxygenation, low levels under 0.59 kPa (6 cmH₂O) are highly recommended.⁴ Several other factors that can increase pulmonary vascular resistance, such as pain, hypothermia and hypoxia should also be avoided as much as possible.

Conflict of Interest Statement

The authors have no conflict of interest to disclose.

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