

Anesthetic Management of A Repeat Cesarean Section in A Parturient with Severe Peripartum Cardiomyopathy Requiring ECMO in A Previous Pregnancy: A Case Report

Hsiu-Pin Chen, MD; Wei-Che Sung, MD;
Yu-Ling Hui, MD, PhD; Chung-Kun Hui, MD

The number of pregnant women with cardiac disease is increasing with improvements in technology. In addition, more people are part of the national health insurance plan. However, there are few reports concerning the best method for anesthesia and mode of delivery in these high-risk patients. We report a 29-year-old woman scheduled for a planned caesarean section, who had a history of severe peripartum cardiomyopathy requiring extracorporeal membrane oxygenation in a previous pregnancy. The patient had regular prenatal care in our obstetric clinic. At 29 weeks' gestation, she developed severe dyspnea. A chest radiograph revealed bilateral pulmonary edema and 2-dimensional echocardiography showed a global hypokinesis and severe valve regurgitation with left ventricular ejection fraction of 41.2%. She had an emergency caesarean section and a cardiovascular surgeon was consulted to stand-by. Anesthesia was induced by ketamine 25 mg, midazolam 2.5 mg and rocuronium 50 mg for rapid intubation. The patient tolerated the procedure well and was extubated on postoperative day 1. She was discharged one week after surgery. Postoperatively, the patient was followed in the obstetric and cardiovascular surgery outpatient departments and at 5 months after surgery she was in good condition without any complaints. (*Chang Gung Med J 2011;34(6 Suppl):28-33*)

Key words: anesthesia, acute respiratory failure, peripartum cardiomyopathy, caesarean section

The number of pregnant women with heart disease is increasing with improvements in medical care. In addition, more people are part of the national health insurance plan. Information on the incidence and epidemiology of heart disease in pregnancy is highlighted in the United Kingdom Registry of High-risk Anaesthesia,⁽¹⁾ and in the Confidential Enquiries into Maternal Deaths in the United Kingdom.^(2,3) Cardiac disease is now the most common cause of indirect maternal deaths, as well as of maternal deaths overall.⁽³⁾ Some studies suggest that pregnant

women with cardiac disease may safely deliver by caesarean section under regional anesthesia, because hemodynamic stability can be maintained by titrated regional anesthesia, intravenous volume, and phenylephrine infusion with invasive monitoring.⁽⁴⁾

Peripartum cardiomyopathy (PPCM) is a rare form of dilated cardiomyopathy causing heart failure in women in late pregnancy or the early postpartum period. PPCM is rare during pregnancy, and 90% of the cases occur in the first two months of the postpartum period.⁽⁵⁾ It causes significant morbidity and

From the Department of Anesthesiology, Chang Gung Memorial Hospital at Linkou, Chang Gung University College of Medicine, Taoyuan, Taiwan.

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Correspondence to: Dr. Chung-Kun Hui, Department of Anesthesiology, Chang Gung Memorial Hospital at Linkou, 5, Fusing St., Gueishan Township, Taoyuan County 333, Taiwan (R.O.C.) Tel: 886-3-3281200 ext. 3624; Fax: 886-3-3281200 ext. 2787; E-mail: ckun@cgmh.org.tw

mortality in both mother and fetus; hence all clinicians and, in particular, acute care physicians, should be aware of this disease. The only way to avoid PPCM is to avoid further pregnancies.

Our high-risk patient had undergone extracorporeal membrane oxygenation life support (ECMO) during her last labor. At 29 weeks' gestation in the current pregnancy, she developed dyspnea and chest radiography showed bilateral pulmonary edema. Since she could not tolerate the pregnancy any longer, a caesarean section was done.

CASE REPORT

When this woman was 27 years old and at 32 weeks gestation in her first pregnancy, she was seen at our hospital with progressive shortness of breath. She had a history of acute lymphoblastic leukemia with complete remission after chemotherapy, but no history of cardiac disease. Cardiac Doppler revealed severe mitral regurgitation, moderate pulmonary hypertension, and poor left ventricular contractility with a left ventricular ejection fraction (LVEF) of 44%. Pulmonary edema was noted on chest radiography.

After admission, furosemide and morphine were administered before she had a cesarean section. She received epidural anesthesia with lidocaine and fentanyl administered under titration, and inotropic agents were required to maintain stable vital signs. A 1955 gm baby girl was born with Apgar scores of 7 and 9 at 1 and 5 minutes, respectively. After surgery, she was sent to the intensive care unit (ICU) for close monitoring, and was discharged after 8 days when her condition was stable. However, one week after discharge she again experienced shortness of breath which was relieved after administration of diuretics. At that time, dilated cardiomyopathy with moderate mitral regurgitation, moderate pulmonary hypertension, and an LVEF of 21% were revealed by echocardiography. PPCM was diagnosed.

Three months after delivery, she experienced dyspnea and cyanotic changes while at home. Echocardiography showed an LVEF of 25% and dilated cardiomyopathy. Emergency ECMO (V-A mode) was performed and an intra-aortic balloon pump (IABP) was inserted the next day. ECMO and the IABP were discontinued 10 days later when her condition was stable. After discharge, the patient was

followed in the cardiovascular surgery outpatient department. Her heart disease was controlled by digoxin and carvedilol.

The patient became pregnant one and a half years later when she was 29 years old. She received regular prenatal examinations at our hospital, and a caesarean section was planned. At 29 weeks' gestation, her dyspnea became more severe and she was admitted. Compared with her prenatal chest radiograph (Fig. 1), her admission chest radiograph revealed bilateral pulmonary edema (Fig. 2). Two-dimensional (2D) echocardiography revealed an LVEF of 41.2% with global hypokinesis, severe



Fig. 1 The prenatal chest radiograph is normal.

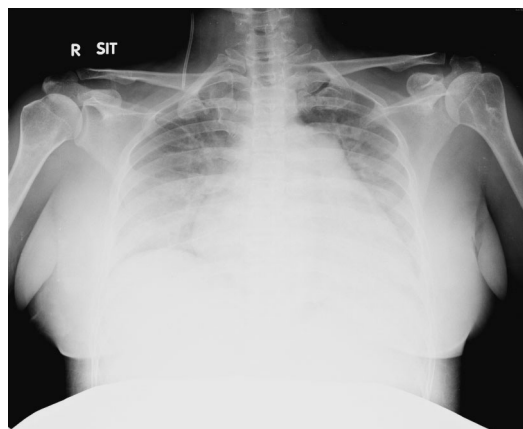


Fig. 2 The chest radiograph at 29 weeks' gestation shows bilateral pulmonary edema after a sudden onset of dyspnea.

mitral valve regurgitation, and minimal pericardial effusion without evidence of constriction or tamponade. An emergency cesarean section was done after all examination data were collected and a cardiovascular surgeon was consulted to stand-by in case immediate open heart surgery was required.

General anesthesia was planned because of impending respiratory failure and the possibility of open heart surgery. An arterial line was inserted before anesthesia induction for real-time monitoring of blood pressure. Patient was induced with ketamine 25 mg, midazolam 2.5 mg, and rocuronium 50 mg for rapid sequence induction, and an oral endotracheal tube was inserted without difficulty. Her blood pressure was maintained with a dopamine infusion and she received positive pressure ventilation during the course of the cesarean section. A 1280 gm boy was born with Apgar scores of 2 and 4 at 1 and 5 minutes, respectively. After the completion of surgery, the patient was sent to the ICU for close monitoring. Furosemide and morphine were used to treat the pulmonary edema. Extubation was performed without complications the next day as her breath sounds had improved and chest radiography (Fig. 3) showed a decrease in the pulmonary edema. The inotropic agents were discontinued two days after the cesarean section. She was discharged on the



Fig. 3 After furosemide and morphine administration, the pulmonary condition has improved.

6th postoperative day in stable condition. Postoperatively, the patient was followed in the obstetric and cardiovascular surgery outpatient departments and at 5 months after surgery she was in good condition without any complaints.

On the other hand, the baby was delivered with bradycardia and no spontaneous respirations initially. He was immediately intubated in the operating room and sent to the neonatal ICU for further management. Because of a significant heart murmur, echocardiography was done 2 days after birth, and showed a 3.6 mm patent ductus arteriosus (PDA) with a left to right shunt. Because of coagulopathy (platelet count of 103,000 with prolonged activated partial thromboplastin time), indomethacin was not indicated. PDA ligation was performed by a cardiovascular surgeon when he was 5 days old. Although a rotavirus infection and episodes of respiratory distress occurred during his ICU course, his clinical condition gradually improved. Since he had fair body weight gain, he was discharged home two and a half months after birth after his family was instructed on home care and feeding.

DISCUSSION

Peripartum cardiomyopathy is a rare disorder of unknown etiology that is characterized by acute onset of heart failure within 1 month before delivery to 5 months after delivery.^(6,7) When cardiomyopathy occurs late in pregnancy, early delivery of the fetus is recommended to reduce hemodynamic stress on the maternal heart. The mode of delivery is generally based on the obstetric indications.⁽⁸⁾ After optimization of the mother's condition, induction of vaginal delivery can be attempted in most cases in close cooperation with the consulting anesthesiologist.

The patient was advised not to become pregnant again. Because of her first pregnancy course, her family was warned that she might not be able to tolerate another pregnancy. However, since her first baby was a girl, her traditional Chinese family demanded a boy as an heir. They refused to terminate the pregnancy because the fetus was male. For high-risk patients, a planned caesarean section is having more advantage with adequate preparation and consultations.

Arguments against a caesarean delivery are the higher risks of infection, bleeding, and anesthetic

complications. However, a vaginal delivery may increase cardiovascular stress, even when optimal pain relief is administered.⁽⁹⁾ There are few reports discussing hemodynamic changes during vaginal delivery, especially during the second stage. This concern has not been a primary focus in previous reports discussing the mode of delivery in these high-risk patients.

Vasodilatation, a reduction in blood pressure, and the risk of a right to left shunt have been given as reasons for not using regional anesthesia in pregnant women with cardiac disease.⁽¹⁰⁾ Nevertheless, the reduction in systemic vascular resistance after induction of regional anesthesia can be countered by giving smaller doses of spinal anesthetic, hydration with crystalloids, and a concurrent infusion of phenylephrine.⁽¹¹⁾ Because of this, a planned caesarean section with regional anesthesia was considered as the method of choice for delivery.

However, acute pulmonary edema with dyspnea was noted in this patient as gestation progressed. An emergency caesarean section was then required. Because of impending respiratory failure, general anesthesia with intubation was planned. We chose midazolam and ketamine as induction drugs. Midazolam is a short-acting drug in the benzodiazepine class with a rapid onset of action, high effectiveness and low toxicity level. Ketamine has a wide range of effects, including analgesia, anesthesia, elevated blood pressure, and bronchodilation. A combination of intravenous ketamine with midazolam is reported to be safe and effective and to greatly reduce anxiety.⁽¹²⁾ Although general anesthesia may induce autonomic responses with hypotension or hypertension and tachycardia, these can be controlled with medications and with an arterial line to monitor blood pressure.

In addition to the emergency caesarean section, a cardiovascular surgeon was available to perform ECMO immediately in case of acute heart failure. Because of hemodynamic instability, we used a small dose of midazolam and ketamine for induction and rocuronium for rapid intubation. The patient tolerated it well and the operation was completed without complications.

It has been reported that 23% of women with sustained peripartum cardiomyopathy and normal left ventricular function develop cardiac dysfunction and 2% die during subsequent pregnancies. Among

women with persistent left ventricular dysfunction after peripartum cardiomyopathy, 54% develop cardiac dysfunction and 9% die in subsequent pregnancies.⁽¹³⁾ Thus, a woman with a history of peripartum cardiomyopathy should be aware of the risks involved if she wishes to conceive again.

Conclusion

Although pregnancy is contraindicated in patients with severe heart disease, with the cooperation and planning of a cardiologist, obstetrician, anesthesiologist, and cardiovascular surgeon, a well-prepared parturient can have a safe delivery.

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曾經使用葉克膜急救之孕婦，再次需要緊急剖腹生產的麻醉處理

陳秀屏 宋偉哲 許汝寧 許仲寬

我國因為醫學的進步及健保的保護下，有心臟病的婦女懷孕的機會大大增加。但是，很少醫學研究報告會提到和這些高危險婦女有關的麻醉與分娩方式。這名懷孕的 29 歲婦女於第一次的妊娠後，引發嚴重心肌病變並於術後使用葉克膜體外循環機 (ECMO) 維生，計畫進行剖腹生產。但是在第二次懷孕 29 周時，隨著妊娠周數增加，心臟衰竭併發了呼吸困難與急性肺水腫。因此經討論，緊急剖腹生產是必要的，也因為呼吸衰竭，於是我們計畫進行全身麻醉。同時照會心血管外科醫生在旁準備，以便剖腹生產中若須緊急進行心臟手術可以立即進行。我們使用 ketamine 25 mg、midazolam 2.5 mg、rocuronium 50 mg 順利的誘導及插入氣管內管，術中維持動脈壓維持在可接受之範圍。術後送往加護病房，於生產隔天順利拔掉氣管內管，病人於一星期後出院回家。於門診持續追蹤五個月，沒有不適之主訴。(長庚醫誌 2011;34(6 Suppl):28-33)

關鍵詞：麻醉，急性呼吸衰竭，妊娠期心肌病變，剖腹生產

長庚醫療財團法人林口長庚紀念醫院 麻醉部；長庚大學 醫學院

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通訊作者：許仲寬醫師，長庚醫療財團法人林口長庚紀念醫院 麻醉部。桃園縣333龜山鄉復興街5號。

Tel: (03)3281200轉3624; Fax: (03)3281200轉2787 E-mail: ckun@cgmh.org.tw