

## Delayed peripartum cardiomyopathy after emergency cesarean section

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Peripartum cardiomyopathy (PPCM) is a primary myocardial disease without any demonstrable cause and with onset in the last month of pregnancy or within six months of delivery [1]. Mortality is as high as 20 to 50% [2]. PPCM may suddenly occur when medical monitoring has been neglected and should be managed with great care by anesthesiologists and obstetricians.

A 40-year-old (weight 81.5 kg, height 157 cm) multigravida (1-0-1-1) was admitted at 34 weeks 1 day of gestation with a chief complaint of preterm labor. Her medical history included obesity and gestational diabetes mellitus in a previous pregnancy. At 32 weeks gestation, she developed gestational hypertension without other significant preeclampsia signs and symptoms. At the time of admission the patient had a blood pressure (BP) of 180/100 mmHg, heart rate (HR) of 106 beats/min and respiratory rate (RR) of 20 breaths/min. She was diagnosed with pregnancy-induced hypertension, preterm labor occurred so emergency cesarean section was decided. Physical examination yielded no specific findings. In blood tests hemoglobin was 14.5 g/dl, hematocrit 40.9%, and coagulation and electrolyte were within normal range, as were chest x-ray and electrocardiogram (ECG). Hence combined spinal-epidural anesthesia was planned.

The patient arrived in the operating room with premedication and antacids. ECG, non-invasive blood pressure and pulse oxymetry were monitored. Vital signs were BP 178/105 mmHg, HR 112 beats/min, RR 20 breaths/min and oxygen saturation 96%. Oxygen was administered via nasal prong at 2 L/min. Combined spinal epidural technique (Portex<sup>®</sup>, Smith Medical International Ltd, Kent, UK) with 7 mg of 0.5% heavy

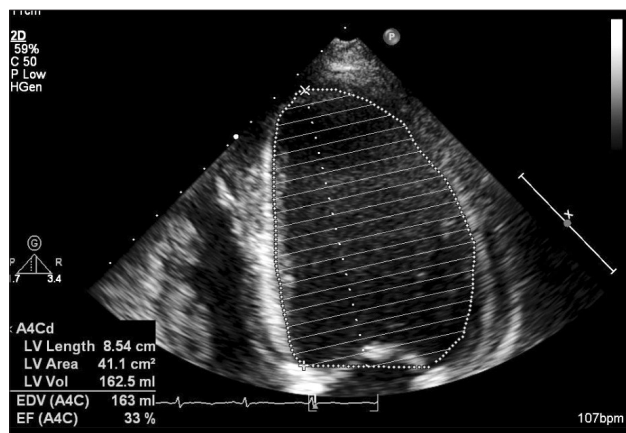
bupivacaine and 15 µg of fentanyl was done in left lateral decubitus position and midline approach at L3-4 interspace. Level of block was checked after 5 and 10 minutes and was found to be up to thoracic 6<sup>th</sup> and 4<sup>th</sup> segment respectively. Surgery proceeded without event and a healthy baby was delivered. Intravenous Carbetocin (Duratocin<sup>®</sup>, Ferring International Center, Switzerland) 100 µg and midazolam 2 mg were given after delivery. Total estimated blood loss was 700 ml. The patient received 2,000 ml of lactated Ringer's solution, and urine output was 200 ml. The operation lasted 65 minutes without adverse hemodynamic events.

Patient was transferred to the postanesthetic care unit and then, over an hour later, to general ward, with stable vital signs. On POD 2, the patient's general condition was good but as her BP was 160–180/90–110 mmHg, anti-hypertensive medication was given. She was supposed to be discharged on POD 4, but suddenly had chest pain and dyspnea, and oxygen saturation by pulse oxymetry became unstable as 81%. Accordingly, oxygen was administered via a reservoir mask, but oxygen saturation continued to be unstable. Immediately, endotracheal intubation and cardiopulmonary cerebral resuscitation were performed and the patient was transferred to the intensive care unit. On chest x-ray the patient had both pulmonary edema and cardiomegaly. Arterial blood gas analysis (FiO<sub>2</sub> 0.6) gave pH of 7.24, CO<sub>2</sub> of 50 mmHg, O<sub>2</sub> of 66 mmHg, bicarbonate of 22 mEq/L, base excess of – 6.0 mEq/L and oxygen saturation of 95%. Laboratory results at that time were B-type natriuretic peptide (BNP) 2,114 pg/ml and D-dimer 3.18 pg/ml; other laboratory tests were within the normal range. A computed tomography

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**Fig. 1.** A transthoracic echocardiography revealed a left ventricular ejection fraction of 33%, and severe left ventricular dysfunction with mild mitral regurgitation.

chest scan to test for possible pulmonary emboli revealed pulmonary congestion and cardiomegaly but no pulmonary emboli. A transthoracic echocardiography (TTE) revealed a left ventricular ejection fraction of 33%, and severe left ventricular dysfunction with mild mitral regurgitation (Fig. 1). Therefore, she was given dobutamine, heparin and furosemide under a diagnosis of PPCM with acute pulmonary edema. On POD 6, her vital signs were BP 150/95 mmHg, HR 105 beats/min, RR 20 breaths/min and oxygen saturation of 96–99%. As her symptoms had improved her endotracheal tube was removed. On POD 7, vital signs remained stable. Arterial blood gas analysis (FiO<sub>2</sub> 0.4) gave a pH of 7.48, CO<sub>2</sub> of 32.5 mmHg, O<sub>2</sub> of 139.7 mmHg, bicarbonate of 22.7 mEq/L, base excess of – 1.6 mEq/L and oxygen saturation of 97%. TTE done on the same day showed a left ventricular ejection fraction of 36%. Since left ventricular ejection fraction improved slightly compared with POD 4, the patient was transferred to a general ward. On POD 13 the patient was discharged without symptoms, and a follow-up examination was scheduled for 6 month later.

The clinical features of PPCM include symptoms of congestive heart failure and chest pain [1]. Signs can include hypertension, tachycardia, tachypnea, pulmonary rales, S 3 heart sound and pedal edema. Because these symptoms and signs overlap with many other conditions ranging from normal pregnancy to pulmonary thromboembolism, diagnosis is often delayed and the disorder is under-recognized. Echocardiography is the most important diagnostic method and also provides information on

the severity of peripartum cardiomyopathy and its prognosis [3]. Our patient did not complain of any particular symptoms until POD 3; symptoms such as dyspnea and chest pain occurred on POD 4 and then suddenly worsened. PPCM usually presents in the postpartum period when physiologic changes of pregnancy should be normalizing [4]. In most cases, PPCM was occurred during cesarean section or immediate postoperative period. However, our patient who developed PPCM on POD 4 could be regarded as a delayed type. Also, symptoms of PPCM overlap with many other condition and these were suddenly occurred and aggravated at any time. Therefore, PPCM should be evaluated early and exclude pulmonary thromboembolism when symptoms such as congestive heart failure occur in the postpartum period.

Risk factors include advanced maternal age, multiparity, multiple gestation, obesity, gestational hypertension, preeclampsia and black race [1]. The prognosis of PPCM is related to its presentation as well as to recovery of ventricular dysfunction [1]. The ejection fraction normalizes in about 50% of patients. However, a second pregnancy is usually not recommended, because PPCM recurs in more than 30% [5].

In conclusion, delayed PPCM can be occurred in the patients with advanced maternal age, obesity and gestational hypertension. Therefore, these patients should be provided with adequate preoperative optimization using a multidisciplinary approach, proper use of anesthetic technique, careful intra-operative monitoring as well as vigilant postoperative care.

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