

Peripartum cardiomyopathy (PPCM) : A case report and review of literatures

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Case Report

ABSTRACT

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Introduction: Peripartum cardiomyopathy (PPCM) is a disease characterized by an enlargement of the heart muscle wall. The disease occurs in the last month of pregnancy up to 5 months postpartum, with no previous history of heart disease. The etiology of the disease is unclear. Early recognition of this case can lead to decrease in morbidity and mortality.

Case: A 20-year-old woman came to the emergency unit with a shortness of breath. There is a history of give birth about 4 months ago. Physical examination shows a regular heart rhythm accompanied by rhonchi sound in the basal aspect of lung. In the M-mode analysis of ECG showed left ventricular systolic ejection function is decrease (56.5%) while the right ventricle is normal. In the hospital, patient get treated with diuretics, aldosterone antagonist, angiotensin II receptor blocker and fluid management. Patient gave good responded to the therapy regiment.

Discussion: The early clinical manifestations of PPCM are difficult to recognize. In the majority of patients, 78% of symptoms are found at 4 months after delivery, only 9% of patients show symptoms in the last month of pregnancy. Clinical symptoms include atypical chest pain, abdominal discomfort, signs of pulmonary edema, orthopnea and paroxysmal nocturnal dyspnea. In the management of patients with PPCM is almost similar to management in other congestive heart disease.

Pendahuluan: Kardiomiopati peripartum (PPCM) adalah penyakit yang ditandai dengan pembesaran dinding otot jantung. Penyakit ini terjadi pada bulan terakhir kehamilan hingga 5 bulan paska persalinan, tanpa riwayat penyakit jantung sebelumnya. Etiologi penyakit ini tidak jelas. Pengenalan dini dari kasus ini dapat menyebabkan penurunan morbiditas dan mortalitas.

Kasus: Seorang wanita berusia 20 tahun datang ke unit gawat darurat dengan napas pendek. Ada riwayat melahirkan sekitar 4 bulan yang lalu. Pemeriksaan fisik menunjukkan irama jantung yang teratur disertai dengan suara ronchi dalam aspek basal paru-paru. Dalam analisis M-mode dari ECG menunjukkan fungsi ejeksi sistolik ventrikel kiri menurun (56,5%) sementara ventrikel kanan normal. Di rumah sakit, pasien diobati dengan diuretik, antagonis aldosteron, bloker reseptor angiotensin II dan manajemen cairan. Pasien memberikan respon yang baik terhadap regimen terapi.

Diskusi: Manifestasi klinis awal PPCM sulit untuk dikenali. Pada sebagian besar pasien, 78% gejala ditemukan pada 4 bulan setelah melahirkan, hanya 9% pasien menunjukkan gejala pada bulan terakhir kehamilan. Gejala klinis termasuk nyeri dada atipikal, ketidaknyamanan perut, tanda-tanda edema paru, ortopnea dan dispnea nokturnal paroksismal. Dalam penatalaksanaan pasien dengan PPCM hampir mirip dengan manajemen pada penyakit jantung kongestif lainnya.

INTRODUCTION

Cardiomyopathy is a group of heart disorders caused by abnormalities of anatomical structures. This disorder is limited only to myocardium with unclear causes. There are two basic forms of known cardiomyopathy. The first is the primary form, where the dominance of cardiac myocardial muscle disorder with the cause is not known for sure. The second is a secondary form involving cardiac muscle disorders with pre-existing and identifiable systemic diseases, such as amyloidosis and the consumption of alcohol.¹

Peripartum cardiomyopathy (PPCM) is a disease characterized by an enlargement of the heart muscle wall. In PPCM there is dilatation of the heart chamber, especially the left ventricle without significant hypertrophy. This process decreased myocardial contractile function that lead to systolic function disorder.² The etiology of the disease is unclear and is associated with the emergence of heart failure. The disease occurs in the last month of pregnancy up to 5 months postpartum, with no previous history of heart disease.³

Epidemiologically, no specific geographical or ethnic origin indicates susceptibility to PPCM, however, the incidence of PPCM is often reported in African countries. In the United States, the incidence of PPCM disease ranges from 1:300 to 1:4000 pregnancies. Within that epidemiological report, about 7% of cases occur in the final trimester of the pregnancy period while 60% of cases occur within the first 2 months of the puerperium.⁴

Post partum cardiomyopathy (PPCM) can be diagnosed through the criteria created by the National Heart Lung and Blood Institute and the Office of Rare Diseases (NHLBI). In this criteria, PPCM occur if (1) heart failure appear in the last month of pregnancy or at 5 months postpartum, (2) no exact cause of heart failure (3) no cardiovascular disease found before pregnancy (4) systolic dysfunction can be ascertained by echocardiography with the left ventricular ejection fraction criterion $< 45\%$ or there is a fractional shortening, with or without the left ventricular diastolic end dimension $>$

$2.7\text{cm}/\text{m}^2$ body surface area.^{3,4}

In general, PPCM risk factors include diseases that cause cardiovascular disorders, such as hypertension, smoking and diabetes. While risk factors associated with pregnancy include age at pregnancy > 32 years, preeclampsia, multiparity, multifetal pregnancy and obesity (BMI > 30).⁴ Early PPCM signs and symptoms usually resemble the normal physiological findings of pregnancy, including feet edema, dyspnea, orthopnea, paroxysmal nocturnal dyspnea, abdominal discomfort and persistent cough. With symptoms that resemble early pregnancy complaints, PPCM is often too late to be diagnosed. The disorder is under recognized, with harmful consequences such as mortality is as high as 20% to 50%.⁵

Purpose of this case report is to deliver one of the PPCM case that occurs in clinical practice. In addition, it will be presented more clearly on how to recognize the disease including pathogenesis, diagnosis and therapy of disease. Researchers expect that PPCM get more spotlight considering the early symptoms of disease that is not typical. It is hoped that there will be no delay in recognizing the disease and causing an increase in morbidity and mortality.

CASE REPORT

A 20-year-old woman came to the emergency unit with a shortness of breath. This case occurred in Aisyiyah hospital which located in Bojonegoro Regency, East Java, Indonesia. She said the complaint had appeared suddenly since 3 months ago. Dyspnea appears beginning with coughs, the symptoms getting worse when the patient do some exercise. There is a history of give birth about 4 months ago. About 1 month before delivery, the patient has begun to feel weak and dyspnea but the symptoms is light. When pregnant, the patient's blood pressure tends to be normal so that the symptoms of breathlessness are not further assessed. The patient also complained of a pounding chest, a fever of approximately last for 1 week and there was pain in the multiple joints. In addition, patient complaint for hair loss in the last month.

When she arrived in the emergency department, the patients had a blood pressure of 110/54 mmHg with 123 bpm heart rate, respiratory rate was 35 times per minute and body temperature was 38.3°C. The examination of peripheral oxygen saturation showed SaO₂ by 81%. It was decided to give early administration of oxygen using a non-rebreathing mask (10 lpm oxygen). After that treatment, the saturation rose and then stabilized at 98%. Physical examination showed a regular heart rhythm accompanied by rhonchi sound in the basal aspect of lung. ECG was performed and showed a sinus tachycardia with heart rate was 120 bpm. In addition, there was a constant “t-wave inversion” at lead V1-V6 in ECG examination. It was decided to transfer patients to the ICU for further monitoring. Blood test result showed normal results with leukocyte

amount 5000 cells/mm³. There was no shift in this type of leukocytes. Serum electrolyte examination include sodium, potassium, chloride and calcium were also within normal level.

When the patient was in ICU, it was decided to perform trans-thoracal echocardiography by a cardiologist. Two dimension analysis results indicated heart valve in normal conditions, the dimensions of the left and right ventricular were normal (LVIDd 4.14 cm and RVIDd 0.450 cm), there was no thrombus or vegetation in cardiac wall. The segmental analysis of the left ventricle showed mild global hypokinetic. In the M-mode analysis showed left ventricular systolic ejection function was decrease (56.5%) while the right ventricle was normal. From all of the examination results, the conclusion was lead to peripartum cardiomyopathy.

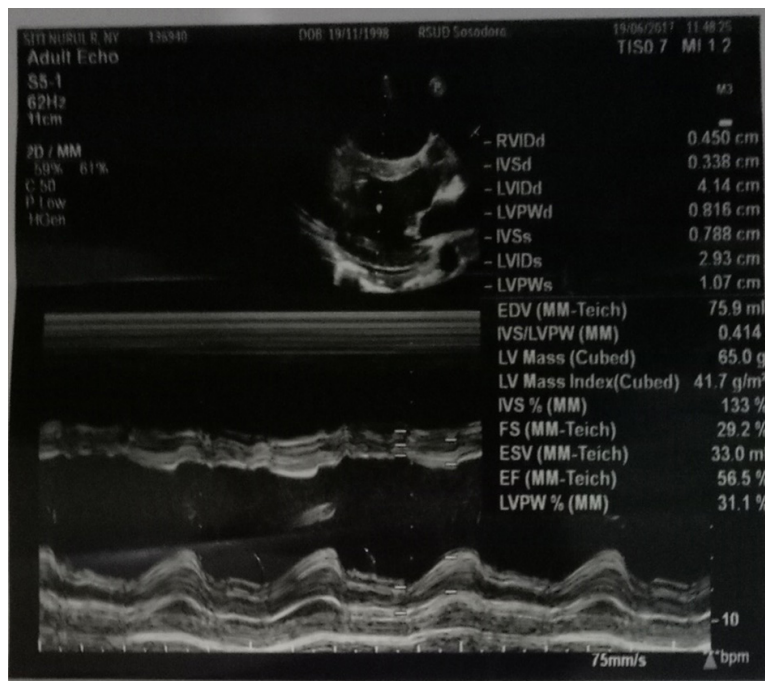


Figure 1. Left ventricular echocardiography picture. This images shows decrease in left ventricle ejection fraction (56,5%), the dimensions of the left and right ventricular are normal.

As for the management of the patient, it was decided given an intravenous infusion of NaCl 0.9% 500 cc for 24 hours, furosemide 20 mg iv every 12 hours and metamizole 500 mg iv every 8 hour. Oral medication was spironolactone 25 mg tablets q.d., candesartan cilexetil 4 mg q.d.

and coten® (ubidecarenone) 100 mg q.d. Patient gave good responded for the therapy very well, indicated by clinical symptoms improvement. Results of echocardiography examination shown in the picture of Figure 1, 2 and 3.

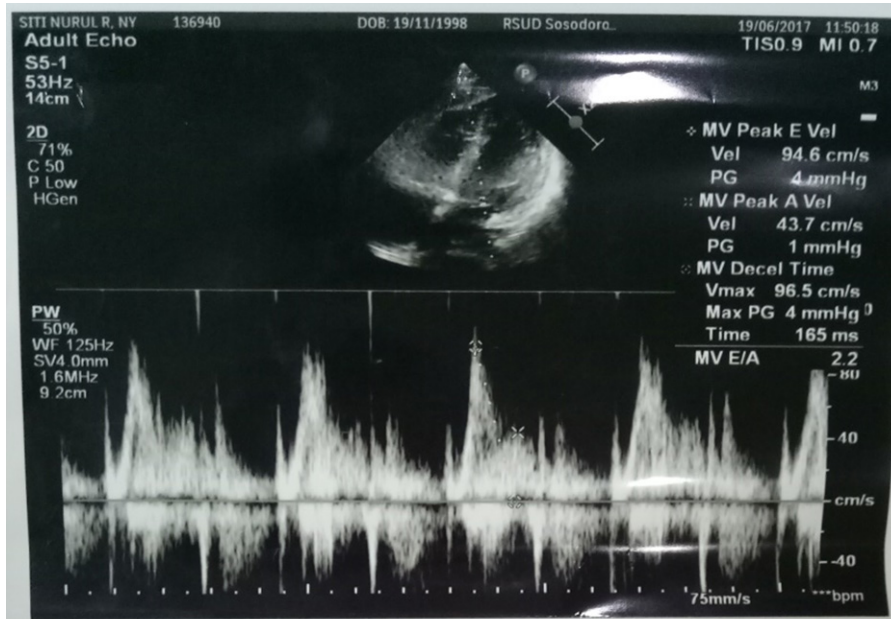


Figure 2. Mitral valve echocardiographic picture. This images shows normal result, there is no vegetation or thrombus occurs

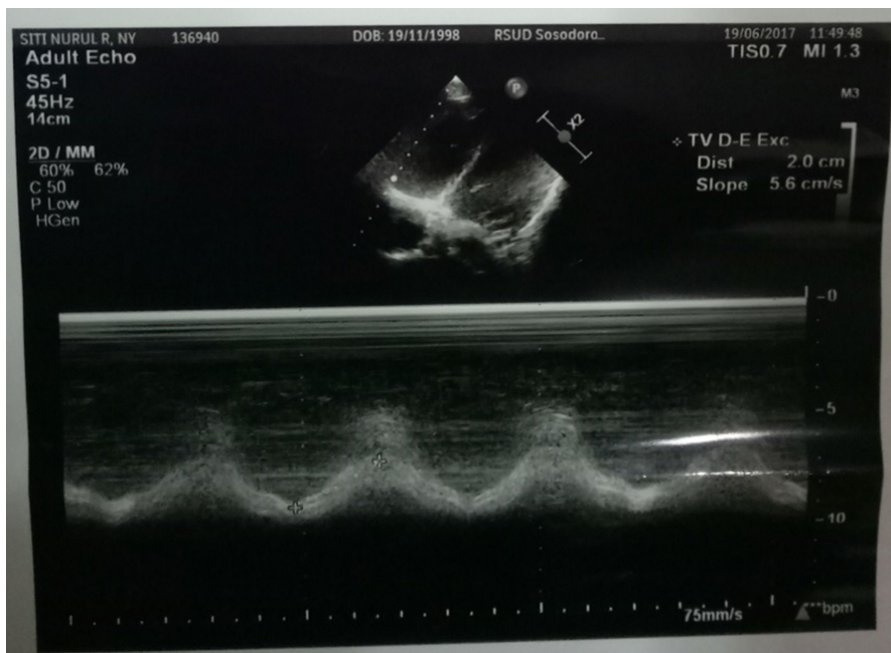


Figure 3. Tricuspid echocardiographic pictures. This images shows normal function of tricuspid valve.

DISCUSSION

Normal pregnancy is associated with physiological changes in the cardiovascular system such as increased blood volume, mild anemia, increased metabolic demand and changes in vascular resistance. The changes

are also accompanied by the presence of mild ventricular dilatation and increased cardiac output. Therefore, early clinical manifestations of PPCM are difficult to recognize.⁶

In this case, the disease occurred in patients with a first pregnancy and a relatively young

age. The appearance of postpartum symptoms are consistent with the most epidemiological data. In the majority of patients, 78% of symptoms are found at 4 months after delivery, only 9% of patients show symptoms in the last month of pregnancy. Patients with peripartum cardiomyopathy will experience signs and symptoms typical of chronic heart failure. But it is common that fatigue, symptoms of shortness of breath during activity and leg edema reasonable found in women pregnant from the 2nd trimester to the final stage. Based on that so dilated cardiomyopathy conditions will be more difficult to detect only through clinical symptoms.⁷ Several hypotheses have been proposed but none of which can be the main explanation for all PPCM cases. PPCM is known to have pathogenesis involving many factors.

Etiology and pathogenesis

Prolactin 16 Kda and Cathepsin D

The new data shows the involvement of oxidative stress, cathepsin D prolactin-cleaving protease, and prolactin on the pathology of PPCM. Oxidative stress can generate 16 kDa of prolactin. Acute PPCM patients has a high serum low-density lipoprotein (LDL) level (an indication of high oxidative stress) as well as elevated activated serum Cathepsin D levels, total prolactin and angiostatic 16kDa prolactin fragments.⁸ These fragments inhibit the proliferation and migration of endothelial cells, inducing apoptosis and impairing capillary structures that have been established. This form of prolactin increases vasoconstriction and impairs cardiomyocyte function.⁹

Heart Inflammation

Myocardial inflammation in the heart is also called myocarditis, known to be associated with PPCM. One study of myocarditis linkage with PPCM suggests that of 26 patients, 8 patients showed signs of viral infection in myocardial biopsy.² These viruses include Parvovirus B19, Human Herpes virus 6, Epstein-Barr virus, and human Cytomegalovirus. The study was based on the hypothesis that changes in the immune system

during pregnancy may exacerbate new infections or reactivate latent viruses in pregnant women. This condition can cause myocarditis leading to cardiomyopathy in pregnant women.¹⁰

Genetics

Some literature reports that PPCM women had mothers or sisters diagnosed with PPCM, others reported a relation between female relatives.⁸ There is also a reported that women who have the dilated cardiomyopathy (DCM) gene, can culminate in PPCM after pregnancy due to hemodynamic stress. In addition, there is a relationship between women and men's families who have DCM.⁹

Autoimmun

Serum in PPCM patients were found to affect the maturation of dendritic cells in vitro, in contrast to healthy postpartum serum women. PPCM female serum contains high autoantibody titers against cardiovascular tissue protein which is not present in idiopathic cardiomyopathy patients.⁸ Multiparity is a risk factor for PPCM. That fact concludes that exposure to fetal or paternal antigens can cause an abnormal myocardium inflammation response.¹²

After complete assesment, we conclude that our patient have some risk factor. But, our conjecture had to be proven with more advanced examination. Our patient are primigravida and did not have family history of PPCM. Based on this information we can not connect multigravida and genetics factor as risk factor in our patient.

Clinical symptoms

Signs and symptoms of heart failure caused by peripartum cardiomyopathy vary widely. Approximately 50% of patients with systolic heart failure are not even symptomatic at all. Clinical symptoms that are a warning sign in peripartum cardiomyopathy patients include atypical chest pain, abdominal discomfort, abdominal distension, cough, hemoptysis, signs of pulmonary edema, orthopnea and paroxysmal nocturnal dyspnea. All of that symptoms usually occur in women who may have had previous

cardiac abnormalities.³

Physical signs of heart failure due to dilated cardiomyopathy during peripartum period vary with degree of compensation, chronicity level (acute heart failure compared with chronic heart failure) and involvement of cardiac chambers (heart to left or right).⁹ On physical examination there may be an enlarged cardiac with high systemic venous pressure. Fluid overload or sign of congestion can be found in patients with chronic heart failure. We can find rales or ronchi in auscultation of the lungs, signs of pleural effusion, distension/ increased jugular venous pressure, ascites, hepatomegaly, peripheral edema, and S3 gallop in auscultation due to increased Left ventricular diastolic end pressure.¹³

When arrived in the hospital, patient complained that she had dyspnea, cough, chest pain, abdominal discomfort and paroxysmal nocturnal dyspnea. Patient also complained that she had hair loss, fever and palpitation. According to the clinical symptoms, it is suitable for cardiovascular disturbance with hyperthyroidism as differential diagnosis.

Diagnosis

It should be remembered that peripartum cardiomyopathy is a diagnosis of exclusion only if all other possible basic mechanisms of heart disease as an etiologic factor have been excluded by analysis history of disease, physical examination and other investigation results.¹⁴ Patients should have been examined carefully and then excluded other causes of heart failure other than pregnancy. This is to rule out the possible diagnosis of idiopathic dilated cardiomyopathy (IDCM). Consideration of PPCM diagnosis is usually in the postpartum period, whereas IDCM is in the 2nd trimester of pregnancy.¹¹

The incidence of myocarditis is common in PPCM, so antigens and antibodies against the myocardial agent can be found, this is usually not found in IDCM. The size of the heart may return to normal in PPCM, but may also be progressive and have a poor prognosis if not

treated promptly.² Laboratory examinations in PPCM show no abnormality unless hypoxic complications have occurred. Examination may be used to rule out differential diagnoses such as preeclampsia and non-cardiogenic pulmonary edema (NCPE). NCPE was described with decreased serum albumin levels (less than 3.2 mg/dL) with symptoms similar to acute pulmonary edema. This disease frequently triggers pyelonephritis.⁸

The majority of PPCM patients had plasma BNP concentrations or N-terminal pro-BNP (NTproBNP) increased due to increased LV end-diastolic pressure due to systolic dysfunction. On chest X-rays examination, can be found patchy infiltrates in the lower lung region, with vascular redistribution/cephalization, cardiomegaly, and pleural effusion. These findings indicate congestive heart failure.¹³ On the electrocardiographic examination can be found left ventricular enlargement. Left ventricular hypertrophy resulting from impaired systolic and cardiac diastolic function is characterized by finding of R waves at aVL lead > 11 mm; or R in V5-V6 leads > 27 mm or S in V1 + R at V5/V6 > 35 mm with ST segment depression and T wave inversion in left and later precordial leads (LV strain pattern).¹

In addition, echocardiography examination can be used to explore the possible causes of heart failure such as ischemia, cardiomyopathy, and heart valve disorders. On echocardiographic examination can be found evidence of left ventricular systolic dysfunction with ejection fraction < 45%, fractional shortening < 30% and dilatation of the entire heart chambers.¹³

Therapy

In the management of patients with PPCM is almost similar to management in other congestive heart disease. Non-medical treatment can be done such as patient education, physical activity appropriate with clinical conditions, dietary interventions with limiting salt intake, preventing excess fluid intake, and vaccination against infectious agent causing worsening of patient's clinical status.¹²

In pregnant patients with severe heart failure conditions accompanied by an unstable hemodynamic status, termination of pregnancy regardless of gestational age should be performed by surgery using combination of spinal and epidural anesthesia techniques.⁵ Preterm birth is experienced by approximately 17% of patients with no negative effects on the baby. Whereas in patients with stable hemodynamic conditions with no obstetric complications, the method of vaginal delivery is preferred using an epidural anesthesia technique and carefully hemodynamic monitoring. After delivery, most patients will have improved hemodynamic status, so standard therapy for heart failure can be started immediately.¹⁴

Patients with NYHA functional class I may be given a neurohumoral system modulator to prevent disease progression and cardiac muscle remodelling. For patients with chronic functional class heart failure (NYHA II-IV) therapy is aimed on minimizing fluid retention by limiting salt intake and diuretic use, increasing patient activity capacity, controlling the risk of disease progression and preventing mortality. According to epidemiological data, about 50% of patients experience improvement of left ventricular function within 6 months after diagnosis.¹³

CONCLUSION

Peripartum cardiomyopathy is one form of dilated cardiomyopathy with signs and symptoms of heart failure that are rarely found in everyday clinical practice. A complete history, appropriate physical and correct diagnostic test is necessary to rule out other etiologic factors as the cause of cardiomyopathy. The main goals of PPCM therapy are to improve clinical symptoms, extend life expectancy, maintain quality of life and prevent disease progression.

CONFLICT OF INTEREST

We declare there is no conflict of interest

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Non declare

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