

Peripartum Cardiomyopathy: Case Report dan Literature Review

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Abstract

Peripartum Cardiomyopathy (PPCM) is a form of heart failure that appears at the end of pregnancy or within a few months after delivery, with an etiology that is not fully understood. The incidence of PPCM varies globally, with a higher prevalence in developing countries than in developed countries. This disease has a significant mortality rate if it is not diagnosed and treated properly. This research aims to analyze cases of PPCM in postpartum patients one week after delivery with the main complaint of worsening shortness of breath. The research method used was a clinical case research with a descriptive approach. Data was obtained through anamnesis, physical examination, supporting examinations such as electrocardiography (ECG), echocardiography, chest x-rays, and analysis of Brain Natriuretic Peptide (BNP) and prolactin levels. The results of the research were compared with the latest literature on the diagnosis, management, and prognosis of PPCM. The results showed that the patient's cardiac ejection fraction decreased to 15%, improving to 40% after four months of intensive therapy. A combination of therapies including diuretics, ACE inhibitors, beta blockers, and bromocriptine was shown to contribute to the improvement of the patient's heart function. The implications of this research highlight the importance of early detection and optimal management of PPCM to reduce mortality and morbidity rates. Comprehensive clinical evaluation and appropriate treatment can improve patient recovery.

Keywords: Cardiomyopathy, *Peripartum Cardiomyopathy*, Case Report.

INTRODUCTION

Cardiomyopathy is an abnormality in the heart muscle that causes heart failure to pump blood (Rachma, 2014), while PPCM (*Peripartum Cardiomyopathy*) by definition is one of the causes of heart failure that can appear in late pregnancy or after childbirth by fulfilling the criteria: the presence of heart failure 1 month before partus or 5 months after partus, in the absence of other etiologies with left ventricular systolic dysfunction with ejection fraction less than 45% with or without left ventricular dilatation (Purwoko & Caprianu, 2018). The incidence of PPCM varies from country to country, but there is a difference in prevalence in developing countries, which are more prevalent than developed countries (Karaye et al., 2018).

Case Report

A 25-year-old patient with G1P1A0 one week postpartum came to the ER with complaints of shortness of breath since 1 week before admission. The complaint was accompanied by a feeling of tightness that worsened if the patient walked approximately 10 meters. The tightness was exacerbated by the position where the sleeping position would cause more severe tightness. Complaints of waking up during sleep have also been

experienced by patients due to tightness. The patient also complained of swollen legs since 2 months before. The patient underwent section cesarean a week due to proteinuria. The patient had no history of hypertension before pregnancy.

On physical examination in the ER, blood pressure was found to be 84/50 mmHg, with a pulse frequency of 115 beats/min and SpO₂ of 96% room air. There were pitting edema on both lower limbs, enlarged heart borders, diastolic murmurs on the mitral valve and tricuspid valve. On pulmonary examination, additional breath sounds were found in the form of bilateral wet ronchi at the lung basal. On X-Ray examination, a CTR (*Cardio Thoracic Ratio*) dilation of more than 0.5 was found, indicating cardiomegaly in the patient. ECG examination showed inverted T wave in leads V4, V5, and V6. The patient was given furosemide 2mg/hour, spironolactone 25 mg, bromocriptine, and oxygen 3 lpm via nasal cannula.

The patient's echocardiographic results showed decreased cardiac contractility (hypokinesia) in all parts of the heart, dilatation of all heart chambers with an EF (*ejection fraction*) value of 15%. Regurgitation murmur moderate, tricuspid regurgitation moderate-severe, with tapse (*Tricuspid Annular Plane Systolic Excursion*) 19 mm. The patient was admitted with NYHA (*New York Heart Association*) classification IV.

The patient was transferred to the ICCU room after stabilizing and the patient was given additional drugs such as ramipril 2.5 mg, bisoprolol 2.5 mg, furosemide continued 2mg / hour, dobutamine 3mcg/kg/min if the map <65, cripa 2x1 and albumin tablets. After 1 day of administration of these drugs, complaints of shortness of breath decreased and pitting edema decreased. After 3 days of treatment, the patient was transferred to a regular inpatient room with additional digoxin. The patient was discharged after 6 days of treatment with discharge medications spironolactone 50mg, 1x1, furosemide 20mg 2x1, bromocriptine 2x1, oniowa 3x1 tab, ramipril 2.5mg 1x1, bisoprolol 2.5mg 2x1, and digoxin tab 1x1.

Patients did not complain of symptoms accompanied by an improvement in ejection fraction from 15% to 40% after 4 months of intervention with heart failure drugs. This improvement is in line with research conducted by McNama et al ¹⁷ where in that research there was a significant improvement in the population group with EF <30% to EF >50 in a 12-month period reaching 71% of all PPCM events, so it is necessary to conduct periodic and continued evaluation of complaints and ejection fraction recovery.

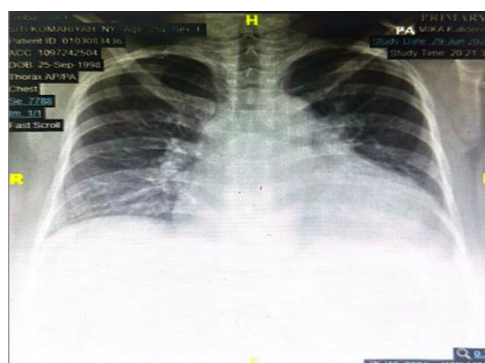


Figure 1. Widened CTR value exceeding 0.50 in patients

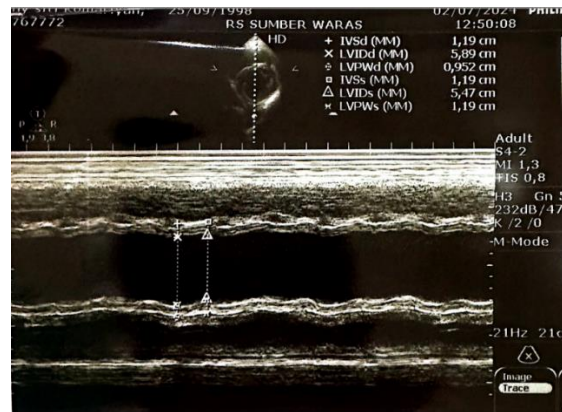


Figure 2. Echocardiography in a patient with EF 15%

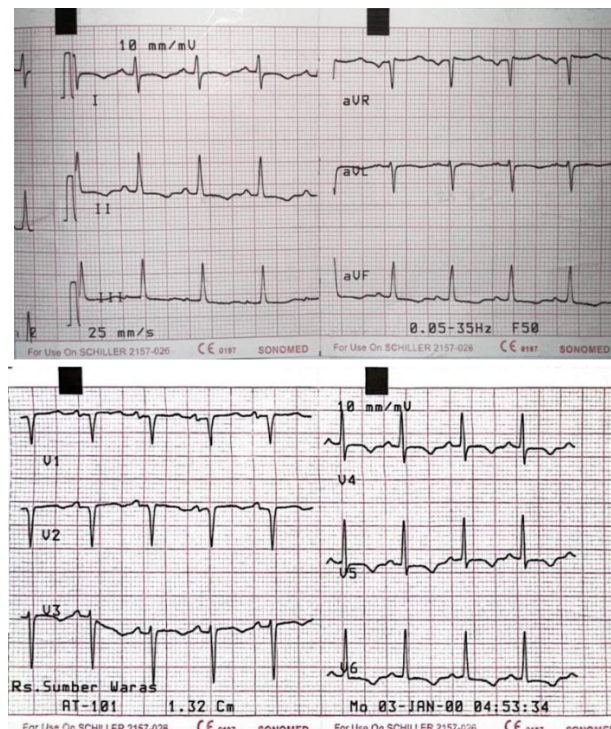


Figure 3. ECG of the patient

Previous research has shown that PPCM has complex risk factors, including hypertension in pregnancy, multiparity, maternal age, and genetic factors. A research by (Sulistiyanti & Suryono, 2019) shows that inflammatory factors and oxidative stress play an important role in the pathogenesis of PPCM, which causes myocardial dysfunction and a decrease in ejection fraction. The novelty of this research lies in the analysis of patient response to gradually administered pharmacological therapy, including the use of bromocriptine as part of the treatment strategy. Several previous studies have associated bromocriptine with improved heart function in PPCM through the inhibition of prolactin, which contributes to cardiovascular damage. However, this case report provides further insight into the effectiveness of the combination therapy used and the recovery of ejection fraction within 4 months after the intervention.

Based on the above background, this research aims to highlight the importance of early detection and optimal management for PPCM patients, as well as evaluating the clinical response to the therapy provided. The benefits of this research are expected to

contribute to an increased understanding of PPCM management and provide recommendations for more effective therapies to improve patient recovery rates.

RESEARCH METHOD

This research used a clinical case research method aimed at analyzing cases of *Peripartum Cardiomyopathy* (PPCM) in postpartum patients one week after delivery with the main complaint of worsening shortness of breath. This research was conducted with a descriptive approach based on clinical data of patients obtained from direct examination, medical records, and a review of related literature.

Subject and Location of Research

The subject of the research was a 25-year-old primiparous female patient (G1P1A0), who was treated in the Intensive Cardiac Care Unit (ICCU) at a referral hospital.

Data Collection Procedure

Data was obtained through:

- a. Anamnesis: Patient's medical history, symptoms experienced, and related risk factors.
- b. Physical Examination: Measurement of blood pressure, pulse rate, oxygen saturation, and other clinical signs.
- c. Supporting Examination:
 - a) Electrocardiography (ECG) to evaluate the electrical activity of the heart.
 - b) Echocardiography to assess ejection fraction (EF) and ventricular function.
 - c) Chest X-ray to assess heart enlargement and signs of pulmonary edema.
 - d) Laboratory tests such as BNP (Brain Natriuretic Peptide) and prolactin levels.

Data Analysis

Clinical data was analyzed qualitatively by comparing patient examination results with current literature on the diagnosis, management, and prognosis of PPCM. The results of this research were then reviewed based on the New York Heart Association (NYHA) guidelines and the Heart Failure with Reduced Ejection Fraction (HFrEF) treatment standards.

Research Ethics

This research was conducted with due regard for ethical principles in clinical research. The patient's identity was kept confidential, and all diagnostic procedures and therapies administered were in accordance with applicable medical standards..

RESULT AND DISCUSSION

In normal pregnancy, there is a decrease in total resistance during the first, second and third trimester of pregnancy, an increase in cardiac output starting from the first trimester and an increase in heart rate in the first to third trimester, causing a decrease in blood pressure in the first and second trimester but increasing to normal in the third trimester (Maulana & Fatimah, 2023). In addition, there is an increase in sympathetic nerves during pregnancy¹. This makes early detection of PPCM difficult.

In our case, the condition was experienced in the first trimester at a relatively young age that appeared after parturition. Complaints were felt for the first time and were the same as in heart failure patients such as shortness of breath especially during exertion, leg

swelling, orthopnea, and PND (paroxysmal nocturnal dyspnea). The patient's diagnosis was made based on history, physical examination, x-ray, and echocardiography results. The patient's ECG showed no abnormalities such as cardiac hypertrophy or heart failure, but this normal ECG result cannot exclude cardiomyopathy (Aulia & Setiawan, 2017).

The patient was treated according to the heart failure condition with beta blockers, ACE inhibitors, mineralocorticoid receptor antagonists, and adjuvant therapy such as diuretics and inotropes if MAP <65. Furosemide was given through the IV line continuously to overcome the signs and symptoms of fluid overload. Patients are also given dopamine receptor agonists to reduce hyperprolactinemia hormone production which is believed to be one of the causes of PPCM.

Early diagnosis and management are important in cases of PPCM to avoid long-term complications that can arise, as well as to create a good outcome with rapid recovery. The use of bromocriptine is still controversial due to its questionable effects. A research conducted by Veraprasad et al. (2016) mentioned that there was a faster improvement in LVEF when compared to the control group, but the improvement was not accompanied by a decrease in mortality cases and the total number of patients who experienced complete improvement (EF > 50%).

PPCM

PPCM is an emergent condition of heart failure associated with pregnancy. The incidence varies widely from 1 in 20000 in Japan to 1 in 100 in Nigeria (Isogai & Kamiya, 2019). This variation may be due to various factors such as genetic (Karaye et al., 2020), accuracy of diagnosis, parity, age at pregnancy, and maternal cardiovascular risk during pregnancy (Kolte et al., 2014). Some of the risk factors that may increase the incidence of PPCM are age over 30 years, African ancestry, multigestational pregnancy, history of preeclampsia, eclampsia, or postpartum hypertension (Bello et al., 2013), drug use such as cocaine, long-term use of tocolytics (>4 weeks) with beta adrenergic agonists such as terbutaline (Lampert et al., 1993), and parity ≥4 (Gunderson et al., 2011).

Risk Factors

Some of the above risk factors such as preeclampsia, hypertension in pregnancy, or cocaine use can be the etiology of heart failure in the late trimester. Many patients with preeclampsia progress to PPCM which illustrates preeclampsia has the same pathomechanism as PPCM. Diabetes is also a risk factor for PPCM, but this risk factor is usually associated with hypertension (Sliwa et al., 2017).

Hyperprolactinemia

Hyperprolactinemia is one of the pathomechanisms believed to occur in PPCM. Prolactin is a hormone secreted by the body during pregnancy until breastfeeding. Increased prolactin hormone levels are associated with increased cardiac muscle apoptosis (Graham et al., 2021), vascular vasodilation ability, decreased endothelial cell proliferation and growth, and decreased matrix remodeling through the mechanism of converting 23 kDa prolactin to 16 kDa with cathepsin D protein (Kumar et al., 2023).

Another factor that is believed to occur in pregnant women leading to cardiomyopathy is the relationship between the physical stress experienced in pregnant women that causes dysregulation of the protective mechanisms of STAT3, PGC-1α, and

PI3/Akt proteins and upregulation of antiangiogenic signal proteins such as sFLT1, PRL that cause an imbalance that contributes to the development of cardiomyopathy (Kumar et al., 2023).

Other factors that may be associated with PPCM are genetic, autoimmune, nutritional intake, infection, age, obesity, and smoking. Which can lead to protein dysregulation and hormonal disruption (Kumar et al., 2023).

Signs and Symptoms

Symptoms that can appear in PPCM are similar to the signs and symptoms that appear in heart failure (Framingham criteria) which are divided into major and minor criteria. Major criteria include orthopnea, paroxysmal nocturnal dyspnea, increased jugular venous pressure, gallop, cardiomegaly on X-ray, and pulmonary edema. Minor criteria include bilateral leg edema, cough at night, dyspnea on exertion, hepatomegaly, pleural effusion, and tachycardia.

Management

The principle of management in PPCM is no different from HFrEF (Heart Failure with Reduced Ejection Fraction) which is the administration of beta blockers, ACE-I/ARB/ ARNI, MRA, and SGLT2 inhibitors and other adjuvant therapies such as diuretics, inotropes or digoxin can be considered in cases.

CONCLUSION

The conclusion of this research emphasizes that early detection and rapid treatment are very important in preventing a worsening prognosis in patients with *Peripartum Cardiomyopathy* (PPCM). This case research shows that PPCM not only occurs in individuals with known risk factors but can also affect previously healthy women. Therefore, a more systematic clinical approach and a more comprehensive diagnostic protocol are needed to ensure early identification and timely intervention to reduce morbidity and mortality rates from PPCM.

As a contribution to future research, this research highlights the need to develop more effective screening methods for detecting PPCM in pregnant populations, including those with no apparent risk factors. In addition, further research is needed to evaluate the effectiveness of various therapeutic strategies to improve the quality of life of postpartum patients. A multidisciplinary approach between specialists in cardiology, obstetrics, and intensive care is expected to be a solution in reducing the clinical impact of PPCM in the future.

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