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Multisystem Complication in Pregnancy: A Case Report of PPCM, SN and RHD

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ABSTRACT

Pregnancy can trigger cardiovascular and renal complications, such as peripartum cardiomyopathy (PPCM), nephrotic syndrome (NS), and rheumatic heart disease (RHD), which increase the risk for the mother and fetus. PPCM occurs due to heart failure in late pregnancy or postpartum, while NS is characterized by proteinuria and edema. RHD can worsen this condition, especially in the presence of mitral stenosis.

Objective: This case report aims to describe clinical presentation and management of complications in pregnancy.

Case report: A 37-year-old woman, G2P1, 33 weeks gestation came with complaints of abdominal tightness and shortness of breath. Complaints were accompanied by fever, weakness, and swelling in the lower legs. Examination found high blood pressure and proteinuria. While heart enlargement and mitral stenosis were found from echocardiography. Obstetric examination showed a baby with a heart rate of 117 bpm and the fetal head had not entered the upper pelvic inlet.

Conclusion: Management of pregnancy with complications such as peripartum cardiomyopathy (PPCM), nephrotic syndrome (NS), and rheumatic heart disease (RHD) requires a strict multidisciplinary approach. Monitoring of cardiovascular and renal function is essential to prevent further complications.

Keywords: Peripartum Cardiomyopathy, Nephrotic Syndrome, Rheumatic Heart Disease, Pregnancy

Introduction

Pregnancy is a complex physiological condition that can affect many systems in a woman's body, including the cardiovascular, renal, and respiratory systems. One condition that can occur during pregnancy is peripartum cardiomyopathy (PPCM), which refers to heart failure that develops in the last trimester of pregnancy or in the months after delivery in the absence of previous heart disease. PPCM is often associated with increased blood volume, hormonal changes, and increased stress on the heart that occurs during pregnancy. In addition, another complication that often occurs in pregnant women is nephrotic syndrome, which can cause swelling, increased protein levels in the urine, and decreased blood albumin levels.[1]

Pregnancy can also increase the risk of hypertension, either in the form of preeclampsia or gestational hypertension, both of which can worsen organ function and affect the health of the mother and fetus. One condition associated with hypertension is nephrotic syndrome, which is characterized by proteinuria, edema, and hyperlipidemia, and can worsen the prognosis in pregnant women. In addition, in pregnancies that experience swelling or edema, careful

management is often required with the administration of drugs such as diuretics, corticosteroids, and other supportive treatments to maintain fluid balance and prevent further complications. Nephrotic syndrome in pregnancy is most commonly caused by preeclampsia, type 2 diabetes mellitus, and/or systemic lupus erythematosus (SLE). The incidence of nephrotic syndrome in pregnancy is around 0.012–0.025% of all cases of pregnancy.[2] In cases of pregnancy complications such as PPCM and nephrotic syndrome, aggressive medical management, including monitoring of cardiovascular, renal function, and obstetric status, is essential to reduce the risk to the mother and fetus.CASE PRESENTATION

a 37-year-old woman, G2P1, pregnant with a gestational age of around 33 weeks. The patient came with complaints of increased abdominal stiffness since October 3, 2023, accompanied by fever and weakness. The patient also complained of shortness of breath for the past 3 weeks, as well as joint pain since 8 months of pregnancy. There were no signs of bruising on her body. The patient had a history of her first pregnancy with spontaneous labor and a baby weighing 3400 grams. Physical examination showed high blood pressure (142/103 mmHg), heart rate 117 bpm, and body temperature 38.6°C. Laboratory examination revealed anemia (Hb 8.6 g/dL) and urine results were positive for nitrite and protein. Additional examinations showed edema in the extremities and lungs and examinations showed the possibility of gestational hypertension (preeclampsia), with suspected nephrotic syndrome, rheumatoid heart disease (RHD), and cardiomegaly which could lead to peripartum cardiomyopathy. Initial treatment was carried out by administering IV fluids, oxygen, antibiotics, and diuretics.

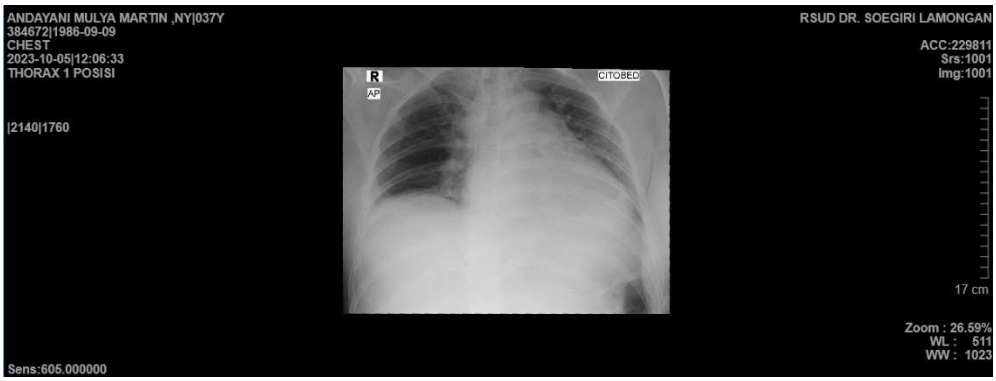

Figure 1. Chest X-ray results of a patient experiencing LV Concentric Remodeling (thickening of the left ventricle wall)

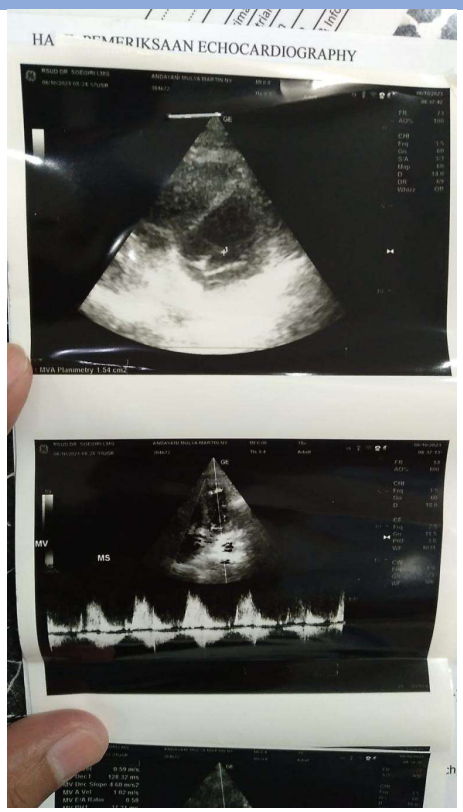

Figure 2. Echocardiography results of a patient experiencing LV Concentric Remodeling (thickening of the left ventricular wall) and mitral stenosis.

Obstetric examination of the patient showed several important things: Linea Nigra and Striae gravidarum were visible on inspection. Fetal Heart Rate (FHR) was heard 113x/minute. On palpation, the Uterine Fundus Height (FFU) was felt to be 24 cm, corresponding to a gestational age of 32-33 weeks. Leopold examination showed the fetal position with the buttocks palpable in Leopold 1, the back in Leopold 2, and the head in Leopold 3. Cervical dilation was still 0 cm with 25% efacement. The amniotic fluid was intact and there was no mucus or blood.

I	Result	Normal Value
Hemoglobin	**8,8**	L: 13,2-17,3 P: 11,7-15,5
Leukosit	7510	3.600-11.000
LED	25-45	10-40/jam
Diff count	0-0-0-73-22-5	2-4/0-1/3-5/50-70/25/40/2-8
PCV	26,9	L: 40-52% P: 35-47%

Trombosit	191.000	150.000-440.000/ul
Neutrofil absolut	5490	1500-7000/ul
Lymphosit absolut	1620	1000-3700/ul
NLR	3,39	Cut off 3.13
GDA	153	>70 - <200
Urea	17	10-50mg/dl
I	**Result**	**Normal Value**
Serum Kreatinin	0,87	0,50-1,10
Uric Acid	5,4	3,4-4,8 mg/dl
SGOT	48	<37 U/L
SGPT	22	<39 U/L
APTT	18,6	25-35 detik
PT	9,6	11-15 detik
HBs-Ag	Negatif	Negatif
Anti HIV	Non Reaktif	Non Reaktif
Protein urine	Negatif	negatif
Kolestrol	198	<200
HDL Kolestrol	38	>35mg/dl
LDL Kolestrol	132	<130mg/dl
Trigliserida	**331**	<150mg/dl
Albumin darah	2,8	3,4-4,8mg/dl

BGA	Result	Normal Value
BE ecf	-6	Arteri. (-3) - (+3) mmol/L
HCO3	**19,1**	Arteri 22-26 mmol/L
O2 sat	99	Arteri 94-98 %
PCO2	**30,5**	Arteri. 33 - 44 mmol/L
PH	7,40 (N)	Arteri 7,35 - 7,45 mmol/L
PO2	123	Arteri 71-104 mmol/L
TCO2	20	Arteri. 23-27 mmol/L
GDA Stick	109	>70. - <200 mg/dl
Urine test	**Result**	**Normal Value**
Berat Jenis	1030	1001-1030
PH	7,0	-
Leukosit	**3-8/lp**	2-3/lp
Nitrit	**+1**	Negatif
Protein	**+4**	Negatif
Urobilinogen	Negatif	Negatif
Bilirubin	Negatif	Negatif
Keton	**+3**	Negatif
Glukosa	Negatif	Negatif
Blood	Negatif	Negatif
Eritrosit	**1-3**	0-2/lp

Epitel	**5-10**	0
Kristal	Negatif	Negatif
Amorf	Negatif	Negatif

Table 1. Laboratorium test results

Further management included close monitoring of the fetal and maternal conditions, and preparation for a cesarean section if necessary. After the cesarean section, the patient's condition was stable although further monitoring was required for possible postpartum complications such as bleeding, infection, or heart failure. The neonate was born weighing 2200 grams and an APGAR score of 5 at the first minute and 6 at the fifth minute. Follow-up was performed to monitor the mother's fluid, electrolyte, and cardiac and renal function status, as well as for further management.

DISCUSSION

Patients who reported experiencing symptoms of shortness of breath, edema, chest pain, and decreased consciousness indicate the possibility of several medical complications related to pregnancy and underlying medical conditions, such as Peripartum Cardiomyopathy (PPCM), Nephrotic Syndrome, and Rheumatoid Heart Disease. In this patient, complaints of shortness of breath that worsened over several weeks and chest pain, accompanied by leg edema and supporting examination results showing proteinuria, confirm the presence of abnormalities in the cardiovascular and renal systems.

Peripartum Cardiomyopathy (PPCM) is a form of heart failure that occurs in the last trimester of pregnancy or in the months after delivery. It can cause symptoms such as shortness of breath, edema, and decreased ability of the heart to pump blood effectively.[1,7] PPCM is associated with an increased risk of maternal and fetal morbidity and mortality, and risk factors include hypertension, preeclampsia, and preexisting cardiac disease. The diagnosis of PPCM often requires echocardiography to assess left ventricular function, which in these patients shows LV concentric remodeling, which is related to structural changes in the heart due to the added burden of pregnancy. Increased concentrations of inflammatory factors such as tumor necrosis factor-α (TNFα), interferon-γ, interleukin-6, C-reactive protein (CRP), and Fas/Apo-1, contribute to the pathophysiology of PPCM. During pregnancy, the maternal body undergoes physiological changes that normally increase antioxidant defense mechanisms, but in PPCM, there is increased oxidative stress, as demonstrated by high levels of oxidized low-density lipoproteins associated with genetic and inflammatory processes. The most common presentation of PPCM is systolic heart failure. Symptoms vary widely but may include fatigue, dyspnea, orthopnea, paroxysmal nocturnal dyspnea, persistent cough, peripheral edema, palpitations, chest pain, decreased exercise tolerance, and abdominal discomfort due to passive congestion of the liver.[1,3,4]

Pregnant women with nephrotic syndrome have a higher cardiac output compared with women with normal pregnancies. This is primarily due to an increase in stroke volume, reflecting the volume expansion seen in nephrotic syndrome. This high cardiac output without a corresponding decrease in total peripheral resistance has the potential to promote the development of hypertension in these women. The high cardiac output before the vasoconstriction phase also occurs in patients with preeclampsia.[6,16] Nephrotic syndrome is a condition characterized by severe proteinuria, hypoalbuminemia, and edema. Approximately 50% of women

with nephrotic syndrome experience increased protein excretion during pregnancy.[8] In this case, positive proteinuria was found on urinalysis, and the patient showed signs of widespread edema.[5] Nephrotic syndrome in pregnancy can affect kidney health and increase the risk of preeclampsia and other complications. The main cause of proteinuria in pregnancy is preeclampsia. Preeclampsia should be considered the main cause of nephrotic syndrome unless proven otherwise.[9] Nephrotic syndrome in pregnant women should be further evaluated to assess the possibility of complications such as preeclampsia or eclampsia which require intensive management because they also affect the fetus (premature birth, low birth weight babies, and intrauterine fetal growth restriction).[5,10]

The normal hemodynamic changes of pregnancy place an additional cardiac burden of 30–50%. This is well tolerated by the normal heart but can result in morbidity and mortality in women with pre-existing RHD.[12] Mitral stenosis (MS) is very sensitive to cardiac insufficiency in pregnancy. RHD (Rheumatic Heart Disease) is a chronic condition resulting from damage to the heart valves caused by rheumatic fever, which in this case affects the mitral valve. Most cases of mitral stenosis (MS) are only detected after complications such as heart failure, atrial fibrillation (AF), pulmonary hypertension (PHT), or embolic stroke occur.[14] The presence of mild mitral stenosis (MS) and mild mitral regurgitation (MR) contributes to the patient's clinical symptoms and complicates the cardiac and renal conditions.[11,15] Mitral stenosis increases left atrial pressure, which can worsen left ventricular remodeling (LV concentric remodeling) and increase the risk of pulmonary congestion.[13] The combination of PPCM and RHD increases the risk of hemodynamic dysfunction, especially if there is decompensation due to systemic and pulmonary edema.[15]

The importance of early diagnosis and appropriate management is crucial, especially in preventing the development of further complications that can be harmful to both the mother and the fetus. A therapeutic approach involving the administration of drugs such as methylprednisolone, furosemide, and digoxin to manage heart failure, as well as the use of antibiotics and supportive therapy to support the kidneys and heart, is part of the comprehensive management required for patients with complex conditions such as this. It is important for the medical team to closely monitor the patient's condition, especially the hemodynamic status and function of vital organs such as the kidneys and heart, and to conciliate with related specialists, such as cardiologists and nephrologists, to determine the optimal treatment plan.

CONCLUSION

Based on the results of anamnesis, physical examination and supporting examinations, the patient was found to have shortness of breath and swelling in the lower extremities, and left ventricular enlargement and positive urine protein results were found. From the following examination results, it can be concluded that this patient has renal disorders and cardiovascular disorders, namely nephrotic syndrome along with peripartum, cardiomyopathy and rheumatoid heart disease.

SUGGESTION

- Patients need to be managed with a multidisciplinary approach consisting of nephrologists, internists, cardiologists and obstetricians to ensure optimal therapy without harming the mother or fetus.
- Control disease activity by administering immunosuppressants according to protocol, such as corticosteroids or other immunomodulatory agents (eg, azathioprine if needed during pregnancy), while closely monitoring for side effects.
- Manage nephrotic syndrome with fluid volume regulation, albumin administration if needed, and use of antihypertensives to prevent further renal damage.

- Monitor pregnancy with screening for obstetric complications such as preeclampsia, fetal growth restriction, and preterm birth and supplementation as needed, such as low-dose aspirin to prevent preeclampsia.

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