Case Report

High intracardiac clot burden in a young mother with peripartum cardiomyopathy in Uganda

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Abstract

Peripartum cardiomyopathy (PPCM) is an idiopathic cardiomyopathy presenting with a reduction in left ventricular systolic function towards the end of pregnancy or in the months after delivery. It is a life-threatening condition with a substantial mortality rate ranging from six to 25%, commonly due to heart failure or sudden cardiac death. Pregnancy is a prothrombotic state. Due to poor systolic function, women with PPCM are prone to intracardiac thrombi and a high risk of thromboembolic events. Early diagnosis with echocardiography and treatment plays a critical role. We describe a case of a woman with PPCM and biventricular thrombi, with the aim of creating awareness for early echocardiographic screening for thrombi and appropriate implementation of care.

Keywords: peripartum cardiomyopathy, thrombus

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Peripartum cardiomyopathy (PPCM) is a global disease with an epidemiological profile that varies between countries. It is a major cause of pregnancy-induced heart failure where the pathophysiology has remained unclear.

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Case report

A 27-year-old African woman presented to our facility at the Uganda Heart Institute (UHI), Kampala, Uganda, following her first pregnancy. The UHI is an autonomous public tertiary institution that offers specialised paediatric and adult medical and surgical cardiology services country wide. She presented with dyspnoea, palpitations and poor effort tolerance. She had had an uneventful pregnancy and normal delivery of a healthy baby girl four weeks prior to presentation.

Dyspnoea on exertion began four weeks postpartum and progressed. The patient reported paroxysmal nocturnal dyspnoea for one week with episodes of palpitations. Her presenting vitals were normal except for tachycardia and a relatively low oxygen saturation (93%).

A physical examination revealed general pallor, bibasilar rales and an S3 gallop. A transthoracic echocardiogram (TTE) showed a severe global hypokinetic left ventricle with a left ventricular ejection fraction (LVEF) of 19% and severe mitral regurgitation. Hypo-echoic masses were seen in both ventricles, with irregular borders concurrent with thrombi (Fig. 1). The 12-lead electrocardiogram was normal (Fig. 2).

Family history for cardiac disease or sudden cardiac death was negative. At this point, a diagnosis of peripartum cardiomyopathy with biventricular intracardiac thrombi and congestive cardiac failure (New York Heart Association class IV) was made.

Counselling was done to stop breast feeding and the patient was given bromocriptine 2.5 mg twice daily. Goal-directed heart failure medical therapy and anticoagulation with warfarin, together with low-molecular-weight heparin (LMWH) at 60 mg 12 hourly dosing was initiated while in admission. She was discharged a week later in a stable state with a therapeutic international normalised ratio (INR) of 2.5 and ready to continue warfarin anticoagulation monotherapy.

However, at 16 weeks postpartum she returned with sudden weakness of the right upper and lower limbs, accompanied by slurred speech. Vital signs on presentation included a blood pressure of 122/65 mmHg and tachycardia of 115 beats per min. A brain computed tomography scan showed an ischaemic infarct in the right middle cerebral artery. The most likely diagnosis was cerebral vascular accident, probably due to the intracardiac thrombi in the setting of dysrhythmias such as atrial fibrillation, as well as decompensated systolic heart failure due to peripartum cardiomyopathy.

Initial laboratory test results showed an elevated brain natriuretic peptide (NT-proBNP) level of 26 563 pg/ml, cardiolipin IgG of 8 (< 10 negative), cardiolipin IgM of 0.06

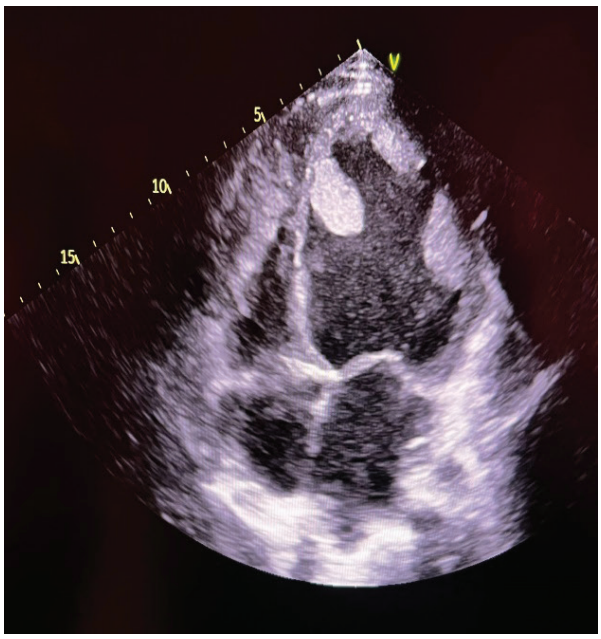

Fig. 1. Transthoracic echocardiogram showing hypo-echoic masses concurrent with biventricular multiple thrombi.

(< 1 negative, > 1 positive), and elevated transaminases of 256 U/l (Table 1). However, laboratory tests for factor V Leiden and protein C and S levels were not done due to financial constraints.

TTE showed a dilated left ventricle (internal dimension in diastole, 6.3 cm) with a LVEF of 19% and right ventricular systolic dysfunction with multiple left ventricular thrombi and a single right ventricular thrombus (Fig. 1).

Table 1. Serial laboratory results

Variables	*August 2022*	*November 2022*	*March 2023*
NT-proBNP, pg/ml	26563	15996	9788
Urea, mg/dl	47.1	94.9	112.3
Creatinine, mg/dl	0.92	1.49	1.63
White blood cells	5.07	13.67	13.51
Haemoglobin, g/dl	14.8	14.3	14.2
Platelets, $\times 10^9$ cells/l	226	81	65
INR	2.5	4.88	2.19

The patient was admitted to the cardiac critical care unit where she was started on intravenous furosemide plus anticoagulation with warfarin and LMWH. Additional medications included carvedilol, furosemide and enalapril. Prior to her discharge, a repeat TTE showed a residual left ventricular thrombus with no right ventricular thrombus. She was later discharged in a stable state clinically, however her neurological state was equivocal with residual hemiplegia of the right limbs and she was to continue with her routine physiotherapy sessions.

During her six-month visit to asses for echocardiographic outcome, it was established that she had new-onset intracardiac thrombi (Fig. 3) with a progressively painful right lower limb and inability to walk. Upon inquiry about her adherence to warfarin, it was established that she had stopped taking all her medications due to financial constraints.

A Doppler ultrasound of the lower limbs showed an extensive partially occlusive right superficial femoral arterial thrombus causing limb ischaemia (Fig. 4). She was readmitted and the cardiovascular team recommended conservative management of her ischaemic limb versus surgical thromboembolectomy. She was continued on warfarin with resolution of warmness in her right lower limb. Additionally, her low ejection fraction of 19% was another indication for a conservative approach versus a

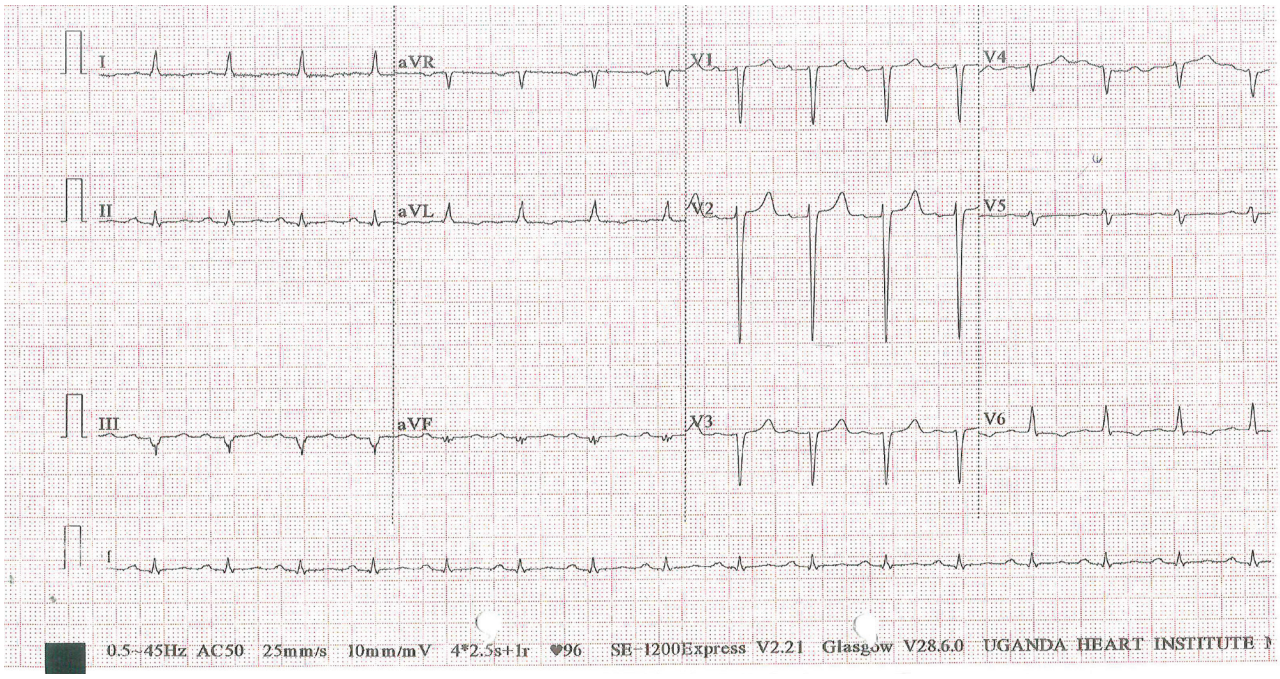

Fig. 2. Twelve-lead electrocardiogram showing sinus rhythm with normal cardiac axis.

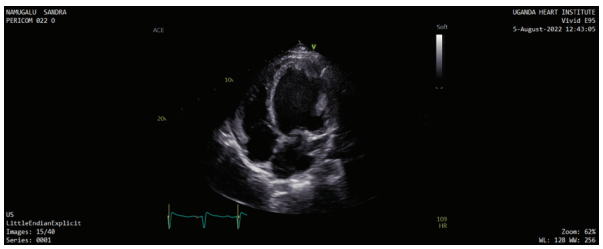

Fig. 3. Transthoracic echocardiogram showing hypo-echoic left ventricular thrombus with spontaneous echo contrast.

surgical thromboembolectomy.

During her second readmission stay, the patient was adequately anticoagulated with warfarin and her INR ranged between 2.1 and 3.5. Her heart failure regimen, which included furosemide, spironolactone, enalapril and carvedilol, was maintained. Counselling on drug adherence was done as well. Laboratory tests revealed persistent elevated NT-proBNP levels at 9 788 pg/ml despite optimal heart failure medication.

Her clinical condition deteriorated further while on the ward, with worsening effort intolerance and 35 days after admission, she died. A possible cause of death was intractable decompensated heart failure due to low ejection fraction.

Discussion

PPCM is an idiopathic reduction in LVEF (< 45%) during pregnancy or in the postpartum period in the absence of other aetiologies.[1] PPCM has serious risks for both morbidity and mortality, with mortality rates ranging from five to 25%.[1-3]

LVEF recovery does not eliminate the risk of recurrence of heart failure due to PPCM. It is estimated that 54% of women with persistent left ventricular dysfunction at the onset of a subsequent pregnancy have a high risk of intracardiac thrombus, which has been associated with the presence of severe left ventricular systolic dysfunction. Therefore, patients with PPCM are more vulnerable to intracardiac thrombus, and peripheral arterial and venous embolism than other types of cardiomyopathies.[2-4]

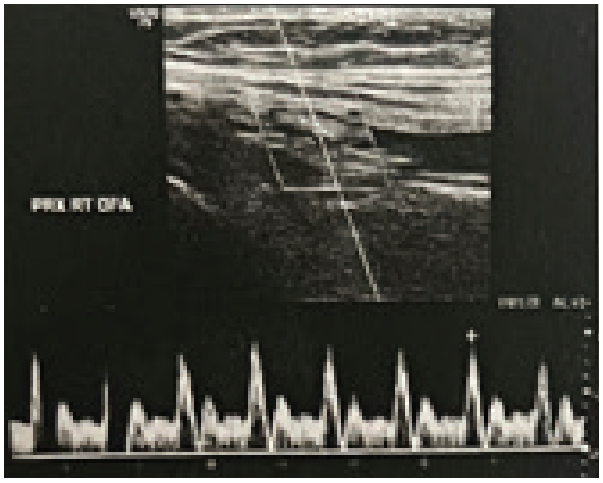

Fig. 4. Right lower limb arterial Doppler showing extensive partially occlusive right superficial femoral arterial thrombus causing limb ischaemia and distal posterior tibial artery occlusion. The external iliac, common femoral and deep femoral arteries were spared.

This case had all the above events, manifesting with the presence of intracardiac thrombi in both left and right ventricles, coupled with a high clot burden. Besides, reduced LVEF, cardiac dilation and endothelial dysfunction predispose patients with PPCM to prothrombotic states. This makes PPCM patients more vulnerable to thromboembolic events, especially intracardiac thrombus, which is the most important and distinctive complication leading to severe cardiovascular and cerebrovascular events.

The prevalence of intracardiac thrombus in PPCM patients is difficult to ascertain and hence there continues to be a lack of consensus on which patients with cardiac impairment should have anticoagulant therapy.

Most data on intracardiac thrombus and thromboembolism have been related to cardiac impairment in association with left ventricular aneurysms. Thromboembolism is one of the many causes of maternal mortality, which can be prevented in many cases.[5] Pregnancy is a temporary prothrombotic state that increases the risk of thromboembolism four to five times, compared to non-pregnant women.[5-7]

The risk of venous thromboembolism is higher in women aged 35 years and older.[7] Thrombophilia, protein C and S deficiency, systemic lupus erythematosus, cardiac disease, sickle cell disease, obesity, fluid retention and electrolyte imbalance, postpartum infection and transfusion are other significant risk factors.[7] However, in this particular case, all these risks for thromboembolism were ruled out.

Many cases of venous thromboembolism (VTE) occur during the first trimester of pregnancy. The risk increases with progression of gestational age and reaches a maximum after delivery.[5] The incidence rate of thromboembolic events related to pregnancy is three women per 1 000 Cesarean sections and it is also suggested that Cesarean delivery is associated with a fourfold increase in the risk of VTE incidence compared with vaginal delivery.[8]

Anticoagulant therapy must be initiated after deliberation of the potential benefits weighed against the haemorrhagic risk, despite the recommendations proposed by the European Society of Cardiology study group on PPCM that the prophylactic dose of oral anticoagulation drugs or LMWH should be administered in PPCM patients with reduced LVEF. The firm indications of anticoagulant therapy are for PPCM patients with intracardiac thrombus, detected by echocardiography, as well as complications of atrial fibrillation.

A limitation of this study was the inability to carry out extensive tests to rule out inherited coagulopathies using protein C and S levels and factor V Leiden mutation.

Conclusions

Peripartum cardiomyopathy is a rare but serious condition associated with significant morbidity and mortality that remains

poorly understood in terms of aetiology and pathogenesis. A multidisciplinary approach is key to ensuring early echocardiographic screening and adequate treatment. PPCM is a hypercoagulable state. Despite adequate therapy, the mortality in many regions remains high.

The key lessons are: (1) PPCM can be complicated with severe intracardiac thrombi, resulting in fatal pulmonary and systemic thromboembolism. Therefore, an aggressive management plan including drug-adherence counselling is key. (2) More research needs to be done to asses and compare different management modalities regarding the treatment of such case scenarios, including lytic therapy and anticoagulation therapies such as warfarin, heparin and novel anticoagulants.

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