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Peripartum cardiomyopathy following a spontaneous septic abortion in a second trimester twin pregnancy: A case report

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Abstract
Peripartum cardiomyopathy (PPCM) is a dreadful complication at the end of pregnancy or in the months following delivery. It is associated with Left ventricular dysfunction and Systolic heart failure. PPCM risk factor includes maternal age > 30 years, multiple gestational pregnancies, African American woman, Hypertension and Pre-eclampsia. Reported Incidence of these cases are variable based on geographical locations. Research in the past has suggested that PPCM is caused by vascular dysfunction, triggered by late-gestational maternal hormones and also multiple hit hypothesis. In this article we are presenting a case of Spontaneous Septic abortion of a Twin pregnancy during 2nd trimester in a Multiparous female who developed PPCM. After early detection and aggressive management she had good recovery from Sepsis and had improved Ejection fraction. Henceforth we emphasize on the need for early diagnosis and aggressive management after onset of PPCM which can lead to better clinical outcomes.

Keywords: Cardiomyopathies, pregnancy, peripartum, sepsis, ejection fraction

Introduction
Heart failure presenting in peripartum period was recognized in the literature as early as the 1800s by Virchow and others [1, 2]. The first large case series was published in New Orleans in 1937 [3, 4]. This entity remained poorly defined until the seminal publications by Demakis and Rahimtoola - and Demakis *et al.* [6] in 1971. The 2010 Heart Failure Association has revised definition of PPCM to "an idiopathic cardiomyopathy presenting with HF secondary to LV systolic dysfunction towards end of pregnancy or in the months following delivery where no other cause of heart failure is found" [7]. LVEF <45% with or without ventricular dilatation is used as a diagnostic criteria [7, 8]. Incidence varies from 1 in 100 deliveries in Nigeria [9] to around 1 in 20000 deliveries in Japan [10]. Risk factors include African American race [11-15], Pre-eclampsia & hypertension [16-19], multiple gestational pregnancies [20, 21], maternal age > 30 years. Pathophysiology is not clearly understood, there is research going on Vascular- Hormonal models. In these study models Bromocriptine was used a treatment option for PPCM. Management with dedicated Cardio Obstetrics team may lead to better outcomes. Treatment options include hemodynamic monitoring, prevention of fluid overload, judicious usage of Antibiotics, Loop Diuretics, Beta blockers, LMWH and Mechanical ventilator & Mechanical circulatory support as required. Worse prognosis is seen with patients with lower LVEF, Dilated LV, African American race and Delayed diagnosis. Sepsis during peripartum period needs to be managed as per Sepsis guidelines and care should be taken to prevent Fluid overload. Long term outcomes may vary from complete recovery to persistent heart failure and in severe cases may lead to mortality. There is increased risk of PPCM in further pregnancies, so patient should be counseled and managed by dedicated Cardio Obstetrics team. Duration of treatment after clinical recovery and newer treatment options are yet to be explored.

Case Presentation
Index patient is a 29year old female with regular menstrual cycles who was presently G5P4L4 with Twin pregnancy in Second trimester (17 weeks Gestational Age). She had complaints of fever for 2 days for which she took Antipyretics following which she had a spontaneous abortion. She was initially managed at another hospital where fetal imaging done which showed IUD of Twin pregnancy. Her labs showed Hemoglobin 7.8 gm/dl, TLC 19,400 cells/ cumm with

normal platelet counts. Transthoracic Echocardiography showed EF 56% without signs of Heart failure. Plan was to deliver dead fetuses next day. However she had spontaneous expulsion of Dead fetuses after which she had developed High grade fever, 1 episode of vomiting, breathlessness, hypotension, tachycardia and tachypnea. Patient was referred to our center. In ER she was Drowsy and was not oriented, BP was 80/50 mm Hg, Pulse 144/ min regular, respiratory rate of 40 cpm, Room air Saturation was 73. In view of impending respiratory failure patient was kept on Ventilator support.

Chest X ray showed Blunting of Costophrenic angle and appearance of Kerley B Lines which was suggestive of acute pulmonary edema. Labs showed raised TLC 35000/cu mm. NT-pro BNP was raised 21900ng/ml, elevated D-dimer18002 pg/ml. ABG showed metabolic acidosis. ECG was showing Sinus tachycardia. Transthoracic Echocardiography showed LVEF 40 with Mild LV dysfunction. HRCT Chest was done which showed central GGO's in bilateral perihilar regions, bilateral minimal to mild pleural effusion, bilateral symmetrical consolidatory collapse with air bronchogram involving bilateral lower lobes, f/s/o Aspiration Pneumonia. USG Abdomen showed a Bulky Uterus (Post-Partum status) with thickened endometrium and few tiny echogenic foci. Blood, Urine and Endo tracheal cultures were sent which were sterile. In the mean while she was started on Antibiotics as per Sepsis guidelines, Ionotrope, Loop diuretics, Beta blockers, Anticoagulants, Antipyretics, Bronchodilators, Fluid restriction and other supportive treatment given. Cardiology and Obstetrics cross consultation was taken.

Patient had gradual recovery and was weaned off ventilator & ionotrope support by Day4 of admission. On Day5 repeat Trans thoracic Echocardiography showed Improvement of LV function (LVEF-55%). Patient was discharged and was on Out-patient follow up. After 2 weeks her repeat TLC was 6100/cu mm, NT-pro BNP was 728 pg/ml with no signs of Heart failure.

Discussion

European Society of Cardiology 2025 guidelines define PPCM as "HF with reduced left ventricular ejection fraction (LVEF)<45%, without any other cause of HF, that occurs mainly during the peripartum period or in the months following delivery, termination or miscarriage" [22]. Incidence is 1 in 2000 deliveries worldwide [23] and varies as per geographical location. Risk factors include Malnutrition, Family history, Previous PPCM, Genetic factors, Geographical location, Ethnicity, Maternal age <20 or >40 years, Multiparity, Multifetal gestation, Smoking, Diabetes, Hypertension and Pre-eclampsia.

Pathogenesis of the disease is poorly understood. Vascular hormonal hypothesis was postulated to be causative. Recent trials are showing "Multiple hit" theory to be causative of PPCM following accumulation of Genetic and Environmental risk factors. Genes involved in the disease expression include TTN, BAG3, FLNC& DSP [24, 25]. Endothelial dysfunction is believed to be due to increase in 16 kDa prolactin and sFlt-1(soluble fms-like tyrosine kinase 1) receptor. Bromocriptine is used in cases where 16 kDa prolactin is increased as a Disease specific therapy [26-29]. Diagnostic tools include Acute Heart failure features (History & Clinical examination), Electrocardiogram, Chest X ray, Raised Natriuretic peptide levels, Transthoracic Echocardiography, Cardiac MRI in some cases.

Patients with Subtle signs of Heart failure are generally misdiagnosed as changes associated with physiological changes of pregnancy especially during postpartum period. In cases where both PPCM & Pre-eclampsia was present there were poor neonatal outcomes, However Recovery of Cardiac function was better (LVEF>50%) [30]. General principles of Heart failure management are followed with changes done as per fetus toxicity. Loop Diuretics and Beta blockers are generally considered safe, these agents were given in our Index case. Spironolactone can be used during lactation. Bromocriptine can be considered for cases of Moderate to severe heart failure cases following PPCM. Patient should also be counseled about Lactational suppression effect of using Bromocriptine vs Benefits of usage of drug. Trials were done comparing 1 week vs 8 weeks regimen with Bromocriptine following PPCM, there was similar recovery in both groups. LMWH needs to be added when considering treatment with Bromocriptine considering its pro thrombotic risk [31].

Risk stratification at presentation can be done by considering presence of worse prognostic factors as mentioned above, hemodynamic parameters and cardiac biomarkers & EF. Mechanical circulatory support like LVAD, ECMO and other devices can be considered in cases where there is prolonged requirement of circulatory support. Sudden cardiac death is seen with cases of LVEF< 35%, Wearable Cardioverter Defibrillator is useful as a bridging tool till recovery [32]. Myocardial recovery following PPCM is defined as LVEF>50%. Recovery is seen in around 46% cases after 6 months (25%-62% as per geographical location) [33]. Maternal mortality at 6 months following PPCM is 6% and most common cause of death is Cardiac arrest. Women planning pregnancies following PPCM have higher chances of relapse of Heart failure. Patients should be counseled about available Contraception methods, and patient to be advised not to conceive in extremely high risk cases. If patient insists on proceeding with pregnancy Cardio Obstetric team who are well versed with these cases need to follow up the patient closely. Patient cardiac markers, EF, Natriuretic peptide levels should be periodically monitored. If patient is already taking Heart Failure medications, they should be modified as per fetal safety profile.

Conclusion

Peripartum cardiomyopathy is a relatively rare complication encountered at the completion of pregnancy, termination or miscarriage. Pathophysiology of this disease is yet to be discovered completely. Multiple hypothesis regarding its pathogenesis is postulated. As per previous clinical research few risk factors were proven to have poor clinical outcomes. Involvement of dedicated Cardio Obstetric team can lead to better clinical outcomes. Extreme caution should be should be exercised in differentiating Early stages of Heart failure from Physiological changes seen during postpartum period. A good clinical examination along with Natriuretic peptide levels and transthoracic echocardiography will help in early diagnosis. Treatment options include Loop diuretics and Beta blockers which are considered safe in prepartum, intrapartum and postpartum periods. Other drugs used in Heart failure management are not considered safe because of their potential fetal toxicity. Bromocriptine as a frontline treatment option is still under research. In cases of prolonged circulatory support requirement LVAD, ECMO devices can be considered. In cases where LVEF<30% WCD should be considered till myocardial recovery to prevent Sudden cardiac death. Even after Myocardial recovery patients need to be followed regularly as there is High chances of Relapse in further pregnancies. There are still many gaps left in understanding pathogenesis and optimal treatment protocols which need to be addressed.

Declarations

Abbreviations: PPCM= peri-partum cardiomyopathy, LV= Left ventricle, EF= Ejection fraction, TLC= Total leukocyte count, NT-pro BNP= N terminal pro Brain natriuretic peptide, HF= Heart failure. LVAD= Left ventricular assist device, ECMO= Extracorporeal membrane oxygenation, WCD= Wearable cardioverter defibrillator

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