

Peripartum Cardiomyopathy: An Overview of Maternal and Fetal Outcome

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Abstract

Background: Peripartum cardiomyopathy, also known as pregnancy related cardiomyopathy, is a rare illness wherein women who have never had heart disease acquire an idiopathic form of left ventricular systolic failure between the last month of pregnancy and five months after giving birth. Several hypothesised explanations have been put forth, such as hormone imbalances, inflammation, viral infections, autoimmune reaction, and genetic predisposition.

Aim: To study the clinical characteristics, perinatal and obstetric outcomes in women with peripartum cardiomyopathy.

Materials and Methods: This prospective study was conducted in our Department of Obstetrics and Gynaecology, DMCH, Laheriasarai, Bihar in a total of 20 patients with Peripartum Cardiomyopathy within a period of 1 year (November 2021 to October 2022).

Inclusion criteria:

- 1) A cardiac event developing in the final month of pregnancy or within five months of birth.
- 2) Lack of a different cause of heart failure.
- 3) No heart conditions prior to pregnancy.

Exclusion criteria:

- 1) Parturients with a previous heart disease.
- 2) Pregnant women or women who delivered with a heart disease developed outside the standard time limit.

Result: The majority of patients complained of exertional dyspnea, and the mean LVEF was 38% at the time of diagnosis. Three cases of maternal fatalities occurred, and in all three cases, the ECHO revealed global hypokinesia and NYHA Classes III and IV. Two patients who were NYHA Class 4 patients died intrauterinally. 5 patients gave birth to IUGRs.

Conclusion: Pre-eclampsia, anaemia, and multiple gestations were linked risk factors that contributed to the bad prognosis for the mother when patients arrived at our clinic with Heart Failure and lower LVEF. It is crucial to identify the disease as soon as possible because its clinical manifestations might be subtle and have a significant risk of morbidity and mortality, particularly in the first three months after childbirth. Taking into account all of these variables, a

multidisciplinary strategy (a team consisting of a cardiologist, perinatologist, obstetrician, and anaesthetist) is necessary for a healthy pregnancy result.

Keywords: Cardiomyopathy, exertional dyspnoea, hypokinesia, ECHO, NYHA Class III and IV.

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Introduction

Peripartum cardiomyopathy also known as pregnancy associated cardiomyopathy is an uncommon condition in which an idiopathic form of Left Ventricular systolic dysfunction develops between the last month of pregnancy and 5 months postpartum in women without previous heart disease. It is a form of systolic heart failure with reduced Left Ventricular Ejection Fraction (LVEF) affecting child-bearing women during pregnancy or in the early postpartum period. Several hypothesised explanations have been put forth, such as hormone imbalances, inflammation, viral infections, autoimmune reaction, and genetic predisposition.

PPCM is a diagnosis of exclusion in women presenting with Heart Failure due to LV systolic dysfunction and should be considered when no other cause is evident.

The first proposed criteria by Demakis and Rahimtoola:

1. The onset of heart failure in the fifth month after birth or during the last month of pregnancy.
2. The lack of any further causes of heart failure.
3. No heart conditions prior to pregnancy.

Also they proposed the addition of Left Ventricular Systolic Dysfunction with LVEF<45%, a fractional shortening <30%, or both with or without an LV end-diastolic dimension >2.7cm/m².

Although it only affects 0.1% of pregnancies and only affects pregnant women who were previously healthy, it has a significant morbidity and mortality rate of 7% to 50%. The result of PPCM is extremely unpredictable. Preeclampsia, advanced

maternal age, many pregnancies, multiparity, obesity, chronic hypertension, and prolonged tocolytic usage are risk factors. PPCM is more common among older, higher-parity women who are at the extremes of childbearing age.

Aim and objective of study

To study the clinical profile alongwith obstetric and perinatal outcome in women with Peripartum Cardiomyopathy.

Materials and Methods

This study was conducted in Department of Obstetrics and Gynaecology, Darbhanga Medical College and Hospital, Laheriasarai, Bihar in a total of 55 delivered with symptoms of heart failure patients with Peripartum Cardiomyopathy within a period of 1 year (November 2021 to October 2022).

Inclusion criteria:

- 1) A cardiac event developing in the final month of pregnancy or within five months of birth.
- 2) Lack of a different cause of heart failure.
- 3) No heart conditions prior to pregnancy.

Exclusion criteria:

- 1) Parturients with a previous heart disease.
- 2) Pregnant women or women who delivered with a heart disease developed outside the standard time limit.

This retrospective observational study was conducted on all antenatal women who were admitted to the labour ward of this hospital and who presented with heart failure in the final month of pregnancy through five months after delivery, without a history of heart disease. The study included all

antenatal women in the reproductive age range of 18 to 40 years.

Reviewing the records in the labour and delivery ward delivery register, the obstetric OT, case notes from the medical records department, and records of the new-born special care unit throughout a one-year period, from November 2021 to October 2022, provided the materials for this study.

For each patient data collected on a standardized form.

Epidemiological Data

1. Age
2. Parity
3. Gestational age
4. Type of lesion
5. Duration of disease
6. Time of diagnosis
7. Risk factors
8. Treatment history
9. NYHA class
10. Maternal complications
11. Mode of delivery & indication of caesarean section.
12. Neonatal outcome & admission to NICU.

Clinical and Laboratory Data

1. ECG
2. Chest X-ray films
3. Echocardiograms

4. Haemoglobin levels on diagnosis
5. Treatments and course in ICU.

All echocardiograms were performed in the hospital echo-lab by a trained cardiology echocardiographer.

Echocardiograms were obtained for diagnosis and shortly following diagnosis as per protocol.

All patients went through at least one detailed fetal ultrasound scan during pregnancy and were cared for by an obstetrician during pregnancy.

Results

25 of the 55 patients who gave birth throughout the time of my study had cardiac problems. The peripartum cardiomyopathy affected 20 of these women. The average age at the time of presentation was 26 years, and there were 5 cases of multiparous. The majority of patients (18/20) complained of exertional dyspnea when they first arrived. At the time of diagnosis, the average LVEF was 38%. There were 5 cases of maternal mortality, and each one showed signs of global hypokinesia on the ECHO and NYHA Classes III and IV. Two out of twenty people had IUDs and were in NYHA Class IV. Two infants suffered IUGR.

Table 1: Age, Parity, Onset of Symptoms

Factors	No. Of patients (n=20)	Percentage
AGE (YEARS)		
18-20	4	20%
21-25	8	40%
26-30	4	20%
>30	4	20%
PARITY		
Primigravida	08	40%
Multigravida	12	60%
ONSET		
37-42 weeks	16	80%
Within 1 week after delivery	03	15%
After 1 week of delivery	01	5%

1. This table shows that out of total 20 subjects 1/3rd were in the age group of 21-25 years.
2. 12 out of 20 (60%) were multigravida while 40% were primigravida.
3. The onset of peripartum cardiomyopathy peaked around 37–40 weeks, when 80% of cases occurred, followed by 15% within one week of birth and 5% beyond the first week.

Table 2: Presenting features and risk factors

NYHA Grading		
1	3	15%
2	5	25%
3	10	50%
4	2	10%
Anaemia	5	25%
Multiparity	8	40%
Hypertensive disease	5	25%
Twin gestation	2	10%

1. According to the study, 50% of the peripartum cardiomyopathy cases fell into NYHA Grade 3, with 25% falling into Grade 2.
2. In this study, gestation of twins, anaemia, and hypertension during pregnancy were risk factors for peripartum cardiomyopathy.

Table 3: Investigations

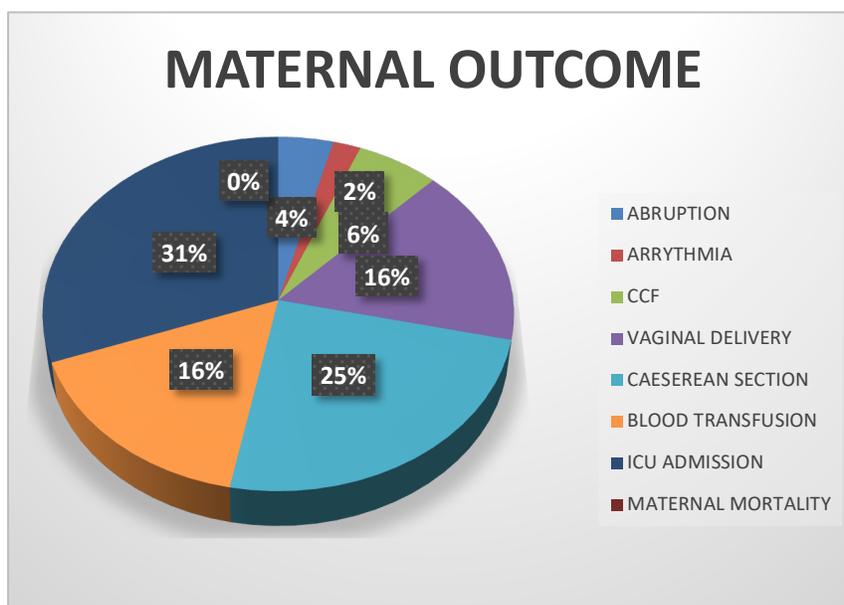
Investigations	No. Of patients(n=20)	Percentage
ECG Changes		
AF	1	5%
Sinus Tachycardia	8	40%
ECHO-Ejection Fraction		
<=25	2	10%
26-35	6	30%
36-45	12	60%
Mitral Regurgitation(trivial)	18	90%
Tricuspid regurgitation(trivial)	18	90%
Left ventricular hypertrophy	4	20%
Left atrial enlargement	3	15%

1. This table displays the results of the investigations into the peripartum cardiomyopathy cases in women.
2. 8 out of 20 patients (about 40%) on the ECG showed sinus tachycardia.
3. The majority of the cases (60%) had an ejection fraction of between 36 and 45%, while only two cases (2% of the total) had an ejection fraction of less than 25%.
4. All of the cases had tricuspid and mitral valve regurgitation, but only four of them also had left ventricular hypertrophy and three of them had enlarged left atrial chambers.

Table 4: Maternal Outcome

Abruption	2	10%
Arrythmia	1	5%
CCF	3	15%
Vaginal delivery	8	40%
Caesarean section	12	60%
Blood transfusion	8	40%
ICU admission	15	75%
Maternal mortality	5	25%

1. In this study, abruption occurred in 2 cases (10%), congestive heart failure in 3 cases (15%), and arrhythmia in 1 case (5%). 12/20 (60%) women received caesarean sections for obstetric reasons, compared to 8/20 (40%) vaginal deliveries.
2. Blood transfusions were necessary in 8 instances (40%) and ICU hospitalisation in 15 cases (75%) respectively.
3. Among the 20 total cases, 5 (or 25%) were maternal deaths, and all 15 survivors had extended stays.



Graph 1

Table 5: Fetal outcome

Fetal outcome	No of patients(n=20)	Percentage
Intrauterine fetal death	2	10%
NICU admission	7	35%
Cause of NICU admission	No. of patients(n=7)	Percentage
IUGR	4	57.1%
Respiratory distress	3	42.8%

- This table displays the foetal outcome with NICU admission, which was necessary in 7 cases (35%) and resulted in 2 (10%) neonatal deaths.

- Of of 7 NICU admissions, 2 (42.8%) experienced intrauterine death and 4 (57.1%) had intrauterine growth retardation.

Discussion

A somewhat uncommon condition called peripartum cardiomyopathy makes the peripartum period more difficult. Being a condition that must be excluded, PPCM has an unknown etiopathogenesis. Several unsubstantiated aetiologies have been proposed, including selenium deficiency, extended tocolysis, autoimmune factors, inflammatory mediators, pregnancy-mediated aberrant hemodynamic response, infectious viral triggers, myocarditis, and autoimmune factors. A 16kDa prolactin fragment has also been proposed as the mediating factor for PPCM. Its diagnosis is based on heart failure-related signs and symptoms, with no other plausible causes having been identified within the preceding five months or within one month after delivery. Patients with PPCM present in a variety of ways. Individuals can range in symptom severity from minimal to NYHA Class IV. In addition, a high index of suspicion is necessary for diagnosing PPCM due to the symptoms of early PPCM significantly overlapping those of pregnancy-related physiologic changes. Signs and symptoms of pregnancy and other pregnancy-related diseases, such as anaemia, include pedal edoema, dyspnea with exertion, orthopnea, and persistent cough. These symptoms might delay diagnosis.

Nonetheless, NYHA functional Class III or IV is the most typical first appearance. Even cardiac arrest and ventricular arrhythmia can occur in some people. The most prevalent symptom at presentation in this study was dyspnea on exertion, NYHA Class III. ECHO is useful for determining the diagnosis of PPCM among clinical, echocardiographic, and hemodynamic factors that have been previously demonstrated. The loss of the placental low resistance bed results in an

increase in afterload, which has the opposite effect of the fetus's delivery, which reduces the metabolic demands on the mother. To save the mother's life, it is always preferable to end the pregnancy. Due to the low risk of complications, vaginal delivery is the preferred method of delivery.

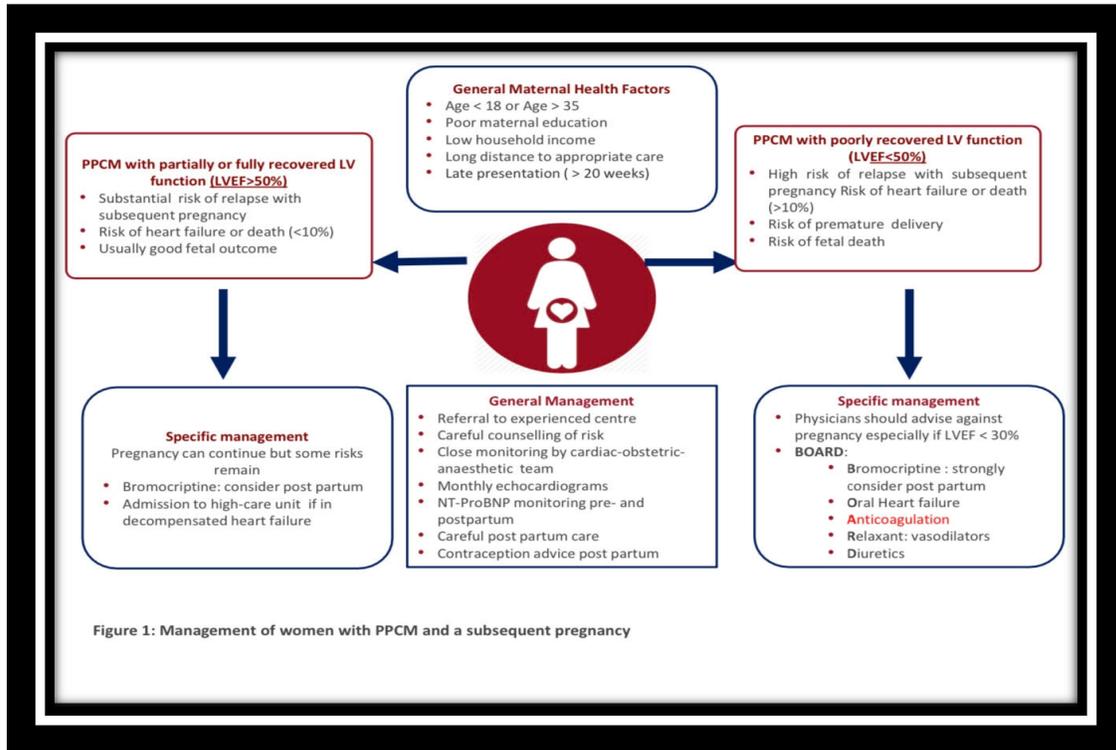
Upon diagnosis, patients were handled in the ICU by a multidisciplinary team that included obstetricians, cardiologists, and specialists in maternal-fetal medicine. Diuretics, beta blockers, ACE inhibitors, nitrates, and breathing support were all used in the course of treatment.

According to the theorised aetiology, the use of pentoxifylline, Intravenous immunoglobulin, immunosuppressive therapy, and bromocriptine are newer techniques of therapy that can aid with the management of PPCM and reduce maternal mortality. In the current study, maternal mortality was impacted by primary care centres' tardy referrals, and a small number of these women had postpartum heart failure presentations. Hence, in cases with PPCM, early identification and fast care are crucial steps for patient survival. In the postpartum period, cardiomyopathy and thromboembolism may persist. The hypercoagulable nature of pregnancy itself or blood stasis brought on by Left Ventricular Dysfunction may both contribute to Thromb boembolism in PPCM.

Left ventricular thrombus is common in PPCM patients with a LVEF of <35%.

The advice is to take into account starting anticoagulation early and continuing it for at least 6 months after delivery. For 6–12 months, PPCM treatment must be continued. Increased rates of heart failure relapse and an increase in mortality are linked to recurrent

pregnancies in the PPCM population, particularly in patients who have persistent LV dysfunction



- Adequate post diagnosis counselling, including future pregnancies and prognosis
- Counselling and education of families
- Prescription of formula milk provided if women is not breastfeeding
- Adequate dose of heart failure medication
- Contraceptive advice provided
- Referral to appropriate centre if unable to come back to expert centre
- Referred to social worker if unable to work/low income circumstances



- Contraception (Female)**
- Intrauterine contraceptive device (e.g. Mirena or copper IUCDs)
 - Oral contraceptive (combined or progestin only pills)
 - Depomedroxyprogesterone acetate (DMPA) injections
 - Tubal ligation
 - Diaphragm
 - Contraceptive implants
 - Contraceptive patch
 - Hysteroscopic tubal occlusion (HTO)
 - Vaginal ring
 - Safe period



- Contraception (Male)**
- Condom
 - Vasectomy



Figure 2: Post Discharge Check Box for women diagnosed with PPCM

Figure 3: Types of contraception

CENTRAL ILLUSTRATION Diagnosis, Management, and Outcomes for Peripartum Cardiomyopathy

Peripartum Cardiomyopathy (PPCM)

Definition:

- Non-ischemic cardiomyopathy with reduced LVEF (<45%)
- Commonly presents in the first months postpartum or towards the end of pregnancy

Risk Factors:

- African-American race, preeclampsia, hypertension, multigestational pregnancies, age >30 years

Symptoms:

- Heart failure symptoms can be confused with common symptoms of normal pregnancy

Management Options for PPCM

During Pregnancy:

- Beta-blockers, loop diuretics, hydralazine/isosorbide dinitrate, digoxin, low-molecular-weight heparin
- (No ACE/ARB/aldosterone receptor antagonists)
- MCS for severe heart failure/cardiogenic shock
- Consider early delivery if unstable

Delivery:

- Plan ahead with a Cardio-Obstetrics Team
- If unstable, consider hemodynamic monitoring and optimization
- Caution for fluid overload, especially after delivery

After Pregnancy:

- Heart failure management. Beta-blockers, enalapril, and spironolactone are compatible with breastfeeding.
- Anticoagulation for LV thrombus; consider if severe LV dysfunction (LVEF <35%)
- Consider a wearable cardioverter/defibrillator if severe LV dysfunction
- Discuss Contraception

Outcomes

Worse prognosis with lower LVEF, dilated LV, African-American race, and delayed diagnosis.

Long-term Outcomes

- After recovery, optimal duration of medication treatment is unknown
- In the case of stopping medications, wean gradually and observe closely
- Continue surveillance after recovery

Davis, M.B. et al. J Am Coll Cardiol. 2020;75(2):207-21.

Conclusion

1. The study came to the conclusion that the prognosis and maternal outcome were poor because the majority of patients presented to us in terminal phases of decreased LVEF and cardiogenic shock.
2. Pre-eclampsia, anaemia, and multiple gestations were linked risk factors that may have contributed to the poor prognosis.
3. Since the clinical manifestation of the disease can hide and cause substantial morbidity and mortality, especially within three months after childbirth, early diagnosis of the condition is crucial.

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