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Original Research Article

Peripartum cardiaomyopathy (PPCM): A 5 years experience at a tertiary centre

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Abstract

Background: In developed countries, maternal heart disease is one of the leading cause of maternal mortality, not only due to an increasing number of women with congenital heart disease (CHD) reach childbearing age but also because of the trend to delay motherhood until later in life, when medical comorbidities, such as chronic hypertension, diabetes, and obesity become more common. In low- to middle-income countries, common contributors to maternal death due to heart disease are typically rheumatic heart disease, cardiomyopathies such as peripartum cardiomyopathy, and uncorrected CHD. The purpose of this study is to identify the clinical risk factors associated with Peripartum Cardiomyopathy and the maternal and fetal outcomes in affected patients.

Materials and Methods: This is a 2 year prospective observational study conducted at a teaching institute and research center BLDE (DU) SHRI B.M. Patil Medical College Hospital and Research Center, Vijayapura from 1st Jan 2022 to 31st Dec 2023. All patients in their peripartum period diagnosed with cardiac failure by clinical and echocardiographic criteria were included in the trial. All the patient who were included underwent complete clinical examination and laboratory evaluation.

Results: A total of 35 women were diagnosed with Peripartum cardiomyopathy (PPCM) during the study period. It was mainly seen in patients between 35-37 weeks followed by 38-40 weeks. LSCS patients were more prone to Peripartum cardiac dysfunction than vaginal delivery patients. The ejection fraction was in the range of 36 - 40% in 37.1% of patients. However, mean EF was 35.94 ± 7.92. The most common risk factor was Eclampsia (40%) and second was post-partum hemorrhage leading to shock. The associated complications like Acute Renal Failure (ARF), Disseminated Intravascular Coagulation (DIC), HELLP syndrome, Thrombocytopenia were studied.

Conclusion: Eclampsia and postpartum hemorrhage are the leading contributors to the development of PPCM in this population. The findings underscore the importance of heightened surveillance in women with hypertensive disorders or significant obstetric complications. Early screening with echocardiography, particularly in high-risk pregnancies, can aid in prompt diagnosis and intervention. A multidisciplinary approach involving obstetricians, cardiologists, and intensivists is essential for improving maternal and fetal outcomes. Continued research and awareness are vital to developing region-specific protocols to reduce the burden of PPCM-related complications.

Keywords: Peripartum cardiomyopathy, Postpartum hemorrhage, Hypertensive disorders of pregnancy.

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1. Introduction

Cardiovascular disease has been one of India's leading causes of maternal mortality, with an incidence of 0.75 per 1000 live births. During pregnancy hypertensive emergencies can develop increasing the risk for the fetus, including pulmonary oedema at lower blood pressure levels compared to non-gravid women. Treatment of hypertension can prevent the progression to HF and decrease the risk of maternal and foetal complications.[1]

During pregnancy, various crucial adaptations in the cardiovascular system occur which are necessary for the progression of successful gestation. Maladaptation of the cardiovascular system during pregnancy in previously healthy women can lead to complications that may cause maternal and fetal morbidity and mortality. Cardiovascular complications during pregnancy may put the mother at risk to develop cardiac dysfunction and subsequent heart failure (HF).[2-4]

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Significant differences in cardiac conditions noted with uncorrected CHD compared to those in corrected CHD, with a markedly worse outcome, particularly in pregnant women with Eisenmenger syndrome and from emerging countries.[5]

The hemodynamic stress of pregnancy can lead to obstetric and cardiac complications in women with heart disease, particularly cardiac complications are common and occur in 5% to 15% of pregnancies in women with heart disease.[6] Hemodynamic stress like postpartum hemorrhage can trigger postpartum cardiomyopathy.[7]

To meet the hemodynamic changes during pregnancy, the heart undergoes structural and functional changes.[8] Indeed, metabolic changes in GDM, elevated blood pressure, and vascular resistance in PE and GH, and LV structural and functional changes in PPCM may all negatively affect cardiac function and may promote HF development.[9]

In various stages of disease progression, PE patients have been reported to exhibit decreased cardiac output, higher LV afterload, increased LV mass and wall thickness and diastolic dysfunction.[8,9]

2. Materials and Methods

All pregnant and postpartum women within who were admitted in BLDE (DU), Shri. B.M. Patil Medical College Hospital and Research Centre, Department of Obstetrics and Gynecology, who were diagnosed with cardiac failure were enrolled into the study.

All patients complaining of breathlessness, decreased saturation either antepartum and postpartum were subjected to Echo.

All pregnant and postpartum women diagnosed with PPCM with the following criteria (Pearson's criteria):[10]

1. Development of cardiac failure in last month of pregnancy or within 5 months after delivery.
2. Absence of an identifiable cause for cardiac failure.
3. Absence of recognizable heart disease prior to last month of pregnancy,
4. Left ventricular systolic dysfunction demonstrated by classic echocardiography criteria, such as depressed ejection fraction or fractional shortening along with a dilated left ventricle.

The patients with known structural cardiac disease or Rheumatic Heart disease and congestive cardiac failure due to severe anemia were excluded from the study.

The clinical predictors like age, parity, gestational age, hypertension, eclampsia, any infection, blood loss, multiple pregnancy and placenta accreta syndrome was noted. The prognosis was studied depending on the different etiological factors, complications developed during treatment, findings on ECHO and treatment method used.

3. Results

A total of 35 patients were studied. Most patients were in the age group of 21-25 years, but other patients with < 20 years also had an increased risk. Almost 91.4% of patients belonged to rural areas and were housewives.

Most of the time, Peripartum cardiac failure develops in the antepartum period but, it was surprising to see more patients diagnosed in the postpartum period.

It was mainly seen in borderline preterm patients i.e., between 35-37 weeks followed by 38-40 weeks. Most patients underwent emergency LSCS (54.3% vs 2.9%) and 42.9% of patients had vaginal deliveries (**Table 1**).

The ejection fraction (EF) in the study population was 36 - 40% in 37.1% of patients (**Table 2**). However, mean EF was 35.94 ± 7.92. Patients along with reduced EF had pulmonary HTN in 22%, 40% had Mitral regurgitation and 14.3% had Tricuspid regurgitation.

Almost 50% of patients had associated complications like Acute Renal failure (22.9%), HELLP Syndrome (17.1%), DIC (11.4%) and isolated thrombocytopenia (2.9%) and most of these complications were seen in preeclamptic patients; about 65.7% needed ICU admissions, 54.3% required ventilatory support, and 51.4% needed inotropes. All of the patients needed at least more than one week of stay in the hospital. Around 20% needed more than 2 weeks (**Table 2**).

Out of 35, 26 neonates had good outcome whereas 5% of them were IUD and 4 were fresh stillborn. Among the 26 live-born babies, 16 of them needed NICU admission of which 1 was admitted for meconium-stained liquor (MSL) (**Table 3**).

Most of the cases had high-risk factors. The most typical risk factor found in PPCF patients was Eclampsia and severe preeclampsia (40%), PPH (25%), Twins (11.4%) followed by grade 4 placenta previa, Abruptio placenta and morbidly adherent placenta, 5-7% of patients with puerperal sepsis developed Peripartum cardiac failure (**Figure 1**).

Women with HTN had a greater likelihood of left ventricular recovery than women without HTN. Neonatal death occurred most often in women with HTN and least often in women without HTN hence HTN was associated with a greater likelihood of an adverse neonatal outcomes-.

In our study of 35 patients, 8 (22.95%) patients died, 5 (14.3%) patients discharged against medical advice and 22 (62.9%) patients recovered with medical treatment and early diagnosis.

Table 1: Represents socio-demographic data of the stubjects

Socio-demographic profile of the study subjects (n=35)		
Variable	Frequency	Percent
Age group		
≤ 20 yrs	10	28.6
21 - 25 yrs	14	40
26 - 30 yrs	10	28.6
> 30 yrs	1	2.9
Mean ± SD	23.97 ± 4.32	
Area		
Rural	32	91.4
Urban	3	8.6
Occupation		
Engineer	1	2.9
Housewife	25	71.4
Labour	6	17.1
Nurse	1	2.9
Teacher	2	5.7
Onset of Cardiac failure		
Antepartum	12	34.3
Postpartum	23	65.7
Gestation		
28 - 34 weeks	4	11.4
35 - 37 weeks	18	51.4
38 - 40 weeks	12	34.3
> 40 weeks	1	2.9
Mean ± SD	36.66 ± 2.48	
Mode of delivery		
Elective CS	1	2.9
Emergency CS	19	54.3
Vaginal	15	42.9

Table 2: Represents clinical profile of the patients

Clinical profile of the patients (n=35)			
Variable		Frequency	Percent
Ejection fraction			
	< 25%	2	5.7
	25 -30%	9	25.7
	31 - 35%	7	20
	36 -40%	13	37.1
	40%-45%	4	11.4
	Mean ± SD	35.94 ± 7.94	
Associated findings			
	Pulmonary artery HTN	8	22.9
	Mitral Regurgitation	14	40
	Tricuspid Regurgitation	5	14.3
	Atrial fibrillation	1	1
Complications			
	DIC	4	11.4
	HELLP	6	17.1
	Renal failure	8	22.9
	Thrombocytopenia	1	2.9

Table 2 Continued…

Management			
	Inotrope usage	18	51.4
	Ventilator support	19	54.3
	SICU admissions	23	65.7
Duration of hospital stay			
	< 1 week	0	0
	1 - 2 weeks	19	80
	> 2 weeks	7	20
	Mean ± SD	10.23 ± 5.41	

Table 3: Represents maternal and neonatal outcome

Maternal and Foetal outcome (n=35)			
Outcome		Frequency	Percent
Maternal outcome			
	Recovered	22	62.9
	Death	8	22.9
	DAMA	5	14.3
Foetal outcome			
	FSB	4	11.4
	IUD	5	14.3
	LIVE	25	71.4
	MSL	1	2.9
	Neonatal Death	0	0

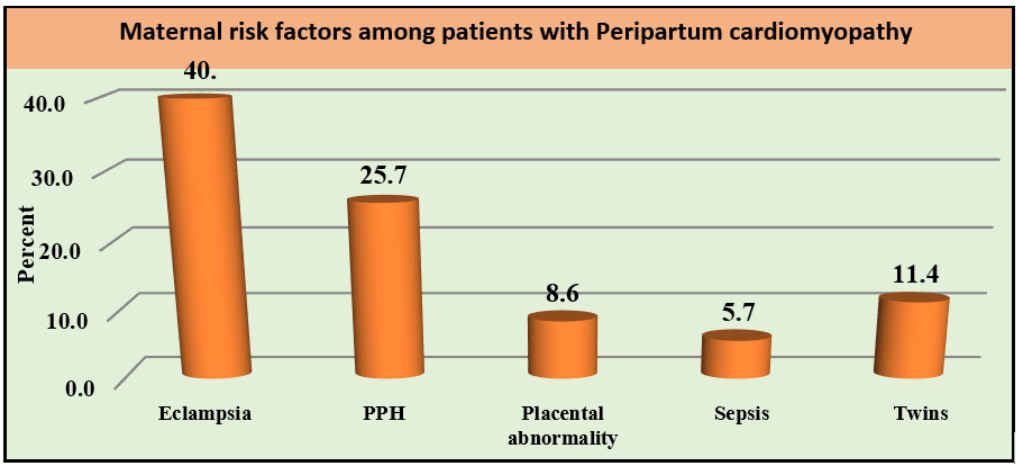

Figure 1: Represents complications of peripartum cardiomyopathy among subjects

4. Discussion

Study is conducted at teaching hospital. This is the tertiary care centre for entire district. Hence probability of receiving complicated cases is more. Analysing results showed that cardiac failure was seen mostly in gestational age of 35-37 weeks.

Women with Peripartum cardiac failure presented with intense symptoms and frequent signs of heart failure than those without HTN, despite having better baseline cardiac functions.

In a study conducted by Goland S, it was observed that out of 185 patients studied, many patients developed major

adverse events, i.e thromboembolic events were reported in 4 patients who were found to have left ventricular thrombus and 3 had severe embolic complications, including cerebrovascular accident, pulmonary embolism and left ischaemia.[12] In our study, out of 35 patients, maternal mortality was around 22.9%, and major adverse events like DIC were seen in only 4 patients constituting 11.4%, HELLP seen in 6 patients constituting 17.1%, thrombocytopenia seen in only 1 patient renal failure seen in 8 patients constituting 22.9%, ventilatory support was needed for 19 patients constituting 54.3% and SICU stay was needed for 65.7% i.e 23 patients.

According to our study, Peripartum cardiac failure was detected on day 1 for 17 patients on admission, constituting 48.6% and very few cases, not more than 5 cases were detected after 7 days of admission. Also, Peripartum cardiac failure was more common in rural domiciles, though the sample size is not big enough to be reliable according to this study.

Most of the cases had high-risk factors. The most typical risk factor was Eclampsia and severe preeclampsia (40%). Next common was PPH (25%). Twins also had an increased risk of Peripartum cardiac failure (11.4%). Patients presenting with placental abnormalities like grade 4 placenta previa, Abruptio placenta and morbidly adherent placenta were at increased risk of developing Peripartum cardiac failure. Around 5-7% of patients with puerperal sepsis developed Peripartum cardiac failure.

According to 2011-2013 study done by P Devabhaktuni, beta blockers were used in 6 (54.5%) patients, 4 normotensives received metoprolol, 2 hypertensives received labetalol and one patient received carvedilol, ivabradine was used for rate control in 4 (36.3%), ACE inhibitors received by 3 (27.2%), one patient in shock required levosimendan and one in refractory heart failure was given digoxin along with diuretics.[1313] According to our study, 6 (17.1%) patient were given Digoxin, 10 (28.6%) patients were treated with Furosemide, Furosemide plus Spironolactone was given for 13 (37/1%) patients, Torsemide plus Spironolactone for 7 (20%) patients, Ivabradine to control rate for 5 (14.3%) patients, Enoxaparin for 2 (5.7%) of the patients and one patient each respectively for Digoxin and Isosorbide Mononitrate SR.

Out of the 35 patients taken into the study, 12 patients came into the category of antepartum eclampsia and 23 patients with postpartum eclampsia. It was mainly seen in borderline preterm patients i.e., between 35-37 weeks followed by 38-40 weeks. Most patients underwent emergency LSCS (54.3% vs 2.9%) and 42.9% of patients had vaginal deliveries.

But according to the study done by Ali A in Pakistan, their maximum mode of delivery was vaginal delivery 52.7%, LSCS being 40.6%, assisted by instrumental delivery being 5.59%; whereas in our study maximum mode of delivery was LSCS 57.2%, vaginal delivery being 42.9%. Out of all this the major risk factor for most patients out of the total 91 patients studied was hypertension being 47.25% followed by diabetes mellitus 43.955 and smoking being 8.79%.[14] Out of the 35 patients 5 patients went for peripartum hysterectomy in which 2 due to PPH, 2 patients due to uterine rupture and 1 patient due to adherent placenta.

The condition usually presents with a marked depression of LV systolic function, and recent data have clearly demonstrated a strong relationship between the severity and persistence of LV dysfunction and the incidence of morbidity and mortality due to progressive heart failure and sudden death.[15]

5. Conclusion

Eclampsia is a major predisposing factor for PPCM, followed by PPH. Close monitoring of Hypertensive disorders/ PPH patients with screening by Echocardiography will help in early detection, better management of patients of PPCM. Meticulous monitoring by multidisciplinary approach will help in reducing the mortality and morbidity.

6. Source of Funding

None.

7. Conflict of Interest

None.

8. Ethical Approval

Ethical; No.: BLDE(DU)/IEC/592-I /2020-21.

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