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Pregnancy outcome in Peripartum Cardiomyopathy

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Abstract

Peripartum cardiomyopathy is a rare disease affecting women of reproductive age. Incidence of peripartum cardiomyopathy is less than 0.1% and has maternal morbidity and mortality rate of 5% to 32%. The aim of our study was, to study the clinical profile, prognostic factors, and the management along with obstetric outcome, in women with peripartum cardiomyopathy. This prospective hospital based observational study was carried out over 3 years at a rural tertiary care center. Antenatal women in reproductive age group of 20 years to 40 years attending the labour ward of a tertiary care center, presenting with peripartum cardiomyopathy, were included. Multiparas constituted 81% (9/11). Two cases (18.18%) developed persistent cardiomyopathy (persistent left ventricular dysfunction beyond six months of presentation). 4/11 (36.36%) women recovered clinically (those who became symptomatically better, breathlessness decreased, chest became clear) whereas the LV function recovered (ejection fraction increased) in 3 women (27.27%). Two women had thromboembolism and required thromboprophylaxis. Maternal mortality was 27.27% (3/11). 6/11 babies were small for date. There were 2 intrauterine deaths, and 1 neonatal death. 4/11(36.36%) women underwent cesarean section for foetal distress.

Keywords

Peripartum cardiomyopathy, maternal outcome, fetal outcome, Echocardiography, cardiovascular disease

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I. Introduction

Peripartum cardiomyopathy is a rare disease of unknown cause that affects women of reproductive age. Aetiology of peripartum cardiomyopathy is multifactorial, and is focused on the physiologic relationship between pregnancy and the postpartum period, infective origin, genetic, hormonal and metabolic changes [1-3].

The incidence of peripartum cardiomyopathy is less than 0.1% of pregnancies and is associated with a maternal morbidity and mortality-ty rate of 5% to 32%.

European Society of Cardiology Working Group on Peripartum Cardiomyopathy proposed the definition of PPCM as an idiopathic cardiomyopathy manifested as heart failure due to left ventricular systolic dysfunction toward the end of pregnancy or in the months after delivery when no other cause of heart failure is found. Thus, PPCM is a diagnosis of exclusion, suggesting that a broader definition would eliminate PPCM as a missed diagnosis. [4,5]

Studies [6-8] about the natural cause of peripartum cardiomyopathy estimate that more than half of these patients experience a regression in ventricular dysfunction, while about 25% evolve to death within 3 months due to heart failure, arrhythmias, or thromboembolism and the remaining patients develop dilated cardiomyopathy.

No consensus, therefore, exists regarding recommendations for future pregnancies in women who have peripartum cardiomyopathy. The persistence of ventricular dysfunction is associated with a high risk of complications and maternal death.

Medications used for treatment of PPCM like B Blockers, Diuretics, Hydralazine have effect on the perinatal outcome, thus posing challenge to the treating clinician. On the other hand, the recovery of ventricular function does not assure a good prognosis of the next pregnancy, in addition to the hypothesis about the recurrence of the disease, decreased EF, and heart failure in the peripartum period [9,10].

This study was carried out;

(1) To study the clinical profile and management of peripartum cardiomyopathy, and

(2) To analyze obstetric outcome of pregnancy in women with peripartum cardiomyopathy and factors associated with its prognosis.

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I. Patients and Methods

This prospective hospital based observational study was carried out over 3 years from 1st Jan 2013 to 31st Dec 2015 at a rural tertiary care centre after obtaining ethical committee approval.

All Antenatal women in reproductive age group of 20 years to 40 years attending the labour ward of a tertiary care centre who presented with heart failure in last month of pregnancy till 5 months postpartum, without previously having a heart lesion and then having ECG changes, ECHO findings suggestive of cardiomegaly, LVEDV (left ventricular end diastolic volume) more than 2.7cm/m2 and EF (ejection fraction) less than 45, were included in the study.

Detailed history (demographic, obstetric, menstrual, past medical, past surgical, Family histories), physical examination, cardiovascular and respiratory system examination was carried out in detail. Women were subjected for routine investigations, ECG, ECHO and were monitored in cardiac intensive care unit. Standard heart failure therapy protocol was used. Ace inhibitors were avoided. Maternal and perinatal outcome was recorded in terms of mode of delivery, maternal complications such as arrhythmia, thromboembolism and IUGR, neonatal deaths.

An analysis of the occurrence of clinical events (heart failure, thromboembolism, cardiac arrhythmia, and death), and of ECG, and EF changes after parturition was performed.

Statistical analysis was done using SPSS software.

II. Results

Total number of deliveries during period from 1st Jan 2013 to 31st Dec 2015 was 6972.

During the same period, there were 54 antenatal women with heart diseases complicating pregnancy with a frequency of (54/6972) 0.774%. The frequency of Peripartum Cardiomyopathy was (11/6972) 0.157%. 5/11 women presented between 36 weeks of gestation and 40 weeks of gestation and 6/11 women presented postpartum within 8 days.

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Table 1 - showing the Mean age, Ejection Fraction, NYHA Grading, and presence of ECG alterations

Etiology	Mean age	Ejection Fraction in %	Parity 1 2 3	NYHA Grading I II III IV	ECG ALTERATION Present Absent
Peripartum Cardiomyopathy	29.76 yrs	39.5+_5.2	2 7 2	2 4 3 2	9 2

The mean age of women with peripartum cardiomyopathy and ventricular dysfunction was 29.76 years. 9/11 women were in functional class II/III/IV (NYHA), and all women had a history of heart failure and decreased ejection fraction on echocardiography. 9/11 had electrocardiographic alterations (right branch conduction disturbance, supraventricular and ventricular extra-systoles, left ventricular hypertrophy).

Table 2 - showing the risk factors for peripartum cardiomyopathy

Risk Factor	No Peripartum Cardiomyopathy	Peripartum Cardiomyopathy	X2, Value, OR, RR
Twin pregnancy	25	2	x2=90.43, P=<0.001 OR61.24, RR50.63
Hypertension during pregnancy	742	6	x2=22.09, P=<0.001, OR10.05, RR5.11
Moderate anemia	2412	8	x27.02, P=<0.0040 OR5.02, RR 2.09

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Table 2 shows the relative risk of developing Peripartum Cardiomyopathy in women with risk factors as twin pregnancy, hypertension during pregnancy and moderate anemia. There were 2 cases of twin pregnancies, 6 women had preeclampsia and 8 women had moderate anemia, these being the risk factors for development of Peripartum Cardiomyopathy.

Table 3 - showing the Characteristics of 11 women with peripartum cardiomyopathy.

	No	Age in years	Parity	Ejection fraction in%	Maternal complication	Mode of Delivery	Perinatal outcome
	1	28.3	One	32	Arrhythmia	CS	AGA
	2	30.2	Two	44	Nil	ND	SGA
	3	29	Two	29	Arrhythmia	ND	SGA
	4	28	Two	44	Nil	ND	IUD
	5	32.3	Three	43	Death (Arrhythmia, TE)	ND	SGA
	6	34	Two	42	Nil	CS	AGA
	7	28	One	29	Death Arrhythmia	ND	SGA
	8	28.6	Two	44	TE	CS	SGA, NND
	9	28	Two	43	Arrhythmia	ND	IUD
	1o	33	Three	39	Death CHF	——-	————--
	11	28	Two	45	Nil	CS	SGA

ABBREVIATIONS: CS - Caesarean section, AGA - Adequate for gestational age, SGA - Small for gestational age, NND – Neonatal death, ND - Normal delivery, IUD - Intrauterine death, TE - Thromboembolism, CHF - congestive heart failure.

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In the study 9/11 women were multiparous, the ejection fraction was in the range of 29-44 %, one case had EF of 45%, 5/11 women developed arrhythmia, there were 3 maternal deaths 2 being post-natal and 1 antenatal multiparous women who died of congestive heart failure. 6/11 women delivered vaginally spontaneously and 4 caesareans were done for obstetric causes, fetal distress being the most common cause in 3/4 women. 6/11 babies born were small for date. There were 2 intrauterine deaths, and 1 neonatal death (Table -3).

Table 4 - showing the Frequency of cardiac complications and ejection fraction post-partum in women with Peripartum cardiomyopathy

Group	**PPCM (Peripartum cardiomyopathy)**
Cardiac complications	8/11(72.72%)
Ejection fraction post-partum	Recovered in 3/11(27.27%)

8/11 women developed cardiac complications as arrhythmia, or thromboembolism as cardiac events. The ejection fraction recovered postpartum in 3/11 women.

Table no 5 - showing the recovery in women with PPCM (peripartum cardiomyopathy)

Recovery	Number
Recovered clinically	4(36.36%)
LV function recovered	3(27.27%)
Persistent cardiomyopathy more than 6 months	2(18.18%)

4/11 women recovered clinically as they became symptomatically better, breathlessness decreased, chest became clear but there was no increase in left ventricular ejection fraction. The LV function recovered (ejection fraction increased) in 3 women and 2/11 women had persistent cardiomyopathy for more than 6 months.

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III. Discussion

This prospective study emphasizes the outcome of pregnancy in patients who had peripartum cardiomyopathy with regards to age, functional capacity, and electrocardiographic and EF alterations in the echocardiogram.

Results showed clinical improvement of pregnancy in patients with peripartum cardiomyopathy who recover ventricular function.

Diversity in the clinical features of peripartum cardiomyopathy causes difficulties in making recommendations about future pregnancies, when the factors of its prognosis are still not clearly established [13].

Table 6 - showing comparison of maternal and perinatal outcome with other studies.

Author	Age	Parity(primi)	LV Function recovered	Maternal Thrombo-embolic events	Vaginal delivery	Maternal deaths	PNM//IUGR
Debasmita Et al (2011)		39%	48%	14 %		5/36(13.88 %)	2/36(5.55%) 2/36(5.55%)
Ours (2016)	29.76 yrs	18.18%	27.27%	18.18%	6/11(54.54 %)	3/11(27.27 %)	3/11(27.27 %) 6/11(54.54 %)

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In an Indian study by Debasmita et al (2011) [12], 14/36 (39%) were primiparas, 26 (72%) women clinically improved, in 17 (48%) women left ventricular functional status returned to normal, 5 cases (14%) developed persistent cardiomyopathy (persistent left ventricular dysfunction beyond six months of presentation), 5 (14%) had maternal complication as thromboembolism and there were 5 (14%) maternal deaths. 2 babies (5.55%) had IUGR and there were 2 (5.55%) neonatal deaths.

Studies performed by Albanesi Filho et al [14] and Sutton et al [15] showed, in a prospective analysis, good outcome, absence of mortality, or recurrence of peripartum cardiomyopathy in 11 pregnancies of women who had recovered ventricular function after a diagnosis of peripartum cardiomyopathy.

Our study found the twin pregnancy as one of the risk factors for Peripartum Cardiomyopathy. Our results are not in accordance with those of Elkayam et al [9] who found a reduction of 8% in EF in the postpartum period in women with peripartum cardiomyopathy.

Lampert et al [16] demonstrated that 7 patients with peripartum cardiomyopathy, who regained normal resting left ventricular size and performance had decreased contractile reserve revealed by the use of dobutamine. This data reported in the literature emphasize the need to revise current criteria of ventricular function recovery in peripartum cardiomyopathy. Perhaps current parameters based on conventional echocardiographic analysis are not enough to ensure a diagnosis of normal ventricular function in women with history of peripartum cardiomyopathy.

Another important aspect of the natural history of peripartum cardiomyopathy is the expectation of a better prognosis because of advances in the therapeutics of heart failure in recent decades. Recovery of ventricular function up to 50% reported in 1970s [3] is less than 75% reported in recent publications. Additionally, mortality rates among patients that remained with dilated cardiomyopathy also decreased from 85% to 30% because of the benefits of cardiac transplantation [17] and to the strategies of drug therapy for this group of patients [18].

In women who experienced peripartum cardiomyopathy in a previous pregnancy, but recovered left ventricular function may have good outcome in subsequent pregnancies. More Prospective studies are necessary to define the correct counseling for these women.

On the other hand, our study showed that the cardiac complication rate in women with peripartum cardiomyopathy with persistent ventricular dysfunction was high 8/11 with 3 maternal deaths. However, worsening of ventricular dysfunction was seen in twin pregnancy, a recognized factor of predisposition to peripartum cardiomyopathy.

It is worth mentioning that among clinical, echocardiographic, and hemodynamic variables previously shown, echocardiography is valuable for formulating prognosis of recovery and course of disease. [19]

Histologic findings of myocarditis in endomyocardial biopsies is controversial [20,21], we did not do any endomyocardial biopsies though, in some series it was

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significantly higher in peripartum cardiomyopathy [22].

Sodium and physical activity restrictions in association with drugs like digoxin and frusemide, which are not contraindicated in this period, help control heart failure during pregnancy. However, use of angiotensin-converting enzyme inhibitors is associated with side effects, such as oligohydramnios, IUGR, prematurity, fetal renal failure, bone malformation, and neonatal death [23].

Obstetricians should consider transferring such patients to a center that offers tertiary care services for both the mother and the fetus. If the mother is having less than 37 weeks' gestation, she should be transferred to a center with a neonatal ICU facility.

Delivering the fetus decreases the metabolic demands on the mother, but afterload increases due to the loss of the low-resistance placental bed.

Vaginal deliveries are preferred because they are associated with much lower rates of complications, such as endometritis and pulmo-nary embolism, 75% of which occur in association with cesarean delivery. In our study 6/11 women delivered vaginally. Caesarean section was performed for obstetric reasons in 4/11(36.36%) women, most common indication being foetal distress.

Use of Hydralazine, with or without nitrates, as an alternative to angiotensin- converting enzyme inhibitors during pregnancy shows that no obstetric and fetal contraindication exists regarding its use, during any phase of pregnancy [24].

Ventricular arrhythmias are usually complex and are related to death in patients with dilated cardiomyopathy, therefore, requiring effective control with antiarrhythmic drugs like amiodarone. [13]

Systemic or pulmonary thromboembolism is another frequent complication, described in more than half of the cases of peripartum car-diomyopathy with ventricular dysfunction. [13]

During pregnancy and the postpartum period, hypercoagulability, including activation of coagulation factors, increase in plasma fibrin-ogen, and platelet adhesion, increases the risk of thrombosis, which is aggravated by the need for prolonged rest due to congestive heart failure.

The treatment of PPCM needs to be continued for 6-12 months [25].

The Use of Pentoxifylline, IV immunoglobulin, immunosuppressive therapy, and bromocryptine [26] are the recent modes of therapy as per the etiology postulated, and is a ray of hope for management of PPCM, decreasing maternal mortality.

Peripartum cardiomyopathy has been referred to as a distinct entity from other dilated cardiomyopathies because of its relation to the peripartum period and the peculiarities of its natural history. However, because it is a rare disease, this prospective analysis may add to the data about a very controversial subject.

Our results enabled us to conclude that elderly women, twin gestation, PIH, anemia are potential risk factors for PPCM.

Left ventricular function is the determinant factor in pregnancy following the diagnosis of peripartum cardiomyopathy.

Based on our understanding and the available data, discouragement of a new pregnancy must be reserved for patients with peripartum

cardiomyopathy who have ventricular dysfunction.

Multidisciplinary approach (a team comprising of cardiologist, perinatologist, obstetrician, and anaesthetist) is required for successful pregnancy outcome. Therapeutics used for management of heart failure is to be used judiciously as they affect perinatal outcome.

It is incumbent for the intensivist to be cognizant of this disease as the clinical manifestations are masked and can be missed and is as-associated with high morbidity and mortality especially within 3 months postpartum. Therefore, it is important to assess risk factors by tools to stratify women at risk.

IV. Conclusion

Our results enabled us to conclude that elderly women, twin gestation, Pregnancy induced hypertension and anemia are potential risk factors for Peripartum cardiomyopathy. Left ventricular function is the determinant factor in pregnancy following the diagnosis of peripartum cardiomyopathy. It is incumbent for the intensivist to be cognizant of this disease as it is associated with high morbidity and mortality. Therefore, it is important to assess risk factors by tools to stratify women at risk.

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