Original Research Article

Profile of peripartum cardiomyopathy cases and outcome on maternal cardiac status with six month follow up

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Abstract

Background: Peripartum cardiomyopathy (PPCM) is a rare type of cardiomyopathy of unknown aetiology associated with significant mortality and morbidity and characterized by heart failure in late pregnancy or puerperium. Diagnosis remains a challenge, as PPCM symptoms vary and may mimic those commonly experienced by women during pregnancy and postpartum. **Objectives**: to evaluate profile of peripartum cardiomyopathy in pregnant women and analyze their outcome on maternal cardiac status with six month follow up. **Methods**: In this retrospectively designed study all patients admitted with the diagnosis of acute severe PPCM at three service hospitals in the country located in central India, North-eastern and western region, meeting the inclusion criteria over a period of 7 years, were enrolled and followed up for 6 months post partum. The LVEF and Left ventricular end diastolic dimension (LVEDD) was assessed by echocardiography at baseline, 3 months and six month postpartum. Mortality and survival with normal or depressed ejection fraction were determined. Predictors of outcome were evaluated. **Results**: The presentation of the cases of in our setup was different and outcome was much better than most of the reported series. In our cases, in majority acute deterioration in unregistered cases in NYHA Class IV in multi-gravida was noted. In follow up for 6 months, there was only one mortality noted unrelated to cardiomyopathy. **Conclusion**: We conclude that our subset of PPCM cases had different risk factors such multiparity, advance age, poor socioeconomic status, hypertension and to colitis use as risk factors. New drugs were used prior to the pregnancy, such as pentoxyphyline, bromocriptine and cabergoline along with digoxin, diuretics and continuation of beta-blockers. Newer interventions such as plasmapheresis, immunoadsorption, ventricular assist devices and heart transplantation were not used. One mortality case was noted in 6 month follow up.

Keywords:Beta-Blockers, Congestive Heart Failure (CHF), Heart Failure, Peripartum Cardiomyopathy.

Introduction

Congestive heart failure (CHF), occurring during the peripartum period, was first described in 1849.[1] However, it was not until the 1930s when it was officially recognized as a clinical entity occurring as a consequence of pregnancy.[2] In the 1970s, a 20-year experience following 27 patients who developed cardiomegaly in the puerperium was published, and the term peripartum cardiomyopathy (PPCM) was established by Demakis and Rahimtoola in 1971.[3] Since then, we have developed a greater understanding through data

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collection and improved diagnostic methods resulting in PPCM becoming a well-defined form of Heart Failure.

The clinical course varies between complete recovery to rapid progression to end stage heart failure and even death. Standard heart failure treatment, with adjustments for women who are pregnant or lactating, is the treatment of choice. Disease specific therapeutic strategies, including prolactin blockade, show promise. National and international registries and collaborative research efforts are warranted to characterize this disease better and to develop novel treatments that can improve outcomes.[4]

Proposed etiologies and patho-physiological mechanisms of PPCM are inflammation, infection, abnormal immune response to pregnancy, abnormal response to haemodynamic stress of pregnancy, increased myocyte apoptosis, abnormal hormonal response, increased adrenergic tone, excessive prolactin production and genetics.[5]

Today PPCM remains a rare yet significant cause of maternal morbidity and mortality. This was common in African population. Being a relatively rare entity, there are small sample studies only available.[6,7] The variety of risk factors describes by different authors have further confused the issue .In this study we have tried to analyze the cases of heart failure in peripartum period in weather registered or unregistered cases of primi as well as multi-gravida. All singleton pregnancy which by chance with normal and presentation delivered as per available practices of assisted vaginal delivery or planned cesarean section.

This study was conducted to evaluate profile of peripartum cardiomyopathy in pregnant women and analyze their outcome on maternal cardiac status with six month follow up.

Material and Methods

This retrospective study was conducted on 27 pregnant women in a tertiary care hospital of Central India, in June 2019 to June 2020. All consecutive PPCM patients admitted for management of acute heart failure were enrolled in the study. Ethical clearance was taken from the institutional review board. Being a retrospective study, written informed consent was not taken from the patient or their relatives.

PPCM was defined as estimated LV ejection fraction of less than 45% with no other obvious cause of LV dysfunction in the last month of pregnancy or 5 months postpartum.

PPCM patients admitted for management of heart failure of age more than 18 years were included in the study. Patients having past history of congenital heart disease with or without corrective surgery, valvular heart disease, coronary artery disease, severe sepsis, alcohol abuse, chemotherapy and any history of chest radiation were excluded from the study.

Demographic, clinical and echocardiographic parameters were recorded at the time of enrollment. LVEF was calculated by eyeballing method. LVEDD was taken in parasternal long axis view. Clinical evaluation and echocardiography was done neat first contact in all patients, 3 months and 6 months in surviving patients.

Complete recovery was defined as LVEF more than 50% and recovery with depressed ejection fraction was defined as ejection fraction less than 50%.

All patients received the guideline recommended standard medical treatment for heart failure wherever applicable. The primary end point was the 6-month outcome (mortality verses survival with normal or depressed ejection fraction).

All the data was collected and transferred in MS excel format. Descriptive analysis with mean ± standard deviation (SD) was calculated for numerical variables. Frequencies with percentages were given for categorical variables. Chi square test was applied to find the significant correlation between the variables and outcome by using SPSS version 21.

Results

A total of 27 women were included in the study. Mean age of the study population was 29±5.6 years (range 20-40). Outcomes of the patients 25(92.5%) women were multi-gravida with a mean parity of 2.74±1.7. (Table -2) 23 (86%) women had symptom onset in pre-partum period. Twenty two (95.65%) patient have undergone planned cesarean section within 48 hrs of reporting to the hospital under care of multidisciplinary medical team.

One patient (4.3%) has undergone assisted vaginal delivery. 24 patients (88.88%) had pulmonary edema at the time of admission. All patients had singleton pregnancy incidentally. Mean duration of follow up was 200 days (164-257days). All surviving women were followed up for more than 6 month as shown in Table1.

Mean LVEF at study entry was 26.82 (15-39%). Sixty four percent (n-17) had LVEF less than 30 % at the study entry while 36% (n=10) had more than 30% LVEF.

Patients with LVEF less than 30 % were followed up more frequently and an additional echocardiographic examination was done on completion of one month and ACE inhibitors/ARBs were optimized in postpartum

phase. Mean LVEF at 3-month follow up was 39.31% with the mean increment by 12.5. Mean LVEDD at study entry was 52.9 (44-70mm), which decreased by a mean of 4.3 mm during follow up as shown in Table 6. Of the 17 patients who had LVEF, 30% at the time of presentation and LVEDD also less than 60 mm as shown in

During the 6-month follow up postpartum, 1 (3.7%) women died unrelated to CVS illness due to viper snake bite at 5th month post-partum. 17 (62.9%) women survived with full recovery and 9 (33.3%) were surviving with depressed ejection fraction, one patient died.

Table 1: Clinical characteristics of the patients (N= 27)

Parameter	Values
Mean age (years)	29±5.6 (20-40)
Symptom onset before delivery	23 (86%)
Symptom onset after delivery	4 (14%)
Preterm delivery	0
Term delivery	27 (100%)
Pulmonary oedema at presentation	24 (88.88%)
Vaginal delivery	02 (7.4%)
LSCS	25 (92.59%)
Primigravid	2
Mean parity	2.74± 1.7(1-4)

Table 2: Characteristics of patients with PPCM (n = 27)

Age (Years)	N	%	Mean
20 – 30	6	22	31.81 ± 3.7
> 30	21	78	
Parity			
1	2	7.4	2.74 ± 1.7
2	14	51.8	
3 and more	11	40.7	
Gestational Age At Diagnosis			
Antepartum	23	85	
Postpartum	04	15	
Functional Class At Diagnosis			
NYHA class			
I	0	0	
II	0	12.5	
III	23	85	
IV	4	15	
Body weight in Kg			71.91 ± 12.92
Complications noted at presentation			
Chronic hypertension	2	7 .4	
Pre-eclampsia	1	3.7	
Long-term Tocolytic	2	7 .4	
Multiple Pregnancy	0	0	

Table 3: Pregnancy outcome of patients with peripartum cardiomyopathy and fetal complications. (n = 27)

	Outcomes	N	%
Maternal	Spontaneous Vaginal Delivery	2	7.4
	Assisted Vaginal Delivery	2	7.4
	Lower Segment Caesarian Section	23	85
Cardiac Complications	Congestive heart failure	27	100
	Arrhythmias	8	29.6
	Thromboembolism		7.4
	ICU admission	27	100
	Recovery	27	100
	Death in follow up period	1	3.7
	Foetal		
	Alive	27	100
	Stillborn	0	0
	Neonatal Deaths	0	0
	Intra Uterine Growth Retardation	10	37.0
	NICU admission	24	88.88

Table 4: Electrocardiographic features of Postpartum cardiomyopathy cases and mean serum BNP level

Criteria	Primigravid (02)	Multigravida (25)
No change	0	01
Sinus tachycardia	2	23
ST-T change biventricular	1	23
ST-T changes only LV type	1	02
T inversion	2	25
Total	2	25
BNP level	1762± 52	2354± 762

Table 5: Ejection fraction according to sub groups Echocardiography at the presentation

Ejection fraction	Primi	Multigravida
<30	2	13
31-34	0	10
35-39	0	2
>40	0	0
Total	2	25

Table 6. Echocardiographic parameters and myocardial recovery at 6 months

	Full recovery (LVEF >50%)	Partial recovery (LVEF, 50%)	P-value
LVEF at study entry, 30 %(17)	14 (82.35%)	3 (17.7)	0.67
LVEF at study entry >30 %(10)	9 (90%)	1 (10%)	
Total	23 (85.1%)	4 (14.9%)	

Discussion

In this retrospectively conducted on the preserved data study twenty-seven women with PPCM were enrolled and treated with standard heart failure medical management.

The incidence of PPCM varies worldwide reported prevalence of PPCM in non African countries ranges between 1:3,000 - 1:15,000 live births.[4-7] In our study done on collected data on a mobile population done in very long period of time, the incidence cannot be assessed. Common reported risk factors for PPCM are

advanced maternal age, multiparity, multiple gestation, black race, obesity, malnutrition, gestational hypertension, pre-eclampsia, poor antenatal care, alcohol and tobacco abuse, low socio economic conditions and long term to calyces as found in various studies.[8-10] In our study the most significant risk factors found were, advancing maternal age, multiparity, poor antenatal care and late presentation of six unregistered cases mean age of 31.18 years, chronic hypertension and pre-eclampsia and long term tocolysis. PPCM has been reported mostly in women older than 30 years.[7-12] In our study also the mean age noted was 31.81 ± 3.7 years despite the trend of young age marriages in our society. Only one patient was a primi grand a with 23 being Para>3 which indicates multiparity as a major risk factor.7-12 In the USA majority of afflicted Americans are of African-American origin[13,14] though Asians, Hispanic and Caucasian mothers are also affected. The reason for the association of PPCM with higher age, parity, multiple gestation and black race is not fully understood.

Pre-eclampsia and chronic hypertension have been associated with a significant number of PPCM cases in various studies.[11] Our study showed an association of 15%. Similarly, long term tocolysis with oral salbutamol and terbutaline in women with preterm labor especially if combined with antenatal steroid administration for fetal lung maturation is a risk factor.

Two patients with multiple pregnancy, received tocolysis combined with antenatal steroids and later developed life threatening cardiomyopathy in late third trimester.[12] Though all patients were in severe heart failure, all had clinical recovery. One of the patients died during the follow up of six months due non cardiovascular cause snake bite. This study is conducted in resourced state funded medical establishment, hence strict follow up and frequent Echocardiography was done to evaluate the progress of the recovery and optimization of therapy by multi disciplinary team. This result is superior to the findings of IPAC study, which had 13% major events at the end of one year.[15]

Though PPCM resembles dilated cardiomyopathy (DCM) clinically LV may not always be dilated. The ejection fraction is nearly always reduced below 45%.This study found a mean ejection fraction of 26.82 ±8.38 (15-45%) similar to a study (28±9.9%) in USA.[16] All patients who had LVEF less than 30% at baseline were followed up more persistently and frequent BNP level and Echocardiography was done antifaiIure therapy was optimized. LVEF >30 % was not associated with better LV recovery at 3 months (P value 0.67) as shown in Table 6. This finding is in contrary to the finding of IPAC study.[17]

Early recovery in patients with PPCM is significantly related to the degree of myocardial insult at the time of diagnosis. Recovery of LV function was more in (54.5%) if the baseline LVEDD was less than 60 mm but this value was not statistically significant to correlate with the better outcome.[18]

Although the disease has been reported in women between the ages of 16 and 44 years, the mean age of women with PPCM in the United States has ranged from 27 to 33 years.[19]

Multiparty has been described as one of the predisposing factors in some studies from Pakistan (3.66±1.5and3.66±1.41, respectively)9,10 but majority of the women in the similar single centre study from Nepal done in short time period study were primi gravida (64%) with mean parity of 1.68±0.56.

PPCM can present both before and after delivery. In this study majority of women (88.8%) became symptomatic in antepartum period. The result is similar to other previous studies (71% in USA, and 68.8% in Pakistan).[8,19]

All the patients required ICU admission; patients with LVEF less than 30% were exhibited with anticoagulant therapy in form of LMWH. Post partum reported cases were also exhibited with Pentoxyphylin therapy in doses 400 mg TDS in three cases. Being very small subset of the study the therapeutic comparison was not done.

Small number of the study population was a major limitation of the study also done in retrospect in a long period data. Patients were enrolled only if they were admitted with heart failure in hospital, thus the study doesn't find out the outcome of less severe disease or if the therapy is initiated early in the course.

Family-planning counselling is an important aspect of the care of patients after a diagnosis of PPCM. Subsequent pregnancy after a diagnosis of PPCM carries higher risk of relapse if left ventricular systolic function is not fully recovered first; and even with full recovery some additional risk of relapse remains.

The reported incidence and prognosis varies according to geography and the disease is likely due to multiple factors. As this study included very few cases, a large number of patients required to give a significant result. Results may vary with geography, ethnicity, living standard, age, parity, associated or systemic disorders, habits and socioeconomic status.[20] Further investigation regarding the incidence, pathophysiology, genetics, treatment, and prognosis of patients with PPCM is warranted and would be greatly facilitated by

the establishment of national and international registries and collaborative research efforts.

Conclusion

This study demonstrated better survival outcome even in the patients with severe acute PPCM. PPCM is a heterogeneous disease that affects women during their last months of pregnancy or during their first months postpartum. Early diagnosis, frequent evaluation and proper management of heart failure can contribute in the positive outcomes. The higher maternal age and multiparity with use of tocolytic were identified risk factors.

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