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Profile of Peripartum Cardiomyopathy Cases and Outcome on Maternal Cardiac Status on Six Month Follow UP

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ABSTRACT

Background: Peripartum cardiomyopathy (PPCM) is a rare type of cardiomyopathy of unknown etiology associated with significant mortality and morbidity and characterized by heart failure in late pregnancy or puerperium. Recently PPCM workshop committee has recommended the inclusion of echocardiographic features of left ventricular dysfunction to redefine PPCM. Women with PPCM continue to have significant mortality despite the use of conventional drugs for managing heart failure. **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 postpartum. The Left ventricular ejection fraction (LVEF) and left ventricular end-diastolic dimension (LVEDD) were assessed by echocardiography at baseline, 3 months and six months postpartum. Mortality and survival with normal or depressed ejection fraction were determined. Predictors of outcome were evaluated. Statistical analyses were done using SPSS version 17. **Results:** The presentation of the cases of in our setup was different and the outcome was much better than most of the reported series. In our cases, in the majority, acute deterioration in unbooked cases in NYHA Class IV in multigravida 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 as multiparity, advanced age, poor socioeconomic status, hypertension and tocolytics use. The use of newer drugs such as pentoxifylline, bromocriptine, and cabergoline only was used along with digoxin, diuretics and continuation of Beta-blockers if they were used pre-pregnancy. Newer interventions such as plasmapheresis, immunoadsorption, ventricular assist devices and heart transplantation were not used. There was only one mortality in 6 month follow up (unrelated to cardiac failure due to Viperidae snake bite).

Keywords: Peripartum cardiomyopathy and mortality, risk factor of PPCM.

INTRODUCTION

Congestive heart failure (HF), 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 collection and improved diagnostic methods are resulting in PPCM becoming a well-defined form of HF. Today, PPCM remains a rare yet significant cause of maternal morbidity and mortality, more common in the African population. Being a relatively rare entity, there are small sample studies only available. The variety of risk factors described by different authors have further confused the issue. In this study, we have tried to analyse the causes of heart failure in the peripartum period in whether booked or unbooked cases of primi as well as multigravida, all singleton pregnancy, which by chance with normal lie and presentation and delivered as per available practices of assisted vaginal delivery or planned cesarean section.

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MATERIALS AND METHODS

July 2009 to Sept 2018. 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 of a medical college. Being a retrospective study, written informed consent was not taken from the patient or their relatives.

Inclusion criteria

a. PPCM patients admitted for management of heart failure.
b. Age more than 18years.

PPCM was defined as an 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.

Exclusion criteria

a. Past history of congenital heart disease with or without corrective surgery
b. Valvular heart disease,
c. Coronary artery disease,
d. Severe sepsis,
e. Alcohol abuse
f. Chemotherapy
g. Chest radiation.

Demographic, clinical and echocardiographic parameters were recorded at the time of enrollment. LVEF was calculated by the eyeballing method. LVEDD was taken in parasternal long-axis view. Clinical evaluation and echocardiography was done at 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).

Statistical analysis:

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 version17.

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

Outcome

Death (1)
Full recovery (9)
Partial recovery (17)

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 edema at presentation	24(88.88%)
Vaginal delivery	02(7.4%)
LSCS	25(92.59%)
Primigravida	2
Mean parity	2.74± 1.7(1-4)

Table 2: Characteristics of patients with PPCM. n = 27

Age (Years)	No	%	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	
Longterm Tocolysis	2	7.4	
Multiple Pregnancy	0	0	

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

Maternal	numbers	Percentage
SpontaneousVaginalDelivery	2	7.4
AssistedVaginalDelivery	2	7.4
Lower SegmentCaesarianSection	23	85
Cardiac Complications		
Congestiveheartfailure	27	100
Arrhythmias	8	29.6
Thromboembolism	2	7.4
Icu admission	27	100
Recovery	27	100
Death in follow up period	1	3.7
Foetal		
Alive	27	100
Stillborn	0	0
NeonatalDeaths	0	0
Intra UterineGrowthRetardation	10	37.0
NICU admission	24	88.88

Twenty-five (92.5%) women were multigravida with a mean parity of 2.74±1.7. [Table 2]. Twenty three (86%) women had symptom onset in pre-partum period. Twenty-two (95.65%) patient have

undergone a planned cesarean section within 48 hrs of reporting to the hospital under the care of a 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 patient has singleton pregnancy incidentally. Mean duration of follow up was 200 days (164-257 days). All surviving women were followed up for more than 6 months shown in [Table 1].

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 echocardiographi examination was done on completion of one month and ACE inhibitors/ ARBs were optimized in the 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 4.3mm 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 60mm as shown in remained symptomatic even after 3 months follow up, however have full recovery at 6 months.

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

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

Criteria	Primigravida(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 subgroups 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.[4,6,7] In our study done on collated data on a mobile population done in a very long period of time, the incidence cannot be assessed. Common reported risk factors for PPCM are advanced maternal age, multiparty, multiple gestationss, black race, obesity, malnutrition, gestational hypertension, pre-eclampsia, poor antenatal care, alcohol and tobacco abuse, low socio-economic conditions and long term tocolysis as found in various studies.[17-21] In our study the most significant risk factors found were, advancing maternal age, multiparity, poor antenatal care and late presentation of six unbooked cases mean age of 31.18 yrs, 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 primigravida 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 origin13,14though 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.[1,7,8] 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 pregnancies in our study received tocolysis combined with antenatal steroids and later developed life-threatening cardiomyopathy in the late third trimester.

Though all patients were in severe heart failure, all had clinical recovery. One of the patient died during the follow up of six months due noncardiovascular 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 a multidisciplinary team. This result is superior to the findings of IPAC study, which had 13% major events at the end of one year.

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.[7] All patients who had LVEF less than 30% at baseline were followed up more persistently and frequent BNP level and echocardiography were done and anti-failure therapy was optimised. LVEF >30 % was not associated with better LV recovery at 3 months (P-value 0.67) [Table 6]. This finding is in contrary to the finding of the IPAC study.[4]

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 60mm, but this value was not statistically significant to correlate with the better outcome.

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.[1,8]

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

PPCM can present both before and after delivery. In this study majority of women (88.8%) became symptomatic in the antepartum period. The result is similar to other previous studies (71% in USA, and 68.8% in Pakistan).[7,11]

A 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.

Limitation of the study:

This study is done at a number of services hospitals in a long duration for 7 year. The specific population is not represented. The study is done in Armed Forces hospitals, hence a middle socioeconomic strata is only represented.

Take home message - The study has educated us that the traditional risk factors such as Primi gravida and hypertension are not the only risk factors. Frequent monitoring and identification of high risk cases like with high LVDD and poor ejection fraction can reduce mortality. The disease is not so common however due to high mortality in the most productive age group is the cause of to constant vigil of breathlessness in peripartum period. Our results are positive compared to all other published studies, early identification and constant monitoring with frequent optimization of the therapy has resulted in nil mortality and minimal residual disease. We could give tab Pentoxyphyllin in few patients but with quicker and better recovery, though statistically not significant. A large study recommended.

CONCLUSION

This study demonstrates that survival outcome is better even in patients with severe acute PPCM with early diagnosis, frequent evaluation and proper management of heart failure. The higher maternal age and multiparity with use of tocolytics were identified risk factors.

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