Outcomes of a Group of Patients with Peripartum Cardiomyopathy in Erbil City, Iraq

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ABSTRACT

Background: Peripartum cardiomyopathy is rare disease that associated with high morbidity and mortality. Peripartum cardiomyopathy was not well studied in Iraq and most nearby countries.

Objective: To investigate patients with peripartum cardiomyopathy in Erbil, Iraq.

Methods: Twenty-two women fulfilled the criteria for diagnosis of peripartum cardiomyopathy were included in this study. Follow-up was done by performing echocardiography to the women for 2.5 years. Data were collected from 2007 to 2017. All patients received conventional heart failure medications after diagnosis and all were diagnosed after delivery,

Results: From the 22 patients, 72.72% had full recovery with rapid response including regression of cardiac size, symptomatic improvement, 3(13.63%) of them incomplete recovery with EF > 35%, with good symptomatic improvement, seven of the studied group were primigravida, two of them had severe LVSD with ejection fraction <30%. One of the primigravida remain in the hospital with full support including intra- aortic balloon pump until death.

Conclusion: Peripartum cardiomyopathy had higher percent of recovery than old reported studies.

Keywords: **Peripartum cardiomyopathy, Left ventricular systolic dysfunction, Ejection fraction.**

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Heart failure associated with pregnancy and the peripartum period was recognized in the literature as early as the 1800s by Virchow and others[1,2]. Peripartum cardiomyopathy (PPCM) was first recognized as a distinctive form of cardiomyopathy in 1937, when Gouley et al noticed features of severe heart failure with an atypical and distinct dilated cardiomyopathy in later months of pregnancy in 7 pregnant females, which persisted after delivery[3]. The subsequent advent of echocardiography allowed the non-invasive characterization of the syndrome, and the criterion of ejection fraction < 45% was introduced in 1999 by a National Heart, Lung, and Blood Institute workshop on PPCM[4,5].

PPCM is a rare and potentially life-threatening form of heart failure affecting women late in pregnancy or in the first months after delivery. PPCM is difficult to diagnose and its onset and progression are variable amongst individuals. The pathophysiology remains poorly understood; hence treatment options are limited and, some, possibly harmful to the fetus[6].

PPCM is defined by the Heart Failure Association of the European Society of Cardiology as 'an idiopathic cardiomyopathy presenting with heart failure secondary to left ventricular (LV) systolic dysfunction towards the end of pregnancy or in the months following delivery, where no determinable cause of heart failure is found. The LV may not be dilated but the ejection fraction (EF) is nearly always reduced below 45%[7]. The exact pathophysiology of PPCM is unclear,

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and many potential causes have been proposed including genetics[8].

PPCM has to be a diagnosis of exclusion after investigating vigorously for other causes of heart failure. Etiology and pathogenesis of PPCM is not known. However, many hypotheses has been postulated derived from different researches blaming the oxidative stress, autoimmune responses, genetic factors, nutritional factors, viral syndromes and inflammatory pathways to be involved. One of such theories is a prolactin induced STAT3 pathway activation[7,9].

PPCM has often been ascribed to a failed hemodynamic stress test during pregnancy. Indeed, pregnancy triggers large hemodynamic shifts that significantly increase cardiac workload[10].

Blood volume and red blood cell mass increase, leading to increased preload. Cardiac output increases by 20% to 50%, a consequence of both increased heart rate by ≈15% to 30% and increased stroke volume by 15% to 25%. Total vascular resistance decreases by 30%, although afterload increases again by the end of pregnancy. All of these changes occur between the first and second trimesters, and patients with known preexisting structural cardiac disease typically present with clinical heart failure at this time in pregnancy[11].

Its incidence varies globally where it is as uncommon as 1 per 2500 to 4000 live births in United States, Canada, Europe; and as common as 1 in 1000 live births in South Africa and up to 1 in 300 live births in Haiti[7,12,13].

The underlying cause of PPCM has not been clearly defined. This may be attributable to a prior viral illness or abnormal immune response, although there is no evidence that antiviral or immunosuppressant medications improve outcomes[12].

The pathogenesis of PPCM remains unknown. Reports suggest that a cleaved product of prolactin has pro-apoptotic and anti-angiogenic effects and may play a role in the development of PPCM[14].

The blockage of prolactin with the dopamine agonist, bromocriptine, has been used in patients with PPCM with some positive results[15].

PPCM is among the leading causes of maternal mortality in the United States. Mortality rates vary from 1.4% to 30% in the highest risk populations. African American women are particularly vulnerable. They are at six times higher risk to die from this disease when compared to other ethnic groups[16,17].

There is very little literature from Asian countries. In a study from south India the incidence of PPCM has been reported at 1 case per 1374 live births[18].

The reported incidence of PPCM in Nigeria was high (one case per 102 deliveries)[19]. 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. Indeed, the 50% rate of ventricular function recovery reported in the 1970s[3] is below the 75% reported in recent publications[20].

Aim of study: to find out the response of patients with PPCM, morbidity and their mortality in Erbil, Iraq.

Methods

In this prospective longitudinal study data was collected from teaching and private hospitals in Erbil City between July-2007 to December 2017, 23 consecutive women were included in this study. The diagnosis of PPCMP was according to the Heart Failure Association of the European Society of Cardiology[7]. Inclusion criteria all woman with negative past medical history how present with heart failure postpartum in the absence of any cause, exclusion criteria; 1-Structural valvular heart disease, 2-Congental heart disease, 3- Hypertrophic cardiomyopathy. All of them present in postpartum period and diagnosed by

echocardiography with ejection fraction less than 40%. The left ventricular volumes and ejection fraction were assessed by biplane Simpson's rule using manual tracing of digital images. Left ventricular end diastolic dimension (LVEDD) was assessed in the parasternal long axis view. One of the women was excluded because of anterior mitral leaflet prolapse, the 22 patients were followed for 2.5 years, with frequent echocardiography done by professional cardiologist. Left ventricular ejection fraction (LVEF) was assessed by transthoracic echocardiogram at enrollment. From standard apical 4-chamber, 2-chamber and long-axis views. Reassessed each weak in first month then monthly for 5 months, then once in 6months.

Results

Out of 22 women with peripartum cardiomyopathy seven (31.81%) was primigravida. One (4.54%) of them twin pregnancy. All patients had negative past medical history and with New York Heart Association (NYHA) class IV at time of diagnosis. Eighteen (81.81%) present with severe left ventricular systolic dysfunction (LVSD) with ejection fraction (EF) of <35%, 4(18.18%) with EF >35% and < 40%, (Table 1).

After 2 months of follow-up 16 (72.72%) recovery of LVSF to normal occur in first 2 months after conventional treatment, three (16.7%) had improvement in symptom with increase in ejection fraction from severe to moderate LVSD, 2 remained in severe LVSD all of them from the primigravida and one of them was died after one month of diagnosis, (Table 2).

After 2.5 years symptomatic improvement with regression of left ventricular size from mean 67.5mm ±5.198 to mean of 53.00±11.088 with highly significant P value 0.000 and increase in EF from 32.55±4.867 to 53±12.026 with highly significant P value 0.000, (Table 3).

Table 1: The distribution of patients according to their basic characteristics.

Number of cases	22
Age range (year)	17-41
Mean age ± SD (year)	28.55± 7.28
median (year)	28.50
Primigravida	7
Multigravida	15
Single pregnancy	21
Twin pregnancy	1
Presentation after delivery	severe shortness of breath
Presentation (Average days after delivery)	2-10 days
Severe LV systolic dysfunction EF <35%	18
Moderate LV systolic dysfunction EF>35% and < 40%	4

Table 2: Left ventricular systolic function before and after treatment.

EF before treatment	EF after treatment			Mortality	Total Death
	Normal LVSF	Moderate LVSD 35-45%	Severe LVSD <35%	zero	
Moderate LVSD 35-45%	4 (100)	zero	zero	zero	4 (100)
Severe LVSD <35%	12(66.7)	3(16.7)	2(9.09%)	1 (4.54%)	18(100)
Total	16(72.72)	3(13.63)	3(13.63)	1	22 (100)

Table 3: Left ventricular diastolic dimension and ejection fraction before and after treatment.

	Before treatment Mean± SD	After treatment Mean± SD	P value
Ejection fraction %	32.55±4.867	53.18±12.02	< 0.000
LVDD	67.5 ±5.14	53±11.08	<0.000

Discussion

In the present study, highly significant patient recovery with p value <0.000. That was 72.72% recover ejection fraction of >56% and 13.63% had persistent LVSD which was similar to the recently completed prospective Investigations of Pregnancy Associated Cardiomyopathy (IPAC) study enrolled 100 women from multiple centers throughout the United States and followed their clinical course for 12 months with careful clinical evaluations, including repeated echocardiography. Which found that 71% of the women recovered LVEF to > 50%, whereas only 13% had major events or persistent cardiomyopathy with EF < 35%[21].

A mean clinical follow-up of 8.6 years of 42 women with peripartum cardiomyopathy showed that the 75% of patients that recovered ventricular function did not have any kind of limitation in functional capacity and had a good quality of life[22].

The current study showed 72.72% recovery, which was in concordant with a study in Pakistan which involved 45 patients in the study showed that 71.1% of PPCM patients recovered left ventricular ejection fraction and the mitral regurgitation also improved in this group[23].

And different from a multiple reports reflect the reversibility of myocardial dysfunction in PPCM, with ≈60% of patients improving and 45% normalizing their left ventricular (LV) function by 6 months after

their diagnosis[24,25]. This may be due to different in ejection fraction at presentation which was 27±0.07 in these report and 32.55±4.867 in the current study.

In this study most of the recovery occur in first 2 months which agree with the study that found recovery occurred almost uniformly by 6 months, with little change in EF thereafter, as has been noted by previous studies[25,26].

In the current study, 81.8% of patients had severe LVSD at presentation which was corresponding to study in Pakistan showed that most of patients (86.6%) had severe LV systolic dysfunction at presentation[23].

In the present study, the death percent was 4.54%, which was similar to IPAC study in which four women (4%) in the IPAC study died[21].

While mortality was lower than the largest series of 123 cases of PPCM showed a cardiac transplantation rate of 4% and a mortality rate of approximately 10% at a mean follow-up of about 2 years[15]. The difference may be due to different sample size.

Also, lower than Harper et al[27] study which show 11% mortality in which the patient was followed for 8 years while in present study follow up for 2.5 years.

Study in Pakistan was shown that majority is primigravida which was different from the present study may be due to different in data collection. In Pakistani study, a majority of the patients 25 (55.5%) were primigravida and 8 (17.7%) patients were gravida 2, remaining 12 (26.6%) patients were multigravida[23].

Silvana Jovanova et al, followed 22 patients who were admitted to hospital with diagnosis of PPCMP, 16(73%) were admitted immediately post-partum, because of acute HF which needed immediate and aggressive HF treatment. Six (27%) patients presented with congestive HF symptoms during the first three months after delivery. During the hospitalization, clinical and functional improvement and stabilization was achieved in all patients[28]. This 6 years period study was in agree with current study in that all diagnosed postpartum, but without mortality and different may be due to different in data collected 44.5% of these patient with EF% about 45% while all patients in present study have EF% of < 40%.

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