

Favourable outcome after peripartum cardiomyopathy: a ten-year study on peripartum cardiomyopathy in a university hospital

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INTRODUCTION Peripartum cardiomyopathy (PPCM) is an uncommon form of congestive heart failure, affecting obstetric patients around the time of delivery. The epidemiology of PPCM is infrequently reported. This study was undertaken to define the prevalence, presentation and outcome of PPCM among women giving birth in a teaching hospital in Malaysia.

METHODS A retrospective case record analysis was conducted on all patients admitted and diagnosed with PPCM at the University Malaya Medical Centre, Kuala Lumpur, Malaysia, from 1 January 2000 to 31 December 2009. All deliveries were undertaken in the same hospital.

RESULTS A total of 12 patients were diagnosed with PPCM during the ten-year study period. The prevalence of PPCM was 2.48 in 100,000 (1 in 40,322) live births. Nine women were diagnosed with PPCM within five months of delivery. Three women had twin pregnancies. There was one death in the group (mortality rate 8.3%). The mean left ventricular ejection fraction at the time of diagnosis was $28.9\% \pm 8.5\%$ (range 15%–40%). Following the index event, left ventricular function normalised in six of the nine patients (66.7%) who underwent subsequent echocardiography one year later. All patients were treated with standard heart failure therapy. Two patients with normalised left ventricular function had subsequent pregnancies – one pregnancy was terminated at seven weeks and the other patient delivered uneventfully at full term.

CONCLUSION PPCM is uncommon. The outcome in our series was favourable, with 66.7% of patients with PPCM recovering their left ventricular function. The mortality rate was 8.3%.

Keywords: epidemiology, heart failure, peripartum cardiomyopathy, pregnancy
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INTRODUCTION

Peripartum cardiomyopathy (PPCM) is an uncommon form of congestive heart failure complicating pregnancy. Virchow first observed the occurrence of heart failure in pregnancy in the 1890s. However, the association between cardiomyopathy and pregnancy was only reported in 1937 by Gouley et al.⁽¹⁾ According to the literature, PPCM occurs in one of every 3,000–15,000 pregnancies, with its incidence being higher in Africa.^(2,3) The present study builds on a previous report of PPCM in the Asian region by Chee and Azman.⁽⁴⁾

In 1971, Demakis and Rahimtoola⁽⁵⁾ established the criteria for the diagnosis of PPCM as: (a) heart failure must manifest in the last month of pregnancy or within five months of delivery; and (b) a diagnosis of PPCM should be made only when other aetiologies for heart failure cannot be found. The diagnostic criteria for PPCM were subsequently refined in 2000 by the National Heart, Lung and Blood Institute (NHLBI) and the Office of Rare Diseases of the National Institutes of Health (NIH) Workshop on PPCM.⁽⁶⁾ The definition of PPCM now includes: (a) development of cardiac failure in the last month of pregnancy or within five months of delivery; (b) absence of an identifiable cause of cardiac failure; (c) absence of recognisable heart disease before the last month of pregnancy; and (d) left ventricular systolic dysfunction with left ventricular ejection fraction (LVEF) < 45% by echocardiography.

The natural history of PPCM is poorly characterised. This is likely due to the limited number of patients being reported and the variations in the diagnostic criteria being used by various authors, along with the degree to which these authors pursue exclusion of other heart disease. Safirstein et al, in a prospective registry of patients with PPCM recruited via the Internet, found that the presence of gestational hypertension, LVEF > 35% at diagnosis, breastfeeding and postpartum diagnosis were all significantly associated with recovery of systolic function in the affected women.⁽⁷⁾ The prognosis of PPCM is also quite variable. Subsequent pregnancy in women with a history of PPCM is associated with a significant decrease in left ventricular function and can result in clinical deterioration, even death. This is especially true for those with persistent depressed left ventricular function.⁽⁸⁾ The risk, however, seems to be lower among patients who have regained normal ventricular function.⁽⁹⁾ Maternal mortality rates in the United States have been estimated to be 25%–50%.⁽¹⁰⁾ Death in the reported series have usually been due to progressive left ventricular failure and associated complications, including arrhythmia and thromboembolism.⁽¹¹⁾

The epidemiology of PPCM in Asia is largely unknown. Long-term prevalence studies on such patients are scarce in the literature as well. In this retrospective case record analysis, the

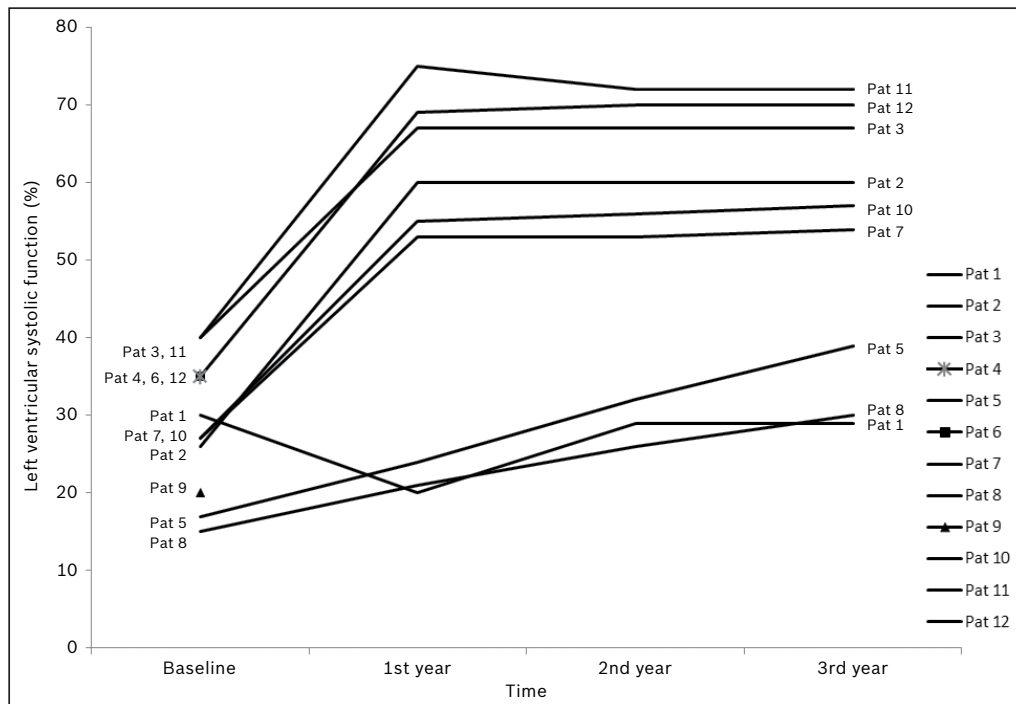


Fig. 1 Graph shows the left ventricular ejection fraction of patients at baseline and during follow-up. Patients 4, 6 and 9 did not undergo subsequent echocardiography.

prevalence, presentation and outcome of PPCM among women who gave birth at a major referral centre in Malaysia over a period of ten years are described.

METHODS

This was a retrospective review of the prevalence of PPCM over a period of ten years between 1 January 2000 and 31 December 2009 at the University Malaya Medical Centre (UMMC), Kuala Lumpur, Malaysia. UMMC is a 1,200-bed teaching hospital that serves the cities of Kuala Lumpur and Petaling Jaya in Malaysia. Kuala Lumpur is the capital city of Malaysia, while Petaling Jaya is a city that originally developed as a satellite township for Kuala Lumpur. The two cities have a combined population of around 3 million. Following approval from the local ethics committee, a retrospective case record analysis was conducted of the medical records of patients in our hospital using the International Classification of Diseases (ICD-10) codes.⁽¹²⁾ The keywords used included 'peripartum cardiomyopathy' and 'cardiovascular diseases complicating pregnancy'. Admission records available at the cardiology and obstetric wards were also searched. All medical notes were reviewed and relevant information, including echocardiographic data, was collected. A diagnosis of PPCM was made based on the recommendations of the NHLBI and NIH, as outlined earlier. All patients included in the study fulfilled the diagnostic criteria.

RESULTS

A total of 12 patients were diagnosed with PPCM at delivery in UMMC during the study period, which saw 48,373 live births recorded at the hospital. The prevalence of PPCM was found to be 2.48 per 100,000 live births in our series. Six patients were

ethnically Malay. The mean age of patients at presentation was 32.2 ± 6.6 (range 24–43) years. Eight patients were multiparous, while four were primigravidae. Four women had preeclampsia in previous pregnancies and one had chronic hypertension. Nine patients presented with PPCM symptoms during the postpartum period, while three patients were diagnosed during the last month of pregnancy. All patients presented with symptoms of congestive heart failure. All 12 patients had dyspnoea, and nine patients showed evidence of leg oedema. All except one patient delivered via Caesarean section. Three (25%) women had twin pregnancies.

All patients underwent transthoracic echocardiography on presentation. The mean LVEF was $28.9\% \pm 8.5\%$ (range 15%–40%). After the index event, six of the nine patients who underwent subsequent echocardiography during follow-up at one year regained normal LVEFs (LVEF > 50%). Three patients had persistently poor LVEF. Two patients were lost to follow-up. The median follow-up duration for the remaining patients was 77 months. The LVEFs of the patients are presented in Fig. 1, which shows that most of the patients improved during the first year of follow-up. The LVEF remained the same for the remaining follow-up period for most patients after the first year of follow-up.

Electrocardiography and cardiac markers (creatinine kinase and troponins) did not show abnormal characteristics. However, chest radiographs were abnormal in 41.7% of the patients. The abnormalities included cardiomegaly, pleural effusion and pulmonary oedema. Two patients required ventilation during illness. One ventilated patient, who died as a result of disseminated intravascular coagulopathy, required inotropic support and intra-aortic balloon pump insertion. One of the patients, a 29-year-old

Table I. Clinical characteristics and outcomes of the patients diagnosed with peripartum cardiomyopathy (n = 12).

Patient no.	Ethnicity/age at diagnosis (yrs)	Year of diagnosis	Baseline LVEF at diagnosis (%)	Previous preeclampsia/hypertension	Twin pregnancy	LVEF at one-year follow-up (%)	Maternal outcome*
1	Malay/38	2003	30	No	No	29	Alive
2	Chinese/27	2003	26	No	No	60	Alive
3	Chinese/31	2002	40	Yes	No	67	Alive
4	Malay/42	2008	35	No	No	NA	Alive
5	Malay/29	2002	17	Yes	No	35	Alive
6	Malay/37	2003	35	No	No	NA	Dead
7	Malay/27	2004	27	Yes	Yes	53	Alive
8	Chinese/35	2007	20	No	No	30	Alive
9	Others/43	2003	20	No	No	NA	Alive
10	Malay/25	2003	27	No	Yes	73	Alive
11	Indian/28	2007	40	No	No	72	Alive
12	Indian/24	2002	35	Yes	Yes	61	Alive

*As of 31 December 2009.

LVEF: left ventricular ejection fraction; NA: not available

woman (gravida 2, para 1) presented with heart failure, with frequent sustained ventricular tachycardia that did not respond to standard medical therapy. An internal cardiac defibrillator was implanted without threshold testing at 26 weeks of pregnancy for this patient. She underwent Caesarean section at 32 weeks of pregnancy and did not receive any defibrillation after delivery. Table I summarises the characteristics of the patients in our series.

Live births were recorded for all the women with PPCM. Three newborns had poor Apgar scores, for whom the scores at one minute and after five minutes were < 4. All three newborns were admitted to the special care nursery, and one newborn who had complications due to respiratory distress syndrome required prolonged stay in the nursery for 38 days. No congenital anomalies were reported in the newborns, and all were subsequently discharged well.

Three women continued to have poor LVEF at the one-year follow-up subsequent to discharge and were treated with standard heart failure medications. These medications included diuretics, angiotensin-converting enzyme inhibitor (ACE-I) or angiotensin receptor antagonist. Only one of these patients could not tolerate β -blockers. The six patients who had regained normal LVEF on echocardiography during follow-up at one year were also continued on heart failure medications. All patients were on ACE-I or angiotensin receptor antagonist, and only two patients were on β -blockers. None of the patients were given antiplatelet or anticoagulation therapy.

Two women subsequently became pregnant despite being advised against it. Both patients had regained normal left ventricular function after the index PPCM pregnancy prior to the subsequent pregnancy. Pregnancy was terminated for one patient at seven weeks gestation following counselling. The other patient delivered uneventfully without complications at full term by elective lower segment Caesarean section, and the newborn had normal Apgar scores.

DISCUSSION

The prevalence of PPCM at our centre, which was 2.48 per 100,000 (1 in 40,322) live births, was low compared to many countries, where studies have reported incidences that vary from 0.88 per 100,000 live births in the United States⁽¹³⁾ to 250 per 100,000 live births in Haiti.⁽¹⁴⁾ The reported prevalence of PPCM in India was 1 per 1,374 live births or nearly 72 per 100,000 live births, according to Pandit et al.⁽¹⁵⁾ Although the reason behind such variations in the reported prevalence of PPCM from various countries is not yet fully understood, it is possible that several contributory factors, including differences in identification protocols, diagnostic criteria and study populations, might be behind it. As our hospital also serves as a tertiary referral centre, it is possible that the prevalence rate in our cohort was biased by referral patterns. Nevertheless, this study represents the first long-term series of PPCM in Asia.

Treatment of PPCM is along the lines of other forms of congestive heart failure in pregnancy. However, a recent study by Yamac et al reported that a 16-kDa fragment of prolactin may induce myocardial damage,⁽¹⁶⁾ and this has proffered a novel treatment option for PPCM that aims to block prolactin with bromocriptine. Although some studies have successfully used this therapy,^(17,18) various others have also advised caution when using bromocriptine for the treatment of PPCM.^(19,20) For instance, Hopp et al reported acute myocardial infarction in a healthy woman using bromocriptine for lactate suppression.⁽²¹⁾ It should therefore be borne in mind that it would be difficult to conduct large prospective clinical trials to guide treatment in this group of patients. This is especially true for patients who later recover their left ventricular function subsequent to the index PPCM.

Generally, the outcome appears to be better in patients who recover left ventricular function. In our series, of the two women who had normal recovery of left ventricular function during follow-up and became pregnant subsequently, one elected for termination of pregnancy at seven weeks while the other went on

to deliver at term without any complication. However, this study was not without its limitations. The data presented here is only representative of the study population. Diagnosis was made solely based on the ICD-10 coding of PPCM, and this may have given rise to some bias. Additionally, the study population was small and sourced from a single referral centre.

In conclusion, PPCM was uncommon in this series from Malaysia. It may be associated with twin pregnancies, as seen in 25% of the women diagnosed with PPCM in this study. Patient outcome was favourable, with 66.7% of women diagnosed with PPCM recovering normal left ventricular function. The mortality rate was low at 8.3%.

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