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**Date of Search:** 03 Aug 2017

**Sources Searched:** Medline, Embase, DynaMed Plus, Oxford Medicine Online.

## Recurrence of Peripartum Cardiomyopathy in Future Pregnancies

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### Evidence Summary

- Peripartum cardiomyopathy (PPCM) is a relatively rare but potentially fatal condition characterised by heart failure towards the end of pregnancy or in the months after delivery and in the absence of pre-existing heart disease. Currently there are no clear guidelines regarding the management of women with PPCM and future pregnancies.
- Outcomes for subsequent pregnancies after peripartum cardiomyopathy are better for women who have fully recovered heart function after their initial presentation.
- Estimated risk of recurrence in subsequent pregnancies vary, but based on the results of cohort studies ([Fett JD et al 2010](#), [Elkayam U et al 2001](#), [Felt JD et al 2006](#)) et al is estimated to be around 30% with mortality reported 0-19%.
- Patients who decide to become pregnant again should undergo baseline echocardiography and determination of serum BNP level before or early in pregnancy. Patients should be followed with repeated echocardiography during the early second and third trimesters, during the last gestational month, early after delivery, and at any time if new symptoms of heart failure develop. Early termination of an unintentional pregnancy should be considered to prevent worsening of LV function and potential maternal mortality, especially in patients with persistent LV dysfunction.

**Sources:** DynaMed Plus [Internet]. Ipswich (MA): EBSCO Information Services. 1995 - . Record No. 115915, Peripartum cardiomyopathy; [updated 2016 Apr 20, cited **04/08/2017**]; [about 11 screens]. Available from <http://www.dynamed.com/login.aspx?direct=true&site=DynaMed&id=115915> .

Katrtsis, Demosthenes G., Bernard J. Gersh, and A. John Camm. "Peripartum cardiomyopathy." In *Clinical Cardiology: Current Practice Guidelines: Current Practice Guidelines*. Oxford, UK: Oxford University Press, 2016-09.  
<http://oxfordmedicine.com/view/10.1093/med/9780199685288.001.0001/med-9780199685288-chapter-39>.

### **1. Reducing the risks for relapse of heart failure in a subsequent pregnancy after peripartum cardiomyopathy?**

**Author(s):** Fett, James D

**Source:** Future cardiology; Jul 2017; vol. 13 (no. 4); p. 305-310

**Publication Date:** Jul 2017

**Publication Type(s):** Journal Article

**PubMedID:** 28621169

**Database:** Medline

### **2. Peripartum cardiomyopathy, what if your patient plans to reconceive?**

**Author(s):** Al Bannay, Rashed; Husain, Aysha; AlJufairi, Zainab

**Source:** Clinical case reports; Jun 2017; vol. 5 (no. 6); p. 753-756

**Publication Date:** Jun 2017

**Publication Type(s):** Journal Article

**PubMedID:** 28588804

Available in full text at [Clinical Case Reports](#) - from National Library of Medicine

**Abstract:**Patients with peripartum cardiomyopathy (PPCM) often express a desire to conceive again, and the risk of relapse in future pregnancies should be disclosed. No consensus is available that can determine that risk. Adequate contractile reserve, evidenced by a stress echocardiogram (exercise or dobutamine), can identify those with lower relapse risk.

**Database:** Medline

### **3. Outcome of subsequent pregnancies in patients with a history of peripartum cardiomyopathy.**

**Author(s):** Hilfiker-Kleiner, Denise; Haghikia, Arash; Masuko, David; Nonhoff, Justus; Held, Dominik; Libhaber, Elena; Petrie, Mark C; Walker, Niki L; Podewski, Edith; Berliner, Dominik; Bauersachs, Johann; Sliwa, Karen

**Source:** European journal of heart failure; Mar 2017

**Publication Date:** Mar 2017

**Publication Type(s):** Journal Article

**PubMedID:** 28345302

Available in full text at [European Journal of Heart Failure](#) - from John Wiley and Sons

**Abstract:**AIMS Subsequent pregnancies (SSPs) in patients with peripartum cardiomyopathy (PPCM) have a high risk of heart failure relapse. We report on outcome of SSPs in PPCM patients in Germany, Scotland, and South Africa. METHODS AND RESULTS Among 34 PPCM patients with a SSP, pregnancy ended prematurely in four patients while it was full-term in 30. Overall relapse rate [left ventricular ejection fraction, LVEF <50% or death after at least 6-month follow-up] was 56% with 12% (4/34) mortality. Relapse of PPCM after SSP was not associated with differences in parity, twin pregnancy, gestational hypertension, or smoking. Persistently reduced LVEF (<50%) before entering SSP was present in 47% of patients while full recovery (LVEF ≥50%) was present in 53%. The majority of patients entering SSP with persistently reduced LVEF were of African ethnicity (75%). Persistently reduced LVEF before SSP was associated with higher mortality (25% vs. 0%) and lower rate of full recovery at follow-up. Patients obtaining standard therapy for heart failure and bromocriptine immediately after delivery displayed significantly better LVEF at follow-up and a higher rate of full

recovery with no patient dying compared with patients obtaining standard therapy for heart failure alone. This was independent of African or Caucasian race. **CONCLUSION** Full recovery of LVEF before SSP was associated with lower mortality and better cardiac function at follow-up. Addition of bromocriptine to standard therapy for heart failure immediately after delivery was safe and seemed to be associated with a better outcome of SSP in African and Caucasian patients.

**Database:** Medline

#### **4. Subsequent reproductive outcome among women with peripartum cardiomyopathy: A nationwide study**

**Author(s):** Hauge M.; Johansen M.; Damm P.; Vejlsstrup N.; Gustafsson F.; Ersboll A.

**Source:** BJOG: An International Journal of Obstetrics and Gynaecology; Mar 2017; vol. 124 ; p. 35-36

**Publication Date:** Mar 2017

**Publication Type(s):** Conference Abstract

Available in full text at [BJOG: An International Journal of Obstetrics and Gynaecology](#) - from John Wiley and Sons

**Abstract:** Introduction Peripartum cardiomyopathy (PPCM) is a relatively rare but potentially fatal condition characterised by heart failure towards the end of pregnancy or in the months after delivery where no other cause of heart failure is identified. Most women recover, but are often advised against a new pregnancy as the risk of relapse in subsequent pregnancies is high. Relapse is reported among 17-46% with 0-19% mortality. Outcome is poorest in women who have not fully recovered left ventricular ejection fraction before the new pregnancy. European reports on subsequent pregnancies are very few. We therefore aimed to describe subsequent reproductive outcome in a Danish population-based cohort during 2005-2014. Methods The Danish National Birth Registry and the Danish National Patient Registry were linked and searched to identify all women with possible PPCM in Denmark from 1 January 2005 to 31 December 2014. Original patient records were retrieved, PPCM diagnoses were validated according to the European Society of Cardiology's diagnostic criteria and additional data were collected for the 61 included women. A second search in the two nationwide registries was then performed to identify all subsequent reproductive outcomes including deliveries, terminations, miscarriages and sterilisations in the cohort. Results Out of 61 women with PPCM 11 (18.0%) had a total of 14 subsequent pregnancies resulting in one miscarriage, six terminations, one ectopic pregnancy and six live-born babies. Among the six women who had a subsequent delivery, the mean time from index to subsequent delivery was 41.7 months (range 35-51). Left ventricular ejection fraction had returned to normal before and remained so throughout pregnancy in all six women giving birth to a live-born baby. All women were delivered by caesarean section. There were no maternal deaths, but one woman (16.7%) had a relapse of PPCM 5 weeks postpartum and resumed medical heart failure therapy. Her left ventricular ejection fraction returned to normal after 11 months. A total of four women (6.6%) were sterilised at a mean age of 36 years (range 32-41); they were all multiparas. Conclusion It seems that PPCM affects women's reproduction with few subsequent pregnancies resulting in a live-born baby. The finding of 16.7% relapse among women with recovered left ventricular ejection fraction is in accordance with previous studies.

**Database:** EMBASE

## 5. Angiogenic Imbalance and Residual Myocardial Injury in Recovered Peripartum Cardiomyopathy Patients.

**Author(s):** Goland, Sorel; Weinstein, Jean Marc; Zalik, Adi; Kuperstein, Rafael; Zilberman, Liaz; Shimoni, Sara; Arad, Michael; Ben Gal, Tuvia; George, Jacob

**Source:** Circulation. Heart failure; Nov 2016; vol. 9 (no. 11)

**Publication Date:** Nov 2016

**Publication Type(s):** Journal Article

**PubMedID:** 28029641

Available in full text at [Circulation: Heart Failure](#) - from Ovid

**Abstract:**BACKGROUNDRecent studies suggest that angiogenic imbalance during pregnancy may lead to acute peripartum cardiomyopathy (PPCM). We propose that angiogenic imbalance and residual cardiac dysfunction may exist even after recovery from PPCM.METHODS AND RESULTSTwenty-nine women at least 12 months after presentation with PPCM, who exhibited recovery of left ventricular (LV) ejection fraction ( $\geq 50\%$ ), were included in the study (mean age  $35 \pm 6$  years, LV ejection fraction  $61.0 \pm 3.9\%$ ). The number of circulating endothelial progenitor cells (EPCs) and plasma levels of proangiogenic vascular endothelial growth factor and of soluble vascular endothelial growth factor receptor Flt1 (sFlt1) were measured. All patients underwent comprehensive cardiac function assessment, including tissue Doppler imaging and 2-dimensional (2D) strain echocardiography. All measurements were compared with healthy controls. Patients with a history of PPCM have significantly higher sFlt1 concentrations (median [25th-75th percentile];  $149.57$ , [ $63.14$ - $177.89$ ] versus  $20.29$ , [ $15.00$ - $53.89$ ] pg/mL,  $P < 0.001$ ) and significantly decreased vascular endothelial growth factor/sFlt1 ratio ( $P = 0.012$ ) compared with controls, with a trend toward lower concentration of circulating CD34+/KDR+ levels. In addition, patients with PPCM had lower early velocities E' septal ( $9.9 \pm 2.1$  versus  $11.0 \pm 1.5$  cm/s,  $P = 0.02$ ), with a significantly lower systolic velocity S' septal ( $7.6 \pm 1.2$  versus  $8.5 \pm 1.2$  cm/s,  $P = 0.003$ ) by tissue Doppler imaging. Significantly lower LV global longitudinal ( $-19.1 \pm 3.3$  versus  $-22.7 \pm 2.2\%$ ,  $P < 0.001$ ) and apical circumferential 2D strain ( $-16.6 \pm 4.9$  versus  $-21.2 \pm 7.9$ ,  $P = 0.02$ ) were present in patients with PPCM compared with controls.CONCLUSIONSHigher concentration of sFlt1 with concomitant decreased circulating endothelial progenitor cell levels along with inappropriate attenuated vascular endothelial growth factor levels may imply an angiogenic imbalance that exists even after recovery and may thus predispose to PPCM. In addition, tissue Doppler imaging and 2D strain were able to identify residual myocardial injury in post-PPCM women with apparent recovery of LV systolic function. Both angiogenic imbalance and residual myocardial injury may play an important role in the recurrence of LV dysfunction during subsequent pregnancies.

**Database:** Medline

## 6. Peripartum cardiomyopathy: a systematic literature review.

**Author(s):** Ersbøll, Anne S; Damm, Peter; Gustafsson, Finn; Vejlstup, Niels G; Johansen, Marianne

**Source:** Acta obstetricia et gynecologica Scandinavica; Nov 2016; vol. 95 (no. 11); p. 1205-1219

**Publication Date:** Nov 2016

**Publication Type(s):** Journal Article Review

**PubMedID:** 27545093

Available in full text at [Acta Obstetricia et Gynecologica Scandinavica](#) - from John Wiley and Sons

**Abstract:**INTRODUCTIONPeripartum cardiomyopathy (PPCM) is a rare but potentially fatal disease defined by heart failure towards the end of pregnancy or in the months following delivery. We aim to raise awareness of the condition and give the clinician an overview of current knowledge on the mechanisms of pathophysiology, diagnostics and clinical management.MATERIAL AND METHODSSystematic literature searches were performed in PubMed and Embase up to June 2016. Cohorts of more than 20 women with PPCM conducted after 2000 were selected to report contemporary outcomes and prognostic data. Guidelines and reviews that provided comprehensive overviews were included, too.RESULTSNew research on the pathophysiological mechanisms of PPCM points towards a two-hit multifactorial cause involving genetic factors and an antiangiogenic hormonal environment of late gestation with high levels of prolactin and sFlt-1. The prevalence of concomitant preeclampsia is high (often 30-45%) and symptoms can be similar, posing diagnostic difficulties. Most women (71-98%) present postpartum. Echocardiography is essential for diagnosis, and cardiac magnetic resonance imaging may provide new insights to pathophysiology and prognosis. Management is multidisciplinary and involves advanced heart failure therapy. Treatment, timing and mode of delivery in pregnant women depend on disease severity. The risk of relapse in subsequent pregnancies is >20%, and women are often advised against a new pregnancy.CONCLUSIONS PPCM has a huge impact on cardiovascular health and reproductive life perspective. New insights into genetics, molecular pathophysiological mechanisms and clinical studies have resulted in potential disease-specific therapies, but many questions remain unanswered.

**Database:** Medline

## 7. Peripartum Cardiomyopathy Treatment with Dopamine Agonist and Subsequent Pregnancy with a Satisfactory Outcome.

**Author(s):** Melo, Maria Adélia Medeiros E; Carvalho, Jordão Sousa; Feitosa, Francisco Edson de Lucena; Araujo Júnior, Edward; Peixoto, Alberto Borges; Costa Carvalho, Francisco Herlânio; Carvalho, Regina Coeli Marques

**Source:** Revista brasileira de ginecologia e obstetricia : revista da Federacao Brasileira das Sociedades de Ginecologia e Obstetricia; Jun 2016; vol. 38 (no. 6); p. 308-313

**Publication Date:** Jun 2016

**Publication Type(s):** Journal Article

**PubMedID:** 27399926

**Abstract:**Pathophysiological mechanisms of peripartum cardiomyopathy are not yet completely defined, although there is a strong association with various factors that are already known, including pre-eclampsia. Peripartum cardiomyopathy treatment follows the same recommendations as heart failure with systolic dysfunction. Clinical and experimental studies suggest that products of prolactin degradation can induce this cardiomyopathy. The pharmacological suppression of prolactin production by D2 dopamine receptor agonists bromocriptine and cabergoline has demonstrated satisfactory results in the therapeutic response to the treatment. Here we present a case of an

adolescent patient in her first gestation with peripartum cardiomyopathy that evolved to the normalized left ventricular function after cabergoline administration, which was used as an adjuvant in cardiac dysfunction treatment. Subsequently, despite a short interval between pregnancies, the patient exhibited satisfactory progress throughout the entire gestation or puerperium in a new pregnancy without any cardiac alterations. Dopamine agonists that are orally used and are affordable in most tertiary centers, particularly in developing countries, should be considered when treating peripartum cardiomyopathy cases.

**Database:** Medline

## **8. Cardiomyopathy of pregnancy**

**Author(s):** Einav S.; Varon J.

**Source:** Current Women's Health Reviews; Apr 2016; vol. 12 (no. 1); p. 3-13

**Publication Date:** Apr 2016

**Publication Type(s):** Review

**Abstract:**Heart failure is a leading cause of long-term maternal morbidity and mortality in developed countries. The most common cause of maternal heart failure is cardiomyopathy. Peripartum Cardiomyopathy (PPCM) is a distinct idiopathic disease that is not triggered by the hemodynamic changes and myocardial overload associated with pregnancy. Diagnostic criteria include the development of heart failure in the time frame between the last months of pregnancy and the months following delivery, the absence of prior heart disease or other identifiable causes of heart failure and an echocardiography demonstrating LV ejection fraction <45% and/or fractional shortening. Diagnosis requires a high level of suspicion; signs of heart failure may be masked by the pregnancy itself and/or by associated diseases such as hypertension and preeclampsia. The hallmark of the disease is the typical reduction in LV function. The incidence of PPCM ranges between 1:100 to 1:3000 live births, and is particularly high among women of African descent. It remains unclear whether race is a modifier of the disease or a risk factor unto itself. Plausible causes for the disease include: exacerbation of pregnancy-induced myocardial injury caused by certain virus strains, genetic and/or environmental factors, circulating autoantibodies, and a flaw in the normal cardioprotective mechanisms of pregnancy allowing development of a vasculopathy triggered by abnormal peripartum hormonal changes. Treatment is comprised of standard heart failure therapy (restriction of salt and water intake, diuretics, angiotensin-converting enzyme (ACE) inhibitors, mineralocorticoid receptor antagonists, beta blockers and digoxin) and preventive anticoagulation if the ejection fraction  $\leq 35\%$ . Delivery should be planned and carried out by a multidisciplinary team. Maternal health should always take precedence over fetal health. Failed therapy should prompt further workup (magnetic resonance imaging (MRI) of the heart and/or cardiac catheterization and endomyocardial biopsy) and consideration of less conventional treatment modalities (e.g. immune modulation, bromocriptine), resynchronization, mechanical support and even heart transplant. The prognosis of PPCM is associated with the severity of heart failure at presentation and the response to therapy and is generally better than that of other cardiomyopathies. Approximate mortality rates are <2% in-hospital, 10-15% at 6 months after diagnosis and 25-30% at 2-4 years. Recovery of LV function occurs in one-third to one-half of the women and may carry on for almost 2 years after diagnosis. Subsequent pregnancies have been associated with a high likelihood of relapse due to residual impairment of the LV contractile reserve. There is insufficient data on neonatal outcome. Copyright © 2016 Bentham Science Publishers.

**Database:** EMBASE

### 9. Why do some recovered peripartum cardiomyopathy mothers experience heart failure with a subsequent pregnancy?

**Author(s):** Fett, James D; Shah, Tina P; McNamara, Dennis M

**Source:** Current treatment options in cardiovascular medicine; Jan 2015; vol. 17 (no. 1); p. 354

**Publication Date:** Jan 2015

**Publication Type(s):** Journal Article

**PubMedID:** 25399800

Available in full text at [Current Treatment Options in Cardiovascular Medicine](#) - from Springer Link Journals

**Abstract:**OPINION STATEMENTAfter concerns about survival and recovery from peripartum cardiomyopathy (PPCM), the question commonly asked is, "Is it safe to have another pregnancy?" While important advances have been made in the past decade in the recognition and treatment of PPCM, we still do not know why some apparently recovered PPCM mothers have a relapse of heart failure in a subsequent pregnancy. Knowing that some risk for relapse is always present, careful monitoring of the post-PPCM pregnancy is currently the best way to enable earlier diagnosis with institution of effective evidence-based treatment. In that situation it is reassuring to observe that when a subsequent pregnancy begins with recovered left ventricular systolic function to echocardiographic ejection fraction  $\geq 0.50$ , even with relapse, the response to treatment is good with much more favorable outcomes. On the other hand, beginning the subsequent pregnancy with echocardiographic ejection fraction  $< 0.50$  greatly increases the risk for less favorable outcomes. This article summarizes the current state of knowledge; addresses the important questions facing patients, their families, and caregivers; and identifies the need for a prospective multi-center study of women with post-PPCM pregnancies. The reality is that an estimated 10 % to 20 % of apparently recovered PPCM mothers are going to relapse in a post-PPCM pregnancy; but we do not yet know why. Nevertheless, the lowest risk for relapse is experienced by those who (1) recover to left ventricular ejection fraction 0.55 prior to another pregnancy; (2) have no deterioration of left ventricular ejection fraction after phasing out angiotensin-converting enzyme inhibitor/angiotensin-receptor blocker treatment following recovery; and perhaps, (3) demonstrate adequate contractile reserve on exercise echocardiography.

**Database:** Medline

### 10. Outcomes of subsequent pregnancies in women with peripartum cardiomyopathy

**Author(s):** Fassett M.; Remington M.; Getahun D.

**Source:** American Journal of Obstetrics and Gynecology; Jan 2015; vol. 212 (no. 1)

**Publication Date:** Jan 2015

**Publication Type(s):** Conference Abstract

**Abstract:**OBJECTIVE: To examine the outcomes of subsequent pregnancies in women with peripartum cardiomyopathy (PPCM). STUDY DESIGN: We identified women with PPCM (ICD-9 674.5) within 9 months before or 6 months after any pregnancy. Medical records were reviewed to confirm diagnosis of PPCM and ascertain the outcomes of any subsequent pregnancies. RESULTS: We identified 85 women with PPCM. Left ventricular ejection fraction (LVEF) returned to normal in 72 women (84.7%). No woman with persistent left ventricular dysfunction had a subsequent pregnancy. 16 women with recovered LVEF (mean 55.3%  $\pm$  6.9%) had 30 subsequent pregnancies. 12 women had one subsequent pregnancy, and 6 women had two or more subsequent pregnancies. Among these 30 pregnancies there were: 7 elective terminations (mean LVEF 62.3%  $\pm$  6.3%), 7 spontaneous abortions (mean LVEF 58%  $\pm$  4.5%), and 13 liveborn infants (mean LVEF 57.7%  $\pm$  4.5%).



4,4%). None of these 16 women experienced recurrent left ventricular dysfunction in a subsequent pregnancy. **CONCLUSION:** Women who recover normal LVEF after a pregnancy complicated by PPCM do not appear to experience recurrent left ventricular dysfunction in subsequent pregnancies.

**Database:** EMBASE

### **11. Risk of subsequent pregnancy in women with a history of peripartum cardiomyopathy.**

**Author(s):** Elkayam, Uri

**Source:** Journal of the American College of Cardiology; Oct 2014; vol. 64 (no. 15); p. 1629-1636

**Publication Date:** Oct 2014

**Publication Type(s):** Journal Article Review

**PubMedID:** 25301468

Available in full text at [Journal of the American College of Cardiology](#) - from ProQuest

Available in full text at [Journal of the American College of Cardiology](#) - from Free Access Content

**Abstract:**Peripartum cardiomyopathy (PPCM) is a pregnancy-associated myocardial disease with marked left ventricular systolic dysfunction. Although this condition can lead to major complications, including severe heart failure, arrhythmias, thromboembolic events, and death, the majority of women with this condition demonstrate a complete or partial recovery. Many of these women desire to become pregnant again and are concerned regarding the safety of additional pregnancies. The purpose of this paper is to review the available information related to subsequent pregnancies in women with a history of PPCM in an attempt to reach conclusions regarding the risk of such pregnancies in this group of patients.

**Database:** Medline

### **12. Peripartum cardiomyopathy: review and practice guidelines.**

**Author(s):** Johnson-Coyle, Leah; Jensen, Louise; Sobey, Alan; American College of Cardiology Foundation; American Heart Association

**Source:** American journal of critical care : an official publication, American Association of Critical-Care Nurses; Mar 2012; vol. 21 (no. 2); p. 89-98

**Publication Date:** Mar 2012

**Publication Type(s):** Journal Article Review

**PubMedID:** 22381985

Available in full text at [American Journal of Critical Care](#) - from EBSCOhost

Available in full text at [American Journal of Critical Care](#) - from Free Access Content

**Abstract:**Peripartum cardiomyopathy, a type of dilated cardiomyopathy of unknown origin, occurs in previously healthy women in the final month of pregnancy and up to 5 months after delivery. Although the incidence is low-less than 0.1% of pregnancies -morbidity and mortality rates are high at 5% to 32%. The outcome of peripartum cardiomyopathy is also highly variable. For some women, the clinical and echocardiographic status improves and sometimes returns to normal, whereas for others, the disease progresses to severe cardiac failure and even sudden cardiac death. In acute care, treatment may involve the use of intravenous vasodilators, inotropic medications, an intra-aortic balloon pump, ventricular-assist devices, and/or extracorporeal membrane oxygenation. Survivors of peripartum cardiomyopathy often recover from left ventricular dysfunction; however, they may be at risk for recurrence of heart failure and death in subsequent pregnancies. Women



with chronic left ventricular dysfunction should be managed according to guidelines of the American College of Cardiology Foundation and the American Heart Association.

**Database:** Medline

### **13. Pregnancy and subsequent pregnancy outcomes in peripartum cardiomyopathy**

**Author(s):** Mandal D.; Biswas S.C.; Maiti T.K.; Chattopadhyaya N.; Mandal S.; Mukherjee D.; Majumdar B.; Panja M.

**Source:** Journal of Obstetrics and Gynaecology Research; Mar 2011; vol. 37 (no. 3); p. 222-227

**Publication Date:** Mar 2011

**Publication Type(s):** Article

**PubMedID:** 21114580

Available in full text at [Journal of Obstetrics and Gynaecology Research](#) - from John Wiley and Sons

**Abstract:**Aim: To study the clinical profile and management of peripartum cardiomyopathy, and to analyze the pregnancy outcomes of pregnant women with this disorder as well as its effect on subsequent pregnancies. Methods: All patients admitted with peripartum cardiomyopathy from July 2006 to June 2009 by the Departments of Cardiology and Obstetrics and Gynecology from the Institute of Post Graduate Medical Education and Research, Kolkata, India, were considered for this observational study. Thirty-six women with 42 pregnancies (36 first pregnancies and six second pregnancies in the same patients) were evaluated. Results: Primiparas constituted 39% (14/36) of the total study population. Twenty-six women (72%) were clinically improved and in 17 (48%) the left ventricular functional status returned to normal. Five cases (14%) developed persistent cardiomyopathy (persistent left ventricular dysfunction beyond six months of presentation), and five women (14%) presented with thromboembolic events and anticoagulation was used as secondary prophylaxis. Maternal mortality was 14% (5/36). Among all live babies two had intrauterine growth restriction (IUGR) and another two died during the neonatal period. Of the six women with subsequent pregnancies, the patient with persistent cardiomyopathy died after delivering a stillborn baby. The remaining five cases with normal left ventricular functional status had favorable fetal outcomes; however, the mothers experienced morbidities such as symptoms of heart failure (two cases) and one of them progressed to persistent cardiomyopathy. Conclusions: Subsequent pregnancies should be discouraged as it increases the risk of recurrence of left ventricular dysfunction. Anticoagulation may be considered as a primary prevention of thromboembolism in pregnant mothers with peripartum cardiomyopathy. © 2011 Japan Society of Obstetrics and Gynecology.

**Database:** EMBASE

#### **14. Risk of heart failure relapse in subsequent pregnancy among peripartum cardiomyopathy mothers**

**Author(s):** Fett J.D.; Fristoe K.L.; Welsh S.N.

**Source:** International Journal of Gynecology and Obstetrics; Apr 2010; vol. 109 (no. 1); p. 34-36

**Publication Date:** Apr 2010

**Publication Type(s):** Article

**PubMedID:** 19945699

Available in full text at [Intl Jrnal Gynecology and Obstet](#) - from John Wiley and Sons

**Abstract:**Objective: To quantify the level of risk for heart failure relapse in a subsequent pregnancy in women who have had peripartum cardiomyopathy (PPCM), and to test the hypothesis that meeting additional criteria may help lower the risk. Methods: Prospectively-identified PPCM patients volunteering between 2003 and 2009 were identified from the PPCM Registry of Hopital Albert Schweitzer, Deschapelles, Haiti, and an internet support group. Data were assessed for full adherence to monitoring and diagnostic criteria, clinical data, statistical analysis, and reporting. Results: Of 61 post-PPCM pregnancies identified, there were 18 relapses (29.5%) of heart failure. Of 26 pregnancies with a left ventricular ejection fraction (LVEF) of less than 0.55 prior to the pregnancy, relapse occurred in 12 (46.2%) pregnancies. Of 35 pregnancies with an LVEF of 0.55 or greater prior to the pregnancy, relapse occurred in 6 (17.1%) ( $P < 0.01$ ). No relapses occurred in 9 women who also demonstrated adequate contractile reserve. Conclusion: The most important criterion associated with reduced risk for heart failure relapse in a post-PPCM pregnancy is recovery defined by an LVEF 0.55 or greater before the subsequent pregnancy. Exercise stress echocardiography showing adequate contractile reserve may help to identify women at an even lower risk of relapse. © 2009 International Federation of Gynecology and Obstetrics.

**Database:** EMBASE

#### **15. Personal commentary: monitoring subsequent pregnancy in recovered peripartum cardiomyopathy mothers.**

**Author(s):** Fett, James D

**Source:** Critical pathways in cardiology; Dec 2009; vol. 8 (no. 4); p. 172-174

**Publication Date:** Dec 2009

**Publication Type(s):** Journal Article

**PubMedID:** 19952553

Available in full text at [Critical Pathways in Cardiology: A Journal of Evidence-Based Medicine](#) - from Ovid

**Abstract:**Peripartum cardiomyopathy (PPCM) is defined as the first appearance of systolic heart failure in a previously healthy woman during the last month of pregnancy or up to 6 months postpartum. Both planned and unplanned pregnancies may occur in recovered and non-recovered PPCM mothers, requiring careful counseling and management strategies. Previous studies indicate that relapse of heart failure in post-PPCM pregnancies is always a possibility, even in recovered PPCM mothers. The risk of relapse is high when the left ventricular ejection fraction is less than 0.50, and should be considered a relative contraindication to subsequent pregnancy. There are not yet established protocols for monitoring subsequent pregnancies in those who once had PPCM, and few medical articles with guidelines. This personal commentary contains parameters that have been found useful to contribute to safer monitoring with improved outcomes.

**Database:** Medline

**16. Brief communication: Outcomes of subsequent pregnancy after peripartum cardiomyopathy: a case series from Haiti.**

**Author(s):** Fett, James D; Christie, Len G; Murphy, Joseph G

**Source:** Annals of internal medicine; Jul 2006; vol. 145 (no. 1); p. 30-34

**Publication Date:** Jul 2006

**Publication Type(s):** Research Support, Non-u.s. Gov't Journal Article

**PubMedID:** 16818926

Available in print at [Patricia Bowen Library and Knowledge Service West Middlesex university Hospital](#) - from Annals of internal medicine

Available in full text at [Annals of Internal Medicine](#) - from Free Access Content

**Abstract:**BACKGROUND Maternal risks with pregnancies after an index diagnosis of peripartum cardiomyopathy (PPCM) are inadequately understood. OBJECTIVE To describe the clinical outcomes of subsequent pregnancy in Haitian women with PPCM. DESIGN Prospectively identified cases from a defined population base, 2000-2005. SETTING Hôpital Albert Schweitzer, Deschapelles, Haiti. PATIENTS 15 patients with PPCM and subsequent pregnancies among 99 prospectively identified patients with PPCM. MEASUREMENTS Clinical and echocardiographic parameters. RESULTS Fifteen women with PPCM had 16 subsequent pregnancies after the index pregnancies. Eight of these patients experienced worsening heart failure; of these, 1 died and 1 regained normal left ventricular systolic function. Seven patients tolerated pregnancy without worsening heart failure, and ventricular function recovered in these patients within 30 months after the subsequent pregnancy. LIMITATIONS The results may not apply to non-Haitian women, and power was insufficient to identify factors that might predict recovery (n = 15). CONCLUSIONS Half of the women with subsequent pregnancy after PPCM experienced worsening heart failure and long-term systolic dysfunction, while the other half experienced no deterioration and regained normal left ventricular systolic function.

**Database:** Medline

**17. Outcome of subsequent pregnancy in patients with documented peripartum cardiomyopathy.**

**Author(s):** Sliwa, Karen; Forster, Olaf; Zhanje, Fitzgerald; Candy, Geoff; Kachope, John; Essop, Rafique

**Source:** The American journal of cardiology; Jun 2004; vol. 93 (no. 11); p. 1441

**Publication Date:** Jun 2004

**Publication Type(s):** Research Support, Non-u.s. Gov't Journal Article

**PubMedID:** 15165937

**Abstract:**Subsequent pregnancy in 6 patients with previous peripartum cardiomyopathy resulted in reduction of ejection fraction by >10% in 5 patients at 1 month postpartum. Two patients with impaired ejection fraction at onset of subsequent pregnancy died 3 months postpartum due to heart failure despite optimal medical therapy. Deterioration of left ventricular function occurred uniformly postpartum and was accompanied by elevation of tumor necrosis factor-alpha plasma levels from 2.4 +/- 1.1 pg/ml at onset of subsequent pregnancy to 6.2 +/- 2.4 pg/ml at 1 month postpartum.

**Database:** Medline

### **18. Successful pregnancy following a peripartum cardiomyopathy**

**Author(s):** Segal O.R.; Fox K.

**Source:** British Journal of Cardiology; 2002; vol. 9 (no. 1); p. 50-52

**Publication Date:** 2002

**Publication Type(s):** Article

**Database:** EMBASE

### **19. Pregnant again after peripartum cardiomyopathy: to be or not to be?**

**Author(s):** Elkayam, U

**Source:** European heart journal; May 2002; vol. 23 (no. 10); p. 753-756

**Publication Date:** May 2002

**Publication Type(s):** Editorial

**PubMedID:** 12009709

Available in full text at [European Heart Journal](#) - from Oxford University Press ; Collection notes: To access please select Login with Athens and search and select NHS England as your institution before entering your NHS OpenAthens account details.

Available in full text at [European Heart Journal](#) - from Highwire Press

**Database:** Medline

### **20. Maternal and fetal outcomes of subsequent pregnancies in women with peripartum cardiomyopathy.**

**Author(s):** Elkayam, U; Tummala, P P; Rao, K; Akhter, M W; Karaalp, I S; Wani, O R; Hameed, A; Gviazda, I; Shotan, A

**Source:** The New England journal of medicine; May 2001; vol. 344 (no. 21); p. 1567-1571

**Publication Date:** May 2001

**Publication Type(s):** Journal Article

**PubMedID:** 11372007

Available in full text at [New England Journal of Medicine, The](#) - from ProQuest

Available in full text at [New England Journal of Medicine](#) - from Massachusetts Medical Society ; Notes: Please select 'Login via Athens or your institution' and enter your OpenAthens username and password.

**Abstract:**BACKGROUND Peripartum cardiomyopathy is a rare and sometimes fatal form of heart failure. Little is known about the outcomes of subsequent pregnancies in women who have had the disorder. METHODSThrough a survey of members of the American College of Cardiology, we identified 44 women who had had peripartum cardiomyopathy and had a total of 60 subsequent pregnancies. We then reviewed the medical records of these women and interviewed the women or their physicians. RESULTSAmong the first subsequent pregnancies in the 44 women, 28 occurred in women in whom left ventricular function had returned to normal (group 1) and 16 occurred in women with persistent left ventricular dysfunction (group 2). The pregnancies were associated with a reduction in the mean ( $\pm$ SD) left ventricular ejection fraction both in the total cohort (from  $49\pm 12$  percent to  $42\pm 13$  percent,  $P<0.001$ ) and in each group separately (from  $56\pm 7$  percent to  $49\pm 10$  percent in group 1,  $P=0.002$ ; and from  $36\pm 9$  percent to  $32\pm 11$  percent in group 2,  $P=0.08$ ). During these pregnancies, a decrease of more than 20 percent in the left ventricular ejection fraction

occurred in 21 percent of the women in group 1 and 25 percent of those in group 2, and symptoms of heart failure occurred in 21 percent of the women in group 1 and 44 percent of those in group 2. The mortality rate was 0 percent in group 1 and 19 percent in group 2 ( $P=0.06$ ). In addition, the frequency of premature delivery was higher in group 2 (37 percent vs. 11 percent), as was that of therapeutic abortions (25 percent vs. 4 percent). **CONCLUSION** Subsequent pregnancy in women with a history of peripartum cardiomyopathy is associated with a significant decrease in left ventricular function and can result in clinical deterioration and even death.

**Database:** Medline

## **21. Risks of repeat pregnancy after peripartum cardiomyopathy: double jeopardy.**

**Author(s):** Baughman, K L

**Source:** Journal of cardiac failure; Mar 2001; vol. 7 (no. 1); p. 36-37

**Publication Date:** Mar 2001

**Publication Type(s):** Editorial Comment

**PubMedID:** 11264548

**Database:** Medline

## **22. Natural course of subsequent pregnancy after peripartum cardiomyopathy.**

**Author(s):** Albanesi Filho, F M; da Silva, T T

**Source:** Arquivos brasileiros de cardiologia; Jul 1999; vol. 73 (no. 1); p. 47-57

**Publication Date:** Jul 1999

**Publication Type(s):** Journal Article

**PubMedID:** 10684141

Available in full text at [Arquivos Brasileiros de Cardiologia](#) - from Free Access Content

**Abstract:** **OBJECTIVE** To assess the effect of subsequent pregnancy after peripartum cardiomyopathy (PPCM) on maternal and fetal outcome. **METHODS** Prospective study of 34 patients with the diagnosis of PPCM (mean age = 26 years). At the time of first diagnosis 5 were in NYHA functional class (FC) II for heart failure, one in FC III and 28 in FC IV. After clinical treatment, patients were advised to avoid new pregnancies and a follow-up was obtained. **RESULTS** There were 12 (35.3%) subsequent pregnancies in patients (pt) aged 19 to 44 years (mean 32), divided into two groups: GI: 6 pts who had normalized their heart size and GII: 6 pts with persistent cardiomegaly. GI had initially mild clinical manifestations (3 were in FC II, 1 in FC II and 2 in FC IV) and complete recovery of cardiac function (FC I). A new pregnancy was well-tolerated in 5 (83.3%); 1 pt presented with preeclampsia, and progressed to FC II. Presently, 5 pt are in FC I and 1 in FC II. GII pts had more severe heart failure at the onset of PPCM (1 pt in FC II and 5 in FC IV); during follow-up, 4 pt were in FC I and 2 in FC II. A new pregnancy was well tolerated in all of them, but the eldest, who had had 2 pregnancies and had a progressive worsening of clinical status, dying 8 years after the last pregnancy and 13 years after the diagnosis of PPCM. The remaining 5 pt are still alive, 3 in FC I and 2 in FC II, with worsening of FC in 1. Subsequent pregnancies occurred 3-7 years after clinical treatment of PPCM and no fetal distress was observed. **CONCLUSIONS** Subsequent pregnancies are well-tolerated after PPCM, but not devoid of risk. No fetal distress was observed. A minimum interval of 3 years after the recovery of function seems to be safe for subsequent pregnancies.

**Database:** Medline

### **23. Recurrent peripartum cardiomyopathy.**

**Author(s):** Ceci, O; Berardesca, C; Caradonna, F; Corsano, P; Guglielmi, R; Nappi, L

**Source:** European journal of obstetrics, gynecology, and reproductive biology; Jan 1998; vol. 76 (no. 1); p. 29-30

**Publication Date:** Jan 1998

**Publication Type(s):** Case Reports Journal Article

**PubMedID:** 9481542

**Abstract:**Peripartum cardiomyopathy (PPCM) is an uncommon myocardial disease arising in the latter part of pregnancy or during the first five postpartum months, in the absence of any obvious cause and with no previously known heart disease. The risk of recurrence of PPCM is considered low when left ventricular size and function return to normal: We illustrate a case of peripartum cardiomyopathy recurred in subsequent pregnancy despite the rapid return to normal of heart size and function.

**Database:** Medline

### **24. Effects of subsequent pregnancy on left ventricular function in peripartum cardiomyopathy**

**Author(s):** St. John Sutton M.; Cole P.; Plappert M.; Saltzman D.; Goldhaber S.

**Source:** American Heart Journal; 1991; vol. 121 (no. 6); p. 1776-1778

**Publication Date:** 1991

**Publication Type(s):** Article

**PubMedID:** 2035390

**Abstract:**Pregnancy has been discouraged in patients with peripartum cardiomyopathy (PPCM) to avoid the risk of precipitating recurrent or progressive left ventricular dysfunction. We assessed left ventricular size and contractile function using echocardiography in four PPCM patients prior to pregnancy, during the third trimester, and a mean of 6 weeks postpartum. Left ventricular mean diameters at end diastole and at end systole prior to pregnancy ( $5.2 \pm 0.3$  and  $3.0 \pm 0.2$  cm, respectively) did not change during pregnancy ( $5.2 \pm 0.3$  and  $3.1 \pm 0.2$  cm). Similarly, left ventricular fractional shortening did not alter significantly during pregnancy or postpartum. Furthermore, no patient developed any symptoms or signs of left ventricular failure. All patients had normal babies, including one who had twins. We conclude that PPCM patients whose left ventricular function returns to normal may undertake further pregnancy with a normal fetal outcome and a low risk of recurrent left ventricular dysfunction.

**Database:** EMBASE

## Strategy 251226

#	Database	Search term	Results
1	Medline	("Peripartum cardiomyopath*").ti,ab	941
2	Medline	("postpartum cardiomyopath*").ti,ab	67
3	Medline	(1 OR 2)	992
4	Medline	(recurr*).ti,ab	479917
5	Medline	exp RECURRENCE/	164416
6	Medline	(4 OR 5)	564097
7	Medline	(3 AND 6)	44
8	Medline	(relaps*).ti,ab	152677
9	Medline	(3 AND 8)	14
10	EMBASE	("Peripartum cardiomyopath*").ti,ab	1428
11	EMBASE	("postpartum cardiomyopath*").ti,ab	110
12	EMBASE	exp "PERIPARTUM CARDIOMYOPATHY"/	1202
13	EMBASE	(10 OR 11 OR 12)	1820
14	EMBASE	(relaps* OR recur*).ti,ab	900294
15	EMBASE	exp RELAPSE/	103700
16	EMBASE	exp "RECURRENT DISEASE"/	155247
17	EMBASE	(14 OR 15 OR 16)	959185
18	EMBASE	(13 AND 17)	107



19	Medline	(subsequent ADJ2 pregn*).ti,ab	3502
20	Medline	(3 AND 19)	36