CASE REPORT

Case Report: Peripartum cardiomyopathy in a young female complicated by cardioembolic stroke [version 1; peer review: 1 approved with reservations, 1 not approved]

Ravi Ranjan Pradhan ¹, Ajay Kumar Yadav¹, Sant Yadav ¹,
Prashant Kumar Gupta ²

¹Department of Internal Medicine, Provincial Hospital, Janakpurdham, Province-2, 0977, Nepal

²Department of Radiodiagnosis, Provincial Hospital, Janakpurdham, Province-2, 0977, Nepal

V1 First published: 20 Dec 2019, 8:2135
<https://doi.org/10.12688/f1000research.21712.1>
 Latest published: 20 Dec 2019, 8:2135
<https://doi.org/10.12688/f1000research.21712.1>

Abstract

Stroke in a young female is rare but, when it occurs, has a serious economic, and mental burden to the patient, and family members. Peripartum cardiomyopathy (PPCM) is one of the rare causes of stroke in young females. We report a case of a 20-year-old female with PPCM complicated by cardioembolic stroke. The patient was started on long-term anticoagulation, and her heart failure regimen was optimized upon discharge. Anticoagulation therapy in cardioembolic stroke prevents further complications.

Keywords

peripartum cardiomyopathy, female, stroke, anticoagulation

Open Peer Review

Approval Status

	1	2
version 1
20 Dec 2019	view	view

1. **Guillaume Schurtz**, Intensifs de Cardiologie, Institut Coeur Poumon, Lille, France
2. **Prashant Nasa** , NMC Specialty Hospital, Dubai, United Arab Emirates

Any reports and responses or comments on the article can be found at the end of the article.

Corresponding author: Ravi Ranjan Pradhan (dravipradhan@iom.edu.np)

Author roles: **Pradhan RR:** Conceptualization, Data Curation, Formal Analysis, Project Administration, Resources, Supervision, Writing – Original Draft Preparation, Writing – Review & Editing; **Yadav AK:** Visualization, Writing – Review & Editing; **Yadav S:** Resources, Writing – Review & Editing; **Gupta PK:** Writing – Review & Editing

Competing interests: No competing interests were disclosed.

Grant information: The author(s) declared that no grants were involved in supporting this work.

Copyright: © 2019 Pradhan RR *et al.* This is an open access article distributed under the terms of the [Creative Commons Attribution License](#), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

How to cite this article: Pradhan RR, Yadav AK, Yadav S and Gupta PK. **Case Report: Peripartum cardiomyopathy in a young female complicated by cardioembolic stroke [version 1; peer review: 1 approved with reservations, 1 not approved]** F1000Research 2019, 8:2135 <https://doi.org/10.12688/f1000research.21712.1>

First published: 20 Dec 2019, 8:2135 <https://doi.org/10.12688/f1000research.21712.1>

Introduction

Peripartum cardiomyopathy (PPCM) is a rare cause of heart failure affecting women in late pregnancy or in the puerperium. The overall incidence of PPCM ranges from 1 in 1300 to 1 in 15,000 pregnancies¹. However, the incidence fluctuates globally, and is higher in developing countries². PPCM is often recognized when the patient has severe myocardial dysfunction, less severe forms of PPCM often go unrecognized³. The 2010 European Society of Cardiology (ESC) Working Group defined PPCM as an idiopathic cardiomyopathy with following characteristics³:

1. The development of heart failure (HF) towards the end of pregnancy or within five months following delivery.
2. The absence of an identifiable cause of HF.
3. Left ventricular (LV) systolic dysfunction with an LV ejection fraction (LVEF) of less than 45 percent. The LV may or may not be dilated.

Despite many attempts to establish the exact etiology of PPCM, the cause remains unknown. Viral, autoimmune, dietary deficiencies, and idiopathic causes may contribute¹. Familial occurrence of PPCM suggests a possible role of genetic predisposition¹. Altered prolactin processing, and elevated soluble Fms-like tyrosine kinase 1 (Flt 1) have also been associated with the pathogenesis of PPCM^{4,5}. During pregnancy, increased oxidative stress leads to cleavage of prolactin by cathepsin D into abnormal 16 kDa protein. This protein damages the heart, and blood vessels⁴. Soluble Flt 1 is secreted by placenta, that inhibits vascular endothelial growth factor signaling, which leads to angiogenic imbalance, and endothelial dysfunction⁵. Relaxin-2, a hormone produced by ovaries, breast, and placenta has a potential beneficial effect in PPCM. It increases cardiac output, and decreases vascular resistance⁶. Risk factors of PPCM are increased maternal age, increased parity, multiple pregnancy, malnutrition, use of tocolytics, and preeclampsia or eclampsia¹. Patients usually present with shortness of breath, orthopnea, cough, hemoptysis, paroxysmal nocturnal dyspnea, and ankle edema³. Tachycardia, elevated jugular venous pressure, third heart sound (S3), and displaced apex beat are common, however; basal crackles are less common³. A high index of suspicion is required for diagnosis, as these features are common in advanced pregnancy and the peripartum period³.

About 6 % of patients of PPCM present with thromboembolic complications such as deep vein thrombosis, pulmonary thromboembolism, stroke, acute limb ischemia etc⁷. Morbidity and mortality is high in PPCM, especially when associated with cardioembolic phenomenon³. Fortunately, despite the high morbidity, mortality, and a high risk of relapse in succeeding pregnancies, many patients with peripartum cardiomyopathy recover within three to six months of disease onset². Here, we report a rare case of a young female with peripartum cardiomyopathy complicated by cardioembolic stroke.

Case report

A 20-year-old female farmer from Nepal presented with shortness of breath and cough which had lasted 10 days in November, 2019. The shortness of breath had a gradual onset and was progressive. Initially patient had shortness of breath on exertion only, but with time she had shortness of breath even at rest, and it was associated with orthopnea. The patients cough was productive with mucoid sputum lasting for 10 days. There was no history of fever, chest pain, and hemoptysis. The patient was 45 days post-partum, and was breastfeeding. She didn't indicate history of illicit drug abuse and use of hormonal contraceptives. The family history was negative for premature coronary artery disease, young stroke, and premature death. With the above symptoms the patient present at her local hospital, where she received injectable and oral antibiotics (intravenous ceftriaxone 1 gram twice a day and oral azithromycin 500 mg daily) thinking that it could be a chest infection. However, her symptoms were not relieved and, she visited our center.

On examination the patient had a temperature of 36.7°C (normal = 36.5°C to 37.5°C), heart rate of 109 beats per minute (normal = 60 to 100 beats per minute), blood pressure was 100/60 mm Hg (< 120/80 mm Hg), respiratory rate of 20 breaths per minute (normal = 14 to 16 breaths per minute), and oxygen saturation of 92% (normal = 95% to 100%) while he was breathing ambient air. There was no peripheral edema. On chest examination there was dullness in the right infra-scapular and infra-axillary region and the intensity of breath sound was decreased, however her trachea was in the midline. Examinations of other systems were unremarkable.

On investigation total leukocyte count was 8,300/uL, hemoglobin was 11.4 gm/dL, platelet count was 4,35,00/uL, and random blood sugar was 100 mg/dL. Details are shown in [Table 1](#).

A provisional diagnosis of right sided pleural effusion was made and the patient was admitted for further evaluation. Antibiotic treatment (intravenous ceftriaxone 1 gram twice a day) was initiated. One day after hospital admission the patient developed weakness of left half of the body. The weakness was more in the upper limb compared to the lower limb. It was associated with slurring of speech, and deviation of face towards the right side. On neurological examination, the patient had left-sided upper motor neuron type facial nerve palsy, muscle strengths in the left upper and lower limbs were 0/5 and 1/5 respectively on the Medical Research Council (MRC) scale, and there was an ipsilateral Babinski sign. Fundoscopy findings were unremarkable. A computed tomography scan of the head was done immediately which was normal. A repeat CT scan head at 48 hours showed a wedged shaped hypodensity involving the gray and white matter of the right anterior temporal lobe, a hypodense area in the posterior portion of lentiform nucleus, the adjacent internal capsule region, and in the head of caudate nucleus (features suggestive of right sided acute ischemic stroke) [[Figure 1](#)]. Electrocardiogram showed sinus tachycardia, and poor progression of the R-wave [[Figure 2](#)].

Table 1. Laboratory parameters on admission.

Parameters	Reference range, adults	On admission
Hematocrit (%)	36.0–45.0	33.2
Hemoglobin (gm/dl)	12.0–16.0	11.4
White-cell count (per mm ³)	4,500–11,000	8,300
Differential count (%)		
Neutrophils	40–70	70
Eosinophils	0–10	2
Lymphocytes	22–44	27
Monocytes	4–11	1
Mean corpuscular volume (um ³)	80–100	87.3
Prothrombin time (sec)	11.0–14.0	12.0
Urea (mg/dl)	18.0–25.0	30.2
Creatinine (mg/dl)	0.9–1.2	1.0
Sodium (mmol/liter)	135–145	138
Potassium (mmol/liter)	3.5–5.5	4.5
Random blood sugar (mg/dl)	60–100	100
Total bilirubin (mg/dl)	0.2–1.2	0.9
Direct bilirubin (mg/dl)	0.1–0.4	0.3
Alanine transaminase (IU/L)	2.0–36.0	32.4
Aspartate transaminase (IU/L)	2.0–36.0	35.3

Figure 1. Computed tomography scan head showing right sided acute ischemic stroke. **Figure 2. Electrocardiogram showing sinus tachycardia, and poor progression of R-wave.**

Transthoracic echocardiography (TTE) showed global hypokinesia of the left ventricular wall with an LVEF of 25%, moderate mitral regurgitation, mild tricuspid regurgitation, and minimal pericardial effusion. On transesophageal echocardiography (TEE) there was no left atrial or ventricle clot.

A diagnosis of right sided ischemic stroke (cardioembolic) with peripartum cardiomyopathy was formulated. The patient was treated with aspirin 150 mg daily, frusemide 20 mg twice a day, spironolactone 25 mg daily, metoprolol 25 mg daily, and prophylactic unfractionated heparin (UFH) 2500 units subcutaneously twice a day. Limb physiotherapy was initiated. Two weeks after the incident of stroke, anticoagulation with warfarin 5 mg daily bridged with low molecular weight heparin 40 mg subcutaneously twice a day for an initial five days was administered. Aspirin and UFH were stopped. On discharge, her HF medications were optimized (frusemide 20 mg twice a day, spironolactone 50 mg daily, and metoprolol 50 mg daily), and anticoagulation with warfarin 5 mg daily was continued with provision for regular monitoring of prothrombin time (PT), and international normalization ratio (INR). At the time of discharge, her power was 3/5 and 4/5 in the left upper limb, and lower limb respectively. The patient was counselled about avoiding subsequent pregnancies.

Discussion

Strokes in young adults are uncommon, comprising 10–15% of all stroke patients^{8,9}. Though uncommon, stroke in young adults has a large economic burden, often leaving the victims disabled during their most productive years.

Previously published articles have defined the cut-off age for strokes in young adults as those younger than 45 or 49 years¹⁰. The etiologies and nature of strokes in young adults are different from the older patients. In young adults, congenital and acquired heart diseases, hematological conditions (such as sickle cell disease), vasculopathy (such as arterial dissection and vasculitis), pregnancy (cortical venous sinus thrombosis, preeclampsia/eclampsia), other hypercoagulable states, smoking, illicit drugs, premature atherosclerosis, hypertension, metabolic disorders (such as Fabry disease, homocystinuria etc), and possibly migraine are common causes. The etiology of stroke in young patients remains a diagnostic challenge. In our patient, the etiology was cardioembolic secondary to hypokinesia of the left ventricle (EF=25%) due to peripartum cardiomyopathy. In a case report from Kumbham *et al.*¹¹ the patient had multifocal infarct involving the left frontoparietal lobe, both occipital lobes, and the right insular cortex as well as thrombi in the left ventricle, which is in contrast with our case. In our case, we performed TEE to rule out a thrombus in the left atria or ventricle, the results of which were negative. The case report from Kumbham *et al.*¹¹ had a multifocal infarct involving both hemispheres, but in our case the infarct was unilateral. Maternal age > 30 years is one of the risk factors for PPCM¹², however our patient was 20 years old. Other

conventional risk factors for PPCM such as increased parity, multiple pregnancy, use of tocolytics, and preeclampsia or eclampsia were not present in our patient.

Management of PPCM with cardio-embolic stroke requires a multidisciplinary approach that involves cardiologist, neurologist, obstetrics, and physiotherapist. Components of HF therapy in PPMC are similar to that of other types of HF, with attention to avoiding particular medications that have an effect on the fetus². Angiotensin converting enzyme (ACE) inhibitors, angiotensin II receptor blockers (ARBs), angiotensin receptor-neprilysin inhibitors (ARNI), and aldosterone antagonists are teratogenic, and shouldn't be used during pregnancy. In our patient we have avoided all these medications, but we used aldosterone antagonist (spironolactone) as our patient was 45 days postpartum, and is relatively safe during lactation¹³. Anticoagulation in PPMC is administered when LVEF is < 30 %¹⁴. In our patient (LVEF=25 %), anticoagulation was started at two weeks following the ischemic stroke to avoid the risk of bleeding, as the infarct was involving more than one-third of the middle cerebral artery region.

The risk of recurrent HF in patients with PPCM is around 25 % when LV function has recovered, and 50 % when LV function has not recovered¹⁵. We therefore, strongly counselled our patient to avoid subsequent pregnancies.

Limitations: Patient developed acute ischemic stroke during hospital stay, however; we were not able to thrombolyse the patient with intravenous recombinant tissue plasminogen activator (rtPA) therapy due to financial constraints for the patient. Work-up for thrombophilias, and vasculitis disorders were not feasible for the same reason. At presentation to our center, we missed the diagnosis of PPCM initially, and didn't consider that pleural effusion could be due to HF in PPCM.

Conclusion

PPCM is one of the rare causes of HF in puerperium. One should consider PPCM as a differential diagnosis in any patient presenting with shortness of breath, and cough during puerperium. Stroke in PPCM is rare, but has a devastating effect on mother, infant, and other family members. Early diagnosis, optimization of HF medication, and anticoagulation therapy prevents the further complications. Patient counselling to avoid subsequent pregnancies is the cornerstone to prevent recurrent HF.

Consent

Written informed consent for publication of their clinical details and clinical images was obtained from the patient.

Data availability

Underlying data

All data underlying the results are available as part of the article and no additional source data are required

References

1. Abboud J, Murad Y, Chen-Scarabelli C, *et al.*: **Peripartum cardiomyopathy: A comprehensive review.** *Int J Cardiol.* 2007; **118**(3): 295–303.
[PubMed Abstract](#) | [Publisher Full Text](#)
2. Bhattacharyya A, Basra SS, Sen P, *et al.*: **Peripartum cardiomyopathy: a review.** *Tex Heart Inst J.* 2012; **39**(1): 8–16.
[PubMed Abstract](#) | [Free Full Text](#)
3. Sliwa K, Hilfiker-Kleiner D, Petrie MC, *et al.*: **Current state of knowledge on aetiology, diagnosis, management, and therapy of peripartum cardiomyopathy: a position statement from the Heart Failure Association of the European Society of Cardiology Working Group on peripartum cardiomyopathy.** *Eur J Heart Fail.* 2010; **12**(8): 767–78.
[PubMed Abstract](#) | [Publisher Full Text](#)
4. Forster O, Hilfiker-Kleiner D, Ansari AA, *et al.*: **Reversal of IFN-gamma, oxLDL and prolactin serum levels correlate with clinical improvement in patients with peripartum cardiomyopathy.** *Eur J Heart Fail.* 2008; **10**(9): 861–8.
[PubMed Abstract](#) | [Publisher Full Text](#)
5. Patten IS, Rana S, Shahul S, *et al.*: **Cardiac angiogenic imbalance leads to peripartum cardiomyopathy.** *Nature.* 2012; **485**(7398): 333.
[PubMed Abstract](#) | [Publisher Full Text](#) | [Free Full Text](#)
6. Damp J, Givertz MM, Semigran M, *et al.*: **Relaxin-2 and soluble Flt1 levels in peripartum cardiomyopathy: results of the multicenter IPAC study.** *JACC Heart Fail.* 2016; **4**(5): 380–8.
[PubMed Abstract](#) | [Publisher Full Text](#) | [Free Full Text](#)
7. Wong CM, Hawkins NM, Jhund PS, *et al.*: **Clinical characteristics and outcomes of young and very young adults with heart failure: The CHARM programme (Candesartan in Heart Failure Assessment of Reduction in Mortality and Morbidity).** *J Am Coll Cardiol.* 2013; **62**(20): 1845–54.
[PubMed Abstract](#) | [Publisher Full Text](#)
8. Varona JF, Guerra JM, Bermejo F, *et al.*: **Causes of ischemic stroke in young adults, and evolution of the etiological diagnosis over the long term.** *Eur Neurol.* 2007; **57**(4): 212–8.
[PubMed Abstract](#) | [Publisher Full Text](#)
9. George MG, Tong X, Kuklina EV, *et al.*: **Trends in stroke hospitalizations and associated risk factors among children and young adults, 1995-2008.** *Ann Neurol.* 2011; **70**(5): 713–21.
[PubMed Abstract](#) | [Publisher Full Text](#)
10. Smajlović D: **Strokes in young adults: epidemiology and prevention.** *Vasc Health Risk Manag.* 2015; **11**: 157–64.
[PubMed Abstract](#) | [Publisher Full Text](#) | [Free Full Text](#)
11. Kumbham P, Sharma B, Patel A, *et al.*: **POSTPARTUM CARDIOMYOPATHY WITH CARDIOEMBOLIC STROKE (P3.298).** *Neurology.* 2017; **88**(16 Supplement): P3.298.
[Reference Source](#)
12. Whitehead SJ, Berg CJ, Chang J: **Pregnancy-related mortality due to cardiomyopathy: United States, 1991-1997.** *Obstet Gynecol.* 2003; **102**(6): 1326–31.
[PubMed Abstract](#) | [Publisher Full Text](#)
13. Phelps DL, Karim A: **Spirolactone: relationship between concentrations of dethioacetylated metabolite in human serum and milk.** *J Pharm Sci.* 1977; **66**(8): 1203.
[PubMed Abstract](#) | [Publisher Full Text](#)
14. Howie PW: **Anticoagulants in pregnancy.** *Clin Obstet Gynaecol.* 1986; **13**(2): 349–63.
[PubMed Abstract](#)
15. Elkayam U, Goland S, Pieper PG, *et al.*: **High-risk cardiac disease in pregnancy: part II.** *J Am Coll Cardiol.* 2016; **68**(5): 502–16.
[PubMed Abstract](#) | [Publisher Full Text](#)

Open Peer Review

Current Peer Review Status:

Version 1

Reviewer Report 06 August 2021

<https://doi.org/10.5256/f1000research.23936.r90531>

© 2021 Nasa P. This is an open access peer review report distributed under the terms of the [Creative Commons Attribution License](#), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Prashant Nasa

Department of Critical Care Medicine, NMC Specialty Hospital, Dubai, United Arab Emirates

I congratulate the authors for the successful diagnosis of this case despite resource limitations. I have few suggestions for discussion to make it helpful for readers.

1. Diagnosis of peripartum cardiomyopathy should be explained as the patient has no previous history of cardiac dysfunction (recent uneventful delivery, with normal cardiac valvular status). The diagnosis of peripartum cardiomyopathy is an exclusion diagnosis.
2. Anticoagulation management (therapeutic and secondary prophylaxis) needs to be discussed. There are no standard recommendations for anticoagulation management for stroke in peripartum cardiomyopathy. A recent case report, (Nasa *et al.*, 2021), discussed this controversy. The dilemma of delaying anticoagulation (for two weeks) to avoid hemorrhagic transformation of infarct area vs early anticoagulation in a prothrombotic state of peripartum cardiomyopathy. This is important for secondary prophylaxis.
3. Thrombophilic profile is required to exclude the differential diagnosis of thrombophilia.
4. Duration of follow-up and anticoagulation is also required. This is missing, as many cases are reversible so long term anticoagulation is not required, as noted in this case report.

References

1. Nasa P, Mortada M, Ali A, Malhotra V, et al.: Cardioembolic Stroke with Peripartum Cardiomyopathy: An Unusual Presentation. *Indian J Crit Care Med.* 2021; **25** (1): 97-99 [PubMed Abstract](#) | [Publisher Full Text](#)

Is the background of the case's history and progression described in sufficient detail?

Yes

Are enough details provided of any physical examination and diagnostic tests, treatment

given and outcomes?

Partly

Is sufficient discussion included of the importance of the findings and their relevance to future understanding of disease processes, diagnosis or treatment?

Partly

Is the case presented with sufficient detail to be useful for other practitioners?

No

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: Critical care medicine

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard, however I have significant reservations, as outlined above.

Reviewer Report 30 July 2020

<https://doi.org/10.5256/f1000research.23936.r66969>

© 2020 Schurtz G. This is an open access peer review report distributed under the terms of the [Creative Commons Attribution License](#), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Guillaume Schurtz

Intensifs de Cardiologie, Institut Coeur Poumon, Lille, France

In this case, authors aimed to discuss the epidemiology of cardioembolic stroke in young adults (i.e. females) and illustrate this with a possible diagnosis of PPCM. Manuscript is well written but many questions remained. PPCM diagnosis is very difficult and cannot be confirmed in this case. Indeed, in the absence of TTE evaluation before delivery (or in the month before) demonstrating usually parameters observed in pregnant women without other abnormalities (LVEF dysfunction,...), we cannot distinguish a PPCM from another form of previous unknown dilated cardiomyopathy. This is a major pitfall in this manuscript, but also seriously raised concern about the true existence of PPCM diagnosis. Of note, LV diameters are not available, nor aortic valvular evaluation or arguments (or not) for a eventual congenital cardiac disease. Cardiac biomarkers are absent, and extensive coagulation testing must have been realized to exclude a possible diagnosis of catastrophic thrombotic syndrome (aPLS, TTP...). Moreover, despite the absence of robust evidence with its utilization (and also the thrombotic risk), bromocriptine prescription should however have been discussed.

Is the background of the case's history and progression described in sufficient detail?

Yes

Are enough details provided of any physical examination and diagnostic tests, treatment given and outcomes?

No

Is sufficient discussion included of the importance of the findings and their relevance to future understanding of disease processes, diagnosis or treatment?

Partly

Is the case presented with sufficient detail to be useful for other practitioners?

No

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: acute heart failure, cardiogenic shock, mechanical circulatory support, percutaneous coronary interventions, TAVR

I confirm that I have read this submission and believe that I have an appropriate level of expertise to state that I do not consider it to be of an acceptable scientific standard, for reasons outlined above.

The benefits of publishing with F1000Research:

- Your article is published within days, with no editorial bias
- You can publish traditional articles, null/negative results, case reports, data notes and more
- The peer review process is transparent and collaborative
- Your article is indexed in PubMed after passing peer review
- Dedicated customer support at every stage

For pre-submission enquiries, contact research@f1000.com

F1000Research