SAGE Open Medical Case Reports
Volume 8: 1–5

DOI: 10.1177/2050313X20979288
journals.sagepub.com/home/sco
SAGE

Peripartum cardiomyopathy and HELLP syndrome in a previously healthy multiparous woman: A case report

Shany Quevedo[1], Caroline Bekele[2], Patrice D Thompson[2], Megan Philkhana[2], Sana Virani[2], Andrea Consuegra[1], Paul Douglass[3,*] and Alida M Gertz[2*]

Abstract

Peripartum cardiomyopathy is a type of dilated cardiomyopathy in which the exact etiology is uncertain. HELLP syndrome is characterized by a constellation of different clinical and laboratory findings, including hemolysis, elevated liver enzymes, and low platelets. Few case reports exist detailing successful diagnosis and management of postpartum HELLP syndrome, peripartum cardiomyopathy, and multisystem organ failure in a previously healthy woman. We herein report the case of a 39-year-old multiparous female with mild gestational hypertension, who presented in the third trimester with vaginal bleeding and was subsequently suspected to have intrapartum placental abruption leading to immediate Cesarean section, complicated by massive postpartum hemorrhage, necessitating care in the intensive care unit. HELLP syndrome, disseminated intravascular coagulation, and acute kidney injury requiring hemodialysis subsequently developed along with respiratory failure and peripartum cardiomyopathy. After diagnosis and proper management, the patient made a full recovery. Peripartum cardiomyopathy should remain on the differential for women with heart failure symptoms.

Keywords

HELLP syndrome, peripartum cardiomyopathy, postpartum cardiomyopathy, postpartum hemorrhage, pregnancy complications, postpartum, placental abruption, peripartal cardiomyopathy

Date received: 13 June 2020; accepted: 11 November 2020

Introduction

Peripartum cardiomyopathy (PPCM) is a type of dilated cardiomyopathy where the exact etiology is uncertain. It is now proposed that the pathophysiology of PPCM is related to impaired angiogenic signaling and oxidative stress.[1,2] PPCM is typically diagnosed once all other probable causes of heart failure have been excluded.[1,2] As per a retrospective study done by Kolte et al.,[3] it has an overall rate of 10.3 per 100,000 live births. It generally develops during the last month of pregnancy but may occur up to 5 months postpartum and can be life threatening to both mother and baby when occurring in the intrapartum period.[4] The following criteria are used to make the diagnosis: (1) development of cardiac failure within the last month of pregnancy or within 5 months postpartum, (2) absence of an alternate etiology, (3) absence of prior recognizable heart disease, and (4) left ventricular (LV) systolic dysfunction on echocardiogram with an ejection fraction of $<45\%$.[5,6] PPCM can easily be missed early in the course of the disease due to other similar conditions such as the physiologic volume increase that happens normally with pregnancy, or a nosocomial pneumonia that can present with similar symptoms.[2,6]

HELLP syndrome, characterized by a constellation of different clinical and laboratory findings, including hemolysis, elevated liver enzymes, and low platelets,[5] is a rare obstetric complication seen in pregnancy, and is life threatening to both

[1]Ross University School of Medicine, Miramar, FL, USA
[2]Wellstar Atlanta Medical Center, Family Medicine Residency Program, Atlanta, GA, USA
[3]Wellstar Medical Group, Metro Atlanta Cardiovascular Medicine, Atlanta, GA, USA

*The senior authors contributed equally to this study.

Corresponding Author:
Alida M Gertz, Wellstar Atlanta Medical Center Family Medicine Residency Program, 303 Parkway Dr NE, Atlanta, GA 30312, USA.
Email: Alida.Gertz@Wellstar.Org

mother and fetus.[7] While most cases of HELLP syndrome occur prior to delivery (mostly between weeks 27 and 37), approximately 30% occur in the postpartum period.[8] Pre-eclampsia is a hypertensive disorder seen in pregnancy that can cause end-organ damage[9] and is the single greatest risk factor for HELLP and is present in more than 80% of all HELLP syndrome cases.[9,5] Pre-eclampsia and PPCM have been suggested to be overlapping diseases of pregnancy.[10,11] A study conducted by Gammill et al.[9] suggests there is a genetic link between the development of eclampsia and PPCM. However, few cases of HELLP complicated by PPCM have been reported in the literature.[4] We herein report a case of a previously healthy multiparous female who developed HELLP syndrome and heart failure in the postpartum period. Written consent was obtained from the patient to report her case.

Case report

A previously healthy, 39-year-old, G3P2, woman with mild gestational hypertension controlled with low-dose labetalol, presented at 38 weeks and 4 days gestation with vaginal bleeding to the birthing center. The patient had no other past medical, surgical, or relevant family history, no allergies, and she reported two prior uncomplicated full-term pregnancies both ending with spontaneous vaginal deliveries and with unremarkable postpartum periods. She had had adequate and unremarkable antenatal care. On presentation, she reported a "gush of vaginal bleeding" at home which led her to present to the birthing center. Her physical exam was notable for a ~20 cc clot in the vaginal vault and frank bleeding, but was otherwise unremarkable. She was transferred to the hospital and admitted to labor and delivery for induction of labor due to concern for placental abruption.

On admission, she reported mild cramping with contractions and normal fetal movement. Her blood pressure (BP) ranged from 140s to 150s systolic and 80s to 90s diastolic with otherwise stable vital signs. She was started on labetalol 100 mg BID. She no longer had frank bleeding but continued to have scant spotting. Her cervical exam was consistent with the latent phase of labor. The fetal heart tracing was category I and reassuring. Admission laboratories were notable for mild anemia (all laboratories noted in Table 1). Urine analysis was consistent with a urinary tract infection, which was treated.

Induction of labor was attempted with pitocin, cervidil, and cytotec in succession over a 4-day period, but the patient failed to progress adequately and developed non-reassuring fetal heart tracings after artificial rupture of membranes. A decision was made to proceed with an emergent Cesarean section at 39 weeks and 1 day, which confirmed abruptio placenta as the etiology of the abnormal bleeding. A healthy female newborn was delivered.

The patient tolerated the procedure well, but continued to have post-operative uterine bleeding secondary to uterine atony, causing hemodynamic instability. Pitocin, methergine, hemabate, and cytotec were given in succession to help the uterus contract and stop the bleeding. Immediate post-operative estimated blood loss was 4300 cc, for which she received 4 units of packed red blood cells (PRBCs) in the operating room, in addition to fluid resuscitation for hemodynamic instability. Once the uterine atony resolved and the patient stabilized, she was transferred to the recovery unit for continued observation. Unfortunately, 2 hours later, the patient's vitals were noted to be unstable once again, with BP in the 80s systolic and tachycardia to 120s, and she continued to ooze blood vaginally despite multiple units of blood products. Her total blood loss at this time was estimated at ~6000 cc. Rapid response was activated, and upon their arrival, the patient's systolic BP was ranging 50s–60s, peripheral pulses were difficult to palpate, and she had diffuse pallor with shallow, labored respirations. She received a total of 9 L of normal saline, and a massive transfusion protocol was initiated with administration of an additional 4 units of PRBCs and 2 units of fresh frozen plasma (FFP); she was then transferred to the intensive care unit (ICU).

The Family Medicine service was then consulted for continued management of postpartum hemorrhage. Based on post-operative laboratories, a diagnosis of disseminated intravascular coagulation (DIC) was made. Two units of platelets were transfused, along with an additional 4 units PRBCs and 6 units FFP. Follow-up blood work revealed transient stabilization of blood counts and improvement in coagulation markers.

Due to continued oozing, and low blood counts over the next several post-operative days (POD), the patient received a total of 22 units PRBCs, 8 units platelets, 12 units FFP, and 10 units cryoprecipitate. She developed anasarca, acute respiratory failure with hypoxia secondary to significant pulmonary edema requiring Bilevel Positive Airway Pressure (BiPAP), and worsening acute renal failure with acute tubular necrosis. An echocardiogram was ordered.

From POD 3 to 4, the patient was noted to have elevated BPs ranging from 140s to 170s systolic and 80s to 100s diastolic. Attempts at diuresis with furosemide were initiated but failed, and in the setting of concomitant rising serum creatinine, nephrology was consulted on POD 3. As she was only making ~250 cc urine output, hemodialysis (HD) was initiated with removal of 4.9 L of volume. On POD 4, torsemide was given prior to HD, and 4.5 L of volume were removed. Urine output improved to ~500 cc. Her coagulopathy began to resolve; however, liver enzymes remained elevated, and lactate dehydrogenase (LDH) continued to increase. Platelets and H&H remained low. A diagnosis of HELLP syndrome was made on POD 3.

We refrained from administering any more blood products to avoid exacerbating the volume overload as well as the hemolytic process. Instead, focus was placed on aggressive BP control. The patient was started on labetalol 300 mg (three times a day) TID and continued HD daily. Echocardiogram results returned revealing reduced LV systolic function with an ejection fraction of 25%–30%. Cardiology was consulted on POD 6 for management of PPCM. FLT-1, Endoglin, and PIGF levels were not checked. Dialysis was stopped as she was making adequate urine on

Table 1. Laboratory values with reference ranges from 4 hours post-operative to 1 week post-discharge.

Variable	Reference range	Admission	Post-op	7 h post-op	POD 1	POD 2	POD 3	POD 4	POD 6	POD 14	1 week post-discharge
CMP											
Sodium (mmol/L)	136–145	136	139	138	133	129	130	131	136	138	140
Potassium (mmol/L)	3.5–5.1	4	6.6	5.9	5.6	5.2	5	4.6	4.6	3.7	4.8
Chloride (mmol/L)	98–107	101	115	111	106	103	103	104	100	103	102
CO_2 (mmol/L)	21–31	24	15	17	17	20	19	16	19	26	
Glucose (mg/dL)	70–105	70	51	84	96	104	82	64	98	95	86
Anion gap	2–11	15	16	16	16	11	13	16	22	13	
BUN (mg/dL)	7–25	14	11	14	20	27	40	49	60	39	23
Creatinine (mg/dL)	0.60–1.20	0.88	1.35	1.42	2.14	2.79	3.9	5	5.42	1.45	1.12
Calcium (mg/dL)	8.6–10.3	9.2	5.7	6.6	6.6	7	7.3	7.3	7.9	9.2	9.7
Total protein (g/dL)	6.0–8.5	6.5		4.6	3.9	4.1	4.5	5	5.6	6.7	7
Albumin (g/dL)	3.5–5.5	3.4		2.8	2.2	2.7	2.7	2.9	2.9	3.6	4.5
Globulin (g/dL)	1.5–4.5	3.1		1.8	1.7	1.4	1.8	2.1	2.7	3.1	2.5
GFR (mL/min/1.73 m^2)	>59	83	49	46	28	21	14	10	9	45	62
Alkaline phosphatase (IU/L)	39–117	237		72	56	48	79	78	97	66	70
AST (IU/L)	0–40	25		70	133	114	129	101	49	21	22
ALT (IU/L)	0–32	10		41	79	52	37	22	7	7	12
Total bilirubin (mg/dL)	0.0–1.2	0.3		2.2	0.7	0.5	0.5	0.6	1	1.2	0.7
Magnesium (mg/dL)	1.9–2.7			1.3	1.9	1.9	2		2.1	2.1	
Phosphorus (mg/dL)	2.5–5.0			3.8			5.8		5.6	3.9	
CK (IU/L)	30–223				1447	1202					
Lactic acid (mmol/L)	0.5–2.2			2.8	2.8	1.3					
Uric acid (mg/dL)	2.3–6.6	6.1									
CBC											
WBC count (10E9/L)	5.00–10.00	9	23.05	11.46	17.02	13.73	17.37	15.85	16.39	8.34	5
RBC count (10E12/L)	4.20–5.40	3.6	3.73	3.24	2.12	1.67	2.31	2.28	2.95	3.68	4.08
Hemoglobin (g/dL)	12.0–16.0	10.9	11.1	9.8	6.4	5.3	6.9	6.9	9	11.6	12.2
Hematocrit (%)	37.0–47.0	31.4	33.5	28.4	18.6	15.4	20	19.8	26.6	33.4	37.6
MCV (fL)	80.0–94.0	87.4	89.8	87.7	87.8	91.9	86.7	87	90.1	90.8	92
Platelets (10E9/L)	150–450	253	134	92	160	141	135	79	111	513	411
Retic count (%)	0.5–1.5							3.76			
Coagulation laboratories											
PT (s)	9.3–12.5		18.9	14.8	15.3	14.9	13	11.4			
PTT (s)	25–38		40	32							
INR	0.85–1.15		1.66	1.3	1.35	1.31	1.15	1.01			
D-dimer (ng/mL)	<243		62,382	22,360		1789		1375			
LDH (IU/L)	140–271	218					588	662	555		
Fibrinogen (mg/dL)	140–420		<150	182		299		416			
Haptoglobin (mg/dL)	44–215							257			
AdamsTS13 activity (% Activity)	68–163							81			

GFR: glomerular filteration rate; AST: aspartate transaminase; ALT: alanine transaminase; CBC: complete blood count; WBC: white blood cell; RBC: red blood cell; CK: creatinine kinase; MCV: mean corpuscular volume; PT: prothrombin time; PTT: partial thromboplastin time; INR: international normalized ratio; LDH: lactate dehydrogenase; POD: post-operative days.

her own due to post-ATN diuresis, recording 2850 cc urine on POD 9. BP medication was sequentially added, including: metoprolol succinate 200 mg daily (QD) (labetalol was discontinued), furosemide 20 mg QD, hydralazine 50 mg TID, and amlodipine 10 mg QD. With this regimen, the patient's BP was well controlled, ranging between 110 and 120s/80s. She was clinically improving, with regard to her volume and respiratory status, and no longer required supplemental oxygen. She was transferred to the telemetry floor. Nephrology and pulmonology signed off. Of note, given the patient was breastfeeding (and had been pumping since POD 1), ACEi/ARBs were not considered.

By POD 14, laboratories had also dramatically improved. Clinically, the patient was nearly back to baseline. Cardiology recommended a LifeVest (external defibrillator) prior to discharge as the patient was at high risk of ventricular arrhythmias and sudden cardiac arrest due to her severely reduced ejection fraction.

The patient was discharged on POD 16. Repeat basic metabolic panel (BMP) and complete blood count (CBC) 1 week after discharge revealed normalization of all laboratories. On outpatient follow-up, all BP medications were sequentially weaned, except metoprolol succinate 25 mg QD, which was continued by cardiology. A repeat echocardiogram done 35 days after discharge showed recovery of the LV systolic function with an ejection fraction of 55% to 65%.

Discussion

Pre-eclampsia and HELLP syndrome share an underlying endothelial pathological process that can affect multiple organs. These are serious conditions that usually develop in late pregnancy and can potentially lead to catastrophic complications. This case exemplifies a severe case of postpartum HELLP syndrome that developed multiorgan injuries and the extremely rare PPCM in spite of early and timely diagnosis and management. The optimal management remains delivery and usually most complications (including end-organ damage) will reverse within a few days. What is most helpful in such cases is intensive supportive care of these complications by a multidisciplinary team in the ICU.

This was an extremely challenging case for a number of reasons: symptoms such as shortness of breath, fluid retention leading to pedal edema, and fatigue are not exclusive to heart failure and commonly occur late in pregnancy. Some evidence exists on the pathophysiologic association between pre-eclampsia and the development of PPCM suggesting that pre-eclampsia may increase antiangiogenic signaling predisposing to cardiac dysfunction.[12] In PPCM, it has been reported that increased levels of a toxic, proapoptotic prolactin fragment are cleaved by cathepsin D and thus enhances oxidative stress leading to the development of LV dysfunction. Also increased circulating levels of anti-angiogenic factor soluble FLT-1 derived in the placenta may be important in the etiology of PPCM. The development of pre-eclampsia may significantly contribute to the development of PPCM based on these hormonal abnormalities.[12] However, the co-existence of postpartum HELLP syndrome and PPCM is extremely rare. A review of the literature revealed only a handful of relevant articles, and only five reported cases of co-occurring HELLP syndrome and PPCM.[4,13–16] In none of these did the HELLP syndrome and PPCM develop solely in the postpartum period. Our case is unique in this respect. In the reported cases, mortality and morbidity were also quite high, with several patients dying, and among those who survived, about half reported long-term reduced ejection fraction. Our patient in contrast, made a complete recovery.

Conclusion

Accurate diagnosis of postpartum HELLP syndrome is essential to ensure correct treatment and favorable outcomes. This diagnosis should remain on the differential for women in the postpartum period and up to 1 month following delivery. Similarly, PPCM may be difficult to recognize as symptoms are similar to those often seen in pregnancy and postpartum period; however, this diagnosis should always remain on the differential particularly in women with heart failure requiring ICU level care.

Our patient had a complicated postpartum course, but with a multidisciplinary team, management plans were made in a timely manner. Fortunately, the patient survived and made a full recovery.

Author's note

Paul Douglass is also affiliated with Morehouse School of Medicine, Atlanta, GA, USA.

Acknowledgements

The authors would like to thank Mrs P for allowing us to share her story so others might also learn from it, as we did. They would also like to thank her family for all of the support they provided through a very challenging hospitalization, and we especially thank the hard-working nurses and doctors who helped care for Mrs P during and after her hospitalization. They thank as well Dr Helena Spector for her editorial assistance.

Declaration of conflicting interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Ethical approval

Ethical approval to report this case was obtained from Wellstar Research Institute.

Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

Informed consent

Written informed consent was obtained from the patient(s) for their anonymized information to be published in this article.

ORCID iDs

Shany Quevedo https://orcid.org/0000-0002-4226-4747

Alida M Gertz https://orcid.org/0000-0001-8025-3793

References

1. Arany Z and Elkayam U. Peripartum cardiomyopathy. *Circulation* 2016; 133: 1397–1409.
2. Hibbard JU, Lindheimer M and Lang RM. A modified definition for peripartum cardiomyopathy and prognosis based on echocardiography. *Obstet Gynecol* 1999; 94(2): 311–316.
3. Kolte D, Khera S, Aronow WS, et al. Temporal trends in incidence and outcomes of peripartum cardiomyopathy in the United States: a nationwide population-based study. *J Am Heart Assoc* 2014; 3: e001056.
4. Wang J and Tan LK. Peripartum cardiomyopathy during puerperium in a pregnancy complicated by severe pre-eclampsia, HELLP syndrome and acute renal failure: a case report. *J Med Cases* 2015; 6: 498–500.
5. Curtin WM and Weinstein L. A review of HELLP syndrome. *J Perinatol* 1999; 19: 138–143.
6. Kota LN, Garikapati K, Kodey PD, et al. Study on HELLP syndrome-maternal and perinatal outcome. *Int J Reprod Contracept Obstet Gynecol* 2017; 6: 715.
7. Hogg JP, 3rd Szczepanski JL, Collier C, et al. Immediate postpartum management of patients with severe hypertensive disorders of pregnancy: pathophysiology guiding practice. *J Matern Fetal Neonatal Med*. Epub ahead of print 10 June 2020; 1–11. DOI: 10.1080/14767058.2020.1776251.
8. Pop-Trajković S, Antić V, Kopitović V, et al. Postpartum HELLP syndrome—the case of lost battle. *Ups J Med Sci* 2013; 118(1): 51–53.
9. Gammill HS, Chettier R, Brewer A, et al. Cardiomyopathy and preeclampsia. *Circulation* 2018; 138: 2359–2366.
10. Parikh P and Blauwet L. Peripartum cardiomyopathy and preeclampsia: overlapping diseases of pregnancy. *Curr Hypertens Rep* 2018; 20: 69.
11. Kamiya CA, Kitakaze M, Ishibashi-Ueda H, et al. Different characteristics of peripartum cardiomyopathy between patients complicated with and without hypertensive disorders. *Circ J* 2011; 75: 1975-1981.
12. Patten IS, Rana S, Shahul S, et al. Cardiac angiogenic imbalance leads to peripartum cardiomyopathy. *Nature* 2012; 485: 333–338.
13. Kozono Y, Wakabayashi S, Ando N, et al. Suspected case of peripartum cardiomyopathy during perioperative period—a case report. *Masui* 2011; 60(1): 107–110.
14. Ballo P, Betti I, Mangialavori G, et al. Association between HELLP syndrome and peripartum cardiomyopathy presenting as myocardial infarction with normal coronary arteries. *Eur J Obstet Gynecol Reprod Biol* 2010; 151(1): 110–111.
15. Stepanková J, Burgelova M, Honsova E, et al. Preeclampsia, dilated cardiomyopathy and renal failure as the first manifestation of systemic lupus erythematosus: a case report. *Clin Rheumatol* 2009; 28(3): 343–345.
16. Redźko S, Przepieść J and Urban J. Hemolysis, elevated liver enzymes, and low platelets syndrome, peripartal cardiomyopathy and disseminated intravascular coagulation during the puerperium. *Eur J Obstet Gynecol Reprod Biol* 2005; 121: 120–123.