Gallbladder wall thickening in a woman with postpartum preeclampsia: A case report

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ABSTRACT

Background: Preeclampsia (PE) is hallmarked by dysfunction of various organs; therefore, its diagnosis can be challenging, especially when patients present with right upper abdominal pain. Herein, we present a case of postpartum gallbladder wall thickening (GBWT) that led to a diagnosis of PE, rather than hemolysis, elevated liver enzymes, and low platelet count (HELLP) syndrome or gallbladder and biliary disease.
Case Presentation: A 31-year-old postpartum woman presented with a fever, hypertension, headache, and right upper abdominal pain. HELLP syndrome and intracranial hemorrhage were initially suspected, due to the combination of symptoms and elevated levels of aspartate transaminase, alanine transaminase, and lactate dehydrogenase. However, hemolysis and thrombocytopenia were absent, and a computed tomography (CT) scan of the head did not indicate the presence of intracranial hemorrhage. Further, transabdominal ultrasound and CT revealed GBWT (edematous gallbladder); CT also revealed an enlarged heart, lung edema, pleural effusion, and ascites. Thus, PE, rather than HELLP syndrome or gallbladder or biliary disease, was diagnosed based on gestational hypertension and proteinuria, new-onset headache, liver dysfunction, and edema in several organs, including the lung. Nicardipine treatment quickly improved hypertension and headache, and, over time, the patient's urination increased, and edema subsided throughout the body. Furthermore, laboratory results improved, and the patient was discharged on postpartum day 11.
Conclusion: Postpartum gallbladder wall thickening can be a diagnostic sign of PE.

1. Introduction

Preeclampsia (PE), a form of hypertensive disorders of pregnancy, is caused by a systemic angiogenic imbalance, endothelial dysfunction, and a proinflammatory state that leads to abnormal renal, hepatic, pulmonary, and neurologic functions [1,2]. PE impacts 2–8% of all pregnancies and is a major cause of both maternal and perinatal morbidity and mortality [2]. The underlying mechanisms contributing to the pathophysiology of PE are still to be determined [2] and the condition's involvement of various organs makes diagnosis a challenge [3,4]. Edema in several organs, such as the heart, lung, coelomic cavities, and subcutaneous tissue, which is primarily induced by increased vascular permeability and cardiac dysfunction, should trigger suspicion of PE [2,5–7]. Moreover, a diverse capacity for organ dysfunction in PE, including hemolysis, elevated liver enzymes, and low platelet count

(HELLP) syndrome, occasionally followed by intracranial hemorrhage, makes the diagnosis of PE complicated when patients present with right upper abdominal pain.

Gallbladder disorders are generally not rare among pregnant women and are commonly diagnosed in those with right upper abdominal pain [8]; thus, gallbladder disorders should be considered in the diagnosis of right upper abdominal pain even in women with PE. However, few reports have clarified the association between diagnosed PE and gallbladder wall thickening (GBWT) [9–11]. To our knowledge, there are no reports of cases where, having excluded HELLP syndrome and other gallbladder pathologies, GBWT led to the diagnosis of PE. Here, we present a case of postpartum PE, the diagnosis of which is owed to GBWT detection via transabdominal ultrasound (TAUS) and computed tomography (CT).

2. Case Presentation

A 31-year-old healthy, nulliparous, pregnant woman was admitted to the obstetric unit at 40 weeks and 3 days of gestation for labor induction owing to sustained gestational proteinuria that had begun at 39 weeks of gestation. The pregnancy course was uneventful, with normal blood pressure (BP). A urinary test revealed a urine protein to creatinine ratio of 0.4 g/gCre. The patient was experiencing regular, painful, uterine contractions, with labor beginning on the day of admission. The labor and postpartum process were uneventful, resulting in the delivery of a male newborn (weight, 3440 g; Apgar scores, 8 at 1 min, and 9 at 5 min; umbilical arterial pH, 7.27). At the time of delivery, the patient was 154 cm tall and weighed 62.3 kg (pre-pregnancy body weight, 47 kg; gestational weight gain, 15.3 kg). On postpartum day 1, her BP was 124/61 mmHg, and she experienced no significant symptoms. On postpartum day 3, routine laboratory tests revealed a white blood cell count of 10.4 $\times 10^3$/μL, a hemoglobin level of 9.5 g/dL, and a platelet count of 147 $\times 10^3$/μL.

On postpartum day 4, the patient experienced right upper abdominal pain; her BP was 120/67 mmHg, and she was kept under observation. However, her symptoms got worse. On postpartum day 5, she experienced continued right upper abdominal pain, headache (the most pronounced symptom), a body temperature of 38.5 °C, a heart rate of 68 beats per minute, a BP of 162/94 mmHg, a respiratory rate of 40 breaths per minute, and room-air oxygen saturation of 88%. Suspecting HELLP syndrome and intracranial hemorrhage, magnesium sulfate (at a dose of 1 g/h) and nicardipine (at a dose of 1 mg/h) were administered, further laboratory tests were done, and a CT scan of the head was performed. Laboratory results revealed elevated levels of aspartate transaminase, alanine transaminase, and lactate dehydrogenase, and a lack of thrombocytopenia (Table 1). Moreover, hematuria was not detected, and the CT scan revealed no signs of intracranial hemorrhage. Thus, both HELLP syndrome and intracranial hemorrhage were not indicated. A urinary test revealed a urine protein to creatinine ratio of 1.2 g/gCre. A polymerase chain reaction test excluded coronavirus disease 2019. As BP decreased with nicardipine treatment, the patient's headache gradually improved. At this time, the patient's symptoms led to the consideration of gallbladder diseases.

TAUS revealed GBWT (Fig. 1). The CT scan reconfirmed the presence of GBWT (Fig. 2); a full-body CT scan revealed an enlarged heart, lung edema, bilateral pleural effusion, bilateral atelectasis, and ascites. Conversely, no signs of deep vein thrombosis and pulmonary thromboembolism were detected. A cardiac ultrasound scan determined an ejection fraction of 59%, which confirmed that heart function was retained. Cumulatively, gestational hypertension; gestational proteinuria; new-onset headache; liver dysfunction; and edema in several organs, including the lung led us to a diagnosis of PE rather than HELLP syndrome, acute fatty liver of pregnancy, other liver diseases, cholelithiasis, cholecystitis, peripartum cardiomyopathy, or acute appendicitis.

The patient's BP stabilized under 140/90 mmHg after nicardipine administration, and urination was confirmed at 5700 mL/day without furosemide administration. Oxygen administration improved her respiratory condition, and magnesium sulfate was administered until postpartum day 6 (for two days post-diagnosis). The patient's symptoms and vital signs improved, and by the next day her previously elevated liver enzyme levels had decreased. The clinical course after PE diagnosis was uneventful, as nicardipine administration was continued until postpartum day 7 (for three days post-diagnosis), followed by nifedipine at a dose of 20 mg/day for 21 days. By postpartum day 10, she no longer exhibited any symptoms, TAUS revealed a normal gallbladder, and laboratory data improved (Table 1).

The patient was discharged on postpartum day 11. Finally, on postpartum day 32, her pathophysiology was confirmed to have completely improved, and her laboratory results were back within normal range (Table 1).

Table 1

Laboratory results on postpartum days 5, 10, and 32 in a 31-year-old woman with right upper abdominal pain.

	Day 5	Day 10	Day 32
White blood cells, /μL (3300–8600)	8500	9600	4800
Hemoglobin, g/dL (11.6–14.8)	10.5	12.1	12.7
Platelets, /μL (158,000–348,000)	192,000	286,000	169,000
AST, U/L (13–30)	343	24	23
ALT, U/L (7–23)	399	95	24
LDH, U/L (124–222)	679	321	200
GGT, U/L (9–32)	12	21	18
Total bilirubin, mg/dL (0.40–1.50)	0.73	0.72	0.58
Total protein, g/dL (6.6–8.1)	5.5	6.1	6.9
Creatinine, mg/dL (0.46–0.79)	0.43	0.50	0.61
Uric acid, mg/dL (2.6–5.5)	4.4	4.5	5.5
Na, mmol/L (138–145)	140	140	143
K, mmol/L (3.6–4.8)	4.4	4.7	4.1
Cl, mmol/L (101–108)	108	106	106
Ca, mg/dL (8.8–10.1)	8.4	9.2	
C-reactive protein, mg/dL (0.00–0.14)	5.47	2.10	0.05
BNP, pg/mL (0.0–18.4)	514.1	12.4	
PT-INR (0.00–1.99)	1.09		
APTT, second (26.1–35.6)	31.9		
Fibrinogen, mg/dL (200–400)	291		
ATIII, % (80–130)	90		

AST, aspartate aminotransferase; ALT, alanine aminotransferase; LDH, lactate dehydrogenase; GGT, gamma-glutamyl transferase; Na, sodium; K, potassium; Cl, chloride; Ca, calcium; BNP, brain natriuretic peptide; PT-INR, prothrombin time; APTT, activated partial thromboplastin time; ATIII, antithrombin III. Numbers in parentheses refer to the normal ranges.

3. Discussion and Conclusions

The present case demonstrates that detection of GBWT can help diagnose PE in a complex case involving a variety of systemic symptoms. GBWT may occur in a postpartum woman without severe signs of PE. Therefore, not only HELLP syndrome and gallbladder and biliary diseases, but also GBWT should be carefully evaluated in postpartum women with right upper abdominal pain to evaluate the underlying pathophysiology.

PE is gestational hypertension accompanied by one or more of the following new-onset conditions, on or after 20 weeks of gestation: proteinuria or other maternal organ dysfunction, including acute kidney injury; liver involvement with or without right upper quadrant or epigastric abdominal pain; neurological complications; hematological complications; and uteroplacental dysfunction [12]. However, implementation of the evolved definitions of PE remains controversial [13]. As systemic symptoms can occur in PE, a confident diagnosis of PE in women with slightly higher BP is sometimes challenging. Although edema is not considered a diagnostic criterion [12,13], its appearance in several organs, such as the heart, lung, coelomic cavities, and
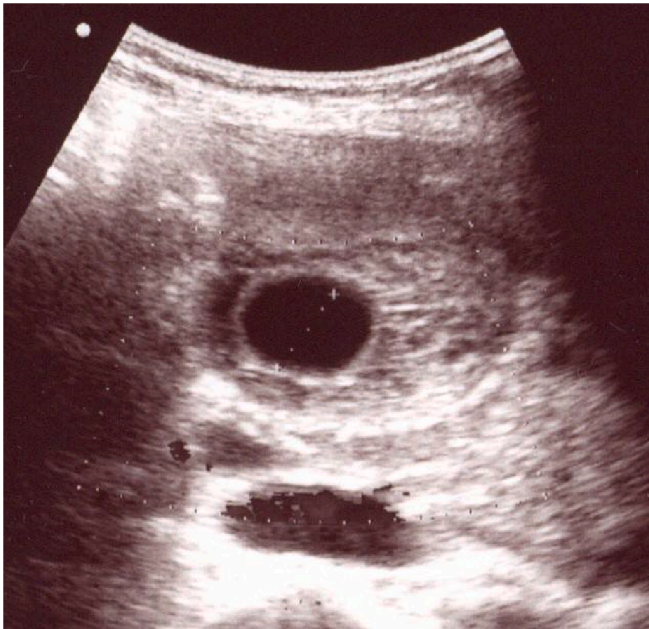
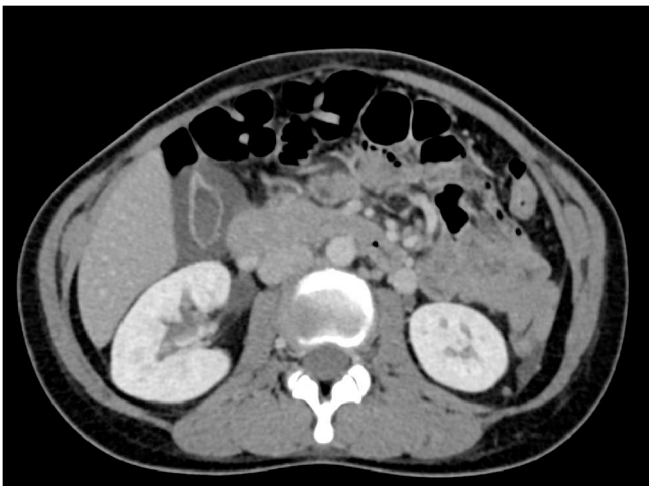**Fig. 1.** Transabdominal ultrasound shows gallbladder wall thickening.

Fig. 2. Computed tomography scan shows gallbladder wall thickening.

subcutaneous tissue, primarily induced by increased vascular perme-ability and cardiac dysfunction, should raise suspicion of PE [2,5–7]. The patient in this case presented with right upper abdominal pain and headache, and while both HELLP syndrome and intracranial hemor-rhage were suspected initially, the laboratory tests and brain CT findings did not confirm the presence of either. Careful evaluation of right upper abdominal pain by TAUS and discovery of GBWT led to the identifica-tion of systemic edema via full-body CT scan, suggesting a diagnosis of PE, rather than other diseases. Thus, detection of GBWT in a pregnant woman using "point-of care" ultrasound would help in the diagnosis of PE at primary- or even secondary-level health facilities, wherein diag-nosis will need to be made initially on the basis of BP, symptoms, and proteinuria until transfer to a tertiary facility [5–7,12].

GBWT is caused by a subserosal edema as a result of phlebostasis reinforced by increased vascular permeability and cardiac dysfunction as well as that in other organs [2]. In pregnant women, PE is one of the primary causes of phlebostasis. Thus, identification of the presence of GBWT would help in the detection of organ edema throughout the body, which might lead to a diagnosis of PE. On the other hand, the risk of

cholelithiasis and cholecystitis also increases in pregnant women; elevated estrogen levels cause cholesterol crystal aggregation and increased bile viscosity, while progesterone induces gallbladder smooth muscle relaxation and bile stasis [14,15]. Torsion of the gallbladder can also occur in pregnant women, although this pathology is rare [16,17]. Thus, the origin of right upper abdominal pain in pregnant women needs to be carefully evaluated, given that GBWT can cause abdominal pain as well as gallbladder hydrops [18].

In conclusion, GBWT can be a diagnostic sign of PE when patients present with right upper abdominal pain. In complicated cases, TAUS and full body CT scans would be helpful diagnostic tools for PE. Further studies to evaluate the utility of GBWT in the diagnosis of PE are required.

Contributors

Tsuyoshi Murata contributed to patient management, data collec-tion, and manuscript writing.

Yuki Yoshimoto contributed to patient management, and manuscript editing.

Yoshiaki Shibano contributed to patient management, and manu-script editing.

Soichi Nakamura contributed to patient management, and manu-script editing.

Ryuji Yamauchi contributed to manuscript editing and supervision. All authors approved the final submitted article.

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The authors declare that they have no conflict of interest regarding the publication of this case report.

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