

CASE REPORT

Abdominal compartment syndrome complicated by preeclampsia and partial HELLP syndrome in a 45-year-old woman: A case report

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Funding information

This work was supported by JSPS
KAKENHI JP17K11232.

Abstract

HELLP syndrome is sometimes followed by massive bleeding, leading to DIC. In cases of intra-abdominal compartment syndrome due to massive intra-abdominal bleeding after cesarean section, if preeclampsia and partial HELLP syndrome persist, hematoma removal helps in the recovery from preeclampsia and partial HELLP syndrome.

KEYWORDS

abdominal compartment syndrome, HELLP syndrome, preeclampsia

1 | INTRODUCTION

In cases of intra-abdominal compartment syndrome due to massive intra-abdominal bleeding after cesarean section, if preeclampsia and partial HELLP syndrome persist, hematoma removal helps in the recovery from preeclampsia and partial HELLP syndrome.

The occurrence of preeclampsia has increased recently because of advancing maternal age (AMA) in Western countries as a result of late marriage and advances in assisted reproductive technology. HELLP syndrome, named for 3 features of the disease (hemolysis, elevated liver enzyme levels, and low platelet levels), is a life-threatening condition that can potentially complicate pregnancy.¹

About 20% of women with severe preeclampsia are affected by HELLP syndrome. According to the Tennessee Classification System, the diagnostic criteria for HELLP are hemolysis with LDH > 600 U/L, AST \geq 70 U/L, and platelets < $100 \times 10^9/L$.^{2,3} Partial HELLP syndrome is defined by the presence of one or two features of HELLP but not the complete syndrome.⁴ Partial HELLP syndrome is not distinct groups from complete HELLP syndrome based on neonatal, long-term, and subsequent pregnancy outcomes.⁵ Partial as well as complete HELLP syndrome is sometimes associated with coagulopathy. Moreover, termination of pregnancy is often affected by massive bleeding, leading to DIC. Herein, we report a case of a pregnant woman with preeclampsia and partial HELLP syndrome, who developed abdominal

Guarantor: Keiichi Kumasawa

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compartment syndrome after a cesarean section, resulting in the worsening of her condition.

2 | CASE REPORT

A 45-year-old G1P0 woman was referred to our hospital at 34 weeks and 2 days of gestation for the management of preeclampsia with severe symptoms. Her blood pressure (BP) was 165/99 mm Hg, and her liver enzyme levels were elevated. She was prescribed α -methyl dopa at the previous hospital. At admission to our hospital, her BP rose to 184/107 mm Hg; however, nonstress test (NST) revealed a reassuring fetal status. Laboratory data revealed elevated aspartate aminotransferase (AST) (71 U/mL) and increased urinary protein levels (3+) (Figure 1). Her serum platelet count was $241 \times 10^9/L$, and hemoglobin level was 12.0 g/dL, suggesting hemoconcentration (Figure 1). She was diagnosed as having preeclampsia with severe symptoms and partial HELLP syndrome. She underwent an emergency cesarean section on the same day of admission and delivered a male infant (2012 g; Apgar scores: 7 at 1 minutes and 9 at 5 minutes). The amount of intraoperative bleeding was estimated to be approximately 800 mL without amniotic fluid or ascites. During the operation, there was no coagulation abnormality, and hemostasis was confirmed with sufficient recognition of hemostasis. In addition, we did not find adhesion nor endometriosis implants. After the cesarean section, her systolic blood pressure remained at 180 mm Hg or higher. Sustained infusion of nicardipine 1.5 mg/h was necessary. Two hours after the cesarean section, intermittent atonic bleeding occurred up to 630 mL despite treatment with oxytocin, ergometrine, and a Bakri balloon. She was administered a transfusion of 10 U of red blood cells (RBC) and 14 U of fresh frozen plasma (FFP). Five hours after the operation, her platelet count decreased to $43 \times 10^9/L$, and 20 U of platelets were transfused (Figure 1). Frequent ultrasonography revealed an increased echo-free space around the Morrison's pouch (Figure 2). Bleeding from the right uterine artery and inferior epigastric artery was confirmed by contrast computed tomography (CT), and embolization was performed. Ultrasonography and blood cell counts confirmed the suppression of bleeding. Vaginal bleeding was also well-controlled. However, her liver enzymes and urinary function continued to worsen (Figure 1). The abdominal swelling was strong, and the inferior vena cava was compressed by the intra-abdominal hematoma and blood. Moreover, her right ventricular flow was partly obstructed. The lower leg edema also progressed. Pain was an analgesic level. Oxygen was administered at 3 L/min to treat the respiratory depression caused by the elevation of the diaphragm. The urinary output was about 30–50 mL/h and did not enter the diuretic phase. Intra-abdominal pressure, intravesical pressure rose to 22 mm Hg.⁶ We concluded that the patient

had abdominal compartment syndrome with preeclampsia and partial HELLP syndrome. To reduce the pressure within the abdominal cavity, a laparotomy to remove the abdominal hematoma was performed 2 days after the cesarean section. A large subcutaneous hematoma measuring $10 \times 10 \times 4 \text{ cm}^3$ was found. A large hematoma and blood retention was found in the peritoneal cavity. The total bleeding was 3560 g. The uterus was edematous and enlarged to the size of a neonatal head. The area surrounding the uterine wound was covered with a hematoma, but there was no continuous bleeding.

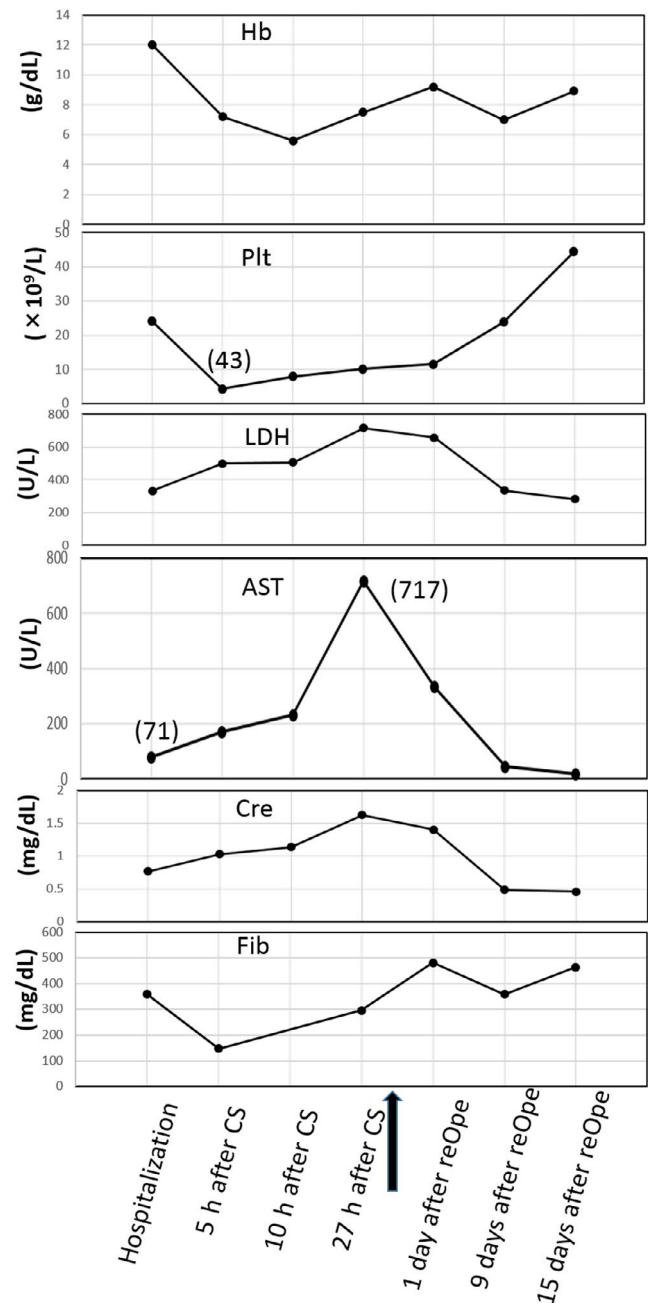


FIGURE 1 Trend of laboratory data: Arrow indicated the point of reoperation. Aminotransferase, AST, aspartate; Cre, creatinine; CS, Cesarean section; Fib, fibrinogen; Hb, hemoglobin; LDH, lactate dehydrogenase; Plt, platelet; reOpe, reoperation

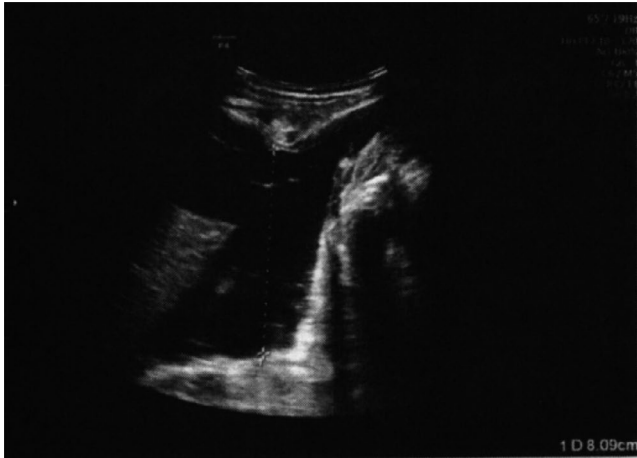


FIGURE 2 Ultrasonography revealed an increased echo-free space around the Morrison's pouch

There was no persistent bleeding in the abdominal cavity. After placing a drain in the vesicouterine excavation, we closed the incision. The volume of urine increased postoperatively and her hepatic and renal functions improved. She was discharged on the 15th day after reoperation.

3 | DISCUSSION

To our knowledge, this is the first report of abdominal compartment syndrome complicating preeclampsia and partial HELLP syndrome. HELLP syndrome is observed in approximately 20% of preeclampsia with severe features. Coagulation abnormalities are likely to occur, and about 20% of pregnant women with HELLP syndrome develop DIC. Intraperitoneal bleeding also occurs easily. Maternal death has been reported in 1% of pregnant women with complications of HELLP syndrome.^{7,8} HELLP syndrome has no reported prophylactic methods⁹; however, recent reports state that pravastatin has the possibility of preventing HELLP syndrome.¹⁰

In patients with HELLP syndrome, clotting ability tends to be disordered; therefore, when intraperitoneal hemorrhage occurs, bleeding may persist until the inside of the abdominal cavity becomes tight, causing compartment syndrome to develop. In this case during the cesarean section, there was no coagulation abnormality, and hemostasis was confirmed with sufficient recognition of hemostasis. Therefore we did not place the drain. Even in this case intraperitoneal bleeding occurred. Drain might have been helpful.

In patients with abdominal compartment syndrome, liver dysfunction and renal dysfunction occur due to the compression of the descending aorta, vena cava, liver, and kidney. Liver dysfunction further slows the improvement of blood coagulability.¹¹ Renal dysfunction is thought to hamper diuresis after termination of pregnancy and delays improvement of pulmonary edema, etc Lactate dehydrogenase (LDH) values

reveal hemolytic status (Fig). Furthermore, elevation of the diaphragm suppresses the respiratory function.

In this case, persistent hypertension following the caesarian section could be attributed to the impaired liver and renal function, which may have degraded the metabolism of sFlt-1, which is the key to the onset of preeclampsia. However, we were unable to measure serum sFlt-1 levels.

In patients who have all three conditions, preeclampsia, (partial) HELLP syndrome, and compartment syndrome, the termination of pregnancy is the fundamental treatment for preeclampsia and HELLP syndrome. In this case, the delivery was already performed; hence, the prompt treatment of compartment syndrome was necessary to treat the combined effects of all three pathologies. Impaired renal function and hypertension improved immediately after hematoma removal for treating the compartment syndrome.

In conclusion, we found that HELLP syndrome may cause intra-abdominal bleeding after cesarean section, and due to complications of compartment syndrome, HELLP syndrome as well as preeclampsia can worsen. Both liver and kidney function improved rapidly after treatment of compartment syndrome by laparotomy.

ACKNOWLEDGMENTS

This work was supported by JSPS KAKENHI Grant Number JP17K11232. We thank all the individuals who were involved in rescuing the patient.

CONFLICT OF INTEREST

All the authors have no conflict of interest to declare.

AUTHOR CONTRIBUTIONS

KK: wrote more than half part of the manuscript and is responsible for the overall of the manuscript. KK: wrote about the Cesarean section part. YT: wrote about the reoperation part. TN, TI, TN, YO, and TF: were engaged in discussion for the manuscript and also engaged in rewriting it.

CONSENT

The patient provided written consent for publishing her case. Consent is retained in our treating institution according to locally approved procedures.

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How to cite this article: Kumasawa K, Kubota K, Takahashi Y, et al. Abdominal compartment syndrome complicated by preeclampsia and partial HELLP syndrome in a 45-year-old woman: A case report. *Clin Case Rep.* 2020;8:1251–1254. <https://doi.org/10.1002/ccr3.2904>