

# Spontaneous Hepatic Rupture in a Pregnant Woman with Preeclampsia: An Autopsy Case

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Spontaneous hepatic rupture, which is a complication of hypertension in pregnancy, is extremely rare. However, high maternal and perinatal mortality rates are observed. Several factors, namely, age over 30 years, multiparity, severe preeclampsia, or HELLP syndrome (a group of symptoms which include hemolytic anemia, hepatic enzyme increase, and thrombocytopenia), are associated with this condition. An autopsy case of a woman with twin pregnancy was studied. She was at 36 weeks of gestational age and suffered from the sudden development and rapid progression of hypertension. Moreover, she died because of spontaneous hepatic rupture despite an emergency operation. Autopsy revealed a capsular rupture of the right lobe of the liver with numerous blood clots and hypovolemic signs, such as weak postmortem lividity and palor of the skin and conjunctiva. A close examination of the trunk and liver for the classification of the cause of rupture and an assessment of medical history, such as preeclampsia, are needed during postmortem examination of pregnant women with hepatic rupture or her fetus. To the best of our knowledge, this fatal complication in pregnant women is not yet presented in postmortem examinations in Korea. Thus, we report the findings of this case to share the knowledge.

**Key Words:** Liver; Spontaneous rupture; Pregnancy-induced hypertension; Autopsy

## Introduction

Spontaneous hepatic rupture, which is a complication of hypertension in pregnancy, is extremely rare. However, high maternal and perinatal mortality rates are observed. Moreover, it is frequently associated with severe preeclampsia or HELLP syndrome (a group of symptoms that include hemolytic anemia, hepatic enzyme increase, and thrombocytopenia). About 80% of the cases involve women who are in their thirties and with a medical history of multiparity and gestational hypertension [1-3].

Its surgical treatments include drainage, hepatic artery ligation, and resection of intrahepatic hematoma. In addition, conservative treatments, such as simultaneous intravenous fluid, transfusion with hemostasis via radiologic hepatic artery embolization, are available. In cases of hepatic hemorrhage, a mortality rate of up to 30% is observed, and liver transplantation may be considered to save a patient's life [4].

Herein, a case of a woman with twin pregnancy was studied. She experienced gestational hypertension that rapidly developed into preeclampsia and eventually

led to death because of spontaneous hepatic rupture. Although clinical and treatment reports of such cases are not rare [5,6], to the best of our knowledge, postmortem examinations with clinical reviews about this case are not reported. Thus, this rare and fatal complication of pregnancy is presented.

## Case Report

A 42-year-old woman with twin pregnancy was in her 36th week of gestation and came to the hospital emergency room (ER) because of sudden abdominal pain at the right upper quadrant (RUQ) after waking up early in the morning. She went through several tests and surgeries; however, she died. She had a history of stillbirth 2 years ago because of intrauterine fetal death at 23 weeks of gestation; she was also diagnosed with diabetes and treated with insulin. In July 2016, she got pregnant with twins via *in vitro* fertilization-embryo transfer and had regular checkups. About 3 weeks before the onset of the symptom (abdominal pain at the RUQ), she was admitted to the hospital for minimal vaginal bleeding for 2 days and then discharged after the condition improved. During her regular checkups 2 weeks and 1 day prior the onset of the symptom, her weight was 102 kg and 109 kg, respectively, with blood pressure (BP) readings of 156/91 mm Hg and 157/96 mm Hg, respectively. Moreover, her urine protein was +/- and 4+, respectively; this finding prompted the physician to suspect preeclampsia. She was then scheduled for a cesarean section about 3 weeks earlier than the expected due date, 1 week after the onset. When she came to the ER because of abdominal pain, her vital signs were obtained (BP, 110/70 mm Hg; pulse rate, 62 beats/min; respiratory rate, 20/min; body temperature, 36.1°C). After her blood and urine analyses, she was transferred to the delivery room. Fetal heart rate showed the loss of heart sound in one of her twins, and an emergency cesarean section was performed. She gave birth to one live baby and one stillborn baby. Furthermore, hemoperitoneum and hepatic capsular rupture was observed during the surgery, and surgery was performed in the ruptured area. After surgery, she was transferred to the intensive care unit, and after 15 minutes, sudden cardiac arrest occurred. Emergency

measures, such as cardiopulmonary resuscitation (CPR), were conducted. However, she did not recover and died. According to her guardian, she did not have a history of even the slightest trauma in her whole body, particularly in the abdomen. A blood analysis was conducted immediately after her hospital visit, which showed a hemoglobin level of 13.4 g/dL (reference, 12 to 16 g/dL), hematocrit of 42.2% (reference, 36 to 48%), platelet count of 124,000/ $\mu$ L (reference, 150,000 to 450,000/ $\mu$ L), aspartate aminotransferase (AST) of 119 IU/L (reference, 7 to 38 IU/L), and total bilirubin of 1.0 mg/dL (reference, 0.3 to 1.2 mg/dL). Blood analysis conducted after surgery showed a hemoglobin level of 6.2 g/dL, hematocrit of 19.4%, platelet count of 56,000/ $\mu$ L, AST of 360 IU/L, and total bilirubin of 0.6 mg/dL.

An autopsy was conducted 3 days after death. The deceased was 168 cm tall and weighed 101 kg with an edematous appearance. Weak livor mortis was observed at the back of the body. Moreover, palor of the skin, conjunctiva, and oral mucosa were noted. Based on an external examination, multiple surgical wounds because of medical treatments, including vertical surgical wound in the abdomen, abrasions in the sternal and bilateral chest area, and multiple injection wounds in the right clavicular and right inguinal area and bilateral limbs were found. Based on an internal examination, damage in the chest area was considered because of CPR, and 670 mL or more of blood was collected from the abdominal cavity. The capsule in the anterior side of right lobe of the liver was torn in various directions, and massive coagulated blood was found between the liver capsule and parenchyma (Fig. 1A, B). After liver resection, no specific finding, such as bleeding in the parenchyma, was observed, and the histological examination of the liver parenchyma revealed multifocal necrosis (Fig. 1C, D). A horizontal surgery mark was found in the lower part of the uterus, and no specific findings, such as retained placenta and perforation, were noted (Fig. 2).

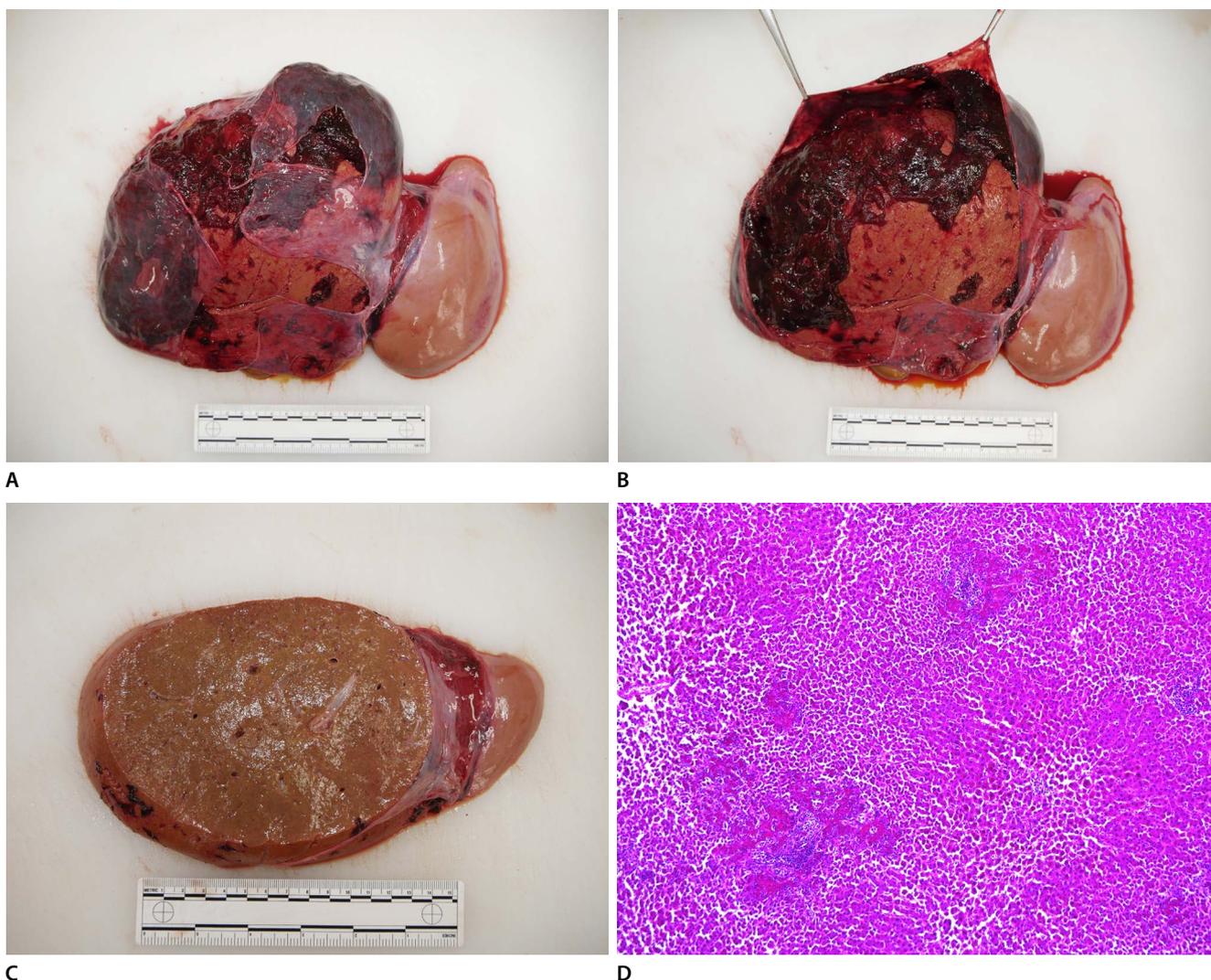
As for the deceased, she came to the hospital with a complaint of abdominal pain at the RUQ, and a medical history of gestational hypertension and results of laboratory examinations supported the postmortem diagnosis of severe preeclampsia. Moreover, hepatic capsular rupture was observed during surgery, and a blood loss of 2,000 mL during surgery was recorded.

Since indications of hypovolemia were observed in the autopsy, the deceased was considered to be died due to massive hemorrhage from hepatic capsular rupture.

### Discussion

Hypertensive disorder, gestational bleeding, and infectious diseases are 3 major diseases that causes of maternal death and illness. Preeclampsia is a hypertensive disorder that occurs after the mid-gestation period and is an internal complication that begins during pregnancy and treated after the termination of pregnancy [7,8]. The classification and diagnostic criteria of hypertensive

disorder related to pregnancy is based on a fundamental concept proposed in 2000. Based on medical records, the deceased was diagnosed with gestational hypertension 2 weeks prior to the onset of abdominal pain at the RUQ, and the condition was confirmed by the presence of proteinuria that was confirmed a day before the onset of the symptom, which led to the possible diagnosis of preeclampsia. On the day of death, the deceased complained of abdominal pain at the RUQ, which makes the possibility of severe preeclampsia or spontaneous hepatic rupture difficult to rule out. After the review of medical records, the condition of the deceased progressed from gestational hypertension to



**Fig. 1.** (A, B) Hepatic capsular rupture with blood clots in the diaphragmatic side of the right lobe of liver was observed. (C) Based on the cut section of the liver, the parenchyma showed no specific abnormality, such as hemorrhage. (D) Upon histopathological examination of the liver, multifocal necrosis was revealed (H&E,  $\times 40$ ).

preeclampsia and then severe preeclampsia within 2 weeks. Moreover, spontaneous hepatic rupture occurred a day after the diagnosis of preeclampsia.

Though the cause of preeclampsia is not clearly confirmed, capillary endothelial cell damage, intravascular activation of platelet, coagulation disorder, and multiple organ injuries are probable causes. Preeclampsia does not affect the liver primarily, and only 10% of patients with severe preeclampsia showed liver involvement. The mechanism of hepatic function disorder is known to destroy hepatic cells because of the microvascular endothelial cells in the hepatic tissues, and necrosis, edema, or hematoma induced by such mechanism leads to the expansion of the Glisson capsule, which causes abdominal pain at the RUQ. More extensive lesions may induce hepatic rupture or breach to the hepatic capsule that leads to subcapsular hepatic hematoma, which is more frequent in HELLP syndrome [7-9]. The deceased in our case was speculated to experience abdominal pain at the RUQ because of the necrosis of hepatic cells and formation of hematoma in the hepatic capsule that worsened the hemorrhage and occasionally caused the rupture of the subcapsular hepatic hematoma and capsule.

The main purpose of the treatment of hypertensive disorder that is related to pregnancy is to terminate pregnancy with the least harm to the mother and fetus, give birth to a baby who can survive after delivery,

and help the mother fully recovery. Therefore, early diagnosis, sensitive medical management, and delivery at an appropriate time are mandatory, and delivery itself is a fundamental treatment. However, the condition is not always clearly diagnosed and presented in various case reports of hepatic ruptures in gestational hypertension, and most of the mothers were not diagnosed or did not receive treatment for gestational hypertension until they presented to the hospital for hepatic rupture [5,6]. Therefore, if a pregnant woman is suspected of gestational hypertension, she is advised to visit the hospital more often, and those with new onset of hypertension are closely monitored in the hospital after admission [7,8]. In the studied case, about 2 weeks of progression was observed from the diagnosis of gestational hypertension to severe preeclampsia, and spontaneous hepatic rupture occurred 1 day after the diagnosis of preeclampsia, which occurred during a short period of time.

Spontaneous hepatic rupture, which is a complication of hypertension in pregnancy, is rare. However, high maternal and perinatal mortality rates are observed. Since no postmortem case report was related to the case in Korea, the findings of this case study were reported. For a case of a pregnant woman with hepatic rupture, the cause of the rupture, whether spontaneous or traumatic, should be classified. It must be considered a medical history of gestational hypertension or



A



B

**Fig. 2.** (A, B) Uterus showed no specific abnormality, such as retained placenta or perforation.

preeclampsia before death. In addition, as spontaneous hepatic rupture is related to gestational hypertension that occurs mainly in older pregnant women or those with multipara history, such factors must be considered.

Next, damage from trauma must be ruled out, which requires a thorough external examination because the liver is frequently damaged by trunk injuries. Wounds from trauma are difficult to find in the abdominal region. Therefore, hemorrhage, such as that in the subcutaneous tissues of the abdominal wall, must also be confirmed. Afterwards, a history of CPR must be confirmed because it frequently causes hepatic rupture. Spontaneous hepatic rupture commonly occurs in the right lobe of the liver, and subcapsular hemorrhage without damage in the parenchyma is a common characteristic. However, hepatic rupture from CPR occurs primarily in the left lobe, falciform ligament, and other nearby parts of the liver. The parenchyma is commonly lacerated, causing hemoperitoneum [7,8,10].

Finally, forensic pathologists must consider the possibility of medical malpractice because maternal death commonly ends in medical dispute. In such regard, it is important to find if the deceased was diagnosed with gestational hypertension and appropriate follow-up was conducted. Considering that the prediction of spontaneous hepatic rupture is difficult, the appropriateness of the measures taken must be evaluated.

#### Conflicts of Interest

No potential conflict of interest relevant to this article was reported.

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