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Case Report

Extensive hepatic infarction in severe preeclampsia as part of the HELLP syndrome (hemolysis, elevated liver enzymes, and low platelets): Evolution of CT findings and successful treatment with plasma exchange therapy

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Abstract

Objective: We describe the serial computed tomography (CT) findings of extensive hepatic infarction and successful plasma exchange therapy in a severe preeclamptic woman with postpartum HELLP syndrome.
Case Report: A 38 year-old woman presented with elevated blood pressure of 140–180/90–120 mmHg and 3+ proteinuria at 28 weeks of gestation. Two days after admission, the patient suddenly complained of severe epigastric pain and headache. Her blood pressure rose sharply to 195/120 mmHg. A 980 g female was delivered by emergency cesarean section. Following delivery, the patient's clinical condition and laboratory values deteriorated, with progressive liver insufficiency (peak AST level = 4246 IU/L, ALT = 3685 IU/L, LDH = 6237 IU/L, platelets = 72,000/mm^3). Two consecutive plasma exchanges (PEX) were undertaken on the 3rd and 4th postpartum day. A contrast-enhanced CT of the abdomen performed 8 days postpartum showed geographically wedge-shaped areas of low attenuation, with a mottled appearance in the right hepatic lobe. Shortly thereafter, the patient recovered and all laboratory parameters gradually normalized 3 weeks after delivery. Follow-up CT-scan of the liver 2 months postpartum showed no evidence of infarction, with complete recovery.
Conclusion: We recommend that severely ill patients with HELLP syndrome having epigastric pain should undergo CT imaging of the liver. A trial of postpartum PEX therapy should be considered for treatment of the HELLP syndrome complicated with hepatic infarction, which is recalcitrant to conventional medical management, and fails to abate within 72–96 hours of delivery.

Keywords: computed tomography; HELLP syndrome; hepatic infarction; plasma exchange; preeclampsia

Introduction

Patients with HELLP syndrome may have various symptoms and signs, although Sibai et al noted that 90% of patients with HELLP syndrome complain of epigastric or right upper quadrant pain [1–5]. These symptoms are thought to result from obstruction of blood flow in the hepatic sinusoids, because of large hyaline deposits of fibrin-like materials associated with periportal or focal parenchymal necrosis [2,4]. In certain rare cases, the hepatocellular necrosis and hemorrhage may be severe enough to result in liver infarction. These characteristic findings have been confirmed by histopathological examination [4].

The therapeutic application of plasma exchange (PEX) therapy with fresh frozen plasma (FFP) for the arrest of

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disease and reversal of postpartum HELLP syndrome has been reported in literatures [6–9]. In this case report, we describe the serial computed tomography (CT) findings of extensive hepatic infarction and successful experimental high dose corticosteroid therapy and PEX therapy in a severely preeclamptic woman with postpartum HELLP syndrome.

Case report

A 38-year-old woman, gravida 3, para 2, presented at 28 weeks' gestation with elevated blood pressure of 140–180/90–120 mmHg and 3+ proteinuria. The patient's past obstetric history was significant for one intrauterine fetal death at 24 weeks of gestation, with unknown causes. LFTs and a CBC examination were within the normal range on admission. Betamethasone 12 mg IM q 24 hours for two doses was given for enhancing fetal lung maturation. Two days after admission, the patient suddenly complained of severe epigastric pain and headache. Her blood pressure rose sharply to 195/119 mmHg. An emergency cesarean section was performed. A 980 g female was born with Apgar scores 3, 6, and 7 at 1, 5, and 10 minutes, respectively.

The maternal platelet count fell from 183,000 to 125,000/mm^3; the ALT level increased from 34 IU/L on admission to 542 IU/L, and LDH level increased from 224 IU/L to 1125 IU/L immediately after cesarean section. The peak total bilirubin level was 0.9 mg/dL. Antiphospholipid syndrome survey with laboratory tests of antiphospholipid antibody (Ab), anti-beta$_2$-glycoprotein Ab, anticardiolipin Abs and lupus anticoagulant were assessed and were found to be negative.

Following delivery, the patient's clinical condition and laboratory values deteriorated, with progressive liver insufficiency (peak AST level = 4246 IU/L, ALT = 3685 IU/L, LDH = 6237 IU/L) 2 days postpartum. A CBC study showed a sharp increase in WBC level to 29,200/mm^3, and a platelet count nadir of 72,000/mm^3. Bedside liver ultrasonography revealed a heterogeneous hypoechoic area $\geq$10 cm in diameter, mainly in the right lobe.

Because of the severity of disease, the patient received experimental postpartum high dose corticosteroid therapy with dexamethasone 10 mg IV q 12 hours for two doses, followed by 5 mg q 12 hours for two doses. Additionally, PEX therapy with 26 units of FFP as the only replacement fluid, using an Asahi plasma separator OP-05W (Asahi Kasei Kuraray Medical Co., Ltd., Tokyo, Japan) was undertaken on the 3rd postpartum day. A second PEX procedure with 24 units of FFP was performed empirically 24 hours later, based on the patient's composite clinical and laboratory assessment. The patient was monitored closely for signs and symptoms of adverse reactions or complications during and immediately after PEX.

Contrast-enhanced CT of the abdomen performed 8 days postpartum showed geographically inhomogeneous wedge-shaped areas of low attenuation with a mottled appearance and enhanced vessels coursing through these lesions mainly in the right hepatic lobe (Fig. 1). These hypodense lesions were compatible with hepatic infarction.

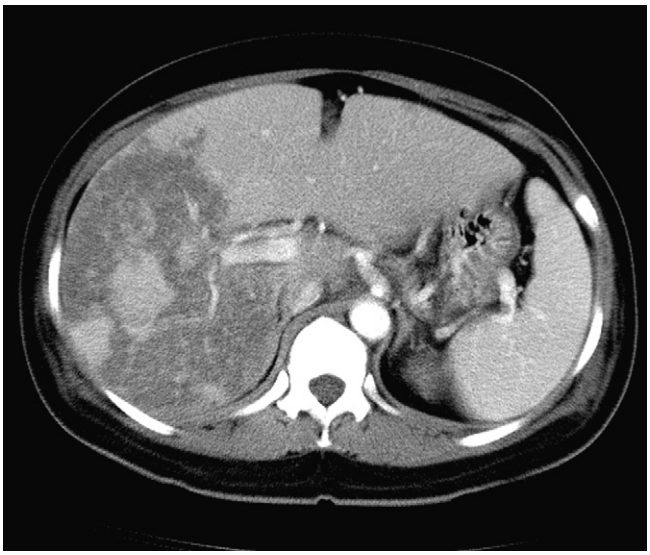

Fig. 1. Contrast-enhanced CT axial image through liver and spleen shows geographically inhomogeneous wedge-shaped areas of low attenuation with mottled appearance and enhanced vessels coursing through these hypodense areas, mainly in the right hepatic lobe.

Shortly after PEX adjunctive therapy to traditional supportive care, the severely ill patient recovered, without maternal complications, and all laboratory parameters gradually normalized 3 weeks after delivery. An enhanced follow-up CT-scan of the liver 2 months postpartum showed no evidence of hepatic infarction, with complete recovery (Fig. 2).

Discussion

Extensive hepatic infarction is a very severe disease which accounts for preeclampsia-eclampsia related death in 11% of patients [4], but fortunately is a very rare extension of the HELLP syndrome, because of the liver's dual blood supply.

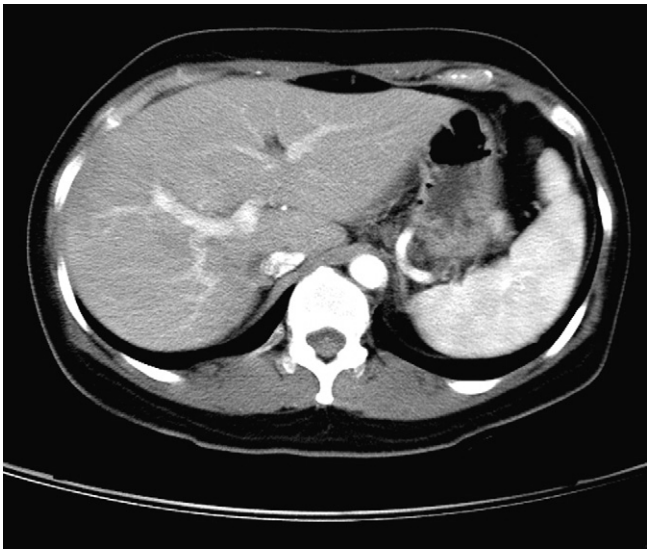

Fig. 2. An enhanced CT scan of the liver 2 months postpartum shows no evidence of hepatic infarction with complete recovery.

Causes of hepatic infarction include arterial insufficiency such as unintentional ligation of the hepatic artery during surgery, decreased portal venous flow, emboli, thrombosis and antiphospholipid syndrome (APS) [10]. A toxemic vasculopathy related to severe vasospasm in the hepatic arterial circulation, may be responsible for a central role in the pathophysiologic features of hepatic infarction [4]. Increasing evidence also indicates that HELLP syndrome is a placenta-instigated, liver-targeted, acute inflammatory condition and disordered immunologic process [5]. Systemic CD95 ligand is a placenta-derived humoral factor that is involved in the pathogenesis of HELLP syndrome. CD95 (APO-1, Fas; TNFRSF6)-mediated apoptosis of hepatocytes is a major pathogenic mechanism for liver disease in general. Apoptosis in liver tissue and cytotoxic activity for primary human hepatocytes has been reported in serum from patients with HELLP syndrome. Blocking of CD95 signaling reduces the hepatocytotoxic activity of HELLP syndrome [5].

Pregnancy-related liver diseases are complex in presentation and often confusing to clinicians, leading to misdiagnoses and unwarranted or delayed therapies. Accurate diagnosis may not be possible on the basis of clinical presentations and laboratory evaluation alone. Ultrasonography can be used as a screening tool. However, CT of the liver appears to be the imaging modality of choice in the differential diagnosis of hepatic dysfunction in late pregnancy and postpartum, because it is more available, faster and safer for potentially unstable patients. The characteristic imaging findings are inhomogeneous areas of low attenuation, either wedge-shaped lesions peripherally or geographically, or larger lesions, with enhanced vessels, coursing through these hypodense areas [11].

Delivery of the placenta with decidual tissues is the definitive therapy for gravid women with severe preeclampsia-eclampsia, with or without HELLP syndrome. However, a very small subgroup of gravid women with severe HELLP syndrome, fail to undergo preeclamptic disease arrest and reversal after expeditious delivery and conventional obstetric medical management within 72 to 96 hours of delivery. In these rare patients with unremitting disease, it is still a challenging problem that is associated with significant maternal morbidity and mortality and an alternative therapy is needed.

PEX with FFP works via either the removal of insulting agents such as placenta-derived humoral factors, immune antibodies, nonspecific factors and cellular debris, or the supplementation of deficient plasma factors, which reduces platelet aggregation and permits endothelial recovery [6–9]. Optimal guidelines for FFP volume and duration of therapy are difficult to establish. We recommend two consecutive daily PEXs and then observation for 24 to 48 hours before a decision to continue daily or alternate day therapy, if laboratory and clinical information does not suggest a trend toward resolution of hepatic infarction.

Although a recent review published in The Cochrane Library on the subject concluded that there is insufficient evidence to determine whether adjunctive corticosteroid use in women with HELLP syndrome decreases major morbidity [12], we still recommend that timely experimental postpartum high dose corticosteroid therapy [5], combined with PEX [6–9], may be life-saving in properly selected patients. We caution that therapeutic time window is narrow for persistently severe preeclampsia-eclampsia with postpartum HELLP syndrome.

In conclusion, preeclamptic patients with HELLP syndrome, with complaints of severe epigastric or right upper quadrant pain, should undergo imaging of the liver. Therapeutic modality of PEX with FFP can be employed effectively for the pregnant patient with severely atypical HELLP syndrome complicated with advanced hepatic infarction, which progressively worsens during labor or the early puerperium.

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