

Spontaneous hepatic rupture in a patient with HELLP syndrome

Ruptura hepática espontánea en una paciente con síndrome de HELLP

José V. Caballero-Cuevas* and Linda C. Jiménez-Ibáñez

Gynecology and Obstetrics Service, High Specialty Hospital Dr. Gustavo A. Rovirosa Pérez, Villahermosa, Tabasco, México

Abstract

Hemorrhagic liver rupture is a rare and deadly complication. The pathogenesis is unknown. This situation forces the multidisciplinary team, the immediate termination of pregnancy, the treatment and management of the patient in an intensive care unit (ICU). We report the results of two patients with spontaneous rupture of the liver during pregnancy and HELLP (hemolysis, elevated liver enzymes, low platelet count) syndrome, asymptomatic, during cesarean section, with management in ICU, poor evolution without adequate response; one died and the other leaves hospital. Liver rupture requires high suspicion and timely, aggressive multidisciplinary management in all cases and surgical intervention in those who develop liver rupture, to improve survival.

Keywords: Liver hematoma. Hepatic rupture. HELLP syndrome. Preeclampsia. Eclampsia.

Resumen

La ruptura hepática hemorrágica es una complicación rara y mortal. La patogenia es desconocida. Esta situación obliga al equipo multidisciplinario, a la interrupción inmediata del embarazo, al tratamiento y manejo de la paciente en una unidad de cuidados intensivos (UCI). Presentamos los resultados de dos pacientes con ruptura espontánea del hígado durante el embarazo y síndrome HELLP (hemólisis, enzimas hepáticas elevadas, recuento bajo de plaquetas), asintomáticas, durante cesárea, con manejo en UCI, mala evolución sin respuesta adecuada; uno murió y el otro sale del hospital. La ruptura hepática requiere alta sospecha y manejo multidisciplinario agresivo y oportuno en todos los casos e intervención quirúrgica en aquellos que desarrollan ruptura hepática, para mejorar la supervivencia.

Palabras clave: Hematoma hepático. Ruptura hepática. Síndrome de HELLP. Preeclampsia. Eclampsia.

Introduction

HELLP syndrome (*hemolysis, elevated liver enzymes, low platelet count*) was described by Weinstein, in 1982, as a clinical picture included within the broad spectrum of disorders that complicate preeclampsia-eclampsia, characterized by hemolysis (hemolytic

microangiopathy), elevation of liver enzymes (aminotransferase two to ten times normal values) and thrombocytopenia ($< 100,000/\text{mm}^3$)¹. The etiopathogenesis is unknown exactly. It has been pointed out that it is probably related to the damage to the vascular endothelium that occurs in hypertensive disease of

*Correspondence:

José V. Caballero-Cuevas
E-mail: valsusmed@gmail.com

Date of reception: 23-08-2020

Date of acceptance: 27-10-2020

DOI: 10.24875/CIRUE.M20000313

Cir Cir (Eng). 2022;90(2):252-257

Contents available at PubMed

www.cirugiaycirujanos.com

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pregnancy, with platelet deposits (thrombocytopenia) and local fibrin, and the passage of red blood cells through the arterioles with fibrin deposits, which deform and they fragment the red blood cells, appearing schistocytes or hedgehog cells. Obstruction of blood flow in the sinusoids by fibrin deposits would be the cause of liver disorders, with vascular congestion and increased intrahepatic pressure, with distension of Glisson's capsule, causing subcapsular hematoma and liver rupture². Hemorrhage with liver rupture is a rare and lethal complication during pregnancy; there is one case for every 45,000 to 260,000 pregnancies. HELLP syndrome develops in approximately 0.1-0.8% of pregnancies and in 10-20% of pregnant women with severe preeclampsia or eclampsia³. Its mortality is 2-3%, and associated with hepatic subcapsular hematoma is 59-62%⁴. In a long review², the incidence of hepatic hemorrhage with rupture was 1 per 45,000 live births. It was observed that the patients who presented hematoma and liver rupture were elderly and multiparous². Unquestionably, it is one of the few real emergencies, like any bleeding disorder in the body, so the diagnosis must be as early as possible and as precise as possible to regulate behavior. Clinically, it manifests with abdominal pain (epigastric and right hypochondrium, sometimes irradiating to the back), nausea and vomiting, signs of hypoperfusion or acute anemia (hypotension, tachycardia, compromised general condition, etc.) and acute fetal distress⁵. Therefore, it is imperative to obtain an imaging study as soon as possible (if clinically suspected) to assess the liver anatomy and structure, as well as the rest of the abdominal organs (intraperitoneal and extraperitoneal). This situation forces the multidisciplinary team to immediately terminate the pregnancy, treat the liver rupture by an experienced surgeon, and manage the patient in an intensive care unit (ICU) due to severe multisystem involvement⁶.

Clinical cases

Case 1

27-year-old woman, free union, incomplete high school, housewife. Gestations 5, births 4. Date of the last period: unreliable. It begins with scant transvaginal bleeding, epigastric pain, and headache, in urgency of gynecology and obstetrics, with blood pressure 160/100 mmHg, respiratory rate 18 rpm, heart rate 65 bpm, temperature 36.9 °C, with no evidence of acute abdomen and hyperreflexia. She was admitted due to

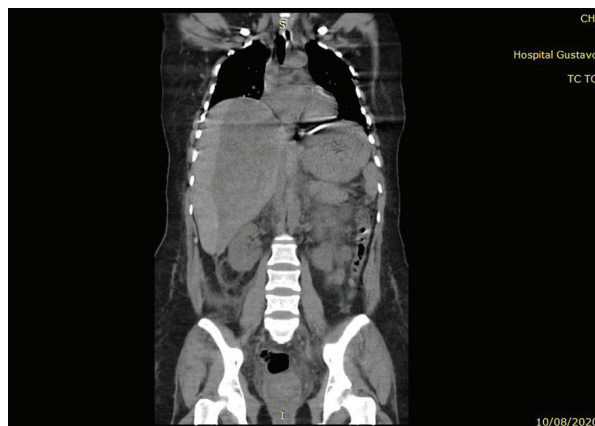


Figure 1. Tomography in coronal reconstruction, observing in the liver a tubular image at the hyperdense subcapsular level, well defined, with attenuation indices of 45 HU (blood density), in relation to a subcapsular hematoma.



Figure 2. Axial section tomography at the level of hepatic segments VII and VIII, identifying in the liver the same hyperdense image of figure 1, subcapsular, preserving the rest of the liver parenchyma its normal density.

a 35.1-week pregnancy, dynamic phase labor and HELLP syndrome, with hemoglobin 13.1, hematocrit 39.9, leukocytes 8.8, platelets 62,000, total bilirubin 2.2, indirect bilirubin 1.8, direct bilirubin 0.4, aspartate transaminase 563, alanine aminotransferase 297, lactate dehydrogenase 924, alkaline phosphatase 158, glucose 96, blood urea nitrogen 11.37, creatinine 0.66, uric acid 24.33. General urine test: proteinuria 300. A caesarean section was performed due to fetal bradycardia of 90 bpm and a newborn with an Apgar score of 6/8 was obtained, who was admitted to the neonatal ICU 30 minutes later due to respiratory distress. On review, bleeding from a ruptured hepatic subcapsular hematoma was observed in segments IV, V, VI, VII and VIII, with active bleeding and hemoperitoneum of

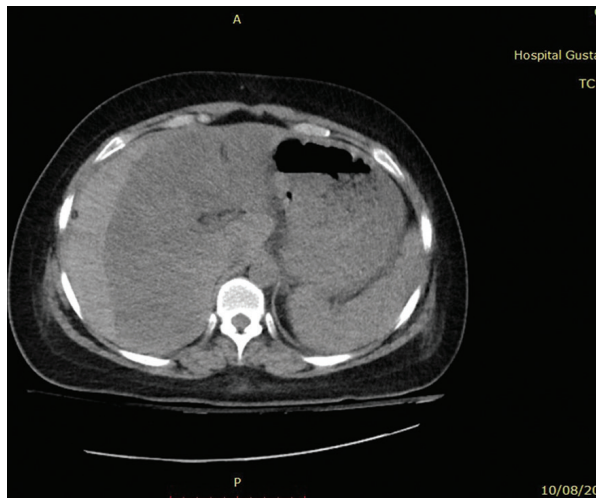


Figure 3. In lower cuts than in figure 2 the subcapsular image continues to be observed in relation to an active hematoma (due to hyper-density), but well defined.

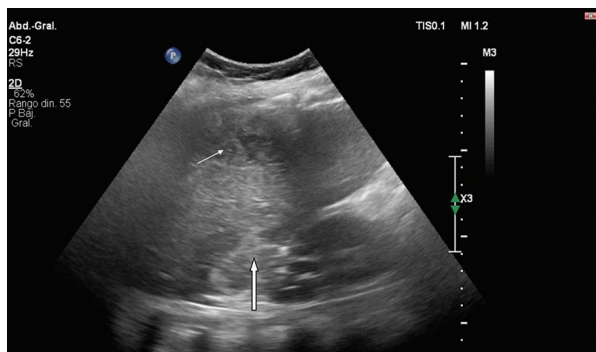


Figure 4. Ultrasound image obtained with a convex transducer, in which the liver is observed at the level of segment VI (thin arrow), at the marginal level a hypoechoic, heterogeneous image, with areas of greater and less echogenicity, and adjacent a diffuse hyperechoic zone is observed, which could correspond to active bleeding (thick arrow).

1300 ml. Transfusion of blood products was started and it was decided to perform liver packing for subsequent damage control, sending her to the ICU with intubation. Control studies: hemoglobin 5.1, hematocrit 24.8, leukocytes 16.5, platelets 120,000 (after transfusion of 10 platelet concentrates), albumin 2.47, globulin 2.36, total bilirubin 2.0, indirect bilirubin 1.4, direct bilirubin 0.6, aspartate transaminase 196, alanine aminotransferase 138, lactate dehydrogenase 1426. General urine test: proteinuria 600. Four hours after admission, the patient presented progressive deterioration and urgent exploratory laparotomy was indicated. During transfer to the operating room, she presented cardiorespiratory arrest and advanced resuscitation maneuvers were performed, without

obtaining a response. Death was declared due to hypovolemic shock, hepatic rupture of subcapsular hematoma, and HELLP syndrome.

Case 2

28 year old woman. Gestations 5, births 4. She was admitted with a pregnancy of 39.2 weeks with preeclampsia with severity criteria. To improve the fetal prognosis, a cesarean section was performed, obtaining a live newborn with an Apgar score of 6/8, Capurro 40 weeks of gestation and weight 3000 g, who was placed in rooming-in. Under review, bleeding of hepatic origin due to rupture of hepatic hematoma in segments V and VI (and probably VII-VIII), for which cholecystectomy and ligation of the right hepatic artery were performed by general surgery; 2000 ml of hemoperitoneum and 300 ml of caesarean section, with transfusion of three globular packets and two of fresh frozen plasma. Admitted to the ICU and a simple abdominal-pelvic computed tomography was performed (Figs. 1 to 3), complemented by abdominal ultrasound (Figs. 4 and 5). Twelve hours after the surgical event, the patient presented a tendency to oliguria and hypoglycemia, with increased transaminases and lactate dehydrogenase, coagulopathy, with evidence of acute liver failure, compromised renal function (increased nitrogen dioxide) and hyperkalemia, and a torpid evolution. Hemodialysis is started with four sessions and renal function is recovered. Also improves liver function and hemodynamic status. Transferred to the gynecology floor for surveillance, tomographic control at 8 days (Fig. 6) and after 5 days the patient was discharged due to improvement.

Discussion

HELLP syndrome was first reported by Weinstein in 1982 as an extremely progressive form of gestosis. In addition to symptoms such as proteinuria and hypertension, the clinical picture is characterized by hemolysis, microangiopathy, thrombocytopenia, and especially impaired liver function. Within this clinical picture, serious complications can occur, such as eclamptic attacks, renal dysfunction, intracranial hemorrhage, intrahepatic hemorrhage, and coagulopathy⁷. It commonly occurs between 28 and 36 weeks of gestation, but can also occur postpartum or even during labor⁸. In the two cases presented, the rupture was spontaneous, without previous symptoms. It is associated with a maternal mortality rate of 3.3%.

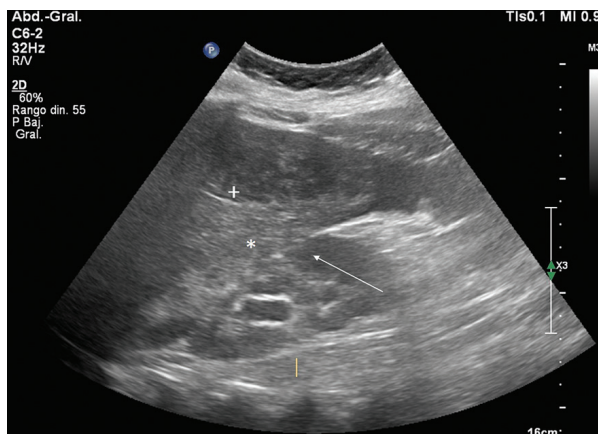


Figure 5. Ultrasound image of segment VI (cross) showing the aforementioned findings and the subcortical distribution of the hematoma can be seen, with areas of adjacent active bleeding (asterisk). Morrison's space (arrow) is seen without free fluid or collections, another finding that rules out free fluid at the time of ultrasound.

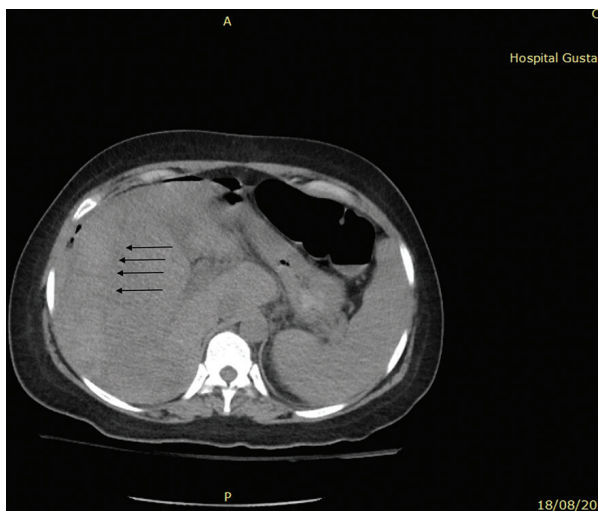


Figure 6. Tomographic control at 8 days, with data of hematoma that did not present evolution or progression (arrows).

However, when liver hematomas are present, or when liver rupture occurs, mortality and morbidity are significantly increased⁹.

Its etiopathogenesis has not yet been clarified; periportal and focal parenchymal necrosis is considered secondary to hyaline and fibrin deposits in the hepatic sinusoids, causing vascular congestion, increased intrahepatic pressure, dilation of Glisson's capsule, and hematoma formation¹⁰. Clinically it is characterized by epigastralgia or bar pain in the right upper quadrant of the abdomen, referred pain in the right shoulder, nausea, vomiting, abdominal distension, and hypovolemic

shock¹⁰. In these cases, pain was not manifested, but rather deterioration of the hemodynamic state and fetal distress, which reflects the heterogeneity and clinical variability of this pathology. The diagnosis was intraoperative and was made during the emergency cesarean section indicated for fetal bradycardia, in which massive hemoperitoneum was observed, conditioned by rupture of segments IV, V, VI, VII, and VIII, which in turn produced hemorrhagic shock.

According to what has been mentioned in the literature, when a subcapsular hematoma (which is not the issue) or liver rupture is diagnosed in an obstetric patient, we have the urgent need to terminate the pregnancy (abdominal route)¹¹. Although there is still no agreement on the best approach to treat liver rupture, management consists of continuous monitoring, as the patient will present with hemodynamic instability (shock, hypotension, anuria, vasopressors), rupture with hemoperitoneum, and ongoing blood loss. In any case, when hepatic rupture is suspected, an exploratory laparotomy should be performed.

Manual compression is undoubtedly one of the most important allies, which allows initial control of bleeding with complete aspiration of the hemoperitoneum, and hemodynamic stabilization of the patient, resuscitation and decision making on the next step; one of them is the Pringle maneuver¹², which consists of the dissection of the hepatic hilum where we can compress both the portal vein and the hepatic artery in order to reduce bleeding, and have a better opportunity to control it according to its depth.

Liver packing¹³ consists of a damage control technique, thus being the most used method, as it is one of the most successful, including the anterior wall of the thorax, the diaphragm and the retroperitoneum. It provides hemostasis practically immediately, obtaining hemodynamic stabilization in the ICU as a response. With it, an 86% survival can be achieved, sectioning the falciform, coronary, right triangular and left triangular ligaments (except if they have a hematoma between their leaves), performed early during laparotomy, having within its complications an abdominal compartment syndrome¹³, being managed as an open abdomen, as well as the removal of the compresses, since it can initiate a second hemorrhagic picture, for which it is necessary to moisten with saline solution. It has the lowest mortality (25-30%) and is therefore used as the first surgical option treatment¹⁴.

When to remove the packaging? There are different options (most of them individualized), one of them being the correction of acidosis, hypothermia and coagulation disorders in 24-48 hours¹⁵. Different authors comment

that there is an 83% risk of perihepatic sepsis if it lasts more than 3 days and a 27% risk of abdominal sepsis if it lasts less than 3 days. The specific recommendation is to remove it before 72 hours¹⁶, being an effective removal of clots and devitalized material. A packing can also be carried out with the omentum¹⁷ occupying the dead space with living tissue, since it favors the activity of macrophages, obtaining a 95% success in stopping bleeding, with 8% mortality, and it is not necessary to remove it. Other treatment options (after packing), such as hepatic lobectomy, hepatic artery ligation, and hepatic embolization, have high mortality of 75%, 40%, and 35%, respectively; can be used if bundling doesn't work¹⁸.

Using hemostatics is also a measure that can help, such as fibrin sealants¹⁹ to stabilize the clot, which can be fibrinogen plus fibrin, calcium chloride and aprotinin, acetylated N-acetyl glucosamine (4 x 4 cm gauze), and recombinant factor VIIa²⁰, which stimulates the formation of hemostatic plugs, with the risk of thrombotic events, pulmonary embolism and disseminated intravascular coagulation. In extreme cases, hepatic artery ligation can be used, which can be done surgically or by means of angiography, using it in less than 1%, and it must be done during laparotomy and after failed packing, only in patients with decreased bleeding after the Pringle maneuver, having a low risk of liver dysfunction in hemodynamically stable patients, risk of ischemia, necrosis and sepsis in patients in shock, and finally may even require emergency liver transplantation^{21,22} indicated in patients with acute liver failure but without neurological damage, who are hemodynamically stable, with correction of coagulation factors and who have a donor available in less than 36 hours in the anhepatic phase²³.

Regarding our surgical approach, immediate liver packing was performed as the first measure supported by the general surgery service of our hospital; however, the massive bleeding could not be contained and, conditioned by the patient's coagulopathy status, her survival was not achieved.

Survival and prognosis depend on early recognition of signs and symptoms, as well as prompt surgical intervention. Despite timely surgical treatment, maternal mortality reaches figures of 40% and fetal mortality is even higher. In patients in whom surgical therapy is unfortunately not installed, mortality reaches figures of the order of 100%. Uncontrollable hepatic bleeding exacerbated to a coagulopathy state is the leading cause of death²⁴.

It is vitally important for us to make these cases known because the clinical presentation of the ruptured subcapsular hematoma was not manifested by characteristic pain. This, coupled with the infrequency

of the symptoms, means that many cases are not suspected, the diagnosis is delayed and the therapy is unknown, being a finding during laparotomy, and therefore with a high mortality rate.

Conclusions

Taking into account the frequency of preeclampsia-eclampsia and HELLP syndrome, it is important to have a high clinical suspicion of this in order to establish an early diagnosis of liver rupture, since being a rare complication associated with HELLP syndrome represents a picture of maternal morbidity extremely severe, with high mortality. It is essential to carry out timely, aggressive multidisciplinary management in all cases and surgical intervention in those who develop this pathology, individualizing management, as the case may be, to improve maternal survival.

Acknowledgments

To Dr. Javier Jesús Juárez Pérez, R4 of the imaging service, for his support in describing the images.

Funding

The authors declare that they have not received any type of funding to carry out this work.

Conflicts of interest

The authors declare that they have no conflicts of interest.

Ethical disclosures

Protection of people and animals. The authors declare that no experiments were carried out on humans or animals for this research.

Data confidentiality. The authors declare that they have followed the protocols of their work center regarding the publication of patient data.

Right to privacy and informed consent. The authors have obtained the informed consent of the patients and/or subjects referred to in the article. This document is in the possession of the corresponding author.

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