Spontaneous Subcapsular Hematoma and Rupture in the Setting of Pre-Eclampsia or HELLP Syndrome: Report of Two Cases and a Systematic Literature Review

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Introduction

Spontaneous subcapsular hematoma (SCH) and hepatic rupture (HR) are rare and often fatal complications of pre-eclampsia (pre-E) and hemolysis, elevated liver enzymes and low platelets (HELLP) syndrome.

Purpose

We present 2 patients with HR in the setting of HELLP syndrome managed surgically. We also present a literature review of HR in HELLP syndrome, with attention on blood product usage and types of surgical management.

Methods

- Two novel case reports were documented with patients' consent.
- A review of relevant literature from 2009-2021 was performed. Select attributes related to outcome and management were analyzed using R-Studio (R-Foundation, Boston, MA).

Results

44 cases analyzed: 6/44 had intact SCH (13.6%), 36/44 had HR (81.8%), 11/44 underwent embolization (25.0%), 35/44 required surgery (79.5%), 2/44 required hepatic resection (4.5%) , 1/44 (2.3%) required liver transplant, and mean blood loss was 3000mL. 13/36 reports of HR required surgery and explicitly documented MTP activation: mean pRBCs 9.0 +/- 10.0, FP 10.0 +/- 6.7, apheresis PLT 4.0 +/- 2.6.

Case Reports

Case 1

32-year old G1P0 at 27+3 weeks gestation

- 7 days RUQ pain
- On admit: (SBP >160, DBP >90), 2+ bilateral lower extremity hyperreflexia, clonus, trace pitting pretibial edema, and 1+ urine protein

Clinical Presentation

- Diagnosis: Pre-E w/ severe features

- HR and 300 mL hemoperitoneum on entry
- MTP activated: 2U pRBC, 1U FFP
- Packing with Arixtra powder, Surgicel gauze, and Surgiflo
- EBL 1800 mL

Management

- 1 day in SICU
- Discharged POD 11
- Mother and child doing well at 4 months

Post-Op Course

Case 2

35-year old G1P0 at 35+3 weeks gestation

- 7 hours abdominal pain, N/V, shoulder ache
- On admit: anemia (Hgb 11.3), elevated blood pressures, elevated liver enzymes (AST 248 U/L, ALT 183 U/L)

Clinical Presentation

- Diagnosis: Pre-E w/ severe features and HELLP

- HR, placental abruption, and 1000 mL hemoperitoneum on entry
- MTP activated: 4U pRBCs, 3U FFP, 3U apheresis platelets
- Packing with FloSeal and Surgicel gauze, Abthera closure placed
- EBL 3680 mL

Management

- 4 days in SICU with additional 3U pRBCs
- Fascial closure on POD2, Discharged POD 12
- Mother and child doing well at 3 years

Post-Op Course

Attributes of SCH and HR Cases in Reviewed Literature

	Analysis of all 44 cases of HR or SCH in Pre-E or HELLP syndrome	Select analysis of 13 studies where blood products quantified and surgery performed to manage HR
Maternal Death (n)	4 (9.1%)	1 (7.7%)
Fetal Death (n)	15 (34.1%)	7 (53.8%)
Both Maternal & Fetal Death (n)	4 (9.1%)	1 (7.7%)
Mean Age (years)	30.8	31.9
Mean Gestational Age (weeks)	32.3	30.9
Method of HR Diagnosis	Imaging (21) (47.7%) vs. intra op (23) (52.3%)	Imaging (6) (46.2%)vs. intra op (7) (53.8%)
Time at HR Diagnosis (intraoperative, pre-op, post-op)	Intra (18) (40.9%), post (5) (11.4%), pre (17) (38.6%)	Intra (5) (38.5%), post (3) (23.1%), pre (5) (38.5%)
Received blood (n)/Mean EBL	15	13
Mean EBL (mL)	3000	3325
HOD vs ICU days (mean ± SD)	18.1 +/- 12.2 vs. 10.33 +/- 10.2	18.8 +/- 14.6 vs. 7.33 +/- 5.77

Preeclampsia to SCH: Pathophysiology

Preeclampsia: BP >140/90 and proteinuria
HELLP Syndrome: Hemolysis, Elevated AST/ALT, Low Platelet Count

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Pregnancy is both a hypercoagulable state and an increased volume state[1] → increased risk of embolism, ischemia, hematoma

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Coagulation cascade activation → increased fibrin deposition[2]

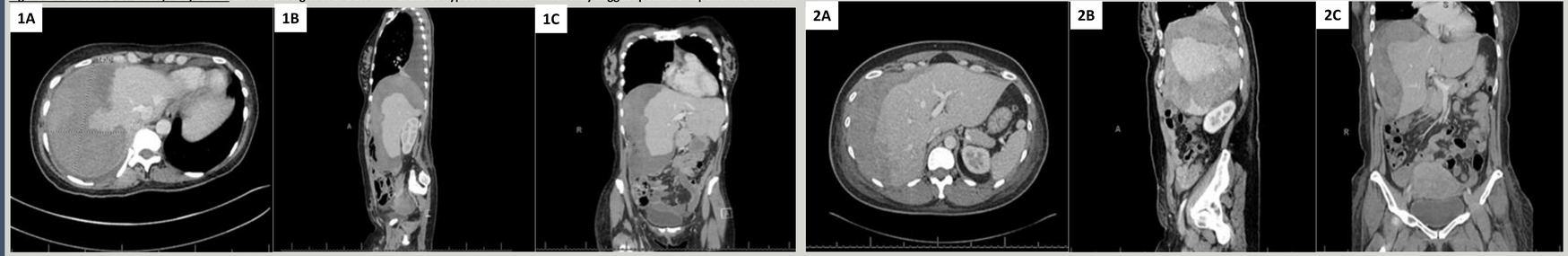
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Fibrin deposits primarily impact sinusoids and hepatic venules[3] → microthrombi → sinusoids expand

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Failing placenta secretes vasoconstrictors[3] →microvascular hemorrhage[3] →portal necrosis and blood migration causing eventual SCH

Figure 1A-C - Case 1 CT Chest/Abd/Pelvis: 14.0 x 10.9 x 26 cm right liver SCH
Figure 2A-C - Case 2 CT Chest/Abd/Pelvis: 21 x 11 cm right liver SCH with areas of hypoattenuation which may suggest possible hepatic infarction



Discussion and Conclusion

- **SCH and HR are rare and lethal comorbidities** of HELLP
  - **Rare:** HELLP affects 0.1% to 0.6% of all pregnancies[1]
    - SCH and HR affect <2% of HELLP cases[1]
  - **Lethal:** High maternal and fetal mortality rates in our analysis are consistent with previous reports which show maternal demise 18-86% cases, and fetal demise 31-80% cases[4]
- **Manage SCH and HR as obstetric emergencies!**
  - Prompt fetal delivery as recommended for Pre-E with severe features and HELLP
  - Activate MTP early – as soon as need is recognized
    - A minority of case reports reviewed (36%) mentioned utilization of a formal MTP in cases of HR that required surgery.
  - To halt or limit ongoing blood loss in these patients, packing, hepatic embolization, hepatic resection, and even liver transplantation may be required

Complete List of References (scan QR code below with phone):

Hemostatic Agent and Device Manufacturers: Abthera closure (Acelity, San Antonio, TX); Arixtra powder (GlaxoSmithKline, Triangle Park, NC); FloSeal (Baxter International Inc, Deerfield, IL); Surgicel gauze (Johnson & Johnson, New Brunswick, NJ);and Surgiflo (Johnson & Johnson, New Brunswick, NJ).

Poster References: **(1)** Lopez-Mendez E. and Lourdes A. E. Pregnancy and portal hypertension: a pathology view of physiologic changes. 2006 Annals of Hepatology 5(3):219-223. **(2)** Westbrook R.H., Dusheiko G., and Williams C. Pregnancy and liver disease. 2015 Journal of Hepatology 64(4):922-945. **(3)** McCormick PA, Higgins M, McCormick CA, Nolan N, Docherty JR. Hepatic infarction, hematoma, and rupture in HELLP syndrome: support for a vasospastic hypothesis. 2021 Journal of Maternal- Fetal & Neonatal Medicine, 1-6, 2021. **(4)** Singh P, Warren K, Collier V. Ruptured Subcapsular Liver Hematoma: A Rare Complication of HELLP Syndrome. Case Reports Hepatol., 2020.