



Case report

Detecting spontaneous retroperitoneal hemorrhage using a modified RUSH protocol: a case report

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ABSTRACT

Introduction: Bleeding in the retroperitoneal space is a serious complication. Hypovolemia and shock develop late after losing a large volume of blood. However, point of care ultrasound (POCUS) examinations in adult patients with shock do not include the retroperitoneal space.

Case presentation: We present the case of a 74-year-old male with ischemic heart disease on dual antiplatelet. He developed vague abdominal pain and hemoglobin drop without overt bleeding source until he developed shock. Modified POCUS examination that included the retroperitoneal space detected the bleeding source and confirmed later by computerized tomography of the abdomen. The case was managed conservatively.

Clinical discussion: The risk factors associated with the formation of spontaneous retroperitoneal hematomas are age above 70 years and dual antiplatelet therapy. The initial integration of point-of-care ultrasound into the assessment of shocked patients leads to an earlier and accurate initial diagnosis with a clear patient care plan. POCUS should include the retroperitoneal space examination in every patient presenting with shock.

Conclusion: In patients with unexplained hemorrhagic shock, a modified POCUS protocol could help by including an examination of the retroperitoneal space in the assessment.

1. Introduction

The retroperitoneum is the anatomic space that lays posterior to the abdominal cavity; it is restrained anteriorly by the posterior reflection of the peritoneum and posteriorly by the muscles of the posterior abdominal wall. This space contains major vessels, nerves, the kidneys, ureters, suprarenal regions, and parts of the colon.

Bleeding in the retroperitoneal space is a serious complication that can occur, as the space can accommodate large volumes of blood before the appearance of clinical signs and symptoms, until hypovolemia occurs late in the clinical course [1]. Different point-of-care ultrasound protocols have been designed to rapidly detect free peritoneal, pleural and/or pericardial fluid, but none of them include the retroperitoneal space [2]. We present a case of retroperitoneal hematoma induced by antiplatelets and detected by a modified point-of-care ultrasound

protocol that includes the retroperitoneal space. The case report has been written in line with the 2020 SCARE Criteria [3].

2. Case presentation

A 74-year-old male was known to have previous anterior myocardial infarction that necessitated coronary artery bypass graft (CABG) in 2017. In 2021, the patient had angina; angiography showed patent venous grafts, and the patient was instructed to take both aspirin and clopidogrel. Three months later, the patient presented with fever, burning micturition and retrosternal chest pain of a one-day duration. His chest pain subsided after GTN in the emergency room, but his troponin level was elevated. An ECG showed reversed ST depression in chest leads 3, 4, and 5. The patient was managed with non-ST elevation myocardial infarction (non-STEMI) and started on enoxaparin according

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to body weight, aspirin and ticagrelor; after 5 days, enoxaparin was stopped. On Day 7, the patient had left loin pain and vomiting. There was no hematemesis, no black stools, and no change in urine color. An abdominal examination showed mild tenderness in the left loin. Results of the laboratory tests are presented in Table 1. Urgent upper and limited lower gastrointestinal endoscopies were normal.

Ultrasound of the abdomen showed a normal renal shadow, liver, and gall bladder. That night, the patient developed hypotension (BP 70/60 mmHg), and his hemoglobin dropped to 6 g/l. Because of respiratory depression and hemodynamic instability, the patient was intubated and ventilated. Abdominal examination showed a mild bluish discoloration of the flanks (Grey Turner's sign).

We used the Rapid Ultrasound in SHock (RUSH) protocol for the evaluation of critically ill patients, which showed no pericardial effusion, no pleural fluid, and no free fluid in the peritoneum. We extended the point-of-care abdominal ultrasound examination by sliding the ultrasound abdominal curvilinear probe to the posterolateral thoraco-abdominal junction zone, which showed a 150–200 cc hypoechoic collection with turbid fluid (hematoma) in the intramuscular region of the left lateral abdominal wall. A similar hematoma of approximately 100 cc was seen in the retroperitoneal region along the psoas on the left abdominal wall (Fig. 1). Because the patient was critically ill, abdominal CT could not be performed.

The patient was started on 4 units of blood and high doses of intravenous fluid, vasopressors and inotropes, and his urine output improved. Twelve hours later, the requirement for vasopressors decreased and hemoglobin increased; another 12 h later, the patient was off vasopressors. Computed tomography of the abdomen with a mesenteric angiogram is presented in Figs. 2, 3 showing a large left psoas hematoma measuring 20 × 7 × 6 cm (volume approximately 500 cc), with another hematoma in the adjacent left posterior abdominal wall measuring 13 × 5 × 5 cm (volume 300 cc). Hemorrhage can also be seen in the left retroperitoneal posterior pararenal space with involvement of the posterior Gerota's fascia (displacing the kidney and descending colon anteriorly), as well as minimal extension into the right retroperitoneal space across the perivascular space. Abdominal arteries and veins were normal, except for atherosclerotic changes, and there was no active arterial or venous extravasation. The patient was weaned from ventilator support.

One week later, CT of the abdomen showed regression of hematomas, and the patient was started on clopidogrel alone. After 4 weeks of follow-up, the patient was stable and had no further complaints.

Table 1

Lab tests.

	In ward		In ICU	6 h	12 h
	Day 1	Day2			
WBC (10 ⁹ /l)	13.6	15.6	20	11.16	7.25
RBC (cells/mcl)	4.5	2.56	1.9	2.7	3.16
Platelet (10 ⁹ /l)	187	200	242	180	180
Hct	40	30	15.7	23.5	26.6
Hemoglobin (gm/dl)	14.2	9.2	5.2	7	8.9
Activated partial thromboplastin time (s)	40	36	50	30	32.6
Prothrombin time (s)	17	19	12.7	15	15
ALT/AST (units/l)	18/26		80/308	120/350	140/380
LDH (units/l)	250	308	735	281	289
Bilirubin umol/l	8	9		12	14
BUN (mmol/l)	6.4	16.3	19.8	20	18
Creatinine umol/l	110	130	133	130	120
Lactate (mg/dl)	1		4	2.5	1

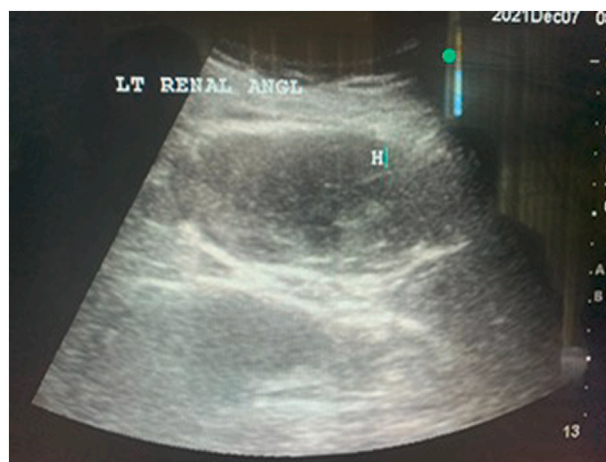


Fig. 1. Ultrasound of the posterolateral thoraco-abdominal junction zone. Large acute hematoma in the left psoas muscle, adjacent left posterior abdominal wall and left posterior pararenal retroperitoneal space.

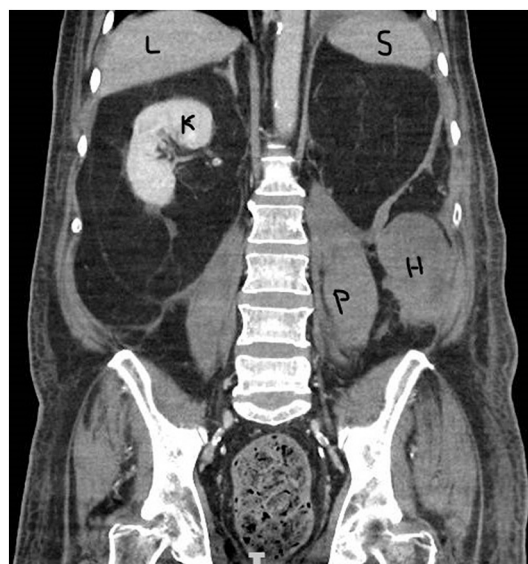


Fig. 2. Abdominal CT. Left psoas hematoma (P) and hematoma seen in the adjacent left posterior abdominal wall (H).



Fig. 3. Abdominal CT. Hemorrhage can also be seen in the left retroperitoneal posterior pararenal space (H) with involvement of the posterior Gerota's fascia.

3. Discussion

The initial integration of point-of-care ultrasound into the assessment of shocked patients leads to an earlier and accurate initial diagnosis with a clear patient care plan [1–12]. Thus, bedside ultrasound has become an essential component in the evaluation of hypotensive patients.

Rapid Ultrasound in SHock in the evaluation of critically ill patients (RUSH protocol) is essential in the early assessment of critically ill and shocked patients [6]. Part of the RUSH protocol is to determine the “leakiness of the tank” using the Focused Assessment with Sonography in Trauma (FAST) examination and a pleural fluid examination. Leakiness of the tank refers to internal blood loss, including hemoperitoneum or hemothorax, fluid extravasation, or other pathologic fluid collections [6]. The FAST examination is performed by examining 3 main regions: the right upper quadrant, left upper quadrant and suprapubic area (pelvis). In our case, after the FAST examination, we slid the probes for the upper right and left posterolateral thoraco-abdominal junction zone further to visualize the retroperitoneal space. This modification of the RUSH technique, by including the posterior-thoraco-abdominal junction zone, permits the detection of free fluid in the retroperitoneal space when sources of bleeding are obscure, as in hemodynamically unstable patients on dual antiplatelets with abdominal pain and decreased hemoglobin levels.

The risk factors associated with the formation of spontaneous retroperitoneal hematomas (SRH) in our patient were age above 70 years and dual antiplatelet therapy. The mechanism of retroperitoneal hematoma is either disruption of blood vessels within the retroperitoneum or interference with coagulation. Patients who are on anti-coagulation or antiplatelet therapy are at an increased risk of developing SRH [7,8]. In most published series of SRH, approximately three-quarters of the patients were on one or more anticoagulant or antiplatelet agents (range, 50 to 89%) [9,10]. Older adults are at risk, as the median age of patients in most published series of SRH is approximately 70 years [9].

Unlike trauma-related retroperitoneal hematoma, where bleeding zones are discrete, and a bleeding vessel may be located, the bleeding source remains obscure in most cases of SRH [10]. Patients with hypovolemic shock refractory to resuscitation, ongoing transfusion requirement, expanding hematoma, or active contrast extravasation on computed tomographic imaging should undergo angiographic intervention (embolization of the bleeding source) or surgery [7,10,11]. Management of SRH is mainly medical (volume replacement, blood products, and anticoagulant reversal) [11]. In a retrospective study of 100 patients of SRH, Baekgaard JS et al. reported angiographic intervention 11% and surgery 6% [11]. In another retrospective analysis of 99 patients by Warren MH et al., the angiographic intervention was reported in 17.2% and surgery 1%. [12]. Our patient did not require any intervention and responded well to medical management.

4. Conclusion

In patients with unexplained hemorrhagic shock, a modified RUSH protocol could help by including an examination of the retroperitoneal space in the assessment.

Sources of funding

No funding was obtained for this study.

Ethical approval

The study is exempted from ethical approval.

Consent

Written informed consent was obtained from the patient next of kin for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in Chief of this journal on request.

Registration of research studies

Not applicable.

Declaration of competing interest

The authors declare no conflicts of interest.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.ijscr.2022.106830>.

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