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Case Report



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Gastric ultrasound–assisted diagnosis of undifferentiated shock: A case report

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ABSTRACT

Rationale: Peptic ulcer disease and variceal bleeding are two of the most common causes of gastrointestinal (GI) bleeding. GI bleeding can present with symptoms of hemodynamic instability such as tachycardia and shock.

Patient's Concern: A 33-year-old man with confusion and hypotension (blood pressure: 70/40 mmHg and pulse rate: 140/min) was brought by emergency medical services from home to the emergency department without any companion. The patient was in undifferentiated shock. His hypotension was assessed with inferior vena cava (IVC) size and collapsibility, and rapid ultrasound in shock and hypotension (RUSH) protocol was used to investigate the cause of his shock. Following the RUSH protocol when scanning the IVC, parts of the stomach were seen in its vicinity and suspended heterogeneous particles were observed in the fluid. After seeing these particles, we suspected GI bleeding.

Diagnosis: Endoscopy confirmed GI bleeding.

Interventions: After placing an orogastric tube and suction, about 2 L of coffee-ground fluid with clots was removed. We started intravenous proton-pump inhibitors 80 mg bolus, followed by a continuous infusion of 8 mg/h. The patient received about 2 L of normal saline and 2 units of packed red blood cells to correct his hypotension.

Outcomes: After being admitted to the GI ward and treated for three days, the patient was discharged from the hospital with a hemoglobin level of 11 g/dL and continued to have an outpatient follow-up at the clinic.

Lessons: The use of gastric ultrasound in conjunction with the RUSH protocol can help to diagnose undifferentiated hypotensive shock. The components of the RUSH exam are the heart (H), IVC (I), Morrison's/FAST abdominal views with the aorta (MA),

and pulmonary and pipes scanning (P), and can be memorized with the mnemonic: HI-MAP. We would like to introduce a new mnemonic: Hi-MAPS, adding stomach (S) to the RUSH protocol in undifferentiated hypotension and shock to evaluate upper GI bleeding.

KEYWORDS: Gastrointestinal bleeding; Emergency room; Gastric ultrasound; Rapid ultrasound in shock and hypotension protocol; Hypovolemic shock

1. Introduction

Peptic ulcer disease and variceal bleeding are two of the most common causes of gastrointestinal (GI) bleeding[1]. Massive GI bleeding can present with symptoms of hemodynamic instability such as tachycardia and shock. Conducting an upper endoscopy is the first diagnostic and therapeutic action for upper gastrointestinal bleeding (UGIB), with specificity and sensitivity of 30%-100% and 92%-98%[2]. Assessment of hemodynamic status in a shocking state remains a challenge for emergency physicians. According

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to the guidelines issued by the American College of Emergency Physicians, “resuscitative - ultrasound use as directly related to an acute resuscitation” is one functional clinical category of emergency ultrasound[3]. Ultrasound is ideal for the evaluation of critically ill patients in shock[4].

In 2006, Dr. Scott Weingart and his colleagues introduced the rapid ultrasound in shock and hypotension (RUSH) protocol. Since published in 2009, this rapid (less than 2 min) and easy-to-perform protocol had helped emergency physicians to promptly investigate patients who are in shock[5].

2. Case report

This study was approved by the Research and Ethics Committees at Zahedan University of Medical Sciences. Informed consent was obtained from the patient. The patient understood that his participation is voluntary and free to withdraw at any time without giving a reason or cost. He voluntarily agreed to take part in this study. He understood that photographs (audio/video recordings) may be taken during the study. He consented to the use of his photo (audio/video) in presentations related to this study

A 33-year-old man with confusion and severe hypotension was brought by emergency medical services from home to the emergency department (ED) and no companion to ask about his medical history and medications. He was pale, confused, tachycardic (pulse rate: 140/min, normal: 60-100/min), and hypotensive (blood pressure: 70/40 mmHg, normal: 90-120/60-80 mmHg), but had no obvious reason for his shock.

We performed rapid ultrasound in shock and hypotension (RUSH) protocol within 3 min of the patient’s arrival at the emergency room to investigate the cause of his shock. Following the RUSH protocol, we found that the patient was having an ejection fraction of 70%, a larger left ventricle than the right ventricle, an obvious kissing sign in the left ventricle, no free fluid in the abdomen, no thrombosis in the limbs vein, and normal lungs. We requested blood tests of complete blood count, blood electrolytes, venous blood gas, and liver and renal function tests.

The only prominent finding was that his inferior vena cava (IVC) was completely collapsed (central vein pressure <5 mm/Hg, normal: 8-12 mmHg) (Supplemental video 1). The patient was in hypotensive shock, and we began fluid therapy (2 L of normal saline within 1 h).

Following the RUSH protocol and when scanning the IVC, parts of the stomach were seen in its vicinity. The stomach was distended, placed in the midline, and suspended heterogeneous particles were observed in the fluid (Figure 1, Supplemental video 2). Seeing these particles, we suspected GI bleeding because the patient had received 2 L fluids in 1 h and was still in shock. After placing an orogastric tube and suction, about 2 L of coffee-ground fluid with clots was removed; this collaborated with our suspicion that the cause of the patient’s

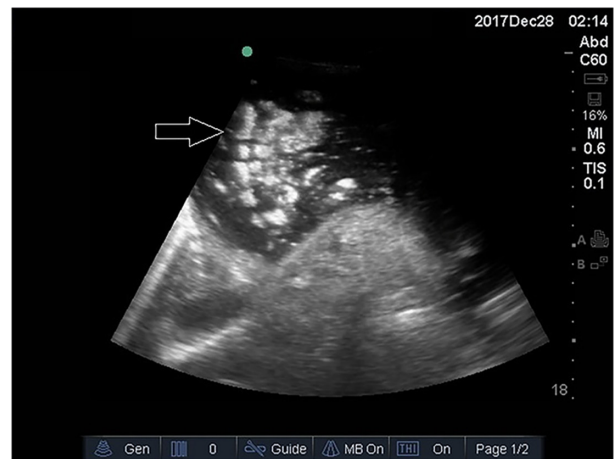


Figure 1. The ultrasoundimage of a 33-year-old male patient with gastrointestinal bleeding showing a distended stomach with suspended heterogeneous particles (arrow).

hypovolemic shock was GI bleeding. We started an intravenous proton-pump inhibitors 80 mg bolus, followed by a continuous infusion of 8 mg/h, and requested an emergency gastroenterology consultation to perform an endoscopy.

At this time, lab results returned and showed only mild metabolic acidosis, a hemoglobin level of 7 (normal: 13.2-16.6 g/dL), and mean corpuscular volume as well as mean corpuscular hemoglobin within normal ranges. We treated the patient with fluid therapy with 0.9% normal saline based on the collapse of the IVC. After 1 h the patient was still in shock and his hemoglobin level remained at 7. We infused two units of packed red blood cells to treat hypotension. After receiving 2 L of normal saline and packed red blood cells, the patient awoke with an improved clinical condition. He complained of having epigastric pain with a weakness for two days, and no previous history of any disease.

The patient underwent a bedside endoscopy in the ED with a gastroenterologist while receiving packed red blood cells infusion, and some hemorrhagic erosion were observed in the gastric antrum. The endoscopy confirmed GI bleeding and the patient was admitted to the GI ward. He was treated for three days, received blood pack cells, and was discharged from the hospital with a hemoglobin level of 11 and continued outpatient follow-up at the clinic.

3. Discussion

UGIB is commonly presented to the ED with an estimated incidence rate of 50-100 per 100 000 population[6]. Patients with UGIB with hypovolemic shock who need hospitalization have a mortality rate ranging from 6% to 14%[7]. Patients with hypotension or shock have high mortality rates, and traditional diagnostic methods can be misleading. However, ultrasound allows for direct visualization of pathology and differentiation of shock states. Recently, articles have discussed the use of focused ultrasound for cardiac arrest and shock patients without obvious etiology, early

sonography to assess patients with undifferentiated acute dyspnea[8], and point-of-care lung sonography to diagnose pneumonia[9].

In an effort to conglomerate all of the various diagnostic ultrasound techniques applicable to patients into a memorable approach, the RUSH protocol was created. The RUSH protocol was designed to be rapid and easy to perform with the portable machines found in most ED.

The components of the RUSH protocol are heart (H), IVC (I), Morison's/FAST abdominal views with the aorta (MA), and pulmonary and pipes scanning (P). These components can be memorized with the mnemonic: HI-MAP. This case illustrates that in patients with hypovolemic shock, in which the cause of which cannot be detected by the RUSH protocol, an additional scanning of the stomach of viewing the supra splenic and left subcostal space should be considered, and the presence of heterogeneous particles can indicate UGIB. We would like to introduce a new mnemonic: Hi-MAPS, adding stomach (S) to the RUSH protocol in undifferentiated hypotension shock to evaluate UGIB. In this way, ultrasound can be used in the diagnosis of GI bleeding. It is a unique safe diagnostic tool that can be used repeatedly at the bedside of sick patients.

Conflict of interest statement

The authors report no conflict of interest.

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Authors' contributions

AB: contributed to the methodology and conceptualization of the study, and drafted the manuscript. AA: reviewed and edited the manuscript.

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