A case of hemorrhagic shock due to massive upper gastrointestinal bleeding: from the differential diagnosis to the correct management

Beatrice Marziani,[1,2] Michele Domenico Spampinato,[1,2] Fabio Caputo,[1] Matteo Guarino,[1,2] Francesco Luppi,[1] Benedetta Perna,[1,2] Angelina Passaro,[1] Daniele Cariani,[3] Alberto Merighi,[4] Rosario Arena,[4] Roberto De Giorgio[1,2]

[1]Department of Translational Medicine, University of Ferrara, Ferrara; [2]School of Emergency Medicine, University of Ferrara, Ferrara; [3]Emergency Medicine Unit, Department of Emergency Medicine, St. Anna University Hospital, Ferrara; [4]Gastroenterology Unit, Arcispedale S. Anna, Ferrara, Italy

Abstract

Upper gastrointestinal bleeding (UGIB) spans from minor bleeding to life-threatening events. Identification of early signs of shock, proper management of hemodynamically unstable patients, and correct risk stratification are essential for an appropriate diagnostic workup and therapy. We present here the case of a 30-year-old man who was admitted to our emergency department for haematemesis. Shortly after admission, further episodes of haematemesis occurred, and the patient's condition rapidly deteriorated to irreversible shock. A contrast-enhanced computed tomography of the abdomen revealed morphological features of chronic liver disease and oesophageal varices. The patient underwent an upper gastrointestinal endoscopy, confirming oesophageal varices with massive bleeding. Although promptly applied, endoscopic hemostasis was ineffective, and the patient died twelve hours after his admission. Based on this case, we reviewed the diagnostic and therapeutic approaches for patients with massive UGIB and provided a practical approach to this life-threatening emergency.

Correspondence: Michele Domenico Spampinato, Department of Translational Medicine, University of Ferrara, Emergency Medicine Unit, St. Anna Hospital, via A. Moro, 8 – 44124 Cona, Ferrara, Italy.
Tel.: +39.380.36.84.962.
E-mail: spmmhl@unife.it

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Introduction

Acute upper gastrointestinal bleeding (UGIB) is a potentially life-threatening condition requiring aggressive treatment. Although oesophagogastroduodenoscopy (OGD) remains the gold standard for the diagnosis and management of UGIB, there is still debate regarding the best diagnostic and therapeutic approach, especially in hemodynamically unstable patients.

Case Report

A 30-year-old man was admitted to our emergency department (ED) with an episode of haematemesis. He had been admitted to the ED two years earlier for chest discomfort when he was diagnosed with thrombocytopenia (55.000/μL) and was not further investigated. He denied alcohol consumption and a history of viral hepatitis. Physical examination revealed pale skin, clamminess, and tachypnoea. His vital signs included blood pressure of 120/80 mmHg, oxygen saturation of 98% on room air, heart rate (HR) of 95 beats per minute (bpm), respiratory rate (RR) of 24 per minute, and body temperature of 36.5°C. Electrocardiography revealed a normal sinus rhythm. Arterial blood gas analysis (ABGA) showed metabolic acidosis with increased anion gap and lactate levels (pH 7.20, pCO2 22 mmHg, pO2 90 mmHg, lactate 8.1, BE -10, HCO3- 16 mmol/L). Blood tests revealed a hemoglobin level of 13 g/dl, platelet count of 50,000/μL, slight prolongation of prothrombin time (1.44 s), and a mild increase in bilirubin levels (total bilirubin 3.26 mg/dl; direct bilirubin 1.32 mg/dL). One hour after admission, further episodes of haematemesis occurred, and the patient became tachycardic (HR 120 bpm), hypotensive (70/50 mmHg), and his level of consciousness deteriorated to Verbal on the Alert Verbal Pain Unresponsiveness (AVPU) scale.[1] His Glasgow-

Blatchford bleeding score (GBS) was 1, indicating a "high risk" GI bleeding that is likely to require intensive care.[2] The patient was informed about the need for OGD and blood transfusion and the risk of short-term adverse events, and informed consent was obtained. The endoscopist was then alerted for an emergent OGD available in 1 hour, and the anesthetist and surgeon were involved in the patient's management. After fluid resuscitation with 1.5 L of Ringer lactate and 2 units of group 0 red blood cells (RBC), the massive transfusion protocol was activated, and a high dose of pantoprazole (80 mg iv) and the vasoactive agent terlipressin (2 mg bolus iv) was administered. After a significant improvement in consciousness and vital signs (alert on the AVPU scale, blood pressure 90/60 mmHg, HR 105 bpm, RR 24), a new episode of haematemesis occurred, and a new ABGA revealed pH 7.14, pCO2 30 mmHg, pO2 90 mmHg with 60% FiO2, lactate 10, BE -12, and HCO3- 14 mmol/L. The state of consciousness deteriorated to Pain on the AVPU scale. Therefore, the patient underwent orotracheal intubation, and a radial arterial line was placed to invasively monitor the patient's blood pressure. While waiting for emergent OGD, the patient underwent a contrast-enhanced computed tomography (CECT) of the chest and abdomen to rule out other life-threatening causes of haematemesis treatable via an endovascular approach or surgery. CECT showed a normal thoracic and abdominal aorta, but an enlarged, cirrhotic liver, dilated esophagus, and stomach filled with haematic fluid with severe diffuse multi-organ hypoperfusion. Despite a total of 2 L of crystalloids, 2 units of group 0 RBC, 3 specific units of RBC, 1 unit of platelets, norepinephrine infusion starting from 10 mcg/min up to a 30 mcg/min to maintain a mean arterial pressure of at least 60 mmHg and epinephrine hydrochloride 20 mcg/bolus, the patient remained in shock with metabolic acidosis. OGD was performed 2 hours after the patient's admission, revealing several actively bleeding oesophageal varices, which were treated with sclerotherapy. The patient was admitted to the intensive care unit. Despite aggressive treatment with invasive ventilation, sedoanalgesia, vasopressors, antibiotics, terlipressin, PPI, and a massive transfusion protocol with the infusion of 10 RBC units, 4 platelet units, and 4 plasma units, the patient's hemodynamic condition remained critical, and he died 12 hours after admission for a multiple organ failure due to an irreversible hemorrhagic shock.

Discussion

UGIB originates proximally to the ligament of Treitz and is one of the most common gastrointestinal causes of hospitalization in the US.[3,4] UGIB can cause haematemesis (*e.g.*, vomiting of blood or coffee ground-like vomit) or melena (black stools) due to a variety of conditions. The most common causes are peptic ulcers, erosive gastritis, oesophagitis, and esophagogastric varices.[4]

UGIB can be acute or chronic. In acute UGIB, the priority is to assess hemodynamic stability and perform early intensive resuscitation. The patient's medical history is crucial for the diagnosis and subsequent management. The most common risk factors for UGIB include previous UGIB, use of anticoagulants and/or nonsteroidal anti-inflammatory drugs (NSAIDs), older age, alcohol abuse, and chronic liver disease.[5] In a patient like the one reported herein without apparent risk factors (apart from the detection of established thrombocytopenia), who had not undergone previous abdominal surgery, and in whom there was no alcohol abuse or clinical signs of liver cirrhosis, gastrointestinal hemorrhage seemed of unclear origin and led to the consideration of possible differential diagnoses. OGD is currently the investigation of choice for UGIB, but CECT has high availability and accuracy, allowing rapid identification of the site of bleeding, including aorta-enteric fistulas, oesophageal diverticulum, vascular abnormalities, Dieulafoy's lesions, gastric antral vascular ectasia, angiodysplasia, and hereditary hemorrhagic telangiectasia,[6-8] and supporting the appropriate treatment (*e.g.*, either endoscopic or non-endoscopic), especially in patients with persistent hemodynamic instability.[9, 10]

In our case, CECT excluded other possible causes of hemorrhagic shock presenting with haematemesis, without delaying OGD. The most recent American College of Gastroenterology clinical guidelines on UGIB recommend endoscopy within 24 hours of presentation, regardless of the risk of rebleeding[11]. Previous guidelines recommend endoscopy within 12 hours in high-risk patients (hemodynamic instability or overt cirrhosis),[12] however, recent studies have shown that early endoscopy is not associated with lower mortality, and the correct timing is still under debate.[13,14] Indeed, it is recommended that OGD be performed under the best possible conditions, that is, after initiation of medical therapy and resuscitation strategies, with hemodynamic stability and without large amounts of blood in the stomach to complicate the examination.[15] The literature on the timing of endoscopy in patients who do not respond to initial resuscitation and medical management is limited. The most recent guidelines recommend rapid interventional endoscopy or radiology to stop the bleeding, although experience is largely anecdotal.[11]

The management of hemodynamically unstable patients with UGIB is very challenging, and in such stressful situations, a clear diagnostic pathway may be highly useful to reduce mortality, especially in hemodynamically unstable patients. According to previous guidelines and evidence, we suggest a possible algorithm for the diagnosis and management of UGIB[10,11,15] based on hemodynamic stability, identification of the source of bleeding, and the feasibility and efficacy of specific treatments (Figure 1). In hypotensive shock with an altered mental status or persistent haematemesis, endotracheal intubation is one of the first therapeutic measures to avoid the risk of aspiration and ensure adequate breathing. Volume resuscitation with fluid and RBC transfusion (if the hemoglobin level is less than 7 g/dL) should be initiated as soon as possible. However, in hypotensive patients with active bleeding, RBCs are recommended regardless of hemoglobin values.[16] Indeed, hemoglobin levels do not predict bleeding severity, as they take time to drop and reflect blood loss.[8] It is important to recognize early signs of shock and monitor clinical signs. Massive UGIB can be defined as bleeding that leads to hemodynamic instability and requires aggressive resuscitation with early transfusion of RBCs along with clotting factors and platelets to achieve hemostasis and prevent coagulopathy.[16] The American College of Surgeons describes four classes of hemorrhage to estimate the volume of blood loss and the need for transfusion.[17] In the case described herein, the patient rapidly progressed from hemorrhage Class I (heart rate minimally elevated or normal; no change in blood pressure, pulse pressure, or respiratory rate; estimated volume loss up to 15% of total blood volume) to Class III (significant drop in blood pressure and changes in mental status occur; heart rate and respiratory rate are significantly elevated, urine output declines and capillary refill is delayed; estimated volume loss from 30% to 40% of total blood volume) and Class IV (hypotension with narrow pulse pressure – less than 25 mmHg – and a more pronounced tachycardia – more than 120 bpm; mental status becomes increasingly altered; urine output is minimal or absent; estimated volume loss over 40% of total blood volume). Massive transfusion protocols are effective in reducing mortality in trauma patients,[17]

and although studies have not shown a significant effect on short-term (24-hour) mortality in non-trauma patients, they should be considered for all types of massive bleeding.[18]

Many studies have recommended continuous intravenous proton pump inhibitor (PPI) administration before endoscopy to reduce the need for endoscopic intervention in patients with severe UGIB. However, the latest guidelines are neither for nor against the use of PPI, since there is no evidence that this treatment could improve clinical outcomes.[11] Conversely, the guidelines recommend the use of prokinetics, such as erythromycin 250 mg iv, or azithromycin 250 mg iv, 20-90 minutes before endoscopy to promote gastric emptying and improve visualization, therefore reducing the need for a second endoscopy.[8,11,19]

If variceal hemorrhage is suspected, patients should be treated empirically with vasoactive agents to lower portal pressure and control bleeding. Octreotide is a long-acting somatostatin analog

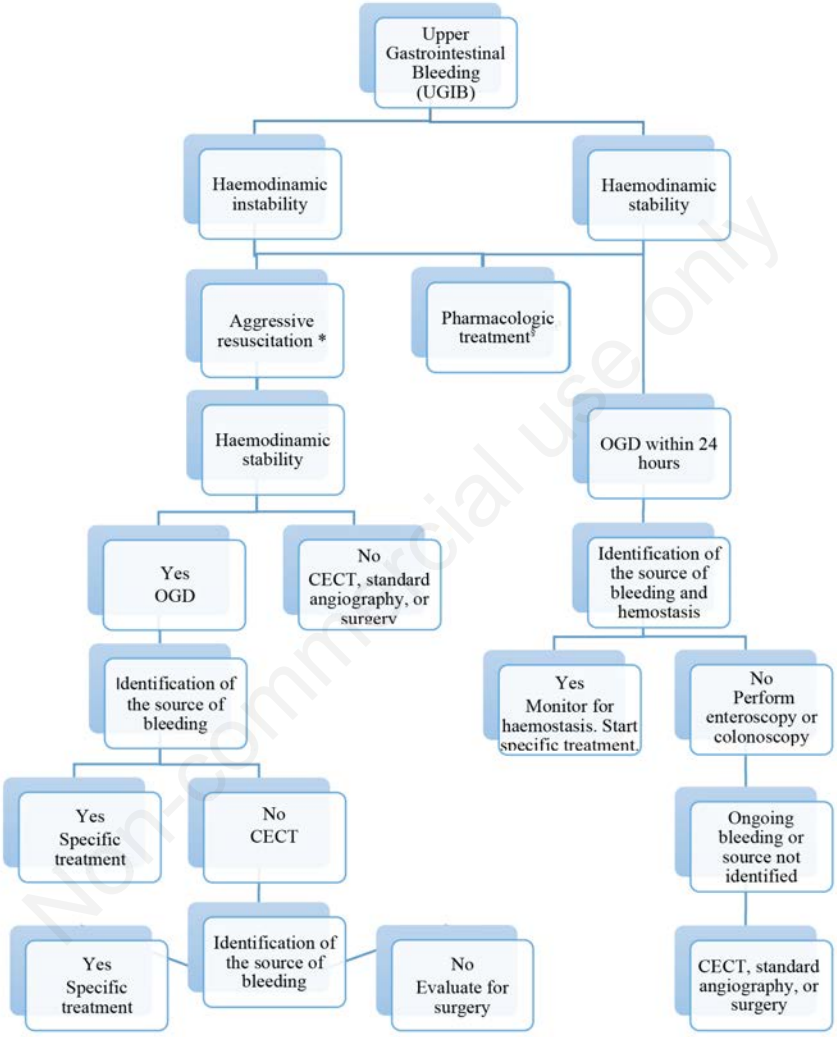

Figure 1. Diagnostic approach and management of massive UGIB.

OGD, oesophagogastroduodenoscopy; GI, gastrointestinal; CECT, contrast-enhanced computed tomography. *ABCD approach:[10,16] airway, breathing, circulation, disability. Perform early rapid sequence intubation (RSI) if consciousness deteriorates and the airway cannot be protected, or if respiratory failure occurs. Consider administering iv fluid bolus or push dose pressors (iv phenylephrine 100 µg [50 to 200 µg] or epinephrine 10 µg [5 to 20 µg]) before RSI to prevent hemodynamic collapse. Prefer induction drugs with minimal hemodynamic effects, such as ketamine 1-2 mg/kg iv or etomidate 0.2-0.3 mg/kg iv. Maintain normal oxygenation and ventilation. Evaluate using lower positive end-expiratory pressure (PEEP) pressure support (PS) and lower tidal volume (6-8 ml/Kg) to minimize the hemodynamic effects of positive pressure ventilation. Increase the respiratory rate to keep end-tidal CO_2 within the normal range. Check anion blood gas analysis frequently to avoid uncompensated metabolic acidosis or concomitant respiratory acidosis, which can rapidly lead to cardiovascular arrest. Support the circulation aggressively via valid vascular access. Consider intraosseous or central venous access if feasible and not time-consuming. Administer fluid in 250-500 mL boluses and consider early resuscitation with 0 positive or 0 negative RBCs and a massive blood transfusion protocol. §High dose PPI, *e.g.*, pantoprazole 80 mg iv (the latest guidelines are neither in favor nor against its use due to the uncertain benefit before upper endoscopy).[11] Prokinetics (erythromycin or azithromycin 250 mg iv, 20-90 minutes before endoscopy).[8,11,19] In the suspicion of variceal bleeding, vasoactive agents (terlipressin 2 mg bolus iv or octreotide 50 µg bolus followed by a continuous infusion of 50 µg/hour).[10] If variceal bleeding is suspected, antibiotic prophylaxis (iv ceftriaxone 1 g/day iv for 7 days).[10]

administered as a 50 µg bolus followed by a continuous infusion of 50 µg/hour for 3-5 days. Terlipressin, administered at a dose of 2 mg iv every four hours and titrated to 1 mg every four hours until bleeding was under control, showed the same efficacy as octreotide, with a more sustained effect on lowering portal pressure and flow.[10] Patients with cirrhosis and UGIB have a higher risk of developing infections during hospitalization, and antibiotic prophylaxis with intravenous ceftriaxone 1 g daily for 7 days has been shown to reduce recurrent bleeding and improve survival.[10] Balloon tamponade via a Sengstaken-Blakemore tube may be a "bridge therapy" but it is associated with a high risk of rebleeding after deflation of the balloon and a high rate of adverse events.[16] Along with medical, radiological, endoscopic, and surgical treatments, the "essential conversation" with the patient is always of utmost importance. A detailed discussion about the disease, prognosis, patient's perception, knowledge, and treatment preference is fundamental to developing the correct diagnostic and therapeutic strategy in accordance with the patient's wishes, especially in critical conditions.[20]

Conclusions

In summary, despite the unfavorable outcome, three important caveats should be considered: i) the patient's clinical history and physical examination are crucial for the diagnosis and management of patients with UGIB; ii) hemodynamic status, instead of hemoglobin levels, should determine the severity of bleeding and guide the appropriate diagnostic and therapeutic work-up, including airway protection, breathing, and circulatory support, eventually with an appropriate massive resuscitation strategy; iii) although not the gold standard, CECT can be a useful tool in patients with massive UGIB to establish a differential diagnosis in combination with OGD (Figure 1). Emergent OGD may appear appropriate in patients who do not respond to initial resuscitation and medical treatment, however, its role in lowering short-term mortality is still unclear.

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