

## Review Article

# Emergency management of upper gastrointestinal bleeding

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## ABSTRACT

Upper gastro intestinal bleeding is one of the most common reasons of emergency department visits, totaling up to 400,000 annual admissions in the United States. Peptic ulcer disease and variceal bleeding are two of the most common causes of GI bleeding. Several studies have been done, and major advancements were made in its management leading to significant drop in morbidity and mortality. Our aim is to study the common causes of upper gastrointestinal bleeding that come to the emergency department and understand the latest guidelines to manage them. We conducted this review using a comprehensive search of PubMed, MEDLINE, and EMBASE from March 1981, through November 2017. The following search terms were used: upper gastro intestinal bleeding, management of upper GI bleeding, variceal bleeding, peptic ulcer bleeding, hemorrhage in the emergency department. Acute upper gastrointestinal bleeding is one of the most common cases encountered in the emergency department and leading to significant morbidity and mortality. Clearing airway and breathing and stabilizing the vitals of the patient by achieving hemodynamic stability and bleeding control is the primary goal in the emergency department.

**Keywords:** Upper gastro intestinal bleeding, Management of upper GI bleeding, Variceal bleeding, peptic ulcer bleeding, Hemorrhage in the emergency department

## INTRODUCTION

The definition of acute upper gastrointestinal bleeding is described as gross loss of blood originating from the gastrointestinal tract with the lesions being proximal to the ligament of Treitz. Upper gastrointestinal bleeding

can sometimes be associated with hemodynamic instability.<sup>1</sup>

One of the most common cases encountered in the emergency department is acute upper gastrointestinal bleeding. Within the last twenty years, several studies

have been conducted to further study incidence, causes, management, and prognosis of acute upper gastrointestinal bleeding. Within the United States, it is estimated that more than 400,000 annual hospital admissions are due to an upper gastrointestinal bleeding.<sup>1</sup>

In the 1980s, proton pump inhibitors (PPIs), and H<sub>2</sub> receptor blockers (H<sub>2</sub>RA) were introduced to clinical practice, which led to significant advances in acute upper gastrointestinal bleeding. Both proton pump inhibitors, and H<sub>2</sub> receptor blockers decrease the incidence of the occurrence of an acute gastrointestinal bleeding by decreasing the complications of peptic ulcers, decreasing rates of rebleeding, and improving the healing of ulcers. Peptic ulcers are considered an important cause of upper gastrointestinal bleeding and are mainly associated with helicobacter pylori infections.<sup>2</sup> Therefore, the eradication of helicobacter pylori has been linked with significant decrease in the incidence of acute gastrointestinal bleeding.<sup>2</sup> Another significant risk factor in the development of acute gastrointestinal bleedings is the chronic use of non-steroidal anti-inflammatory drugs. Recently, morbidity and mortality resulting from acute gastrointestinal bleeding has declined.

Several previous studies have been conducted to evaluate and assess acute upper gastrointestinal bleeding and found a wide variation of its incidence. For example, a study in west Scotland has concluded that 172 per 100,000 adults will develop an upper gastrointestinal bleeding.<sup>3</sup> On the other hand, the incidence in the Netherlands and in Denmark was significantly lower (48 per 100,000 adults and 37 per 100,000 adults, respectively).<sup>4,5</sup> This variation between areas could be attributed to several factors. Male sex and lower socio-economic status were both associated with higher incidence of developing acute gastrointestinal bleeding.<sup>3</sup>

According to previous observational studies, mortality following an upper gastrointestinal bleeding can range between 3% and 14%. A previous study was conducted in Greece in 2001 and found that 3.1% of upper gastrointestinal bleeding were associated with mortality.<sup>6</sup> Another study was conducted in Canada within the same period and found that non-variceal upper gastrointestinal bleeding was associated with a 5.5% mortality rate.<sup>7</sup> Increasing age has been linked with higher mortality rates following acute gastrointestinal bleeding.<sup>3</sup> Other risk factor that have been associated with higher mortality rates following acute gastrointestinal bleeding include low blood pressure, shock, other co-morbidities, and rebleeding.<sup>3</sup>

In this review, we will discuss most common causes of acute gastrointestinal bleeding and their management according to the latest published guidelines in the literature.

## METHODS

We did a systematic search upper gastrointestinal bleeding and emergency department using PubMed search engine (<http://www.ncbi.nlm.nih.gov/>) and Google Scholar search engine (<https://scholar.google.com>). Our search looked for epidemiology, causes, management, treatment, and prognosis of acute gastrointestinal bleeding. The following search terms were used: upper gastro intestinal bleeding, management of upper GI bleeding, variceal bleeding, peptic ulcer bleeding, hemorrhage in the emergency department. All relevant studies were retrieved and discussed. We only included full articles.

The study was approved by the REVIEW committee of King Abdulaziz University Jeddah.

## GENERAL MANAGEMENT OF ACUTE UPPER GASTROINTESTINAL BLEEDING

Acute upper gastrointestinal bleeding could be either scant or profuse. Medical staff should have the sufficient skills to care for both cases and should know how to distinguish and when to decide to admit the case in the intensive care unit. Alarming signs in critical cases include the presence of any hemodynamic instability. When dealing with patients with a severe upper gastrointestinal bleeding, the first thing would be to decide whether to admit the patient or not, and whether to admit the patient to the normal ward or the intensive care unit.<sup>8</sup>

Assessing and correcting fluid loss is considered to be the first step in the management and should aim at restoration of hemodynamic stability. This is achieved by the insertion of two large-bore catheters intravenously, and initiation of crystalloid fluids. When dealing with older patients, it is also recommended to administer supplemental oxygen and transfuse red blood cells. The rationale behind this is that older patients (especially those who have a comorbid cardiovascular disease and/or pulmonary disease) will have diminished capacity of carrying oxygen which will lead to worse prognosis.<sup>9</sup> Patients who have coagulopathy should receive platelets and/or fresh frozen plasma.<sup>1,9</sup>

The next essential step is to obtain a proper thorough history that well covers all possible causes of bleeding, with drug history (like the use of aspirin or other antiplatelet drugs, the use of non-steroidal anti-inflammatory drugs, the use of anticoagulants, and other possible drugs). History should also ask about the alcohol use, liver cirrhosis, previous bleeding events, the presence of peptic ulcer, heart failure, renal disease, and other relevant diseases. Physical examination should look for signs of hypovolemia, signs of shock, bleeding in other sites, abdominal pain, and rectal pain. Complete blood count, liver functions tests, serum electrolytes, coagulations studies, cardiac enzymes, blood urea

nitrogen, hemoglobin levels, along with other laboratory investigations (based on the case) should all be ordered. Electrocardiogram and nasogastric lavage are performed. Upper endoscopy is the standard diagnostic and therapeutic approach for most cases of acute upper gastrointestinal bleeding.<sup>10</sup>

Several scoring systems have been developed and tested in the cases of acute upper gastrointestinal bleeding. These scores aim to easily estimate and predict the severity of the bleeding and possible prognosis and outcomes, based only on clinical information (from the history or physical examination). Moreover, some of these systems can be used to plan management more properly.<sup>3</sup> Based on these scores, physicians could also assess the need of immediate endoscopic procedure in the patient. One important scoring system is the Blatchford Score. It is a validated scoring system used in cases of upper gastrointestinal bleeding cases. It depends on both clinical and laboratory information and can predict the necessity of endoscope.<sup>3</sup> This score can range between 0 and 23. The higher the score is, the more likely the patient will need to undergo endoscopic procedure.

Another important scoring system that is widely used in the assessment of acute upper gastrointestinal bleeding is the Rockall score. It is considered to be the most commonly used scoring system that stratifies patients with upper gastrointestinal bleeding according to their risk. The Rockall scoring system has been tested and validated in several health care systems.<sup>11</sup> Rockall scores can be done in two steps. The first step, which is known as the clinical Rockall score, is usually calculated depending only on clinical information obtained from history and physical examination of the patient. The next step is usually calculated after undergoing endoscopy, and the score is calculated on both clinical information and endoscopic findings. The complete Rockall scoring system is generally used to assess the risk of rebleeding and mortality of the patient. The result of Rockall scoring system can range between zero to eleven, with eleven indicating the worst prognosis, and zero indicating the best prognosis with no risk of complications.<sup>11</sup> When it comes to predicting the necessity of undergoing endoscopic procedures, the Blatchford score has been found to produce more accurate estimates<sup>12</sup>. Moreover, the Blatchford score can also help decide if patients can be soon discharged following endoscopy. In fact, it has been estimated that the use of the Blatchford score to determine patients to discharge was associated with 25% reduction in unnecessary hospitalization after acute upper gastrointestinal bleeding.<sup>13</sup>

## MANAGEMENT OF SPECIFIC CAUSES OF UPPER GASTROINTESTINAL BLEEDING

### *Peptic ulcer bleeding*

Peptic ulcer is considered to be one of the most important causes of upper gastrointestinal bleeding. In fact, it has

been found to be associated with up to 60 percent of cases. This incidence is even higher in the United States than Europe.<sup>6</sup>

Peptic ulcers are more likely to be in the duodenum rather than the stomach. *Helicobacter pylori* infection and non-steroidal anti-inflammatory drugs are considered to be the most common risk factors to cause peptic ulcers. Although recent years have carried significant advances in the management of peptic ulcers and resulting bleeding, rebleeding following treatment still occurs in up to 20 percent of cases.<sup>6</sup>

Management of upper gastrointestinal bleeding caused by a peptic ulcer can vary among cases, depending on severity, stability of the patient, and the presence of other comorbidities. In many cases, the bleeding can be stopped during hospital admission. However, some severe cases may eventually require surgery and/or angiography due to recurrent rebleeding.<sup>14</sup>

Similar to the general management of any other upper gastrointestinal bleeding, the first step in the assessment will include an evaluation of patient's stability, and the determination of patient's need for oxygen supplementation, intravenous fluids, and blood transfusion.<sup>14</sup> It is also essential to put all peptic ulcer patients on an intravenous proton pump inhibitor.<sup>15</sup> The most commonly used proton pump inhibitors are esomeprazole and Pantoprazole and are given first two times a day. The dose is gradually decreased and switched to oral dose when the bleeding stops.<sup>14,15</sup>

The standard method to establish a diagnosis for a bleeding peptic ulcer is upper gastrointestinal endoscopy. Endoscopy can also assess the risk of rebleeding: ulcers with clear bases have a relatively lower risk of rebleeding, whereas an ulcer is categorized as 'high-risk' when the base is not clean. This categorization system helps with both planning management and assessing the risk of future rebleeding.<sup>14,16</sup> Hospitalization is a must for patients whose risk of rebleeding is high.<sup>14</sup> In severe cases of peptic ulcer bleeding, and when there are large amounts of blood in the stomach, intravenous erythromycin is recommended to help empty the stomach faster, leading to a better visualization when doing an endoscopy.<sup>15</sup>

Endoscopic therapy differs based on the classification of the ulcer. Hemostatic clips and/or thermal coagulation with injection therapy, are the two most important methods for treatment.<sup>17</sup>

Injecting epinephrine leads to a significant reduction of the bleeding by causing vasospasm. This method is generally used in combination with other therapies.<sup>15</sup> On the other hand, thermal coagulation therapy depends on the use of contact probes that will help compress the bleeding vessel. Coagulation is simultaneously performed, which is followed by the sealing of the

bleeding vessel.<sup>14</sup> Hemoclips are used when performing a therapeutic endoscopy. They can also be used as a radiopaque marker when interventional angiography is required.<sup>18</sup> Fibrin sealant is usually injected through the endoscope during the procedure to help decrease the bleeding.<sup>15</sup> Nanopowder can also be sprayed during endoscopy. These substances help the formation of clots that will top the bleeding.<sup>19</sup>

After a successful endoscopy, it is recommended to perform another follow-up endoscopy within 1-2 days, to assess for rebleeding.<sup>15</sup> Patients should be strictly monitored for the development of complications following upper endoscopy. Any change in the condition of the patients (especially a sudden one) must be taken seriously and deeply investigated. Interventional angiography could be attempted in cases of endoscope failure. Techniques include the transarterial embolization of the bleeding vessel, which is associated with a very high cure rate.<sup>8</sup>

When patients still have profuse bleeding despite repeated endoscopy and interventional angiography, surgical repair of peptic ulcer is indicated. Other indications for surgical repair of the ulcer include persistent instability following three units of blood, signs of shock, or perforation. Surgical approaches include pyloroplasty, truncal vagotomy, selective vagotomy, and over sewing of ulcer.<sup>14</sup> All patients who present with a bleeding peptic ulcer should be consulted on the use of antiplatelets, anticoagulants, and non-steroidal anti-inflammatory drugs.

### **Variceal bleeding**

An observational study in France has revealed that variceal bleeding can constitute about 14% of total upper gastrointestinal bleeding cases. Authors attributed these results to the high prevalence of alcohol abuse in France, leading to liver cirrhosis.<sup>20</sup> Another Turkish study concluded that up to 30% of upper gastrointestinal bleeding cases could be due to a variceal bleeding.<sup>21</sup> Generally, a large portion of patients with liver cirrhosis will present at some time during the course of their disease with variceal bleeding. Variceal bleeding is usually severe and associated with significant morbidity and mortality. Therefore, special care with proper management should be applied to reduce rates of long-term complications.<sup>4</sup> Being one of the most serious causes of upper gastrointestinal bleeding, the cause of bleeding is usually considered variceal and managed accordingly, until proven otherwise. First step in management of variceal bleeding is to stabilize the patient. Acute gastrointestinal bleeding due to variceal bleeding is associated with a 29% rebleeding rate, 76% six-week survival rate, and 60% one-year survival rate.<sup>22</sup>

All these mentioned numbers are results of studies that have been conducted more than five years ago. However, within the last decade, significant improvements of

medical and endoscopic therapies have been achieved. For example, currently the first line therapy for variceal bleeding is endoscopic ligation.<sup>23</sup> Pharmacotherapy with vasoactive drugs (somatostatin, terlipressine) has also been found to improve outcomes, especially when started early and continued for at least five days.<sup>23</sup> Therefore, there is a necessity to conduct more recent epidemiological studies that evaluate current prevalence, incidence and mortality of variceal bleeding.

Management of an active acute upper gastrointestinal bleeding that originates from ruptured varices can be somewhat similar to the general management of upper gastrointestinal bleedings, with the presence of some differences. Generally, a case of ruptured varices will present with a severe hemodynamic instability, thus is considered an emergency. Therefore, all patients with bleeding due to ruptured varices should be immediately admitted to the intensive care unit. Assessment of airway should be done, with preservation of an open airway. Physicians should make sure they prevent aspiration of blood into the airway. Endotracheal intubation could be done in cases of massive bleeding to prevent aspiration.<sup>24</sup>

After assessing and establishing safe airways, the next step is to insert a nasogastric tube. The insertion of two large-bore catheters is essential. Volume resuscitation should be started as soon as possible, especially when severe instability is present. In cases of decreased hemoglobin levels, red blood cells transfusion is recommended, and if coagulopathy is present, fresh frozen plasma should be administered.<sup>24</sup>

Vasoactive medications (like vaptotide and octreotide) should then be started, along with prophylactic antibiotics treatment with ciprofloxacin, ofloxacin, or other broad-spectrum agents. In patients with liver cirrhosis and high risk of developing hepatic encephalopathy, lactulose is administered. The presence of alcohol withdrawal symptoms should always be well-monitored. Thiamine is administered in all patients who have a history of alcohol abuse and related liver disease.<sup>25</sup>

The gold standard to confirm the presence of ruptured varices is esophagogastroendoscopy, which should be conducted within twelve hours of the development of symptoms. Esophagogastroendoscopy is also therapeutic, and treatment is performed with either sclerotherapy or ligation. When there is recurrent bleeding that is refractory to all previously mentioned measures, transjugular intrahepatic portocaval shunt is performed.<sup>25</sup> Meanwhile, bleeding can be temporarily controlled using a balloon tamponade. When the bleeding is controlled, patients are recommended to use a prophylactic beta blocker. Beta blockers have been found to decrease rates of recurrent bleeding.<sup>24</sup>

### **Other causes of bleeding**

Peptic ulcer and variceal bleeding alone constitute most cases of upper gastrointestinal bleeding causes. Other

causes of upper gastrointestinal bleeding can include oesophagitis and erosive disease, Mallory–Weiss syndrome, and malignancies.<sup>3</sup> The cause of the upper gastrointestinal bleeding can remain unclear in up to 7% of cases despite undergoing diagnostic endoscopy. Management of these causes is generally similar to the management of other causes. However, some differences are present according to the underlying cause.

## CONCLUSION

Acute upper gastrointestinal bleeding is considered to be one of the most common cases encountered in the emergency department and leading to significant morbidity and mortality. The most common causes for acute upper gastrointestinal bleeding are peptic ulcer and ruptured varices. Several other causes are present but are less commonly encountered. When dealing with a patient with an acute upper gastrointestinal bleeding, the most important thing is to assess vital signs. Airways must be assessed and maintained. Hemodynamic instability must be immediately managed with fluids resuscitation (through two large-bore intravenous catheters). Then, a medical history with a physical examination are performed to help establish a diagnosis and plan management. Laboratory investigations should be performed. The gold standard for diagnosis and treatment remains to be upper endoscope. It can confirm the cause of the bleeding and possibly treat this bleeding.

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