

# Upper gastrointestinal bleeding

## What is upper gastrointestinal bleeding?

Acute upper gastrointestinal bleeding (UGIB) is a gastroenterological emergency with a mortality of 6%–13%<sup>[1]</sup>. Despite changes in management, mortality has not significantly improved over a period of 50 years<sup>[2]</sup>. Bleeding from the upper gastrointestinal tract (GIT) is about four times as common as bleeding from the lower GIT. It is important to identify patients with a low probability of re-bleeding from patients with a high probability of re-bleeding. The size of the bleeding vessel is important in prognosis. Visible vessels are usually between 0.3 mm and 1.8 mm. Large bleeding vessels cause faster blood loss. Generally, larger vessels are found deeper in the submucosa and serosa and more specifically high in the lesser curve of the stomach and postero-inferiorly in the duodenal bulb.

## Upper gastrointestinal bleeding causes (aetiology)

Endoscopy does not reveal a cause in approximately 12% of patients presenting with apparent acute UGIB. The most common causes of upper gastrointestinal (GI) bleed are oesophago-gastric varices and gastric erosions<sup>[3]</sup>.

- Peptic ulcer.
- Oesophagitis.
- Gastritis/erosions.
- Erosive duodenitis.
- Varices.
- Portal hypertensive gastropathy.

- Malignancy.
- Mallory-Weiss tear.
- Vascular malformation.

Rare causes of upper GI bleed include:

- Dieulafoy's lesion (a vascular malformation of the proximal stomach).
- Angiodysplasia.
- Haemobilia (bleeding from the gallbladder or biliary tree).
- Pancreatic pseudocyst and pseudo-aneurysm.
- Aortoenteric fistula.
- Bleeding diathesis.
- Ehlers-Danlos syndrome.
- Pseudoxanthoma elasticum.
- Gastric antral vascular ectasia.
- Osler-Weber-Rendu syndrome.

## Epidemiology

The incidence of acute UGIB in the UK ranges between 84-172 per 100,000 per year, causing 50-70,000 hospital admissions per year<sup>[4]</sup>.

### Risk factors for UGIB

An ageing population with associated conditions and a worse prognosis has helped maintain constant mortality figures despite advances in treatment. Mortality is about 7% in patients admitted because of bleeding but some three times higher amongst those developing UGIB whilst in hospital<sup>[3]</sup>. Peptic ulcer disease is the most common cause of UGIB. Risk factors for peptic ulcer disease are:

- Alcohol abuse.
- Chronic renal failure.

- Non-steroidal anti-inflammatory drug (NSAID) use.
- Age.
- Low socio-economic class.

Although duodenal ulcers are more common than gastric ulcers, both contribute nearly equally to the incidence of UGIB. After an initial bleed the risk factors for re-bleeding, with associated higher mortality, are:

- Age over 60.
- Presence of signs of shock at admission.
- Coagulopathy.
- Pulsatile haemorrhage.
- Cardiovascular disease.

## Assessment

Upper gastrointestinal bleeding severity can be assessed by <sup>[5]</sup> :

- The extent of blood loss.
- The degree of shock.

Initial assessment may provide an indication of the cause of UGIB:

- Abdominal pain - eg, epigastric pain, diffuse abdominal pain.

- Bleeding<sup>[3]</sup> :
  - Haematemesis: bright-red haematemesis usually implies active haemorrhage. Patients presenting with haematemesis have a higher mortality than those presenting with melaena alone.
  - Coffee-ground vomit refers to the vomiting of black material which is assumed to be blood; it implies that bleeding has ceased or has been relatively modest.
  - Melaena: black tarry stools, usually due to acute UGIB but occasionally bleeding from the small bowel or right side of the colon.
  - Haematochezia: passage of fresh or altered blood per rectum, usually due to colonic bleeding but occasionally due to profuse upper gastrointestinal or small bowel bleeding.
- Loss of blood: shock, syncope, presyncope.
- Features of underlying cause - eg, dyspepsia, weight loss, jaundice.
- Risk factors:
  - Alcohol intake.
  - Drug history is important. Drugs such as NSAIDs, aspirin and corticosteroids are an important cause of bleeding. Iron and bismuth may mimic melaena.
- Past history of bleeding (haematemesis or melaena) or of anaemia.
- Retching may precede bleeding with a Mallory-Weiss tear.

## Examination

The main aim of examination is to assess blood loss and look for signs of shock. A secondary aim is to look for signs of underlying disease and significant comorbid conditions - for example:

- Pallor and signs of anaemia should be sought.
- Pulse and blood pressure.

- Postural hypotension may be detected and usually indicates a blood loss of 20% or more.
- Other signs of shock:
  - Cool extremities
  - Chest pain
  - Confusion
  - Delirium
- Evidence of dehydration (dry mucosa, sunken eyes, skin turgor reduced).
- Stigmata of liver disease may be present (jaundice, gynecomastia, ascites, spider naevi, flap, etc).
- Signs of a tumour may be present (nodular liver, abdominal mass, lymphadenopathy).
- Subcutaneous emphysema and vomiting suggest Boerhaave's syndrome (oesophageal perforation).
- Urine output should be monitored (oliguria is a sign of shock).

## Investigations

Endoscopy is the primary diagnostic investigation in patients with acute UGIB .

- Endoscopy should be undertaken immediately after resuscitation for unstable patients with severe acute UGIB.
- Endoscopy should be undertaken within 24 hours of admission for all other patients with UGIB.

### Laboratory tests<sup>[6]</sup>

- FBC: haemoglobin is measured serially (4- to 6-hourly in the first day) to help assess trend. The requirement for transfusion is based on initial haemoglobin and a clinical assessment of shock.

- Crossmatch blood (usually between 2 and 6 units according to rate of active bleeding).
- Coagulation profile: prothrombin time with activated partial thromboplastin time and an international normalised ratio (INR), fibrinogen level:
  - A consumptive coagulopathy may occur with UGIB. This may be associated with thrombocytopenia. A platelet count of less than 50 with active bleeding requires platelet transfusion and fresh frozen plasma to try to make up for depleted clotting factors.
  - Coagulopathy may be a marker also for advanced liver disease. Low fibrinogen and abnormal **LFTs** may also indicate liver disease.
- LFTs to detect underlying liver disease
- Renal function tests and electrolytes. A serum urea nitrogen:creatinine ratio of more than 30 (with urea and creatinine levels measured in mg/dL) increases the likelihood of a UGIB .
- Calcium level should be assessed to detect hyperparathyroid patients and to monitor the effect of citrated blood transfusions.
- Gastrin levels can identify the rare gastrinomas causing UGIB<sup>[7]</sup> .

## Imaging<sup>[8]</sup>

- CXR: may identify aspiration pneumonia; pleural effusion, perforated oesophagus.
- Erect and supine abdominal X-ray to exclude perforated viscus and ileus.
- CT scan and ultrasound can identify:
  - Liver disease.
  - Cholecystitis with haemorrhage.
  - Pancreatitis with haemorrhage and pseudocyst.
  - Aortoenteric fistulae.

- Nuclear medicine scans have been used to identify areas of active haemorrhage.
- Angiography may be useful if endoscopy fails to identify site of bleeding.

## Hospital admission<sup>[9]</sup>

**Consider for admission and early endoscopy (and calculation of full Rockall score) if:**

- Aged  $\geq 60$  years (all patients who are aged  $>70$  years should be admitted); or
- Witnessed haematemesis or haematochezia (suspected continued bleeding); or
- Haemodynamic disturbance (systolic blood pressure  $<100$  mm Hg, pulse  $\geq 100$  beats per minute); or
- Liver disease or known varices.

Other significant comorbidity (especially cardiac disease, malignancy) should also lower the threshold for admission.

## Upper gastrointestinal bleeding management

### Resuscitation and initial management<sup>[2]</sup>

Shocked patients should receive prompt volume replacement. It has been demonstrated that early and aggressive resuscitation reduces mortality in UGIB<sup>[10]</sup>.

- Transfuse patients with massive bleeding with blood, platelets and clotting factors in line with local protocols for managing massive bleeding. Major haemorrhage protocols should be in place.
- Decisions on blood transfusion should be based on the full clinical picture; over-transfusion may be as damaging as under-transfusion<sup>[11]</sup> <sup>[12]</sup>.
- Platelet transfusions should not be offered to patients who are not actively bleeding and are haemodynamically stable.

- Platelet transfusions should be offered to patients who are actively bleeding and have a platelet count of less than  $50 \times 10^9/L$ .
- Fresh frozen plasma should be used for patients who have either a fibrinogen level of less than 1 g/L, or a prothrombin time (INR) or activated partial thromboplastin time greater than 1.5 times normal. If a patient's fibrinogen level remains less than 1.5 g/L despite fresh frozen plasma use, offer cryoprecipitate as well.
- Prothrombin complex concentrate should be used for patients who are taking warfarin and actively bleeding.
- Recombinant factor VIIa should not be used except when all other methods have failed.

Proton pump inhibitors (PPIs) should not be used prior to diagnosis by endoscopy in patients presenting with acute UGIB.

### **Risk assessment**

Recommendations emphasise early risk stratification, using validated prognostic scales, and early endoscopy (within 24 hours)<sup>[13]</sup>. The following formal risk assessment scores are recommended by the National Institute for Health and Care Excellence (NICE) for all patients with acute UGIB<sup>[2]</sup>.

- The Blatchford score at first assessment; and
- The [full Rockall score](#) after endoscopy.

The Blatchford risk assessment is designed to be used pre-endoscopy (see the full NICE Guideline for details)<sup>[2]</sup>. Scores are added using the level of urea, haemoglobin, systolic blood pressure, pulse rate, presentation with melaena, presentation with syncope, hepatic disease and cardiac failure. A score of 0 is the cut-off with any patient scoring >0 being at risk of requiring an intervention.

### **Rockall Numerical Risk Scoring System<sup>[14]</sup>**

The [Rockall numerical risk scoring system](#) can be used in those that clinically have an upper GI bleed but have not had an endoscopy yet. It can help stratify which patients need endoscopy and intensive care. It is less accurate at predicting those that may be suitable for outpatient care.

### **Management of non-variceal bleeding<sup>[2]</sup>**



Endoscopy is now the method of choice for controlling active peptic ulcer-related UGIB<sup>[15]</sup>. Endoscopic therapy should only be delivered to actively bleeding lesions, non-bleeding visible vessels and, when technically possible, to ulcers with an adherent blood clot. Black or red spots or a clean ulcer base with oozing do not merit endoscopic intervention since these lesions have an excellent prognosis without intervention<sup>[16]</sup>.

Adrenaline (epinephrine) should not be used as monotherapy for the endoscopic treatment of non-variceal UGIB. For the endoscopic treatment of non-variceal UGIB, one of the following should be used:

- A mechanical method (eg, clips) with or without adrenaline (epinephrine).
- Thermal coagulation with adrenaline (epinephrine).
- Fibrin or thrombin with adrenaline (epinephrine).
- Interventional radiology – should be offered to unstable patients who re-bleed after endoscopic treatment. Refer urgently for surgery if interventional radiology is not immediately available.

Acid-suppression drugs (PPIs or H<sub>2</sub>-receptor antagonists) should not be offered before endoscopy to patients with suspected non-variceal UGIB. PPIs should be offered to patients with non-variceal UGIB and stigmata of recent haemorrhage shown at endoscopy.

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### **Treatment after first or failed endoscopic treatment<sup>[2]</sup>**

- Repeat endoscopy, with treatment as appropriate, should be considered for all patients at high risk of re-bleeding, particularly if there is doubt about adequate haemostasis at the first endoscopy.
- A repeat endoscopy should be offered to patients who re-bleed, with a view to further endoscopic treatment or emergency surgery.
- Interventional radiology should be used for unstable patients who re-bleed after endoscopic treatment. Percutaneous angiography may be used to localise the bleeding point and embolisation of the artery using foam and coils to stop bleeding. The benefits of embolisation have to be balanced against the risk of causing ischaemic necrosis of the gastrointestinal tract.

- Refer urgently for surgery if interventional radiology is not immediately available.

## **Management of variceal bleeding**<sup>[2]</sup> <sup>[17]</sup>

- Terlipressin should be offered to patients with suspected variceal bleeding at presentation. Treatment should be stopped after definitive haemostasis has been achieved, or after five days, unless there is another indication for its use.
- Prophylactic antibiotic therapy should be offered at presentation to patients with suspected or confirmed variceal bleeding.
- Balloon tamponade should be considered as a temporary salvage treatment for uncontrolled variceal haemorrhage – eg, Sengstaken-Blakemore tube.
- Oesophageal varices:
  - Band ligation should be used for patients with UGIB from oesophageal varices.
  - NICE recommends that there is sufficient evidence to show that stent insertion is effective for selected patients with oesophageal varices in whom other methods of treatment have failed to control bleeding<sup>[18]</sup> .
  - Transjugular intrahepatic portosystemic shunts (TIPS) should be considered if bleeding from oesophageal varices is not controlled by band ligation.
- Gastric varices:
  - Endoscopic injection of N-butyl-2-cyanoacrylate should be offered to patients with UGIB from gastric varices.
  - TIPS should be offered if bleeding from gastric varices is not controlled by endoscopic injection of N-butyl-2-cyanoacrylate.

## **Control of bleeding and prevention of re-bleeding in patients on NSAIDs, aspirin or clopidogrel**<sup>[2]</sup>

- Continue low-dose aspirin for secondary prevention of vascular events in patients with UGIB in whom haemostasis has been achieved.
- Other NSAIDs (including cyclo-oxygenase 2 (COX-2) inhibitors) should be stopped during the acute phase in patients presenting with UGIB.
- Discuss the risks and benefits of continuing clopidogrel (or any other thienopyridine antiplatelet agents) in patients with UGIB with the appropriate specialist (eg, a cardiologist or a stroke specialist) and with the patient.

### **Surgical intervention**

Surgical intervention is required when endoscopic techniques fail or are contra-indicated. Clinical judgement is required and consideration given to local expertise.

- In general, it is recommended:
  - To inform surgeons early of the possibility of surgery.
  - To use the most experienced personnel available.
  - To avoid operations in the middle of the night.
- The particular procedure required depends on a number of factors, not least the site of bleeding. Gastric ulcers are probably best excised. There are few studies comparing the different techniques.

### **Medical management post-endoscopy**<sup>[2]</sup>

***Helicobacter pylori* eradication** - see the separate [Helicobacter Pylori](#) article:

- All patients with a bleeding peptic ulcer should be tested for *H. pylori* - eg, urea breath test or biopsy specimen.
- Patients who test positive should receive a one-week course of eradication therapy.
- This should be followed by three further weeks with ulcer healing treatment.

- All therapy can be discontinued after successful healing of peptic ulcers provided patients are not taking NSAIDs.
- A negative urea breath test should be confirmed on the initial biopsy specimen taken prior to diagnosis and before any PPI therapy was given.
- Two weeks after successful therapy and stopping of all medication, a repeat urea breath test should be performed to confirm successful eradication.
- Unsuccessful eradication should be treated with second-line therapy.

### **Other points to note**

- PPI use is not recommended prior to diagnosis by endoscopy in the latest NICE guidance.
- There is insufficient evidence to use somatostatin or tranexamic acid routinely in UGIB.
- Patients with a UGIB might need to be admitted to a high-dependency unit or intensive care unit. This decision should be clinical and used in conjunction with the Rockall Score.
- Some hospitals have beds specifically for patients with UGIB. Evidence suggests that patients with UGIB should be assessed and managed in dedicated units, as their outcome is improved. Emergency endoscopy should be available 24 hours a day in such units<sup>[17]</sup>.
- Note that patients with liver disease are a special case and have separate guidelines for management.

### **Continuing other medication**<sup>[2]</sup>

- Discuss the risks and benefits of stopping antiplatelet drugs and anticoagulants with the appropriate specialist (eg, stroke physician or cardiologist).
- NSAIDs (including COX-2 inhibitors) should be stopped during the acute phase of bleeding.

- Selective serotonin reuptake inhibitors (SSRIs) should be used with caution in patients at risk of UGIB or who have had a previous UGIB (especially if other drugs such as aspirin or NSAIDs are used).
- Corticosteroids will also need to be used carefully and probably with concomitant PPI in high-risk patients or those on high doses.

## Complications

The complications of UGIB are self-evident. Other complications can arise from treatments administered - for example:

- Endoscopy:
  - [Aspiration pneumonia](#).
  - Perforation.
  - Complications from coagulation, laser treatments.
- Surgery:
  - [Ileus](#).
  - [Sepsis](#).
  - Wound problems.
- Salvage surgery for patients who continue to bleed is associated with a high mortality.

## Prognosis

Elderly patients and people with chronic medical conditions withstand acute UGIB less well and have a higher risk of death<sup>[2]</sup>. Mortality is about 7% in patients admitted with a UGIB. It is as high as 26% in patients who develop bleeding whilst in hospital having been admitted for another cause<sup>[3]</sup>. A score of less than 3 using the Rockall Score system above is associated with an excellent prognosis, whereas a score of 8 or above is associated with high mortality<sup>[14]</sup>.

Factors which affect the risk of death include:

- Age: deaths under age 40 years are rare. Prognosis is worse with advancing age.
- Comorbidity: complications are more likely with comorbid disease.
- Shock: the presence of signs of shock at presentation confers a worse prognosis.
- Prognosis is also worse with liver disease, being an inpatient, continued bleeding after presentation, haematemesis, haematochezia and elevated blood urea .
- Endoscopic findings: much work has been done on classifying and identifying endoscopic findings which correlate with high risk - for example:
  - Mallory-Weiss tears or clean ulcers have a low risk of re-bleeding and death.
  - Active bleeding in a shocked patient carries an 80% risk of re-bleeding or death.
  - Non-bleeding but visible vessel has a 50% risk of re-bleeding.

Mortality is reported to be lower in specialist units, possibly because of adherence to protocols rather than because of technical advances. The prognosis in liver disease relates significantly to the severity of the liver disease rather than to the magnitude of the haemorrhage.

## Prevention

- The most important factor to consider is treatment for *H. pylori* infection. Eradication of *H. pylori* reduces the risk of both recurrent ulcers and recurrent haemorrhage.

- Primary prophylaxis for acutely ill patients in critical care<sup>[2]</sup> :
  - Acid-suppression therapy (H<sub>2</sub>-receptor antagonists or PPIs) should be offered for primary prevention of UGIB in acutely ill patients admitted to critical care (using the oral form of the drug if possible).
  - The ongoing need for acid-suppression drugs for primary prevention of UGIB in acutely ill patients should be reviewed when they recover or are discharged from critical care.

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## Further reading

- [Kanno T, Yuan Y, Tse F, et al](#); Proton pump inhibitor treatment initiated prior to endoscopic diagnosis in upper gastrointestinal bleeding. Cochrane Database Syst Rev. 2022 Jan 7;1:CD005415. doi: 10.1002/14651858.CD005415.pub4.

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