

Management of bleeding peptic ulcer

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INTRODUCTION

- Upper gastrointestinal (UGI) bleeding secondary to peptic ulcer disease is a common medical condition that results in high patient morbidity and medical care costs.
- While the majority of patients with bleeding peptic ulcers will stop bleeding spontaneously and not rebleed during hospitalization,
- A subgroup of patients is at high-risk for recurrent hemorrhage and requires endoscopic therapy to decrease this risk .
- If endoscopic therapy fails, interventional angiography or surgery may be required.
- Mortality rates have not improved

APPROACH TO THE PATIENT

- Assessing hemodynamic stability and determining the need for fluid resuscitation and/or blood transfusion.
- Intravenous proton pump inhibitor should be started while undergoing their initial evaluation.
- Once the patient is stabilized, endoscopy is performed to diagnose high-risk lesions
- Ulcers that are actively bleeding and most non bleeding ulcers that are at high-risk for recurrent bleeding based upon the presence of stigmata of recent hemorrhage require endoscopic therapy.
- Ulcers that lack high-risk stigmata can be managed acutely with acid suppression alone

Acute management of severe upper gastrointestinal bleeding

1. Resuscitation and stabilization, initiation of medical therapy with an intravenous proton pump inhibitor

2. Assessment of onset and severity of bleeding

3. Risk stratification using validated prognostic scale

4. Diagnostic endoscopy

Preparation for emergent upper endoscopy

Localization and identification of the bleeding site

Identification of stigmata of recent hemorrhage

Stratification of the risk for rebleeding

4. Therapeutic endoscopy

Control of active bleeding or high-risk lesions

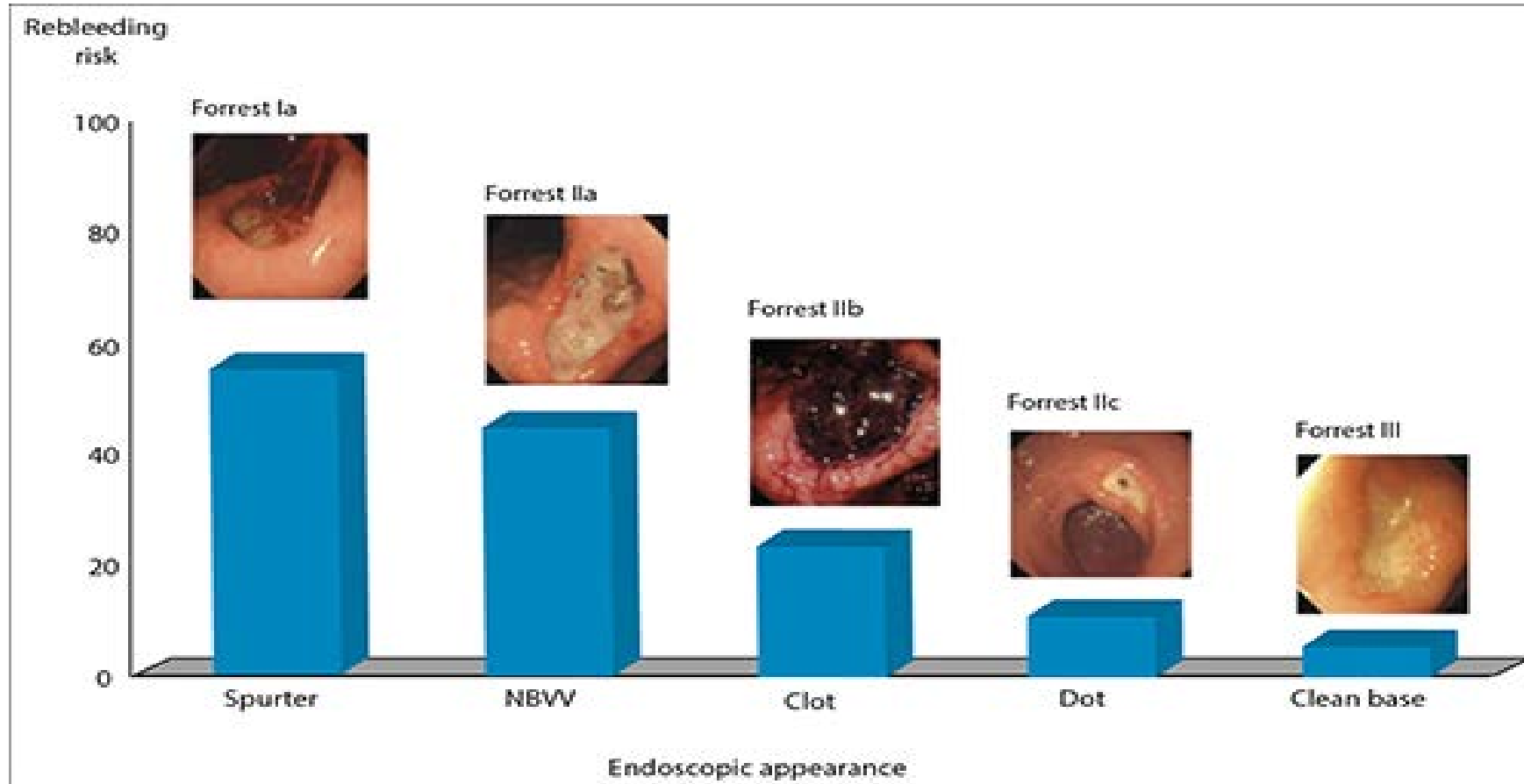
Minimization of treatment-related complications

Treatment of persistent or recurrent bleeding

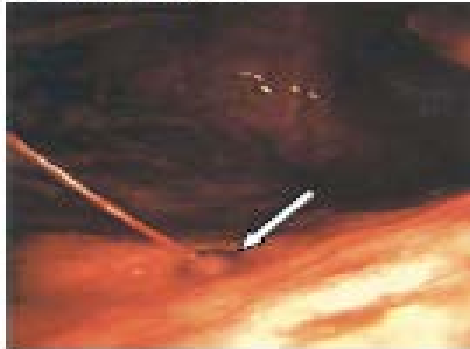
Stigmata of recent hemorrhage

- Stigmata of recent hemorrhage are present if anything other than a clean ulcer base is seen. However, only patients with active bleeding (spurting or oozing), a non bleeding visible vessel, or an adherent clot are generally considered to be at high-risk for recurrent bleeding.
- Most patients with high-risk stigmata require endoscopic therapy to decrease the risk of recurrent bleeding. On the other hand, patients without these high-risk stigmata are considered low-risk and do not require endoscopic therapy

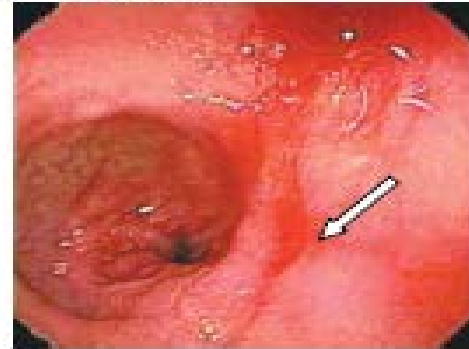
Forrest classification



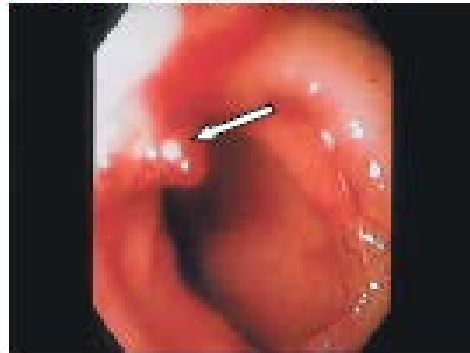
A Spurting Blood



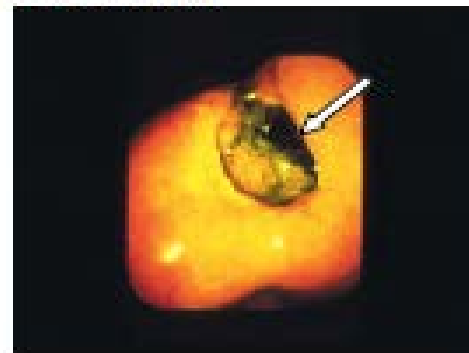
B Oozing Blood



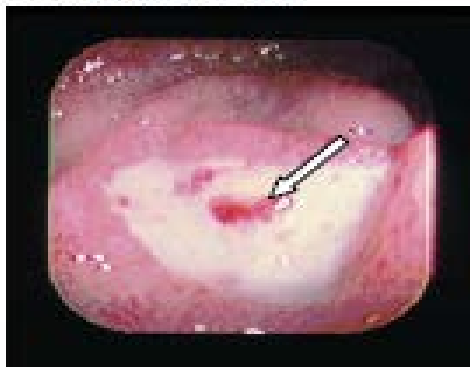
C Nonbleeding Visible Vessel



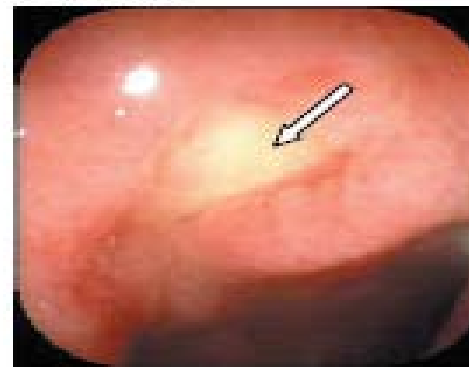
D Adherent Clot



E Flat, Pigmented Spot



F Clean Base



Endoscopic predictors of recurrent peptic ulcer hemorrhage

Endoscopic stigmata of recent hemorrhage	Prevalence, percent	Risk of rebleeding on medical management, percent
Active arterial bleeding (Forrest Ia)	10	90
Oozing without visible vessel (Forrest Ib)	10	10 to 20
Non-bleeding visible vessel (Forrest IIa)	25	50
Adherent clot (Forrest IIb)	10	25 to 30
Flat spot (Forrest IIc)	10	7 to 10
Clean ulcer base (Forrest III)	35	3 to 5

INPATIENT VERSUS OUTPATIENT MANAGEMENT

- Hospitalization is required for patients at
 - high-risk for recurrent bleeding,
 - evidence of severe upper gastrointestinal (UGI) bleeding (hemodynamic instability, blood transfusion requirement),
 - patients at increased risk for complications should bleeding recur (eg, significant coronary artery or cerebrovascular disease, age over 65 years, patients taking antiplatelet or anticoagulant medications).
- Patients who are otherwise healthy
- low risk for recurrent UGI bleeding may be safely allowed to eat and discharged from the hospital on oral antisecretory therapy once the effects of procedural sedation have worn off, provided that the patient is reliable and can promptly get medical care should bleeding recur.

Risk stratification scores

- Differentiate patients who require hospitalization from those who are appropriate for outpatient management.
- Rockall score
- Blatchford score
- AIMS65 score.

Table 2

Rockall score for the prognostication of upper gastrointestinal bleeding ³

	Score			
	0	1	2	3
Pre-upper gastrointestinal endoscopy				
Age	<60 years	60–79 years	≥80 years	
Shock	<i>No shock</i> BP >100 mmHg and pulse <100	<i>Tachycardia</i> BP >100 mmHg and pulse >100		<i>Hypotension</i> BP <100 mmHg
Comorbidity	No major comorbidity		Ischaemic heart disease, cardiac failure, any major comorbidity	Renal or liver failure Disseminated malignancy
Post-upper gastrointestinal endoscopy				
Diagnosis	Mallory-Weiss or no lesion found, and no major stigmata of recent haemorrhage		All other diagnoses	Gastrointestinal malignancy
Major stigmata of recent haemorrhage	None or dark spot only		Blood in upper gastrointestinal tract, non-bleeding visible vessel, spurting vessel or adherent clot	

BP = systolic blood pressure

Patients with a score of 0, 1 or 2 have a lower risk of haemorrhage, whereas approximately 50% of patients with a post-endoscopy score of 3 or more will re-bleed.

B Rockall Score

		Variable	Points
Complete Rockall Score	Clinical Rockall Score	Age	
		<60 yr	0
		60–79 yr	1
		≥80 yr	2
		Shock	
		Heart rate >100 beats/min	1
		Systolic blood pressure <100 mm Hg	2
		Coexisting illness	
		Ischemic heart disease, congestive heart failure, other major illness	2
		Renal failure, hepatic failure, metastatic cancer	3
		Endoscopic diagnosis	
		No lesion observed, Mallory–Weiss tear	0
		Peptic ulcer, erosive disease, esophagitis	1
		Cancer of upper GI tract	2
		Endoscopic stigmata of recent hemorrhage	
Clean base ulcer, flat pigmented spot	0		
Blood in upper GI tract, active bleeding, visible vessel, clot	2		

Blatchford Score

A Blatchford Score

At Presentation	Points
Systolic blood pressure	
100–109 mm Hg	1
90–99 mm Hg	2
<90 mm Hg	3
Blood urea nitrogen	
6.5–7.9 mmol/liter	2
8.0–9.9 mmol/liter	3
10.0–24.9 mmol/liter	4
≥25 mmol/liter	6
Hemoglobin for men	
12.0–12.9 g/dl	1
10.0–11.9 g/dl	3
<10.0 g/dl	6
Hemoglobin for women	
10.0–11.9 g/dl	1
<10.0 g/dl	6
Other variables at presentation	
Pulse ≥100	1
Melena	1
Syncope	2
Hepatic disease	2
Cardiac failure	2

PHARMACOLOGIC THERAPY

- All patients with bleeding peptic ulcers should receive acid suppressive treatment with a proton pump inhibitor.
- In general, a high-dose intravenous (IV) proton pump inhibitor (PPI) should be initiated in all patients with suspected clinically significant upper gastrointestinal bleeding prior to endoscopy as part of their initial management.

Acid suppression

- Treatment with PPIs leads to elevation of gastric pH levels, which stabilizes blood clots and improves clinical outcomes .
- PPIs are recommended for all patients with peptic ulcer bleeding.
- Prior to endoscopy, patients are typically started on a continuous infusion of an intravenous PPI.
- Twice daily dosing of an oral proton pump inhibitor may be a reasonable alternative if intravenous formulations are not available.

- The suggested dose of IV omeprazole, [pantoprazole](#), or [esomeprazole](#) is a bolus of 80 mg followed by a continuous infusion at a rate of 8 mg per hour.
- In patients with high-risk stigmata of recent hemorrhage, the IV PPI may be switched to a standard-dose PPI (eg, [omeprazole](#) 20 mg daily) 72 hours after endoscopy, provided there is no evidence of recurrent bleeding.
- It is unlikely that an IV PPI would be of significant benefit in patients who do not have active bleeding or other high-risk stigmata (such as a visible vessel or adherent clots) because their risk of recurrent bleeding is low. Such patients may be switched to a standard dose oral PPI immediately following endoscopy.

H2 receptor antagonists (H2RAs)

- Studies of H2 receptor antagonists (H2RAs) in bleeding peptic ulcers have produced mixed but generally disappointing results
- A meta-analysis concluded that there was a possible minor benefit with IV H2RAs in bleeding gastric ulcers but no benefit with duodenal ulcers
- The improved efficacy seen with PPIs may be due to their superior ability to maintain a gastric pH at a level above 6.0.

Efficacy of proton pump inhibitors

- A meta-analysis of 21 randomized trials that compared PPIs with either placebo or an H2RA for bleeding ulcers (with or without endoscopic therapy)
- significant and consistent reduction in the risk of recurrent bleeding (OR 0.46, 95% CI 0.33-0.64) and the need for surgery (OR 0.59, 95% CI 0.46-0.76) with PPIs .
- However, there was no effect on mortality.

High-dose versus non-high-dose PPIs

- PPIs given for the treatment of bleeding peptic ulcers are often given as high-dose continuous infusions (eg, [omeprazole](#) or [pantoprazole](#) 80 mg bolus followed by 8 mg per hour).
- However, studies comparing high-dose with non-high-dose PPIs have failed to show a difference in clinically relevant endpoints.

Oral versus intravenous dosing

- Oral dosing of PPIs is less expensive than IV dosing, and some studies suggest it may be an option for the treatment of patients with peptic ulcer bleeding .
- However, where available, IV dosing is currently considered standard of care.
- If oral dosing is being considered, a high-dose of an oral PPI should probably be used (eg, [omeprazole](#), [pantoprazole](#), or [esomeprazole](#) 40 mg twice per day).

Somatostatin and octreotide

- Somatostatin and its long-acting analogue [octreotide](#) (commonly used in the management of variceal bleeding) have a theoretical benefit in bleeding ulcer disease because they reduce splanchnic blood flow, inhibit gastric acid secretion, and may have gastric cytoprotective effects .
- A clinical benefit has been described in ulcer bleeding, but because of the effectiveness of endoscopic therapy, its role is generally limited to settings in which endoscopy is unavailable or as a means to help stabilize patients before definitive therapy can be performed.

- A meta-analysis of these trials suggested that somatostatin was associated with a reduced risk of continued bleeding (relative risk 0.53; 95% CI, 0.43 to 0.63)
- The risk also appeared to be reduced with [octreotide](#), although there were fewer studies. Thus, somatostatin or octreotide can be used as adjunctive therapy before endoscopy, or when endoscopy is unsuccessful, contraindicated, or unavailable
- The doses used in the above studies were variable; a typical dose of somatostatin was 250 mcg given as a bolus followed by an infusion of 250 mcg per hour for three to seven days, while a typical dose of octreotide was 50 to 100 mcg given as a bolus followed by an infusion of 25 mcg per hour for up to three days.
- The dose of octreotide used is lower than that used for variceal bleeding (50 mcg bolus followed by an infusion of 50 mcg per hour), so if there is concern prior to the endoscopy that the bleed could be due to varices, the higher dose of octreotide should be used.

Prokinetic agents

- Prokinetic agents such erythromycin 3 mg/kg intravenously over 20 to 30 minutes may be given 30 to 90 minutes prior to endoscopy to aid with endoscopic visualization.

ENDOSCOPIC THERAPY

- Endoscopic therapy is indicated for the treatment of most ulcers with stigmata of recent hemorrhage that increase the risk of recurrent bleeding.
- With appropriate treatment, high-risk lesions have recurrent bleeding rates of 5 to 20 percent, depending upon the endoscopic appearance of the ulcer.
- On the other hand, ulcers with a clean base or a flat pigmented spot are at low risk of recurrent bleeding (3 to 5 percent for clean-based ulcers and 7 to 10 percent for ulcers with a flat spot) and should not be treated endoscopically.

- Adherent clots that are not easily removed endoscopically (eg, with irrigation or gentle suctioning of the clot away from the ulcer crater to reveal the underlying stigmata) carry a 20 to 30 percent risk of recurrent bleeding.
- A traditional dictum has been to leave these clots in situ and manage patients medically.
- More recent experience suggests that removing the clot (eg, using a cold guillotine technique with a polypectomy snare) and then treating the underlying ulcer stigmata can significantly reduce the risk of recurrent bleeding.

Choice of endoscopic treatment

- Several types of endoscopic treatment for bleeding peptic ulcers have been described, including injection therapy, thermal coagulation, hemostatic clips, fibrin sealant (or glue), argon plasma coagulation, and combination therapy (typically injection of epinephrine combined with another treatment modality)
- Currently, most patients are treated with either thermal coagulation therapy or hemostatic clips, with or without the addition of injection therapy.
- This approach is based upon results from meta-analyses of randomized trials comparing different forms of treatment to control bleeding .

- Compared with epinephrine monotherapy, the risk of further bleeding is significantly lower with other monotherapies, such as thermal coagulation (relative risk [RR] 0.6) or epinephrine followed by another modality (RR 0.3).
- Hemoclips are more effective than epinephrine alone for preventing recurrent bleeding (RR 0.2) but were not different than other endoscopic therapies.
- The efficacy of endoscopic therapies for adherent clots was uncertain.
- The choice between hemoclips and thermal therapy will often depend upon factors such as the location of the ulcer and the preference of the endoscopist.
- **Standard approaches** — Standard approaches to treatment include thermal coagulation and hemoclip placement. In addition, both of these modalities can be combined with injection therapy, an approach known as combination therapy

Injection therapy

- Injection therapy should be used in conjunction with other forms of therapy, such as thermal coagulation or hemoclip placement.
- Injection therapy should not be used as monotherapy because it is associated with higher rates of recurrent bleeding than treatment with thermal coagulation, hemoclip placement, or combination therapy .
- Injection therapy with dilute epinephrine results in local tamponade and vasospasm .
- The technique is inexpensive and effective for temporary hemostasis .
- Epinephrine diluted with saline to 1:10,000 to 1:20,000 is injected in 0.5 to 2.0 mL aliquots in four quadrants within 3 mm of the bleeding site.
- In patients who are at increased risk of having an adverse event with epinephrine injection, such as those with significant cardiac disease or those with lesions close to the esophagogastric junction (epinephrine injected into this area may enter the systemic circulation without a first pass through the liver), a dilution of 1:100,000 can be used.

Thermal coagulation

- Thermal coagulation with contact probes achieves acute hemostasis and prevents recurrent bleeding by **coaptive coagulation** of the underlying artery in the ulcer base .
- Coaptive coagulation involves applying pressure to the vessel with the probe to compress it while coagulation is performed. This results in sealing (coaptation) of vessel.
- An alternate form of thermal coagulation uses argon plasma coagulation (APC). This approach has a theoretical disadvantage for the treatment of bleeding ulcers since it is not coaptive.

Hemoclips

- The endoscopic application of hemoclips is an alternative to thermal coagulation.
- Once applied, the clips achieve hemostasis in a manner similar to surgical ligation.
- Placement of a hemoclip can be of value even if an ulcer is not amenable to endoscopic therapy, since it may serve as a radiopaque marker for subsequent interventional angiographic or surgical intervention.

Alternative approaches

- Fibrin sealant
- Hemostatic nanopowder
- Cyanoacrylate injection

Second-look endoscopy

- Second-look endoscopy refers to the practice of performing a planned follow-up endoscopy, generally within 24 hours of the initial endoscopy.
- If there is active bleeding or a nonbleeding visible vessel, endoscopic therapy is performed. Data are conflicting regarding the benefits of second-look endoscopy, and in general, guidelines and reviews do not recommend it.
- The 2010 International Consensus Recommendations for the management of patients with nonvariceal upper gastrointestinal bleeding do not recommend routine use of second-look endoscopy . However, the guidelines also suggest that patients at particularly high risk for recurrent bleeding may benefit from second-look endoscopy.

- Situations that might warrant a second-look endoscopy include:
 - If visualization during the initial endoscopy was limited by blood or debris
 - If there is concern on the part of the endoscopist that the prior endoscopic therapy was sub-optimal
 - In addition, repeat endoscopy is indicated if there is recurrent bleeding in order to exclude previously missed lesions and/or to retreat the bleeding ulcer.

Treatment related complications

- Complications can arise prior to, during, or after emergency endoscopy.
- Complications of endoscopic therapy include perforation and precipitation (or worsening) of bleeding.
- In addition, epinephrine can cause tachycardia and arrhythmias.
- Aggressive initial treatment or repeated applications of thermal or injection therapy may improve hemostasis, but also increase the risk of treatment-induced complications.

TREATMENT OF PERSISTENT AND RECURRENT BLEEDING

- Although the majority of bleeding ulcers can be controlled endoscopically, some patients have persistent or recurrent bleeding.
- **Persistent bleeding** refers to active bleeding that does not stop despite endoscopic therapy or bleeding that develops during endoscopic therapy of a nonbleeding lesion that cannot be controlled endoscopically.
- **Recurrent bleeding** refers to bleeding that occurs following spontaneous hemostasis or after successful endoscopic hemostasis.

Recurrent bleeding

- Hematemesis or bloody nasogastric aspirate more than 6 hours after endoscopy
- Melena after normalization of stool color
- Hematochezia after normalization of stool color or after melena
- Development of tachycardia (heart rate ≥ 110 beats per minute) or hypotension (systolic blood pressure ≤ 90 mmHg) after at least one hour of hemodynamic stability (ie, no tachycardia or hypotension) in the absence of an alternative explanation for hemodynamic instability, such as sepsis, cardiogenic shock, or medications (of note, many endoscopists, ourselves included, consider tachycardia to be present if the heart rate is greater than 100 beats per minute)

- Hemoglobin drop of 2 g/dL or more after two consecutive stable hemoglobin values (less than a 0.5 g/dL decrease) obtained at least three hours apart
- Tachycardia or hypotension that does not resolve within eight hours after index endoscopy despite appropriate resuscitation (in the absence of an alternative explanation), associated with persistent melena or hematochezia
- Persistently dropping hemoglobin of more than 3 g/dL in 24 hours, associated with persistent melena or hematochezia

- Patients with one episode of recurrent bleeding following initially successful endoscopic therapy are typically treated with a second attempt at endoscopic therapy.
- Therapy may consist of the same therapy initially used or a different endoscopic modality (eg, if thermocoagulation therapy was used initially it may either be repeated or treatment with a hemostatic clip employed).
- Surgery or angiography-guided intervention is indicated for patients who fail endoscopic therapy (persistent bleeding or recurrent bleeding after two therapeutic endoscopies)

Risk factors for persistent or recurrent bleeding

- Ulcer location
 - the patient's presentation
 - the appearance of the ulcer at the time of endoscopy
 - size of the ulcer
 - presence of comorbid illnesses.
-
- A meta-analysis of 10 studies found that predictors of recurrent bleeding included active bleeding at endoscopy, large ulcers (>1 to 2 cm), posterior duodenal ulcers, and gastric ulcers on the lesser curvature.
 - End-stage renal disease may also increase the risk of recurrent bleeding.

Current indications for surgery for peptic ulcer hemorrhage

- 1 Hemodynamic instability despite vigorous resuscitation (>4-units or >6-units taking into consideration the patient's age, with more transfusion tolerated for the younger person)
- 2 Failure of endoscopic techniques to arrest hemorrhage
- 3 Recurrent hemorrhage after initial stabilization (with up to two attempts at obtaining endoscopic hemostasis)
- 4 Shock associated with recurrent hemorrhage
- 5 Continued slow bleeding with a transfusion requirement exceeding 3 units per day

Surgery

- Traditionally, surgery was required for patients who **failed endoscopic therapy**, though depending upon local resources and expertise, many patients now undergo an attempt at interventional angiography prior to surgery.
- Surgical treatments for peptic ulcer disease include oversewing of the artery with truncal vagotomy and pyloroplasty, antrectomy with gastrojejunostomy (Billroth II procedure), and highly selective vagotomy.
- Emergency surgery for bleeding peptic ulcer disease involves oversewing of the ulcer (to ligate the bleeding artery) plus truncal vagotomy (to decrease acid secretion) and pyloroplasty (for gastric drainage).
- More time consuming procedures, such as highly selective vagotomy, can be performed either at standard laparotomy or laparoscopically for non-emergency ulcer surgery

Other indications for surgery for peptic ulcer hemorrhage include:

- Hemodynamic instability despite vigorous resuscitation (more than a three unit transfusion)
- Shock associated with recurrent hemorrhage
- Perforation

- Secondary or relative indications include rare blood type, difficult cross match, refusal of transfusion, shock on presentation, advanced age, severe comorbid disease, and chronic gastric ulcer as the origin of hemorrhage.

- In addition, surgery may be appropriate for elderly patients who are unlikely to tolerate prolonged attempts at resuscitation, large volume transfusions, or periods of hypotension.

- If performed emergently, surgery is associated with high mortality rates (up to 36 percent) . On the other hand, early elective surgery is associated with a much lower mortality rate (0 to 7 percent). Recurrent bleeding rates following surgery vary from 3 to 23 percent

Interventional angiography

- Angiography with transarterial embolization (TAE) for persistent or recurrent peptic ulcer bleeding is a less invasive alternative to surgery. Initial success rates for patients with acute peptic ulcer bleeding are between 52 and 98 percent, with recurrent bleeding rates of 10 to 20 percent .
- Indications for interventional angiography for acute nonvariceal upper gastrointestinal bleeding :
 - Surgery and transcatheter arteriography/intervention are equally effective following failed therapeutic endoscopy, but transcatheter arteriography/ intervention should be considered particularly in patients at high risk for surgery.
 - Transcatheter arteriography/intervention is less likely to be successful in patients with impaired coagulation
 - Transcatheter arteriography/intervention is the best technique for treatment of bleeding into the biliary tree or pancreatic duct.

- Given **the less invasive nature of angiography**, we suggest that patients who have failed endoscopic therapy first undergo attempted angiography with TAE, and that surgery be reserved for those who fail angiographic therapy.
- However, surgery is a reasonable alternative
 - if an interventional radiologist with expertise in TAE is not available,
 - if the lesion is deemed unlikely to respond to angiographic therapy or
 - if the patient has underlying conditions that may complicate the ability to perform angiography or TAE (eg, renal insufficiency).

FOLLOW-UP

- All patients with bleeding peptic ulcers need to be evaluated for factors that predispose to ulcer formation (eg, *H. pylori*) and treated as appropriate. This issue and issues related to maintenance proton pump inhibitor use/discontinuation are discussed in detail elsewhere.



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- **Management of Patients with Ulcer Bleeding**

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Initial assessment and risk stratification

1. Hemodynamic status should be assessed immediately upon presentation and resuscitative measures begun as needed (Strong recommendation).

2. Blood transfusions should target hemoglobin ≥ 7 g/dl, with higher hemoglobins targeted in patients with clinical evidence of intravascular volume depletion or comorbidities, such as coronary artery disease (Conditional recommendation).

3. Risk assessment should be performed to stratify patients into higher and lower risk categories and may assist in initial decisions such as timing of endoscopy, time of discharge, and level of care (Conditional recommendation).

4. Discharge from the emergency department without inpatient endoscopy may be considered in patients with urea nitrogen < 18.2 mg/dl; hemoglobin ≥ 13.0 g/dl for men (12.0 g/dl for women), systolic blood pressure ≥ 110 mm Hg; pulse < 100 beats / min; and absence of melena, syncope, cardiac failure, and liver disease, as they have $< 1\%$ chance of requiring intervention (Conditional recommendation).

Pre-endoscopic medical therapy

5. Intravenous infusion of erythromycin (250 mg ~30 min before endoscopy) should be considered to improve diagnostic yield and decrease the need for repeat endoscopy. However, erythromycin has not consistently been shown to improve clinical outcomes (Conditional recommendation).

6. Pre-endoscopic intravenous PPI (e.g., 80 mg bolus followed by 8 mg/h infusion) may be considered to decrease the proportion of patients who have higher risk stigmata of hemorrhage at endoscopy and who receive endoscopic therapy. However, PPIs do not improve clinical outcomes such as further bleeding, surgery, or death (Conditional recommendation).

7. If endoscopy will be delayed or cannot be performed, intravenous PPI is recommended to reduce further bleeding (Conditional recommendation).

Gastric lavage

8. Nasogastric or orogastric lavage is not required in patients with UGIB for diagnosis, prognosis, visualization, or therapeutic effect (Conditional recommendation).

Timing of endoscopy

9. Patients with UGIB should generally undergo endoscopy within 24 h of admission, following resuscitative efforts to optimize hemodynamic parameters and other medical problems (Conditional recommendation).

10. In patients who are hemodynamically stable and without serious comorbidities endoscopy should be performed as soon as possible in a non-emergent setting to identify the substantial proportion of patients with low-risk endoscopic findings who can be safely discharged (Conditional recommendation).

11. In patients with higher risk clinical features (e.g., tachycardia, hypotension, bloody emesis or nasogastric aspirate in hospital) endoscopy within 12 h may be considered to potentially improve clinical outcomes (Conditional recommendation).

Endoscopic diagnosis

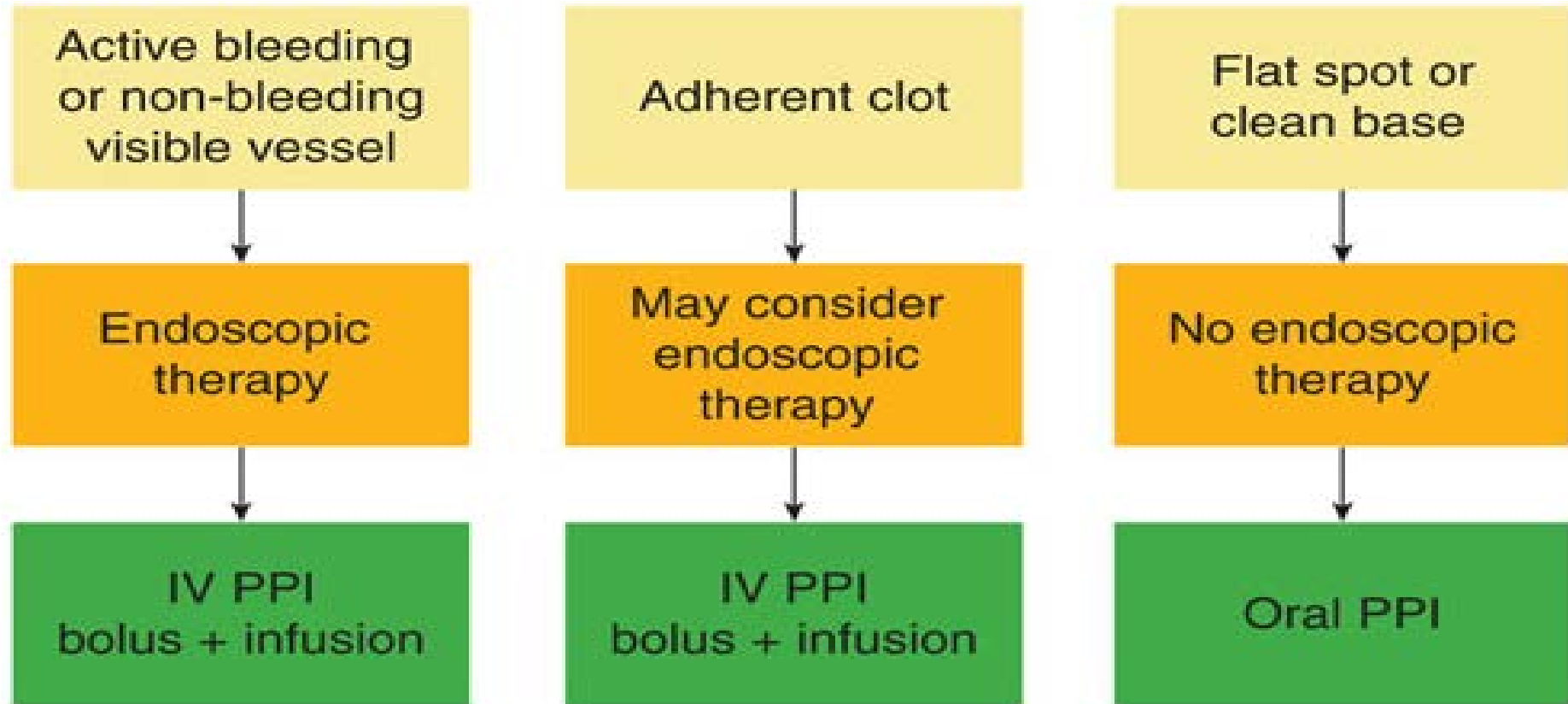
12. Stigmata of recent hemorrhage should be recorded as they predict risk of further bleeding and guide management decisions. The stigmata, in descending risk of further bleeding, are active spurting, non-bleeding visible vessel, active oozing, adherent clot, flat pigmented spot, and clean base (Strong recommendation).

Endoscopic therapy

13. Endoscopic therapy should be provided to patients with active spurting or oozing bleeding or a non-bleeding visible vessel (Strong recommendation).

14. Endoscopic therapy may be considered for patients with an adherent clot resistant to vigorous irrigation. Benefit may be greater in patients with clinical features potentially associated with a higher risk of rebleeding (e.g., older age, concurrent illness, inpatient at time bleeding began) (Conditional recommendation).

15. Endoscopic therapy should not be provided to patients who have an ulcer with a clean base or a flat pigmented spot (Strong recommendation).



Endoscopic therapy

16. Epinephrine therapy should not be used alone. If used, it should be combined with a second modality (Strong recommendation).

17. Thermal therapy with bipolar electrocoagulation or heater probe and injection of sclerosant (e.g., absolute alcohol) are recommended because they reduce further bleeding, need for surgery, and mortality (Strong recommendation).

18. Clips are recommended because they appear to decrease further bleeding and need for surgery. However, comparisons of clips vs. other therapies yield variable results and currently used clips have not been well studied (Conditional recommendation).

19. For the subset of patients with actively bleeding ulcers, thermal therapy or epinephrine plus a second modality may be preferred over clips or sclerosant alone to achieve initial hemostasis (Conditional recommendation).

Medical therapy after endoscopy

20. After successful endoscopic hemostasis, intravenous PPI therapy with 80 mg bolus followed by 8 mg/h continuous infusion for 72 h should be given to patients who have an ulcer with active bleeding, a non-bleeding visible vessel, or an adherent clot (Strong recommendation).

21. Patients with ulcers that have flat pigmented spots or clean bases can receive standard PPI therapy (e.g., oral PPI once daily) (Strong recommendation).

Repeat endoscopy

22. Routine second-look endoscopy, in which repeat endoscopy is performed 24 h after initial endoscopic hemostatic therapy, is not recommended (Conditional recommendation).

23. Repeat endoscopy should be performed in patients with clinical evidence of recurrent bleeding and hemostatic therapy should be applied in those with higher risk stigmata of hemorrhage (Strong recommendation).

24. If further bleeding occurs after a second endoscopic therapeutic session, surgery or interventional radiology with transcatheter arterial embolization is generally employed (Conditional recommendation).

Hospitalization

25. Patients with high-risk stigmata (active bleeding, visible vessels, clots) should generally be hospitalized for 3 days assuming no rebleeding and no other reason for hospitalization. They may be fed clear liquids soon after endoscopy (Conditional recommendation).

26. Patients with clean-based ulcers may receive a regular diet and be discharged after endoscopy assuming they are hemodynamically stable, their hemoglobin is stable, they have no other medical problems, and they have a residence where they can be observed by a responsible adult (Strong recommendation).

Long-term prevention of recurrent bleeding ulcers

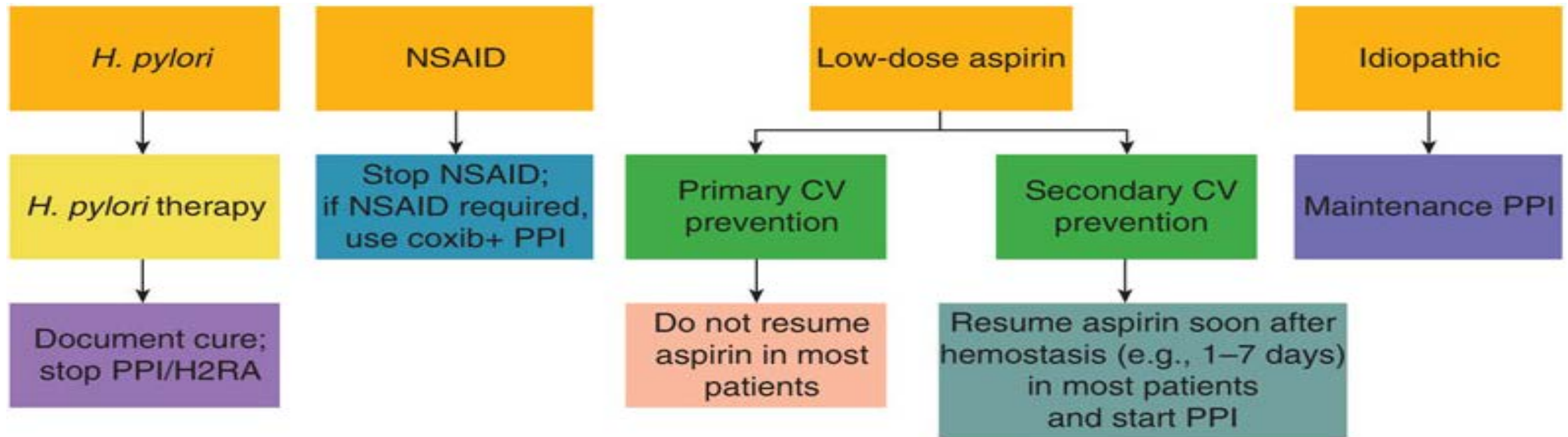
27. Patients with H. pylori-associated bleeding ulcers should receive H. pylori therapy. After documentation of eradication, maintenance antisecretory therapy is not needed unless the patient also requires NSAIDs or antithrombotics (Strong recommendation).

28. In patients with NSAID-associated bleeding ulcers, the need for NSAIDs should be carefully assessed and NSAIDs should not be resumed if possible. In patients who must resume NSAIDs, a COX-2 selective NSAID at the lowest effective dose plus daily PPI is recommended (Strong recommendation).

29. In patients with low-dose aspirin-associated bleeding ulcers, the need for aspirin should be assessed. If given for secondary prevention (i.e., established cardiovascular disease) then aspirin should be resumed as soon as possible after bleeding ceases in most patients: ideally within 1–3 days and certainly within 7 days. Long-term daily PPI therapy should also be provided. If given for primary prevention (i.e., no established cardiovascular disease), anti-platelet therapy likely should not be resumed in most patients (Conditional recommendation).

30. In patients with idiopathic (non-H. pylori, non-NSAID) ulcers, long-term antiulcer therapy (e.g., daily PPI) is recommended (Conditional recommendation).

Long-term prevention of recurrent bleeding ulcers

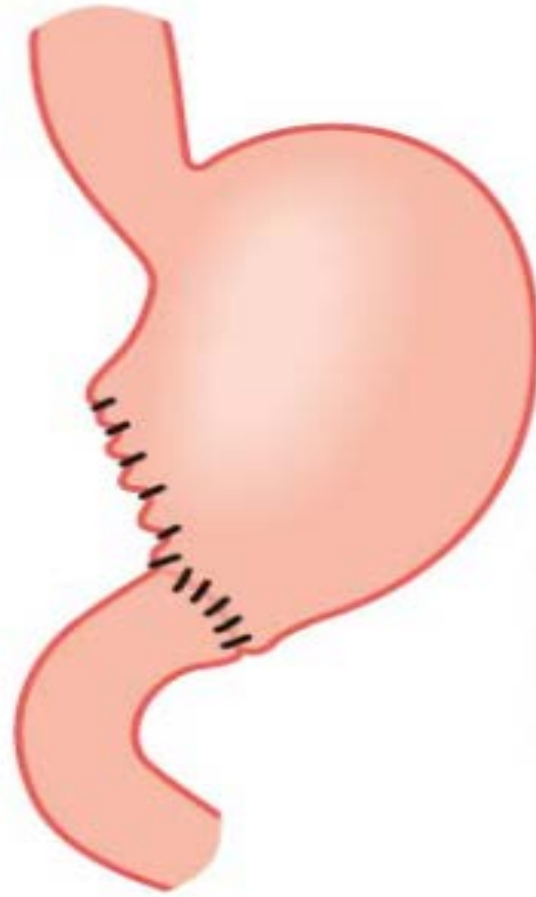


OPERATIVE APPROACH

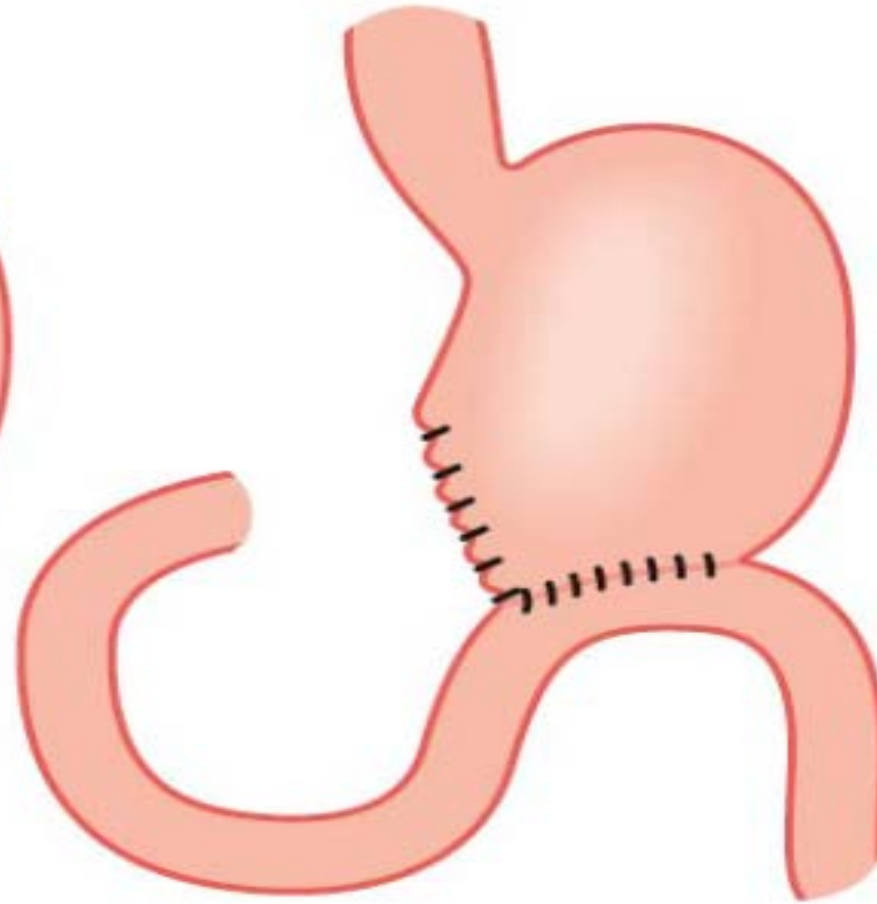
- The primary goal of any operation for a bleeding peptic ulcer is hemorrhage control.
- Classically, the secondary goal of surgery was treatment of the underlying ulcer diathesis.
- With our current understanding of the underlying causes of peptic ulcers and the advent of potent acid suppressive medications, the need for surgical reduction of acid secretion is **less clear**.
- The preferred operative approach to a peptic ulcer will depend on the location of the ulcer, and for this reason it is important for the surgeon caring for the patient to be present during upper GI endoscopy to obtain precise information on the location of the ulcer.

- **Bleeding gastric ulcers** are generally best treated by excision of the ulcer and repair of the resulting gastric defect.
- Excision or biopsy of the ulcer is important, as 4–5% of benign appearing ulcers are actually malignant ulcer.
- For ulcers along the **greater curvature** of the stomach, antrum or body of the stomach **wedge excision** of the ulcer and closure of the resulting defect can easily be achieved in most cases without causing significant deformation of the stomach.

- **Gastric ulcers along the lesser curvature** of the stomach are more problematic. Because of the rich arcade of vessels from the left gastric artery, wedge excision of these ulcers is more difficult than in other locations, and the subsequent closure of the gastric defect is much more likely to result in deformation of the stomach and either luminal obstruction or gastric volvulus of the resulting J-shaped stomach.
- For **distal gastric ulcers** along the lesser curvature in the area of the incisura angularis, **a distal gastrectomy** with either a Bilroth I or Bilroth II reconstruction is often the easiest method of excising the ulcer and restoring GI continuity.

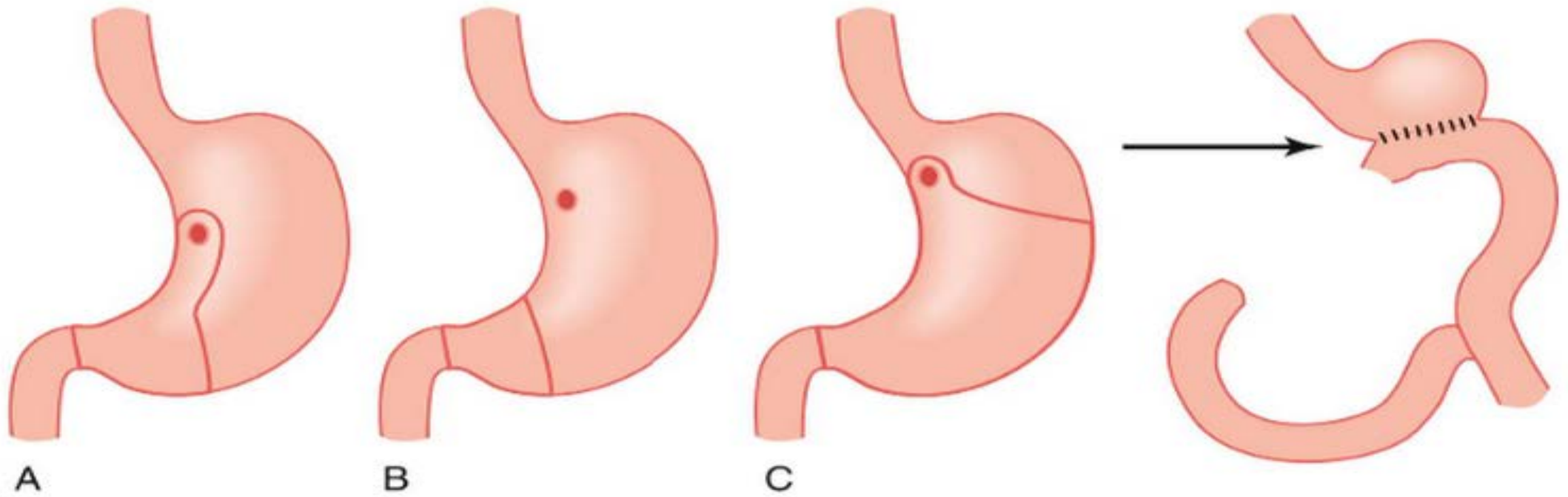


Billroth I

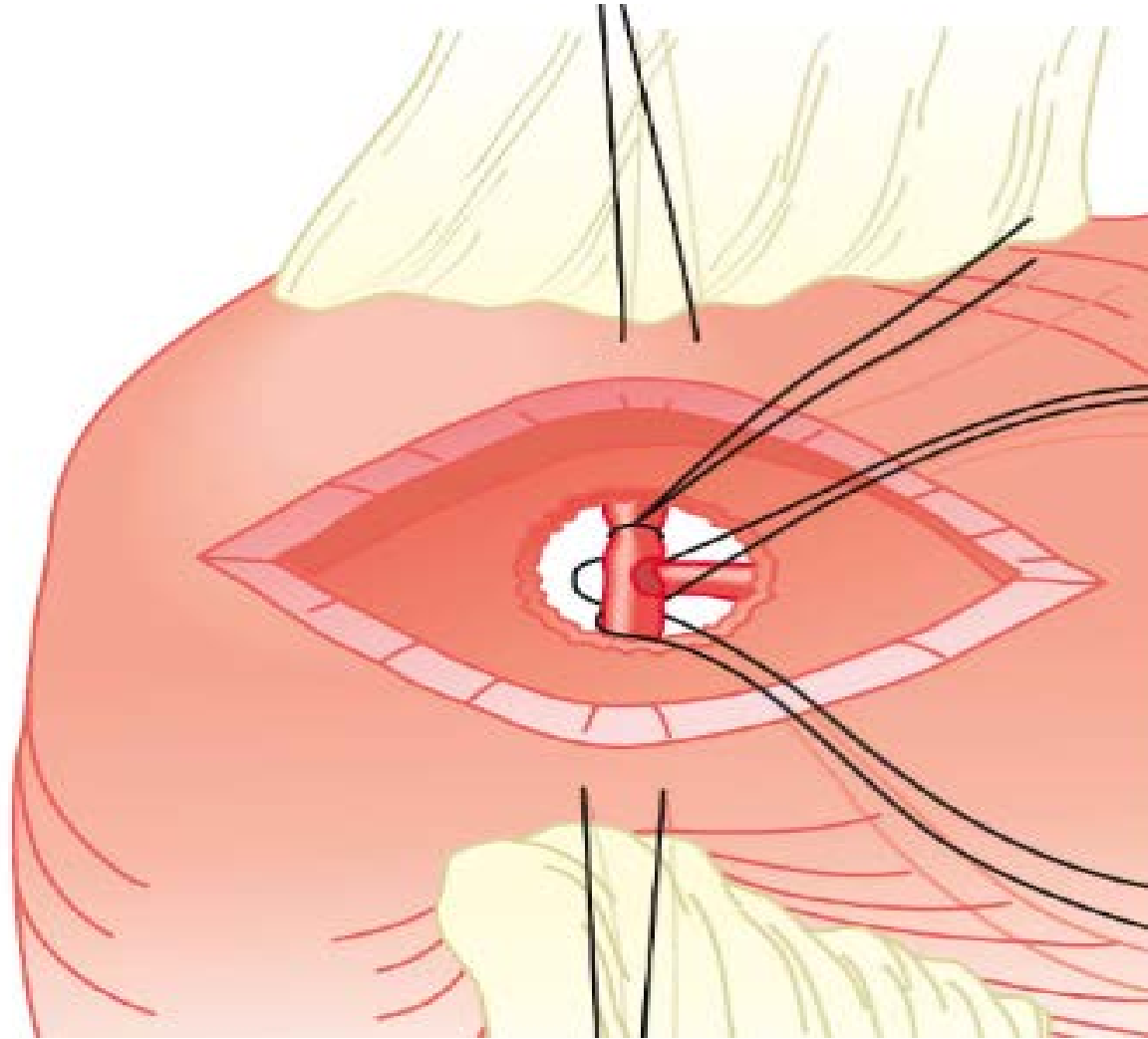


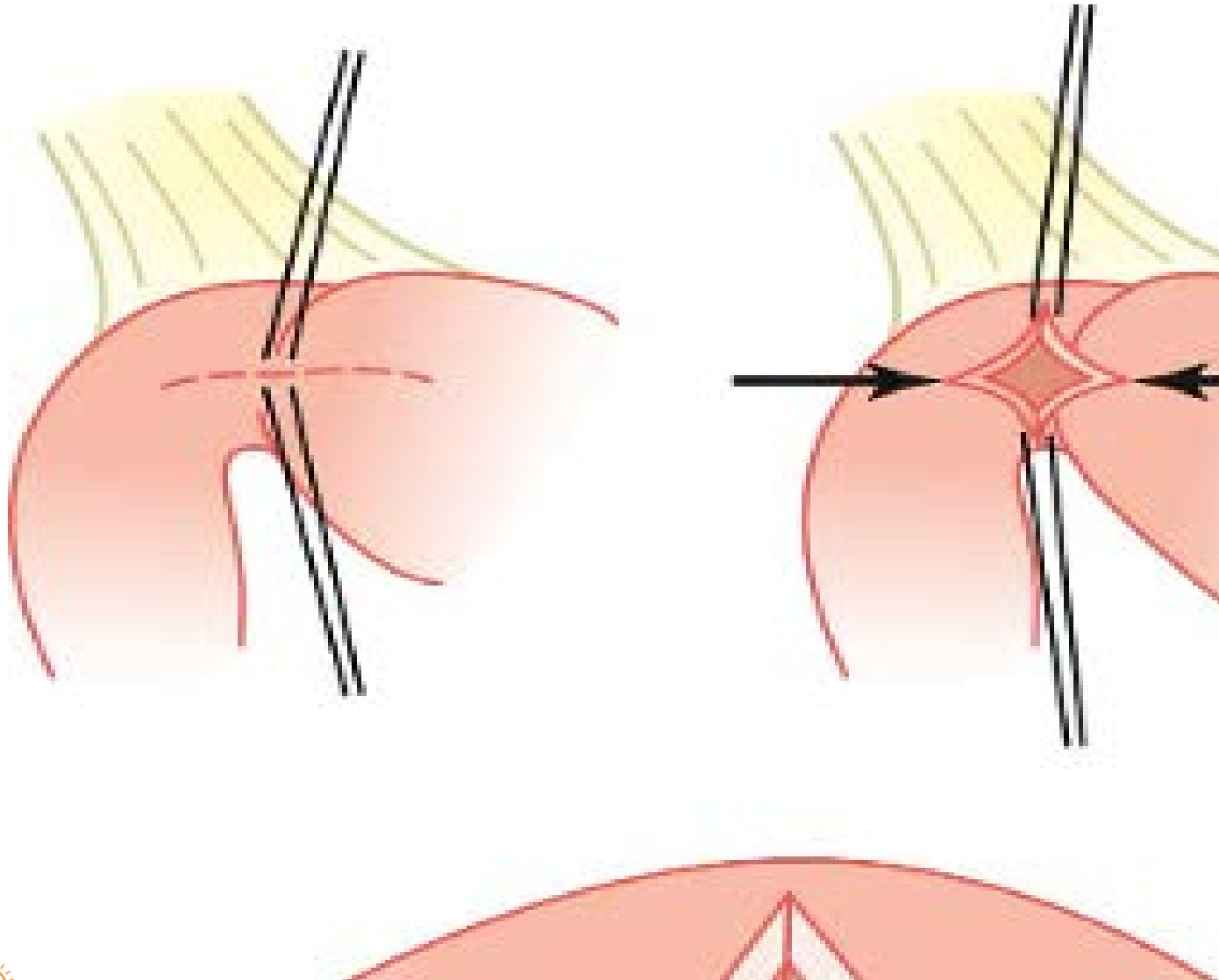
Billroth II

- A special case is **the proximal gastric ulcer** near the gastroesophageal (GE) junction.
- Wedge excision of these ulcers will often result in compromise of the GE junction and leak.
- In most patients the easiest approach is an anterior gastrotomy with biopsy and oversewing of the ulcer from inside the gastric lumen.
- With this approach it is relatively easy to avoid compromising the GE junction. In the event that ulcer excision is necessary, a **Csendes procedure**, a distal gastrectomy with tongue shaped extension of the lesser curve resection margin to include the ulcer and subsequent Roux-Y esophagogastronomy is an excellent option.



- The standard approach to a **bleeding duodenal ulcer** is to perform an anterior longitudinal duodenotomy extending across the pylorus to the distal stomach.
- The bleeding vessel, often the gastroduodenal artery is ligated in the ulcer crater by placing a figure of eight suture at the top and the bottom of the ulcer crater to control the artery proximally and distally. A third suture is placed as a U-stitch underneath the ulcer to control the transverse pancreatic branches that enter the GDA posteriorly.
- The transverse duodenal incision is then closed vertically to construct a Heineke-Mikulicz pyloroplasty.





- Classically a truncal vagotomy is then performed to reduce the risk of recurrent ulceration.
- The role of the vagotomy in 2011 is unclear. Our modern understanding of the pathogenesis of peptic ulcer suggests that treatment of H. pylori and elimination of NSAID use should result in cure of the underlying risk of ulcer.

- Further, with the advent of PPI's it is now possible to medically eliminate gastric acid production without the side effects of vagotomy.
- Most surgeons no longer perform a vagotomy as a component of operation for bleeding duodenal ulcer.

Rebleeding after surgery

- Despite the best surgical efforts, re-bleeding after vagotomy and pyloroplasty occurs in
- between 6–17% of cases.
- Endoscopic therapy is generally not an option after a recent duodenotomy, leaving two options either reoperation or transcatheter arterial embolization (TAE).
- Classically reoperation was the procedure of choice for rebleeding after duodenotomy.
- In the case of reoperation for recurrent bleeding most surgeons have advocated a more extensive operation, usually distal gastrectomy with or without vagotomy and ulcer excision or exclusion.
- This approach is unfortunately fraught with complications and associated with high operative mortality.

- More recently several authors have advocated TAE as a viable alternative to operative treatment for ulcer bleeding refractory to endoscopy.
- Without a head to head trial, it is unclear whether TAE should replace surgery as a primary approach to bleeding control, but data from two large series suggest that TAE can achieve long-term hemostasis in roughly 75% of patients with recurrent bleeding after duodenotomy and ulcer oversewing.
- Given the significant risk of complication or mortality in reoperation for recurrent bleeding, TAE, when available should be the first line therapy for recurrent bleeding after duodenotomy and ulcer oversewing.