Stomach and Duodenum

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Duodenal Ulcer

Concept

The majority of questions will be related to obstruction, bleeding, or perforation. Most ulcers are related to *Helicobacter pylori* or nonsteroidal anti-inflammatory drug (NSAID) use. Nonoperative therapy may be appropriate for initial discovery of an ulcer and for initial bleeding from the ulcer. Be sure to rule out Zollinger-Ellison (ZE) syndrome, ulcerogenic medications, hyperparathyroidism, and antral G-cell hyperplasia when appropriate.

Way Question May Be Asked?

"A 43-year-old man presents to the emergency department (ED) with acute onset of severe epigastric pain with a rigid abdomen on physical examination. Upright abdominal x-ray (AXR) reveals free air."

You are unlikely to get a presentation this classic. Be sure to go through your differential diagnosis (DDx) for epigastric pain, ruling out myocardial infarction (MI) and pancreatitis, or your DDx for upper gastrointestinal (UGI) bleeding if appropriate.

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How to Answer?

History
- NSAID, smoking, ethanol use
- History of ulcer symptoms (chronic history affects your choice of operation!)
- *H. pylori* treatment
- Family history (MEN I)
- H2 blocker therapy
- Foreign body ingestion
- Diarrhea (gastrinoma)

History should also focus on symptoms, being sure to rule out other possibilities:
- Pancreatitis
- MI
- Pneumonia (all less likely if you see free air, so make sure to obtain an upright AXR)
- Esophagitis upright!
- Gastritis
- Gallbladder disease
- Aortic dissection

Physical Examination
- Check vital signs
- Look for peritoneal signs (guarding, rebound)
- Remember that findings are more subtle in the elderly and in patients on steroids

Diagnostic Tests
- Full laboratory panel including amylase/lipase
- Gastrin/calcium if there is suspicion of gastrinoma, hyperparathyroidism, or chronicity of problem
- For a perforated ulcer:
  - Upright AXR
  - Computed tomography (CT) scan (to demonstrate free air and rule out diverticulitis stenosis)
  - CT or magnetic resonance imaging (MRI) of brain in symptomatic patients

M.A. Neff (ed.), *Passing the General Surgery Oral Board Exam*,
DOI 10.1007/978-1-4614-7663-4_13, © Springer Science+Business Media New York 2014

Magnetic resonance angiogram if available (if not, angiogram to include aortic arch and proximal common carotid artery)

For bleeding ulcer: Esophagogastroduodenoscopy (EGD) to rule out other pathology, help predict course, treat bleeding, and check for *H. pylori*

Treatment of bleeding ulcer by EGD:

Electrocautery

Heater probe

Injection therapy

Endoscopic appearance:

Clean-based ulcer (rarely rebleed)

Adherent clot (likely to rebleed)

Nonbleeding vessel (likely to rebleed)

For an obstruction, you need UG0049.

Treatment

For perforated ulcer:

There is no role for conservative treatment!

You need to initially resuscitate patient (intravenous fluids [IVF], antibiotics, H2 blockers).

Take to operating room (OR).

Make an upper midline incision.

Three choices:

1. High-risk patient (elderly, >24 h, unstable, advanced peritonitis):
   Omental patch and abdominal lavage (>5 L saline)
2. Lower-risk patient (young, <24 h, stable, early peritonitis):
   Omental patch, parietal cell vagotomy, lavage
3. Lower-risk patient with history of peptic ulcer disease (PUD):
   Antrectomy (will include ulcer)/vagotomy, lavage

For bleeding ulcer:

Treatment initially is conservative with an EGD, transfusions, and H2 blockers.

You should know your limit of transfusions before going to the OR (>6 in 24 h or hemodynamic instability).

You should know what endoscopic appearance is a relative indication for surgery.

1. High-risk patient:
   Perform vagotomy/pyloroplasty/oversew of ulcer (U stitch)
2. Lower-risk patient with small ulcer:
   Oversew ulcer and perform parietal cell vagotomy
3. Lower-risk patient with large ulcer (> 2 cm) or history of PUD:
   Perform antrectomy/vagotomy

For an obstruction:

Treatment is initially conservative with a trial of nasogastric tube (NGT) decompression and H2 blockers.

Check UGI series to confirm.

If this fails treatment (which it will on the boards), then proceed to the OR:

1. High-risk patient:
   Gastrojejunostomy ± vagotomy
2. Low-risk patient:
   Antrectomy and vagotomy (Billroth I reconstruction)

You should always try for a Billroth I (avoids afferent/efferent problems with the Billroth II and problems with a second anastomotic line). Be sure to extend at least 0.5 cm beyond the distal edge of the pylorus and check the proximal antrectomy line with a frozen section to show parietal cells.

If performing a pyloroplasty, you may not be able to do the typical Heineke-Mikulicz pyloroplasty with a scarred duodenum, so do a Finney or a Jaboulay (anastomosis involving distal stomach to the second portion of the duodenum). If all three are impossible, gastrojejunostomy is an effective emptying procedure.

Truncalvagotomy involves stripping the esophagus bare of areolar tissue in the distal 5–7 cm of esophagus.

If the patient has had prior surgery and preoperative workup reveals no specific cause for recurrence, take the next most aggressive option:

If there was a prior vagotomy with drainage, perform an antrectomy.

If there was a prior antrectomy with vagotomy, perform a subtotal gastrectomy.

Common Curveballs

EGD shows an adherent clot or visible vessel

Perforation is more than 24 h old

Perforation is in a patient with a long history of refractory ulcer disease

Perforation is in an elderly patient

Patient had prior abdominal surgery

You are not able to close the duodenal stump after antrectomy

Patient keeps requiring blood transfusions, but spread out over several days

Nonoperative treatment works but patient later presents with gastric outlet obstruction

Examiner asks you to describe how to perform a vagotomy/pyloroplasty/antrectomy and/or "U stitch" for bleeding duodenal ulcer

Gastrojejunostomy is complicated by a marginal ulcer, afferent loop syndrome, etc.

Duodenal stump leaks postoperatively

Patient rebleeds postoperatively after a U stitch was performed (consider angiographic embolization of gastroduodenal artery)

Patient has ZE syndrome

Patient had prior ulcer surgery

Clean Kills

Not ruling out other etiologies of epigastric pain
Trying to treat a perforated ulcer conservatively
Not trying to conservatively treat a bleeding ulcer at first presentation
Not being prepared to perform a different operation in someone with chronic symptoms
Not performing an EGD for a bleeding ulcer
Trying to treat gastric outlet obstruction with an endoscopic balloon dilatation
Performing any operation laparoscopically
Not knowing how to manage the difficult duodenal stump
Not knowing how to manage duodenal stump leak
Not oversewing the bleeding site when performing vagotomy/pyloroplasty
Not having an idea in your head about recurrence/mortality rates after different operations
Forgetting *H. pylori*
Trying to perform highly selective vagotomy in an unstable patient

Stats vary with the literature quoted, but rough rates are cited below:

	Recurrence (%)	Mortality (%)	Morbidity (%)
Vagotomy/pyloroplasty	10	1	15
Vagotomy/antrectomy	1	2	20
Parietal cell (highly selective) vagotomy	10	0	5

Summary

Duodenal pathology may present with bleeding, perforation, or obstruction. Surgical intervention is likely emergent with perforation, delayed with bleeding, and planned with obstructive pathology. The type of operative procedure performed should be dictated by both the presenting pathology as well as the patient's risk stratification. One should always biopsy the ulcer and consider *H. pylori* as an etiology.

Gastric Cancer

Concept

Gastric cancer will likely present as a large ulcer and biopsy-proven malignancy. The patient may not be candidate for anything but palliation. Be prepared to describe your workup and operation. Remember that gastric lymphoma is a different beast from gastric cancer.

Way Question May Be Asked?

"A 63 year-old man presents to the ED with UGI bleeding. After stabilization, an EGD is performed that reveals a large ulcer on the greater curvature. Biopsies return with well-differentiated adenocarcinoma. What do you do?"

The case may also present as a nonhealing ulcer, with pain, with perforation, with obstruction, or in work-up for melena or heme-positive stool.

How to Answer?

History
- Risk factors
- Weight loss
- Abdominal distension

Physical Examination
- Evidence of weight loss
- Palpable abdominal mass
- Prior surgical scars
- Lymphadenopathy (supraclavicular, periumbilical)
- Rectal examination (Blummer's shelf)

Diagnostic Tests
- Full laboratory panel
- UGI series
- EGD
- CT scan (to rule out metastatic disease)
- Can consider laparoscopy at outside of operation (to rule out liver metastases/carcinomatosis)
- Measure basal acid output (acchlorhydria associated with malignancy)

Location of Tumor

1. Tumors in antrum/distal third of stomach: radical subtotal gastrectomy involving 3 cm of the first part of the duodenum, hepatogastricomentum, greater omentum, and a D1 resection (immediately adjacent perigastric lymph nodes)
2. Tumors in corpus/middle third of stomach: subtotal or total gastrectomy depending on size of tumor
3. Tumors in proximal third of stomach: total gastrectomy, reconstruction with Roux-en-Y
4. Palliation → total gastrectomy (not gastroenterostomy!)

Comments on Surgery

Resect with 5-cm margins (if within 5 cm of gastroesophageal (GE) junction, perform a total gastrectomy).
Only resect the spleen if there is gross tumor involvement.

There is no evidence for resection of hepatic metastases.
Check the margins of resection by frozen section.
Perform en bloc resection of any directly invaded organ (spleen, tail of pancreas, kidney), except common bile duct or head of pancreas!
There is no evidence for Japanese-style D2 resection.
You should perform a D1 resection, which includes suprapyloric, infrapyloric, and nodes along the greater and lesser curvatures.
You can consider adjuvant and neoadjuvant treatments.
Do not forget vagotomy (anastomosis is an ulcer-producing procedure).
Do not forget the different types of reconstruction (Billroth II procedure if cancer).

Common Curveballs

Patient has a postoperative anastomotic bleed (especially if you did not perform vagotomy)
Patient has a postoperative leak
Patient is malnourished
Patient has a postoperative complication of gastric surgery:
- Dumping syndrome—conservative measures first, then Roux-en-Y
- Postvagotomy diarrhea—conservative measures first, then reversed jejunal segment
- Alkaline reflux gastritis—confirm by hepatobiliary scan; conservative measures first, then Roux-en-Y gastrojejunostomy
- Anastomotic bleed—EGD, then a suture ligation if EGD fails
- Afferent loop syndrome—side-to-side jejunojejunostomy
- Gastroperesis—conservative measures first, then a complete antrectomy or gastrectomy, depending on prior surgery, may be necessary

An ulcer that is high on the greater curve near the GE junction
Tumor penetrates into the surrounding structures (spleen, kidney, distal pancreas)
Examiner asks the difference between R1, R2, and R3 nodes
Pathology indicates a lymphoma
Patient actually has esophageal cancer and needs a traditional Ivor-Lewis resection
Patient presents later with evidence of metastatic disease/obstruction
Celiac node is positive (what does that mean?)
Patient has peritoneal metastases (how will you palliate patient?)
Examiner asks about treatment for duodenal stump leak (if early: duodenostomy, drains, nothing by mouth [NPO], total parenteral nutrition [TPN]); if late/abscess: CT-guided drain, NPO, TPN)

Clean Kills

Resecting hepatic metastases
Performing less than total gastrectomy for a tumor <5 cm from GE junction
Not staging the patient appropriately
Discussing laparoscopic resection of gastric cancer
Not checking the margins of resection by frozen section
Offering any therapy besides surgery for a "cure"
Discussing photodynamic therapy
Discussing endoscopic mucosal resections

Summary

Gastric cancer must be considered in the differential diagnosis when evaluating all gastric pathologies. A surgeon should be prepared to perform a cancer operation when operating on a patient with UGI bleeding and/or ulcer disease. Always take into consideration a patient's current and future nutrition status when planning the operation (i.e., placement of feeding jejunostomy).

Gastric Ulcer

Concept

The four basic types of gastric ulcers are categorized by location and etiology. Always have a high index of suspicion for malignancy and do everything possible to rule it out. The four types of gastric ulcers are:

I. Lesser curve, unrelated to acid
II. Gastric ulcer with associated duodenal ulcer, related to acid exposure
III. Prepyloric ulcer (within 3 cm of pylorus), related to acid exposure
IV. Adjacent to gastroesophageal junction (juxtacardial), unrelated to acid

Way Question May Be Asked?

"A 45-year-old man with a history of UGI bleeding had a gastric ulcer identified on EGD. He has been on omeprazole for 8 weeks and repeat EGD shows the ulcer is still present. What do you want to do?"

The question may go in the direction of how to initially treat this patient, how long to try acid suppressive therapy, and when to operate, or it may jump right into a discussion of how to manage a bleeding or perforated gastric ulcer. Size

and pH are particularly important because most ulcers >3 cm and most ulcers in the achlorhydric patient will eventually need surgery.

How to Answer?

History
- Risk factors for PUD
- *H. pylori* treatment
- Steroid/NSAID use
- History of epigastric pain
- Iron-deficiency anemia
- Vomiting/bloating (from gastric outlet obstruction)
- Family history of ZE syndrome
- Use of antiulcer medications
- Relevant past medical history (heart disease, etc.)
- Prior surgeries (especially prior surgery for PUD)

Physical Examination
- Vital signs (tachycardia/hypotension to suspect shock)
- Abdominal examination (rigidity/peritoneal signs to suggest perforation)
- Rectal examination (heme positive, Blummer's shelf)

Diagnostic Studies
- Routine laboratory panels, including Type and Cross (T + C) and coagulation panel, especially if bleeding
- Electrolytes to show evidence of gastric outlet obstruction (low K, low Cl, high bicarbonate)
- Abdominal x-rays (to rule out free air)
- ± Barium UGI series
- Gastric acid analysis (achlorhydria is suggestive of cancer)
- EGD + biopsy (at least 10)
- Biopsy should include four quadrant margins, central biopsy, and brushings

Surgical Treatment

1. Resuscitate the unstable patient.
2. Repeat EGD/biopsy at 6–8 weeks for the chronic ulcer, treat medically, If improving, repeat EGD in 6–8 weeks:
   - No improvement at first 6–8 week follow-up indicates surgery.
   - Failure to disappear at second 6–8 week EGD indicates surgery.
3. Indications for surgery:
   - Intractability
   - Bleeding
   - Perforation
   - Obstruction
4. For type I (lesser curve) ulcer (most common):
   - Antrectomy to include ulcer (goblet cells on duodenal side indicates adequate resection) and reconstruction with a Billroth I procedure. Make sure the frozen section is negative for malignancy before reconstructing with BI. Recurrence rate is 2 %.
5. For Type II and III ulcers:
   - Antrectomy and truncalvagotomy
6. For Type IV ulcers:
   - Resection with Roux-en-Y esophagogastrojejunostomy (Csendes' procedure)
7. For a bleeding ulcer:
   - EGD + biopsy ± Angiogram with vasopressin/embolization
   - Have a threshold in your mind of when to operate on patient (more than 6 U of packed red blood cells [pRBC] in 48 h—always consider baseline comorbidities in your limit)
   - In the OR:
     (a) If the patient is stable, perform antrectomy to include the ulcer, and when possible, suture ligate ulcer, biopsy + antrectomy
     (b) If the patient is unstable, perform a wedge resection or suture/biopsy ulcer plus vagotomy/pyloroplasty
8. For a perforated ulcer:
   (a) If the patient is stable, perform an antrectomy to include the ulcer or antrectomy plus omental patch and biopsy the ulcer
   (b) If the patient is unstable, perform a biopsy and omental patch (a wedge resection of the ulcer is always an option if easy to do)

Common Curveballs

Biopsy comes back malignant, indeterminant, or benign
Type of ulcer (I–IV) switches during the scenario
Examiner asks your method to test for *H. pylori*
Patient fails medical management
Patient actually has gastric cancer (check frozen section before reconstruction)
Examiner asks your treatment algorithm for *H. pylori*
Examiner asks how to manage type IV ulcer intraoperatively
You are not able to encompass ulcer in antrectomy
Ulcer perforates
Patient bleeds postoperatively
Gastric acid measurements show achlorhydria
Examiner asks about postgastrectomy complications:
- Bleeding
- Dumping

Afferent/efferent obstruction
Postvagotomy diarrhea
Carcinoma

Clean Kills

Describing any laparoscopic approach
Not knowing how to deal with postgastrectomy syndromes
Not knowing how to describe your operation
Misdiagnosing a gastric cancer as a benign ulcer
Not testing for or treating *H. pylori*
Not knowing the importance of achlorhydria and its link to malignancy
Not rescoping/rebiopsying a patient with a chronic nonhealing ulcer
Not knowing the indications for surgery
Spending too long with angiographic methods to control bleeding
Not checking for malignancy before performing reconstruction (BII is preferred for malignant gastric ulcer)

Summary

A surgeon must be able to manage gastric ulcer disease in both the emergency department as well as the clinic. Questions can range from emergent operative management to outpatient treatment modalities. A firm grasp on the types and locations of the various gastric ulcers is important because this will dictate the operative procedure performed. Always biopsy the ulcer and be prepared for postgastrectomy complications.

Mallory-Weiss Tear

Concept

Mallory-Weiss tear presents as UGI bleeding in a patient after forceful vomiting. It is the result of a linear tear in the mucosa of the gastric cardia.

Way Question May Be Asked?

"A 23-year-old man presents to the ED with hematemesis after binge drinking."

Pain should not be a prominent feature; if it is, consider Boerhave's syndrome. This may be seen in patients with vomiting from other causes (pancreatitis, chemotherapy, etc.)

How to Answer?

Resuscitate the patient while doing history and physical examination!

History
NSAID/ethanol use
History of PUD
H. pylori treatment
Portal hypertension
Hiatal hernia (tear is usually in gastric cardia rather than at the GE junction)
Violent retching
Remember your DDx of UGI bleeding: PUD, esophagitis, varices, Mallory–Weiss tear

Physical Examination
Check vital signs
Look for peritoneal signs (guarding, rebound)

Diagnostic Tests

Full laboratory panel, including coagulation factors, T+C

Management
Place two large-bore intravenous (IV) lines and a large-caliber NGT.
Irrigate via the NGT to estimate ongoing blood loss.
Correct coagulation.
Resuscitate the patient.
Administer IV H2 blockers.
Give a blood transfusion if the patient is unstable.
Perform an EGD to identify and control bleeders.
Rule out other pathology.
Use a heater probe, sclerotherapy, electrocautery.
Perform angiography to diagnose bleeder.
Perform embolization of branches of left gastric.
Give a selective infusion of vasopressin.
Do not use Sengstaken–Blakemore tubes.

Surgery Indications
Tranfusion of more than 6 U of PRBC
Failure of EGD to stop bleeding
Failure of angiographic embolization (used in patients with severe comorbidities)

Surgical Technique
Make an upper midline incision.
Explore UGI (may see subserosal hematoma at GE junction along the lesser curve of the stomach).
Perform gastrostomy.

Oversew mucosal tear with absorbable, locking sutures.
Pack proximal and distal stomach with lap pads to locate the bleeding source.

Common Curveballs

EGD does not show mucosal laceration
Patient has evidence of perforation
Stomach is full of blood
EGD picks up other pathology
Endoscopic control/angiographic control fails
Patient has portal hypertension
Sclerotherapy results in esophageal perforation
Patient had prior abdominal surgery
Patient has tears in distal esophagus (may need left thoracotomy and esophagotomy and then suture ligation)
Patient may need to be intubated before EGD because of significant hematemesis (otherwise patient will aspirate)

Clean Kills

Jumping to angiography rather than EGD first
Using a Sengstaken-Blakemore tube
Not resuscitating the patient
Mistaking for Boerhave's syndrome
Performing any type of antiulcer surgery
Not looking for other pathology on EGD
Trying to do any of the above with a laparoscope

Summary

The majority of Mallory-Weiss tears are self-limiting. It is important to quickly stabilize and resuscitate the patient while taking a thorough history. Diagnostic modalities, such as EGD and angiography, may also be therapeutic in this setting. Surgery should be entertained if all other options have been exhausted or the patient is quickly deteriorating. In the operating room, the surgeon needs to be prepared to operate both below and above the diaphragm.

Upper Gastointestinal Bleeding

Concept

It is important to consider a broad DDx when consulted for upper gastrointestinal (GI) bleeding. Also pay close attention to the ABCs because a patient with massive hematemesis may exanguinate while you are still interviewing the patient. Perform a history with questions focused on the use of alcohol, recent vomiting, and a history of ulcer/liver disease.

Way Question May Be Asked?

"A 64 year-old woman presents to the ED with a chief complaint of weakness for 24 h and dark stools. She has a history of osteoarthritis currently being managed with NSAID therapy."

History is important because physical examination findings may be subtle. Coffee-ground emesis should serve to direct a practitioner toward the diagnosis through NGT lavage.

How to Answer?

Take a brief history and physical examination while resuscitating the patient:
History of PUD
Associated pain
Age
Aspirin, NSAID, dipyridamole, and steroid use
Current outpatient use of Coumadin, Plavix, Lovenox, or Pradaxa
Current outpatient use of antihypertensives or beta-blockers
Alcohol use
Recent retching/vomiting (Mallory-Weiss Tear)
Liver disease
Trauma/stress
History of UGI surgery (marginal ulcer)
History of abdominal aortic aneurysm (AAA) repair (aortoenteric fistula, initial small herald bleed followed a few days later with massive hemorrhage)

Physical Examination
Stigmata of liver disease (e.g., telangiectasia, jaundice, ascites)
Evidence of prior surgical scars
Melena or hematochezia on rectal examination
Bruit upon auscultation of the abdomen

Algorithm
ABCs ± endotracheal intubation depending on severity of bleed
Resuscitation (two large-bore IV lines, IVF, full laboratory panels including complete blood count, prothombin time/partial thromboplastin time, T + C, NGT)
Gastric lavage via NGT
Proton pump inhibitor (PPI) drip
Upper endoscopy if aspirate is bloody or clear (diagnostic and potentially therapeutic)
Tagged red blood cell scans
± Angiography
Surgery

Endoscopic methods to control bleeding
- Heater probe
- Electrocautery
- Epinephrine injection
- Mechanical occlusion via clips or band ligation/sclerotherapy (esophageal varices)

(Appearance is important here because overlying clots/visible vessels have a higher chance of rebreeding than a clean ulcer base.)

Angiography
- You can treat certain bleeds with intra-arterial gelfoam, metal coil springs, and vasopressin.
- It is useful for gastric/duodenal ulcers or Dieulafoy lesions.
- If bleeding successfully controlled, then initiate medical management.
- Administer PPI or H2 blockers and treat *H. pylori* if indicated.

Surgery

Surgery is reserved for unstable patients or patients with continued or recurrent bleeding (6 U pRBCs), complicated ulcer disease, massive UGI bleeding, or nonhealing ulcers.
- For gastric neoplasms:
  - If benign, perform a wedge resection (leiomyomas, hamartomas, hemangiomas, stromal tumors).
  - If adenocarcinoma, resect with a 5–6 cm proximal margin (Billroth II). If adenocarcinoma is within 5 cm of the GE junction, then perform a total gastrectomy.
- For stress gastritis, perform a total/near-total gastrectomy or gastric devascularization if unstable (quicker)
- For gastric ulcer:
  - If patient is stable, perform a hemigastrectomy to include ulcer or wedge resection if ulcer is located proximal. Always send frozen section.
  - If patient is unstable, perform a wedge resection and frozen section biopsy. Vagotomy and pyloroplasty can be considered in patients with a history of complicated ulcer disease.
- For a Dieulafoy lesion, perform a suture ligation or excision.
- For a duodenal ulcer:
  - For high-risk/unstable patients, oversew the ulcer (U-stitch) and perform truncal vagotomy/pyloroplasty.
  - For a stable patient with a small ulcer and no history of PUD, oversew the ulcer.
  - For a stable patient with a small ulcer and history of PUD, oversew ulcer and perform a highly selective vagotomy.
  - For a stable patient with a giant ulcer and history of PUD, perform an antrectomy plus vagotomy.
  - For bleeding from an anastomotic line from recent surgery, perform an EGD. If/when it fails, re-explore and ligate the bleeder.
- For a Mallory-Weiss tear, perform an anterior gastrotomy and suture ligation of mucosal tears. If the tear is in the esophagus, perform a left thoracotomy/esophagotomy and suture ligate bleeders.
- For hemosuccuspancreaticus, perform a distal pancreatectomy with excision of the pseudocyst and ligation of the splenic artery.
- For an aorto-enteric fistula, control bleeding, resect the graft, close the enteric fistula site, and place a new extra-anatomic or in situ bypass graft.
- For varices:
  - If patient is a transplant candidate, perform a transjugular intrahepatic portosystemic shunt (TIPS) and then transplant when organ available.
  - If patient is not a transplant candidate, perform emergency portacaval/splenorenal shunt or esophageal transection/suture ligation.
- A four-port Minnesota tube may achieve hemostasis through balloon tamponade prior to initiating surgical treatment.

Common Curveballs

- Angiogram fails to localize lesion or embolization does not work
- Endoscopy fails to localize lesion
- Patient had prior ulcer surgery
- Patient had prior AAA repair
- Patient has coagulopathy
- NGT lavage is not bilious
- Bleeding is from the duodenum despite nonbloody, bilious NGT aspirate
- Recurrent bleeding occurs after endoscopic treatment
- Large ulcer is malignant
- You may need to make gastrotomy/duodenotomy to localize bleeding
- Bleeding is from nasopharynx or hemoptysis from lungs
- Gastroenterologist is not available to perform EGD
- Nonoperative therapy fails
- "U-stitch" does not work (ligate gastroduodenal)

Clean Kills

- Not placing NGT
- Taking a prolonged history and physical examination
- Improper resuscitation of patient
- Not taking patient to surgery when appropriate
- Not treating for *H. pylori*
- Not taking biopsy of ulcer seen during EGD

Placing Sengstaken-Blakemore tube for Mallory-Weiss tear
Performing distal splenorenal shunt emergently for bleeding varices

Summary

To correctly diagnose and treat UGI bleeding, a multidisciplinary approach needs to be employed. A focused algorithm aimed at hemodynamic stabilization and localization via upper endoscopy is key to successful management. Upper endoscopy is potentially diagnostic and therapeutic and is indicated within 24 h of presentation, along with immediate initiation of intravenous infusion of a proton pump inhibitor. Surgical intervention may be required if the patient remains unstable or bleeding is refractory to all other treatment modalities.