Small Bowel Bleeding and Balloon Assisted Enteroscopy

Denise Kalmaz, MD
Associate Clinical Professor
Director of Small Bowel Endoscopy
GI Fellowship Program Director
Division of Gastroenterology
UC San Diego
Disclosures

None
Overview

• Techniques for small bowel examination
  – Dependent on availability and expertise
  – Newer modalities have replaced small bowel follow through and interoperative enteroscopy
  – Different modalities are complementary:
    • Capsule endoscopy (CE)
    • Double balloon enteroscopy (DBE)
    • Single balloon enteroscopy (SBE)

• Types of bleeding

• Pathology
  – Benign
  – Malignant
GI anatomy

• Esophagus, stomach, and up to second portion of duodenum – upper endoscopy
• Colon and terminal ileum – colonoscopy
• Small intestine – not so easy...
Small bowel anatomy

• Small intestine – named after smaller diameter compared to colon
• Longer – range between 11 and 32 feet
• 3 parts:
  – Duodenum – 25cm
  – Jejunum – 2/5 length
  – Ileum – 3/5 length
Capsule endoscopy

- Approved by the FDA in 2000
- Olympus has the EndoCapsule which is comparable with Pillcam
- Ambulatory or hospitalized patients
- Physiologic – moves passively via peristalsis
- Size: 26mm x 11 mm
- 1:8 magnification - allows visualization of villi
Capsule Procedure

• Swallowed by patient after activation
• Requires 10-12 hour fast
  – Improved visualization with bowel prep and simethicone
  – Clear fluids acceptable after 2 hours and food/medications after 4 hours
• Datarecorder worn by patient is used to store wireless transmitted images that are later downloaded using software
• Main risk: retention
  – Increased in prior abdominal surgery or Crohn’s disease
• Timing important - INPATIENT
Endoscopic placement

- Patient unable to swallow (dementia, dysphagia)
  - Case reports of aspiration
- Gastroparesis
- Esophageal motility disorders
- Advance delivery device to endoscopically place into the duodenum
Balloon Assisted Enteroscopy

• If abnormality found on capsule or imaging, can direct therapeutic intervention
  – Push enteroscopy (pediatric colonoscope)
    • Only reaches proximal jejunum
  – Single balloon enteroscopy
  – Double balloon enteroscopy with hemostasis or biopsies
  – Surgery

• Capsule is good screening tool – anterograde versus retrograde approach of DBE
  – Finding in first 75% versus distal 25% of small bowel transit time
Double Balloon Enteroscopy

- Oral or anal route – complete enteroscopy
- Manufactured by Fuginon
  - 140cm overtube backloaded on a 230cm enteroscope
  - 2 latex balloons on tip of enteroscope and overtube
  - Serial inflation/deflation of balloons – pleat small bowel over the enteroscope
- DBE has overall higher yield and total enteroscopy rate

Double Balloon Enteroscopy

• Best results if used with general anesthesia (added risks)
  – Typical exam can last between 1.5 to 3 hours
• CE and DBE complement each other
  – Higher yield if positive capsule or radiological findings
• Risks similar to other types of endoscopy (bleeding, perforation, infection) except added risk of pancreatitis
  – Complications: 0.8% diagnostic, 4.3% therapeutic
• If abdominal pain after procedure, requires CT abdomen to rule out duodenal (retroperitoneal) perforation
Double Balloon Enteroscopy Technique
DBE - PROS

• Therapeutic intervention in small bowel
• Diagnostic yield 43-80%
• Carbon dioxide insufflation: improves depth of insertion and reduces patient discomfort


• Water method can also improve depth of insertion but can add to procedure time
• Reserved for patients with abnormalities on capsule endoscopy or CT/MR enterography
  – Brisk bleeding – consider therapeutic DBE first line vs angiogram
DBE - CONS

- Time consuming
- Labor intensive
- Need for general anesthesia
- Difficult to determine depth of insertion
- No guarantee for complete visualization of small bowel
- Average procedure time: 70 to 110 minutes
  - Factors: endoscopist expertise, procedure time allotted, bowel anatomy, body size, prior abdominal surgery

Single Balloon Enteroscopy

- Manufactured by Olympus
  - Single silicon balloon at overtube tip
  - Stiff 200cm enteroscope
  - Not as deep advancement
  - Improved depth of insertion with water technique
  - Use to reach a jejunal lesion
Single Balloon Enteroscopy Technique

1. Insert the scope as deep as possible.
2. Angulate the scope to hold the intestinal tract and deflate the balloon.
3. Advance the splinting tube.
4. Inflate the balloon.
5. Release the angulation.
6. Withdraw the splinting tube and scope to shorten the intestinal tract.

- Scope motion
- Splinting tube motion
Spiral Enteroscopy

- Technology bought by Olympus
- Previously handheld but will be motorized
- Rotational energy -> bowel pleating
- Uses polyvinyl overtube chloride overtube with spiral element locked onto enteroscope
- Compared to double balloon enteroscopy – decreased depth of insertion but shorter exam time

Suspected Small Bowel Bleeding
Obscure GI bleeding

• Diagnosis of obscure GI bleeding (ongoing without source) – 5% of GI bleeds
  – Occult - iron deficiency anemia or FOBT + (no visible blood loss)
  – Overt - melena or maroon stools
• Source frequently in the small bowel – broad differential diagnosis
• Terminology changing to suspected small bowel bleeding
Suspected small bowel bleeding

- Recommendation of ACG/AGA/ASGE: proceed with capsule endoscopy after unrevealing EGD and colonoscopy
  - Proceed after EGD (+/- push enteroscopy) and colonoscopy with intubation of the terminal ileum (should repeat if done before especially in overt bleeding)
    - Up to 25% of lesions within reach of traditional upper endoscope
- Results determine whether balloon assisted enteroscopy needed
Algorithm for suspected small bowel bleeding

1. Occult / Overt Bleeding
   - Video capsule endoscopy*
     - Positive
       - Deep enteroscopy
       - Lesion not reached
       - Surgery
     - Negative
       - Young age recurrent bleeding
       - Meckel scan CT or MR Enterography
         - Positive
           - Surgical intervention
         - Negative
           - Recurrent bleeding
           - Repeat video capsule endoscopy, deep enteroscopy, laparoscopic-assisted double balloon enteroscopy or intraoperative enteroscopy

2. Brisk Bleeding
   - Angiogram or deep enteroscopy or surgery

*Perform CT enterography / MR enterography or patency capsule if obstructive symptoms
*Lesion marking with deep enteroscopy if luminal lesion
CASE #1

- 62 yo male with history of end stage renal disease on hemodialysis and coronary artery disease on aspirin and Plavix presents to ED with shortness of breath
- Noted to have a Hgb of 7 (no baseline available)
- No hematochezia or melena
- No diarrhea, abdominal pain, or weight loss
- Upper endoscopy and colonoscopy were unrevealing

- What is the diagnosis?
- What is the next step?
Angiodysplasias

- AKA: arteriovenous malformations, vascular ectasias
- Pathogenesis not well understood
- Majority acquired later in life (age over 60)
- Most often occur in right colon (also larger) but can occur anywhere in GI tract
  - Duodenum > jejunum > ileum
- Multiple in 40-60% of patients, cluster in segments
- Most common etiology of small bowel bleeding
  - Asymptomatic or source of occult (iron deficiency anemia) versus overt bleeding
Co-morbid conditions and angiodyplasias

• End stage renal disease
  – Anywhere in GI tract and often multiple
  – Second most common cause of GI bleeding
  – ? Secondary to uremia-induced platelet dysfunction

• Von Willebrand’s disease
  – Clinically evident due to coagulopathy

• Aortic stenosis – Heyde’s syndrome
  – Unclear - ? acquired Von Willebrand’s disease
    • Mechanical disruption secondary to turbulent passage through narrowed valve
  – Aortic valve replacement recommended by ACG - bleeding shown to improve (angiodyplasias still present)
Diagnosis of AVMs

• Capsule endoscopy – superior than all other modalities
  – Detect mucosal abnormalities and AVMs throughout entire small bowel
  – Direct therapy if active bleeding – double balloon enteroscopy, push enteroscopy or surgery
Treatment of angiodysplasias

- No treatment of incidental lesions in asymptomatic patients – low risk of future bleeding
- If occult bleeding:
  - Start with medical therapy – iron supplementation and transfusions
  - Can add octreotide (transition from short to long acting)
- If overt bleeding:
  - Treat actively bleeding with APC, BICAP or clips
  - Treat underlying coagulopathy
  - Angiography with embolization in larger lesions versus surgery
- If refractory bleeding, consider changing antithrombotic therapy
Effectiveness of Endoscopic therapy

• Unclear – rebleeding common and often from other lesions

• PubMed search between 2006 and 2013:
  – 6 articles with rebleeding rates without endoscopic therapy (natural history of AVMs)
    • 64 out of 130 rebled = 49.2% rebleeding rate
  – 24 articles with rebleeding rates after endoscopic therapy (push enteroscopy versus DBE)
    • 209 out of 490 rebled = 42.7% rebleeding rate

  Romagnuolo et al. J Clin Gastroenterol 2014

• Study of 33 pts with IDA with treated lesions vs conservative therapy –
  – less transfusions at 30 months (0.32 vs 2.16 units per month)

  Askin et al. GIE 1996.
Left Ventricular Assist Devices and GI bleeding

- Increasing use of LVADs – previously bridge to transplant and now destination therapy
- Patients on warfarin, aspirin and dipyramidole
- High rates of GI bleeding
  - Recent meta-analysis by Draper et al. in GIE 2014 with rate of 30%
  - Many patients with multiple episodes
- Pathogenesis unclear, first episode within 2 months
LVADs and GI bleeding

• Factors:
  – Use of anticoagulation
  – Acquired von Willebrand syndrome
  – Platelet dysfunction
  – Increasing incidence of AVMs due to chronic low pulse pressure – mucosal ischemia/alteration in mucosal hemodynamics

• Data for octreotide equivocal

• Endoscopic therapy did not influence rate of recurrence of GIB

CASE #2

• 29 yo male presents with second episode of painless hematochezia
• Hgb drop from baseline of 15 to 8
• Upper endoscopy and colonoscopy unrevealing

• What is the diagnosis?
• What is the next step?
Meckel’s diverticulum

• Result from incomplete obliteration of the omphalomesenteric duct
• 2% of population, male to female ratio 2:1
• Found within 2 feet of IC valve
• 2% of pts will develop complication – 60% are less than 2 years of age
• GI bleeding – painless, secondary to mucosal ulceration within ectopic gastric tissue
  – 50% don’t have gastric mucosa
Meckel’s Continued

- Diagnosis: Meckel’s scan (99m technetium pertechnetate) – affinity for gastric mucosa
  - Technetium 99 scan – decreased sensitivity in adults due to lack of heterotopic mucosa (85 down to 63%)
    

- Role for capsule endoscopy – case reports

- CT enterography

- Treatment – surgical resection
CASE #3

- 58 yo male c/o intermittent RLQ abdominal pain along with 20 pound weight loss over the past year
- PMH: sigmoid colon cancer s/p left hemicolectomy 4 years ago and a daughter with recent diagnosis of colon cancer at age 35
- Recent EGD, colonoscopy, and CT abdomen are negative for pathology

- What is the diagnosis?
- What is the next step?
CASE #3

- Capsule endoscopy reveals a mass-like lesion in the proximal ileum
- Retrograde DBE performed: mass found in proximal ileum
- Biopsies consistent with adenocarcinoma
- Patient undergoes surgical resection
Malignant tumors of the small bowel

- Rare, 2% of GI neoplasms
  - Less mucosal irritation than colon, also rapid transit (shorter exposure to carcinogens), lower bacterial load, increased lymphoid tissue
- Mean age at diagnosis: 65, male predominance
- Increasing incidence
  - ? Secondary to increased detection
- Risk factors: alcohol, red meat, salt/smoked foods, ? tobacco and obesity
Presentation

• 70-90% of malignant lesions are symptomatic

• Nonspecific signs and symptoms
  – Most common – intermittent, crampy abdominal pain in 44-90% of pts
  – Weight loss (24-44%)
  – GI bleeding (23-41%) – occult or overt
    – Obstruction (22-26%)

• Delay in diagnosis common – advanced stage
Diagnosis

• Best strategy/sequence of tests not established
• Radiologic studies:
  – CT or MRI enterography
• Capsule endoscopy
• Double versus single balloon enteroscopy
  – Not all small bowel malignancies require surgical resection (lymphoma)
  – Can biopsy lesion and make diagnosis
  – Can tattoo lesion for surgical resection
Small bowel malignancy

- Adenocarcinoma
  - Mainly in duodenum, ulceration common leading to GI blood loss/anemia
- Carcinoid tumors
  - Mostly in the ileum, neuroendocrine tumor (produce serotonin), firm and submucosal nodules
- GIST (Gastrointestinal Stromal Tumor)
  - Subepithelial tumor erodes into small bowel causing overt bleeding
- All treated with surgical resection
Lymphoma

• Can be a primary GI neoplasm or component of systemic disease
• Primary – no peripheral lymphadenopathy, normal WBCs, no liver or spleen involvement
  – Arise from lymphoid aggregates in the submucosa
    • Most common in ileum
• Present in 70s, male predominance (60%)
• Require enteroscopy to make diagnosis and follow response to treatment (not surgical)
CASE #4

• 52 year old male with HIV was noted to have new onset iron deficiency anemia and melena
• Hemoglobin dropped from 16 to 7.9 mg/dl
• EGD and colonoscopy without etiology

• What is the diagnosis?
• What is the next step?
CASE #4

- Capsule endoscopy showed an ulcerated lesion in distal ileum with active oozing
- Retrograde single balloon enteroscopy performed with a 1.5 cm ulcerated distal ileum lesion
- Biopsies revealed renal cell carcinoma (rare to have GI metastases)
Metastatic lesions to the small bowel

- Most common tumor to metastasize to the small bowel - metastatic melanoma
- Hematogenous spread – lung, breast, cervix, sarcoma, renal, and colon
- Extraluminal involvement – peritoneal carcinomatosis
  - Erosion through bowel wall can occur
  - Ovarian, colon, and gastric cancers
Summary

• Techniques to evaluate small bowel include capsule endoscopy, single balloon and double balloon enteroscopy

• Variety of pathology can cause overt versus occult small bowel bleeding

• Different modalities – complementary
  – Balloon assisted enteroscopy (BAE) reserved for abnormal capsule or radiological study

• Angiodysplasias are a common cause of occult GI bleeding and can be treated conservatively
  – If active bleeding found, then BAE can be used for hemostasis

• Malignancies of small bowel, although rare, are often diagnosed late because of nonspecific symptoms
  – BAE is key in diagnosis
Thank you

Questions?