Small Bowel - Capsule Endoscopy and Enteroscopy

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Objectives

• Identify the common causes of gastrointestinal bleeding in the upper gastrointestinal tract.
• Discuss the history and evolution of traditional evaluation of upper gastrointestinal bleeding.
• Explain new technologies for upper gastrointestinal bleeding: wireless capsule endoscopy (WCE) and Double Balloon Enteroscopy (DBE).
• Discuss patient evaluation and care for patients undergoing wireless capsule endoscopy and Double Balloon Enteroscopy
• Identify nursing impact of wireless capsule endoscopy and Double Balloon Enteroscopy
Upper GI anatomy/Small Bowel anatomy
What is Obscure gastrointestinal bleeding (OGIB)

- Definition per AGA:
  “Bleeding of unknown origin that persists or recurs after a negative initial endoscopy and colonoscopy. It may present either with amounts of blood only detectable by chemical tests in the stool and manifested by iron deficiency anemia or overt GI bleeding with recurrent melena or hematochezia”
Case Study

• 68 year old Caucasian female (Ms. J) with a long standing coronary artery disease status post PTCA drug alluding stent x2 in 2008 and 2011. She describes over the past few days increasing shortness of breath, fatigue and “darker stools”. She calls the office to speak to the midlevel provider......Sound familiar???
Diagnosis of OGIB

- The clinical history may suggest possible location and cause of OGIB, rarely diagnostic
- Hematemesis: reliable only as bleeding above Ligament of Treitz
- Color of stool (melena/hematochezia)-less predictive of transit time
- Pain may also help with source-esophageal versus, stomach abdomen
Most common causes of OGIB

<table>
<thead>
<tr>
<th>Location</th>
<th>Causes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Esophagus</strong></td>
<td>Esophagitis</td>
</tr>
<tr>
<td><strong>Stomach</strong></td>
<td>Cameron erosions, Dieulafoy lesion, GAVE, Portal HTN gastropathy</td>
</tr>
<tr>
<td><strong>Duodenum</strong></td>
<td>Ampullary lesion, distal duodenal neoplasias, aortoenteric fistula, pancreatic aneurysm, hemobilia</td>
</tr>
<tr>
<td><strong>Small bowel</strong></td>
<td>Angiodysplasias, primary neoplasias, metastasis, polyposis syndromes, meckel diverticulum, NSAIDS, Crohn’s disease, portal hypertensive intestinal, Osler Rendu syndrome</td>
</tr>
</tbody>
</table>
Etiology of Gastrointestinal Bleed

- Patient’s younger than 40—more likely: cancer or Dieulafoy’s lesion
  - Lymphoma
  - Carcinoid
  - Adenocarcinoma
- Older patients—
  - AVMs
  - Erosions
  - Ulcers
Ms. J. goes to the emergency room as advised by the midlevel provider and is found to be mildly tachycardic and have a hemoglobin of 6.8. A ER physician does a rectal exam and she is occult positive. A GI consult is requested.
WORK UP FROM HERE?
Initial Patient work up

- EGD
- Colon
- Enteroscopy
- Bleeding scan
- Small bowel follow through
- Enteroclysis
- Angiography
Lesions most commonly Missed

• Upper GI tract:
  – Hiatal Hernia
  – Peptic Ulcers
  – Vascular Ectasia
  – Esophageal Varix
  – Persistent IDA-rule out Celiac disease
Case study

• Ms. J undergoes an upper endoscopy that reveals gastritis and a colonoscopy that reveals two 6 mm tubular adenomas in the sigmoid colon. No old blood or signs of overt bleeding noted. She continues to pass intermittent melena and drops her hemoglobin to 7.2 despite receiving 4 Units PRBCs over the preceding days. She undergoes a tagged RBC scan that reveals possible bleeding in the mid abdomen.
Now what?
Small bowel
## History of small bowel by radiology

<table>
<thead>
<tr>
<th>Test</th>
<th>Describe</th>
<th>Visualize</th>
<th>Yield</th>
<th>Complications</th>
</tr>
</thead>
<tbody>
<tr>
<td>SB Series</td>
<td>Pre-oral dilute barium with serial abd images</td>
<td>Rules out strictures</td>
<td>0-6%</td>
<td>Minimal –none</td>
</tr>
<tr>
<td>Entero-Clysis</td>
<td>Double contrast-by passing tube into prox small bowel</td>
<td>Fails flat Lesions-AVMs</td>
<td>10-20%</td>
<td>Minimal</td>
</tr>
<tr>
<td>Radionucleides canning</td>
<td>Detects bleeding relative brisk</td>
<td>Active bleeding</td>
<td>If bleeding-0.1-0.5 ml/min</td>
<td>Minimal</td>
</tr>
<tr>
<td>Angiography</td>
<td>Not usually necessary-unless severe bleeding. Can find vascular lesions</td>
<td>Follow + bleeding scan if rate &gt; 0.5 ml/min</td>
<td>44-68%</td>
<td>Bleeding,sedation</td>
</tr>
</tbody>
</table>
History of endoscopic of small bowel evaluation

- EGD/colon
- Push enteroscopy-1980s and 1990s-has shown diagnostic yield in bleeding-shorter length
- Non-surgical-total small bowel enteroscopy
  - “Ropeway”(1972)-guided string method may take several days from mouth to rectum
  - Sonde(1972) Endoscopy-Unable to readvance
Surgery for Small bowel evaluation

• Surgery of OGIB final approach
• Surgeon helps with intubation of bowel by pushing over the enteroscope
• Mucosal trauma common-confuses with normal bleeding
• Exam during insertion
• Yield of 70-93%
• Disadvantage- invasive in nature
Therapeutic/Conservative Therapy

• Supportive care:
  – Blood transfusions
  – Epoetin alfa
  – Iron replacement
  – Hormonal therapy
  – Octreotide
  – Avoid NSAIDs
Case study (cont.)

• Ms. J undergoes a capsule endoscopy. The capsule study is an adequate exam and demonstrates a bleeding “region” 10 min 45 seconds past the ligament of treitz. She undergoes a push enteroscopy. The extent of the exam is just distal to the ligament of treitz. No bleeding source is identified. She is sent back to the unit. She stabilizes and is sent home.
Capsule Endoscopy

- WCE-Wireless capsule endoscopy
- Considered novel noninvasive technology for small bowel
- Excellent resolution 1:8 magnification.
- Allows visualization of individual villi
- No bowel inflation required
- Approved in 2000 by Given replaced by the M2A-Pillcam SB.
Small Bowel Capsule

- LEDs
- Lens
- CMOS chip
- Battery
- Antenna

Hard drive

Reading softwear
Capsule Endoscopy-statistics

• Diagnostic yield of 32% to 76%
• The ability of capsule study to exclude GI bleeding between 82.6% and 100%
• Multiple studies have demonstrated capsule better yield for GI bleed
• In up to 35% of patients secondary to slow transit time.
• Possibly adding simethicone may help improve visibility.
Capsule Endoscopy (cont.)

- System includes software and color red (suspected blood indicator)
- Capsule takes 2 images per second
- Recorder acquires 55,000 images in 8 hours.
- Review of the images 30-90 minutes
Capsule endoscopy studies (Yield)

- WCE-able to identify obscure GI bleeding more often than push enteroscopy (Lewis et al 2002)
- WCE yield 50-70%.
- Largest study-100 consecutive patients with obscure bleeding-3-groups-highest diagnostic yield (92%) in active bleeding (Pennazio et al 2004)
- Another study-WCE prior to push enteroscopy-higher diagnostic yield (de Leusse et al 2007)
Benefits of Capsule Endoscopy

- Non-invasive
- Permits examination of most of small bowel
- Very sensitive
- Can be performed in outpatient setting
- Can allow patient to work
- No ride
- Can stay on anticoagulation
Limitations of Wireless Capsule Endoscopy/complications

- Wireless capsule endoscopy depends on peristalsis
- Only visualization is possible, **no biopsy or treatment possible**
- Lack of air insufflation and ability to rinse
- 1% risk of capsule entrapment in strictures or diverticula—good initial eval important
- Consider patency capsule
Contraindications of WCE

- Dementia
- Gastroparesis
- Esophageal stricture or swallowing disorders
- Partial or intermittent small bowel obstruction
- Inoperable-or refuse surgery
- In the past pacemakers and defibrillators
M2A patency capsule

- Composed of lactose and 5% barium sulfate
- Can be located by radiofrequency and dissolves in 40-100 hours after ingestion
- Painless defecation of an intact capsule indicated safety of conventional capsule study.
- Painful passage or disintegration is highly suggestive of a significant small bowel stricture
- Not considered entirely safe—in small group of patients may cause intestinal occlusion
Case study (cont.)

• Ms. J represents to the emergency room 4 weeks after hospital discharge. She describes increasing fatigue over the past few days and melena started last night. She had been restarted on her Plavix and aspirin by her cardiologist. Her hemoglobin is 7.1.

PLAN?
Double Balloon Enteroscopy (DBE)
Double Balloon Enteroscopy

- Considered nonsurgical-steerable enteroscopy created by Yamamoto et al in 2000 in Japan-Fujinon ©.
- Two balloons attached at the tip of the enteroscope and overtube (Double Balloon)
- Can be performed orally or rectally
- Can be performed with moderate sedation, MAC or general anesthesia
DBE system

• Standard system includes

• Fuji system (Fujinon EN-450P5)
  – Thin endoscope with a 8.5 cm diameter and 200 cm working length
  – 145 cm soft overtube with an outer diameter of 12.2 mm
    with a precise designed pump.
  – Soft latex balloon attached to scope tip

• A therapeutic DBE scope is available (Fujinon EN-450T5)

• The pressure in both tubes monitored accurately at 6 kPa.
Double-Balloon Endoscopy (DBE)

The new guy in town since 2004 (USA)

Developed by Hironori Yamamoto, released in 2000
Double-balloon method
Double-balloon method
Double-balloon method
Double-balloon method
Double-balloon method
Double-balloon method
Double-balloon method

REDUCTION
Double-balloon method
REDUCTION
Therapies performed during DBE

• Injexion
• Bicap/APC(Argon Plasma Coagulation)
• Biopsy/Polypectomy/EMR
• Endoscopic clips
• Balloon Dilation
• Removal of trapped capsule
• Stent placement
• Gastric Bypass patients/Roux en Y anastomosis-ERCP
Double Balloon Enteroscopy (studies)

- Study by Matsumoto et al (2005) - positive findings in 64% push enteroscopy and 82% in DBE.
- A meta-analysis of 11 studies compared DBE to capsule - yield similar.
  - It was concluded that wireless CE performed first and DBE performed after positive findings on WCE.
Limitations of DBE

- Need to hold anticoagulation
- General anesthesia/MAC
- Day off of work/need a ride
- Adhesions
- Full exam at times not possible
- Post op pain
DBE Complications

- Abdominal pain (20%)
- Perforation (0.3-1%)
- Pancreatitis (<1%)
- Aspiration pneumonia
- Risk of GA
- Serositis from injection
# Capsule Endoscopy vs Double Balloon

<table>
<thead>
<tr>
<th>Device</th>
<th>Inflation</th>
<th>Sedation</th>
<th>Trauma</th>
<th>Control</th>
<th>Bx / Tx</th>
<th>MD Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capsule</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>40 min</td>
</tr>
<tr>
<td>DBE</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>1.5-4 hrs Anes/Xr</td>
</tr>
</tbody>
</table>
Work up order

• Repeat EGD/Colon
• Push Enteroscopy
• Capsule endoscopy
• If abnormality noted:
  – DBE
  – Surgery
  – Watch/treat if possible
Patient preparation-capsule endoscopy-pre arrival

• Strict NPO 10 hours prior to exam
• Medication history-review in advance
• Avoid red dye in food 24 hours prior
• Review patient health history-
• Prep if indicated
• Pacemaker/Defibrillator-no longer contraindication
• Can they swallow large pills????
• Do they have a history of abdominal surgery-risk of pill becoming lodged
Capsule endoscopy-day of exam

- Have patient sign consent-mention possible capsule entrapment
- Confirm history/connect leads-data recorder
- Have patient swallow pill-8 oz water with simethicone-(if unit policy)
- Patient can resume clear liquids/meds-2 hours
- Four hours snack, 6 hours full meal
- Patient to return device 8 hours after exam for download
Double Balloon Enteroscopy pre procedure work up

• Preoperative evaluation crucial to all patients (Anesthesia evaluation)
• Method - antregrade/retrograde
• Type of anesthesia to be used
• What medication are they on - are modifications needed.
• Do they need admission for blood - Cbc one week prior along with other labs if warranted
Post-Procedure DBE care

- Hospital policy where patient recovers
- Determine if patient able to go home
- Do medications need to be added or restarted
- Pathology results
- Follow up- is retrograde required? Surgery?
Case study (cont.)

• Ms. J undergoes a antregrade DBE with general anesthesia. She has a successful exam with an extent of 150 cm past the ligament of treitz. At approximately 40 cm past the ligament of treitz a active bleeding site is noted. The site is localized and bicap cautery is applied along with one endoclip. Bleeding stops instantly. Procedure completed. She is discharged home.

• Two week follow up hospital discharge Hgb 10.5 with no additional bleeding episodes
Questions?

• What type of follow up for this patient?
• Do you resume Plavix? Aspirin? Only one?
• What do you do if patient rebleeds?
• What approach?
• What are the various options?