Obscure GI Bleeding – Role of Capsular Endoscopy

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Objectives

• Define Obscure GI bleeding?
• Procedures used in evaluation & diagnosis of obscure GI bleed?
• Discuss yield, limitation and complications of Video Capsular Endoscopy (CE) relative to the other endoscopy procedures?

Case

In February 2010, a 58 y/o woman was admitted with c/o fatigue and weakness and hematochezia of 1-2 day duration.

Found to have low Hb -8.1, pt. on chronic iron replacement. No hematemesis, (+) FOBT in past. On Coumadin for last 3 months for diagnosis of PE.

Past history: In August 08, hospitalized with iron deficiency anemia and transfused PRBC, (+) FOBT, No NSAID use.

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Case

- November 08, EGD Gastric polyp, Hiatal hernia
- Biopsy: Duodenum – Normal, No morphologic evidence of gluten sensitive enteropathy (sprue), no Giardia, Hyperplastic Antral polyp
- Nov 08, Colonoscopy – Colon polyps, Internal Hemorrhoids.
- Histology: No colitis, (-) microscopic colitis, Rectal polyp negative for melanoma

Hematology consult

- SPEP normal, Hemoglobin Electrophoresis normal, Vitamin B12, Folate, Reticulocyte count normal.
- Peripheral smear – microcytosis, hypochromia, with low MCV in past.
A/P Patient transfused, Coumadin held, INR sub-therapeutic, GI consulted

GI Bleeding Definitions

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
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<tbody>
<tr>
<td>Overt or Visible Bleeding</td>
<td>GI bleeding manifested as visible bright red or altered blood in vomit or stools</td>
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<tr>
<td>Ongoing Bleeding</td>
<td>Initial presentation of iron deficiency anemia and/or positive D8 and/or positive stool occult</td>
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<tr>
<td>Uremia/chronic bleeding</td>
<td>Obliterative of chronic bleeding manifested as persistent chronic diarrhea and/or positive stool occult.</td>
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<tr>
<td>Obscure occult bleeding</td>
<td>Ombiterative of obscure bleeding characterized by recurrent or persistent occult or visible bleeding with no source found at original endoscopy.</td>
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Obscure GI Bleed (OGIB) Definition

Bleeding from the GI tract that persists or recurs without an obvious etiology
- Normal upper and lower endoscopy and
- Normal radiologic evaluation of the small bowel such as small bowel follow-through
- Categorized into obscure overt and obscure occult bleeding based on the presence or absence of clinically evident bleeding


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Obscure GI Bleeding

Frequency

- 10% - 20% of GI bleeding without identifiable etiology
- 5% GI bleeding recurrent without identifiable etiology
  – Majority have small bowel source

Reclassification of Gastrointestinal Bleeding

Upper Tract (Proximal to Ampulla of Vater)
85% -> Esophagus, Stomach, Duodenum

Middle Tract (Ampulla of Vater to ileocecal valve) 5% -> Small intestine

Lower Tract (Distal to ileocecal valve) 10% -> Colon

Small Bowel Bleeding Evaluation

Traditional Imaging and Endoscopy

- Nuclear scan and angiography
- UGI SBFT
- Push Enteroscopy
- Intraoperative Enteroscopy

New Modalities – A Paradigm Shift

- Video Capsule Endoscopy (CE)
- Double balloon Enteroscopy (DBE) or Balloon assisted Enteroscopy (BAE)
- CT and MR Enterography - CT Enteroclysis
**Historical Challenges Related to the Evaluation of OGIB**

- High miss rate for lesions on initial endoscopy
- Limited capacity of older diagnostic modalities of the small bowel
- In 44% to 58% of patients with angioectasias, bleeding stops spontaneously
- Rate of rebleeding is significant and range from 13% to 34%

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**Obscure GI Bleeding**

### Nuclear Scans

- Technetium 99m-labeled red blood cell scan (TRBC)
  - Late pooled blood may not identify bleeding site
  - Can only localize the area of bleed
- Requires bleeding rate of 0.1 to 0.4 mL/min
- Positive in 45% of LGI bleeding
  - Angiography verification highest (67%) when bleeding scan is immediately positive

**Data in obscure bleeding limited**

- 15% false positive, 12-23% false negative
- Need verification by angiography or endoscopy

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### Angiography

- Severe bleeding
- Bleeding rate of 0.5 mL/min
- Positive in 27-77% of acute LGI bleeding
- Positive in 61-72% if,
  - Pt actively bleeding requiring transfusion
  - Hemodynamic compromise
  - TRBC scan shows an immediate blush
- Administer anticoagulants, vasodilators, clot-lysing agents to precipitate bleeding
  - Increased diagnostic yield from 32 to 65%
  - 17% complication rate including excessive bleeding

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### Intraoperative Enteroscopy

- Transfusion dependent - Severe blood loss
- Risk of continued bleeding outweigh the risk of laparotomy
- Identifies bleeding source in 70 – 95%
- Technically difficult
  - Adhesions, luminal blood, infiltrating neoplasia
- Complications (procedure and post op)
  - Perforation, mucosal tears, mesenteric hemorrhage, prolonged ileus, ischemia, wound infection, pneumonia
  - High Mortality rate
Obscure Bleeding
SBFT and Enteroclysis

• SBFT
  0 - 5.6% diagnostic yield – can not dx angiodysplasia

• Enteroclysis
  – Superior to SBFT
  – Double contrast, Tube into proximal small bowel
  – Inject barium, methylcellulose, air
  – Performed with CT and MRI
  – Only 10-21% diagnostic yield
  – Use if capsule endoscopy or enteroscopy unavailable

Push Enteroscopy

• Pass scope beyond the ligament of Treitz
  – Adult or pediatric colonoscope, SB entroscope

• Diagnostic yield: 40-50%

• Angiodysplasia in 80%

• Advantage over capsule endoscopy
  – Sample tissue
  – Endoscopic therapy

Second-Look Endoscopy

• A source of bleeding is frequently overlooked during the first endoscopy in 20% of cases

• The yield is increased when the procedures are done within 48 hours of the acute event

• Second-look endoscopy should always be considered before proceeding to small bowel evaluation: EGD and Colonoscopy

Newer Endoscopic Small Bowel Imaging Modality


History

- Dr. Gavriel Iddan – Senior engineer for Israeli Ministry of Defense initiated the research
- Goal: to create a “tiny missile” to visualize the small bowel.
- Dr. Paul Swain, Dr. Iddan and Dr. Gavriel D. Meron created GIVEN Imaging Ltd – Gastro Intestinal Video Endoscopy
- FDA approved M2A capsule for obscure GI bleed

Features of the Capsule

- Capsule takes two images per second
- On average, 50,000 images are obtained during an 8 hour exam
- Magnification: 8x
- Capsule coating: non-adherent
- Disposable

PillCam™ SB Exam Set

1. The PillCam™ Capsule
2. SensorArray™ SB
3. Given® Data Recorder™
   Or
   SensorBelt
**Wireless Capsule Endoscopy**

**Patient Experience**

- Sensors placed and attached to data recorder
- Easily ingested, painless procedure
- Progresses naturally through the GI tract via peristalsis
- Transmits images to data recorder
- Prep???

**Indications**

- Obscure gastrointestinal bleeding
- Evaluation of extent of small intestinal disorders such as Crohn’s disease or Celiac sprue
- Suspected Crohn’s disease and small bowel tumors
- Suspected malabsorption
- Surveillance of polyposis syndromes involving small intestine
  - Pillcam colon – Role uncertain
  - Pillcam ESO approved for Barrett’s and esophageal mucosal disease
  - pH monitoring under investigation

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Figure 13-16 Representative findings detected by capsule endoscopy. A, An ulcerated gastrointestinal stromal tumor in the jejunum. B, An incidental lipoma was seen in the same patient. C, A large vascular ectasia in the jejunum. D, A stricture and associated ulcer. E, A villous adenoma in the distal duodenum.

(Courtesy of Brian Dobos, MD and Naunag Agrawal, MD, Durham, NC.)

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Figure 112.6 A, Capsule endoscopy photograph of a patient with refractory celiac sprue and multiple erosions (ulcerative enteritis) in the duodenum and jejunum. The capsule image shows villus atrophy and an erosion in the mid jejunum. B, Capsule endoscopy photograph of another patient with refractory celiac sprue and ulcerative enteritis. The capsule image shows a lumen ulceration with exudate, located in the ileum. Duodenal biopsies revealed a clonal T cell population. A, Courtesy of Jeffrey R. Baker, MD, Toronto; B, Courtesy of Naunag Agrawal, MD, and Peter Green, MD, NC.

(Courtesy of Brian Dobos, MD and Naunag Agrawal, MD, Durham, NC.)
Outcomes with CE

- Diagnostic yield 38-83% with PPV of 94-97% and NPV of 83-100% in OGISB
- Findings lead to a change in management in 37-87% of patients
- 50-66% of these patients remain transfusion free
- The rebleeding rate is low (5.6-11%) in patients with negative CE

Limitations, Contraindications and Complications of CE

- Inability to control movement
- No ability to sample tissue or perform therapy
- Potential for missing solitary lesions
- Non specific findings in Crohn’s Disease
- Gastrointestinal obstruction, strictures, or fistulas based on the clinical picture
- Swallowing disorders
- The main complication of WCE is capsule retention by a GI stricture

Non-specific finding on CE

CE findings for Crohn’s disease are not specific. A, B: Aphthous ulcers, typical of Crohn’s disease; C: Geographical ulcers, observed in severe cases of small bowel Crohn’s disease, with strictures associated; D: F Small aphthae, quite often observed in normal people, but, in these cases, in patients with a recent NSAIDs therapy; E: A typical ring shaped stricture associated to NSAIDs. F: An ulcer in a patient with anemia and in treatment with high doses of NSAIDs for arthritis. Rendon-Cereno E. World J Gastro 2010;16(20):179-80
Capsule Retention

- Typically by a GI stricture
- Current visualization of small-bowel strictures uses traditional radiological studies:
  - High-dose radiation
  - False negatives
- Methods do not always reveal small-bowel patency for solids


Patency System

Patency Capsule

28mm long X 11mm diameter (same dimensions as CapsuleSB)

A dissolvable capsule containing a detectable Radio Frequency Identification (RFID) tag and is propelled through the GI tract by natural peristalsis.


Patency Capsule

- Parylene coating
- Lactose body w/barium
- Uncoated exposed window for fluid erosion
- Timer plug
- RFID tag

12mm


Patency Procedure

Capsule disintegrates after 40 hours
Capsule excreted intact in >80% of patients in less than 40 hours

Double Balloon Enteroscopy

- First described by Yamamoto in 2001
- Allows the diagnosis and treatment of disease along the entire length of the small bowel
  - Entire SB visualized in 86% of patients (Yamamoto)
- Also called “push-pull enteroscopy”
- Advanced antegrade or retrograde
- Patient Prep
  - Antegrade: NPO 6-8 hrs
  - Retrograde: Colon prep
- Moderate sedation, propofol, or general anesthesia

Double Balloon (Push-and-Pull) Endoscopy

Advantages over Capsule Endoscopy
- Complete visualization of the entire small bowel to the terminal ileum
- Can do therapeutic interventions
- Allows for sampling/biopsying of small bowel mucosa
- Allows for resection of polyps
- Placement of stents or dilation of small bowel strictures
Double Balloon (Push-and-Pull) Endoscopy

Disadvantages
- Technically difficult procedure
- Very time consuming (Procedure can take > 3 hours)
- Patient may need to be admitted to the hospital
- Higher risk of small bowel perforation
- Case reports of pancreatitis and intestinal necrosis
- Reported incidents of aspiration and pneumonia

Double Balloon Enteroscopy

Complications
- A total of 10 centers (nine academic centers and one teaching hospital) across four continents participated in the study.
- 40/2362 procedures (1.7%) by Mensink
  - 13/1728 diagnostic procedures (0.8%)
  - 27/634 therapeutic procedures (4.3%)
- 12/364 post-polypectomy bleeding (3.3%)
- 3/253 post-Argon Plasma Coagulation perforation (1.2%)
- 2/70 post-balloon dilations perforation (2.9%)

Yield of Small Bowel Imaging Modalities in Obscure GI Bleeding

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<tr>
<th>Length of Insertion</th>
<th>Yield</th>
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<tr>
<td>DBE</td>
<td>61 – 85%</td>
</tr>
<tr>
<td>PE</td>
<td>50 – 150 cm</td>
</tr>
<tr>
<td>WCE</td>
<td>100% SB</td>
</tr>
<tr>
<td>IOE</td>
<td>Up to 100%</td>
</tr>
<tr>
<td>Radiology</td>
<td>100%</td>
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Comparing Endoscopic Modalities

- A total of 14 studies (n = 396) compared the yield of CE with Push Enteroscopy for OGIB.
- The yield for CE and Push Enteroscopy was 63% and 28%, respectively (IY = 35%, p < 0.00001, 95% CI = 26-43%) and for clinically significant findings (n = 376) was 56% and 26%, respectively (IY = 30%, p < 0.00001, 95% CI = 21-38%).
- CE superior to PE
- CE had a higher yield for both vascular and inflammatory lesions
- CE has largely replaced Push Enteroscopy in evaluation of OGIB and is now third test of choice

CE and Intraoperative Endoscopy (IOE)

47 consecutive patients with OGIB
- CE followed by IOE

Results
- IOE successful in all patients and identified a bleeding source in 72.3%
- CE showed the source in 74.4%

Sensitivity 95%   PPV 95%
Specificity 75%   NPV 86%

Meta-Analysis of CE vs DBE
8 Studies
- No difference in overall yield between CE and DBE (OR 1.21 [95% CI: 0.64-2.29])
- However, CE had a higher yield compared to DBE using a single approach (OR 1.61 [95% CI: 1.07-2.43])
- But CE had significantly lower yield compared to DBE using a combined approach (OR 0.12 [95% CI: 0.03-0.52])

CE Guided DBE/BAE
- A screening tool – increase both diagnostic (73-93%) and therapeutic yield (57-73%)
- CE transit times useful in planning
  - Antegrade DBE for lesions within the proximal 75% based on transit time
  - Retrograde DBE for more distal lesions
- A negative CE in patients with low pre-test probability allows for the avoidance of BAE

CE – Guided DBE Shortcomings...
- 11% false negative for all SB findings and 19% for neoplasms
- Reports of neoplasms missed on CE and diagnosed on BAE
- With a negative CE but high clinical suspicion total enteroscopy with DBE/BAE should be pursued
Summary

- Significant improvements in diagnosis and management of patients with OGIB
- In most cases, capsule endoscopy is the initial test of choice
- Deep enteroscopy is the method of choice to endoscopically treat most lesions
- More prospective studies are needed to understand the benefits of endoscopic therapy in terms of clinical outcomes in patient with OGIB