Endoscopic Techniques for Small Bowel Imaging – Going Where No Man Has Gone Before!

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Reasons to Image the Small Bowel

Vascular
- Angioectasia
- Hemangioma
- Dieulafoy lesion
- Portal hypertensive enteropathy
- Varices
- Radiation enteritis

Inflammatory
- Inflammatory bowel disease
- NSAID enteropathy
- Celiac disease
- Autoimmune enteropathy

Neoplastic
- Carcinoid
- GIST
- Adenocarcinoma
- Lymphoma
- Metastases

True obscure causes – hemobilia, hemosuccus pancreaticus, vasculitis
Diagnostic Approach in Patients with OGIB

- Document objective evidence of gastrointestinal bleeding
  - Exclude hematologic causes for anemia
  - Exclude malabsorption
- Sufficiently rule out an upper and lower gastrointestinal tract bleeding source with second-look endoscopy as indicated
- Then proceed with a small bowel evaluation
- Endoscopy remains the cornerstone in the diagnosis and management of OGIB

Obscure GI Bleeding
Principles of Endoscopy in OGIB

• Be prepared to take longer than usual
• Try to do exam while patient bleeding
• Don’t fully correct INR if on anticoagulation
• Clean bowel of blood as you go in
• Use water immersion to identify exact bleeding source

Clinical Case Study

72 year-old old man
• Cardiac stent placed 2 months ago – started ASA and Plavix
• 1 month ago
  • Melena, hemoglobin 8, transfused 2u
  • EGD and colonoscopy negative
• Now
  • Recurrent melena, Hg 9.1
  • EGD and colonoscopy again negative

What next?
Management of Obscure GI Bleeding
The Olden Days – circa 2000

Obscure GI Bleeding
\[ \downarrow \]
Repeat EGD and colonoscopy
\[ \downarrow \]
Push enteroscopy
small bowel x-ray or enteroclysis
\[ \downarrow \]
Angiogram
Intraoperative Endoscopy

Zuckerman et al: AGA position statement and review, Gastroenterology 2000; 118;197, 201
Capsule Endoscopy

Yield of CE Compared to Other Modalities

- Range: 45-83%
- Entire small bowel seen in 80-90%
- CE had an incremental yield of 30% and 36% compared to Push Enteroscopy and SBFT, respectively
- Main utility of CE lies in its high positive predictive value (94-97%) and its high negative predictive value (83-100%)
- It can identify a bleeding lesion and help direct further therapeutic intervention and/or surgery

Deep Enteroscopy

- Overall diagnostic yield: ~ 60% (41%-80%)
- Channel allows therapeutic interventions
  - In 33% of Deep Enteroscopies (12%-70%)
  - APC, bicap, clips, inject, polypectomy, biopsy
- Total enteroscopy is possible (~ 50-70%)
- More Invasive
  - Anesthesia: MAC or general endotracheal
  - Complications low (1-3%) but do occur
- Resource utilization is high
  - Procedure duration >60min
  - Assistants, anesthesia, fluoroscopy

Forcep channel allows biopsy and therapy!
Comparing Deep Enteroscopy Methods

- All are useful techniques
  - Similar yield, safety, learning curve
  - Spiral may allow faster intubation
- Overtubes and balloons
  - DBE has latex (allergy); others don’t
  - Overtubes – one-time use, similar cost
- Altered anatomy (Billroth, gastric bypass)
  - All can reach bypassed stomach
  - All allow successful ERCP; spiral may be more stable platform

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 a significantly lower yield compared to
  DBE using a combined approach
  (OR 0.12 [95%CI:0.03-0.52])

This reinforces the importance of total enteroscopy with DBE
in patients with a high clinical suspicion for a SB lesion
Newer Radiologic Procedures

Cross-sectional imaging (CTE, CTA, MRE)

- May identify small bowel AVMs or tumors
- Diagnostic yield 10-40% (vs 50-80% CE)
- May miss lesions detected by deep enteroscopy (AVM, tumors, Meckel’s)
- Consider before capsule if concern for obstruction
- Consider if ongoing bleeding despite negative capsule or deep enteroscopy

Our Case – Obscure GI Bleeding

72 year-old man

- Recurrent melena, negative EGD/colonoscopy x2
- Capsule endoscopy – multiple small bowel AVMs in first third of small bowel transit time

- Bleeding stopped, anemia resolved
- 12 months later anemia returned and required more interventions
Outcomes with CE

- Diagnostic yield 38-83% with PPV of 94-97% and NPV of 83-100% in OGIB
- 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 a negative CE


Cause of OGIB?
Outcomes After Deep Enteroscopy

- Bleeding source found in up to 75%, but rebleeding occurs in as many as 30%
- Patients with angioectasia or normal exams to the depth of insertion are most likely to report recurrent hemorrhage
- Uncertainty whether angiodysplasia detection and ablation affect long-term outcome because most angiodysplasia not actively bleeding when detected

In the Setting of Recurrent Bleeding

- Next steps are not completely evidence-based
- Don’t forget second-look endoscopy
- In setting of recurrent bleeding
  - Repeat capsule
  - Deep Enteroscopy from opposite route for total enteroscopy
  - CTE or angiography
  - Medical therapy
- Limited data, and clinical experience, suggests benefit for intervention

Gerson: GIE 2008;68:920
Importance of Second Look Endoscopy

65 year-old female with recurrent iron deficiency anemia – colonoscopy negative and upper endoscopy showed “antral erythema”

Cost-Benefit Analysis
PE, DBE, CE-Guided DBE, Angiography, IOE

• DBE most cost-effective approach for overt OGIB
• DBE had the highest success rate for bleeding cessation
• However, it was concluded that CE-guided DBE may be associated with better long-term outcomes due to decreased risk for complications and appropriate resource utilization
CE as a Screening Tool Prior to Deep Enteroscopy

- CE transit times are useful
  - Antegrade approach for lesions within the proximal 75% based on transit time
  - Retrograde for more distal lesions
- Increases both the diagnostic (73-93%) and therapeutic (57-73%) yield
- A negative CE allows for the avoidance of Deep Enteroscopy in patients with a low pre-test probability for SB findings

Hendel JW et al: Scan J Gastro 2008;43:363-77

CE Before BAE

62 year-old male presented with a hemoglobin of 2; colonoscopy negative and upper endoscopy showed angioectasia in the stomach
CE vs Deep Enteroscopy vs CTE/CTA for OGIB
A Reasonable Approach

• For most OGIB patients, CE should be performed before Deep Enteroscopy to direct the best initial route

• For active bleeding in the hospital setting, it may be most cost-effective to go directly to Deep Enteroscopy

• If no source identified, consider CTE or CTA

CE-Guided Deep Enteroscopy
May Not Always Be Applicable

• CE has been found to have a false negative rate of 11% for all SB findings and 19% for neoplasms

• There are reports of neoplasms missed on CE and diagnosed on Deep Enteroscopy

• Therefore, in patients with a negative CE but a high clinical suspicion, CTE and/or total enteroscopy should be pursued

Case Study

- 70 year-old male with overt OGIB for 5 years
- Two negative capsule studies
- Patient referred for Deep Enteroscopy
- CTE performed first
Hamartomatous Polyp

What To Do In Clinical Practice

Bringing it together –
Integrating Capsule and Deep Enteroscopy in obscure GI bleeding
Perform Capsule Endoscopy after Negative EGD and Colonoscopy (and perhaps second look endoscopy)

Review of Capsule Endoscopy

Are findings equivocal and clinical suspicion low?

Consider repeat CE vs Cross-Sectional Imaging vs Observation

Perform Capsule Endoscopy after Negative EGD and Colonoscopy (and perhaps second look endoscopy)

Review of Capsule Endoscopy

Definite submucosal tumor with bleeding

Should patient go directly to surgery? If not, then Deep Enteroscopy should be planned
If Surgery Not Planned, Review of Capsule Endoscopy
Estimate Location to Plan Deep Enteroscopy Approach

0% Small Bowel Transit

0%-75%
Start with Oral Approach

75%-100%
Start with Anal Approach

Approach to Possible Small Bowel Lesion

Positive capsule

Suggests vascular lesion

Treat those in reach with Push Enteroscopy even if not bleeding

Deep Enteroscopy if symptoms persist

For mild anemia, few angiodysplasia, observe with iron therapy, stop antiplatelet therapy if possible

Negative capsule

Mild anemia or low suspicion – observe with iron therapy

If serious problem or suspicion high, then proceed with Deep Enteroscopy and/or Cross-sectional Imaging

Suggests tumor or inflammation

Consider Push Enteroscopy or colonoscopy if in reach

Cross-Sectional Imaging is considered complimentary and often very helpful

Otherwise proceed with Deep Enteroscopy if findings might prevent surgery
Imaging the Small Bowel
Important Points to Remember

- Middle Small Bowel Bleeding in ~75% of OGIB, usually angiodysplasia
- Overlooked upper or lower GI source common; consider second look endoscopy
- Capsule endoscopy is next best test – yield higher if done soon after overt bleeding
- Capsule and deep enteroscopy are complimentary
- Cross-Sectional Imaging is complementary and can be used for bleeding, tumors or inflammation