Enteroscopy in Inflammatory Bowel Disease

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Small Bowel Endoscopy
- Any endoluminal examination of the small bowel, including capsule endoscopy, push enteroscopy, balloon and device assisted enteroscopy
- SB involvement in Crohn’s disease occurs in up to 60% of patients; nearly 30% have isolated SB disease

Why is Enteroscopy so Important?
- Histological confirmation is important
- Recently validated criteria for reporting findings and confirming dx of Crohn’s on capsule endoscopy
- Multiple things can mimic Crohn’s on capsule endoscopy including NSAID enteropathy, infections, or malignancy
- Endoscopic remission is becoming the goal of therapy and enteroscopy may have a role in assessment

Capsule Endoscopy
- Useful in patients with high clinical suspicion of CD despite negative radiological and conventional endoscopy
- Prospective study showed superiority of CE over standard small bowel imaging
- Can be used in established CD with unexplained symptoms like persistent anemia, abdominal pain, or malabsorption
- Strictures should be excluded before CE
- Normal CE has a high negative predictive value for active CD

Guidelines (OMED ECCO)
- Device assisted enteroscopy can be used if:
  - Conventional studies, including ileocolonoscopy and radiographic imaging, have been inconclusive
  - Histological diagnosis would alter disease management
  - Therapeutic maneuvers are required

But…..
- Capsules fail to reach the cecum in as many as 25% of patients
- Patients with known CD have a risk of capsule retention of 6-13%
- Only recently has there been diagnostic criteria for the diagnosis of Crohn’s disease
  - Lewis score and CECDAI
  - Most people used > 3 ulcerations in the absence of NSAIDs

Thus the Development of Deep Enteroscopy
Advantages of Enteroscopy

- Real time viewing of the small bowel
- Ability to sample the small bowel
- Ability to perform therapeutic interventions such as:
  - Dilation with TTS balloons
  - Hemostasis
  - Polypectomy
  - Stent insertion
  - Tattoo of lesions allowing targeted surgical intervention
  - Retrieval of foreign bodies (i.e. capsule endoscopy)

Double Balloon Enteroscopy

- Developed in 2001 by Prof Yamamoto
- Inflatable balloon allows better mucosal grip of the enteroscope and the overtube helps to stabilize position within the lumen
- Push-pull technique
- Surprisingly a-traumatic
- Most therapeutic maneuvers possible
- Short learning curve for most accomplished, patient endoscopists!

Endoscopic Findings of Crohn’s Disease during DAE

<table>
<thead>
<tr>
<th>Endoscopic finding</th>
<th>Description</th>
</tr>
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<tbody>
<tr>
<td>aphthoid ulcer</td>
<td>small, shallow depressed lesion with loss of villi</td>
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<tr>
<td>lamina propria ulcer</td>
<td>typical Crohn’s ulcer, usually occurring on the mesenteric side of the intestine</td>
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<tr>
<td>cobblestone appearance</td>
<td>result of inflammatory changes and edema in the mucosa left by ulcers</td>
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<tr>
<td>strictures</td>
<td>repeated formation and healing of ulcers causes circumferential contraction of the intestinal mucosa</td>
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<tr>
<td>fibrosis</td>
<td>usually occurs proximal to a stricture</td>
</tr>
<tr>
<td>pseudo-obstruction</td>
<td>multiple strictures may lead to the formation of pseudo diverticula</td>
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<tr>
<td>re-epithelial lesions</td>
<td>both adenocarcinoma and lymphoma may occur in intestinal CD</td>
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Currently Available Tools

- Push enteroscopy – has working channel of 220-250cm
  - Allows visualization of proximal small bowel, usually up to about 100 cm distal to the Ligament of Trietz
  - Can also use a pediatric colonoscope
  - Widely available
  - Largely replaced now by balloon-assisted techniques
Single Balloon Enteroscopy
- Second on the scene
- Silicone balloon (not latex) on a flexible overtube
- Push and pull technique
- Also a-traumatic
- Most therapeutic maneuvers possible
- Short learning curve
- Seems to get a good exam 50-70% of the time
- Less set up time, less confusion
  - Only one balloon to worry about

Spiral Enteroscopy
- Another overtube based method
- A raised spiral attached to a locking overtube (118 cm long)
- Scope is advanced by rotating the overtube and bowel is actually pleated on to the overtube
- Allows rapid and deep intubation of the small bowel
- Spiral, rotational technique

DBE in Crohn’s Management
- 5 large tertiary DBE centers in the US from 2004-2009
- 98 procedures in 81 patients with known (38) or suspected (43) Crohn’s disease
- Indications: bleeding, abnormal imaging, abdominal pain, stricture, diarrhea, retained capsule
- Diagnostic yield = 87% overall
- In known Crohn’s patients, yield = 87%
  - Recurrent Crohn’s disease confirmed (11/38)
  - CD stricture (5/38)
  - Exclusion of Crohn’s disease (9/38)
  - Non-specific ulceration (2/38)
  - Anastomotic ulceration (2/38)
  - Function obstructions (3/38)
- DBE impacted management in 79% of patients (in known CD it was 82%)
- DBE was safe – (1 fever and 1 perforation)

Safety of Deep Enteroscopy

- Adverse event rate of 1% for diagnostic exams in Crohn’s Disease (similar for other indications)
- Main complications are sedation risks, bleeding, pancreatitis, and perforation

How does DAE compare to other Modalities?

- DAE versus capsule endoscopy
  - Incomplete small bowel visualization occurs in up to 30% of CE investigations
  - Studies comparing CE to DBE have shown significant small bowel abnormalities missed on capsule

Abnormal Capsule Findings

Evaluation of Prior Ileostomy Site in a Patient s/p IPAA

Path = Acute and chronic enteritis

Recurrent pSBO in Patient with Normal CT and Normal SBFT

Stricture dilated to 12mm

BUMC Experience of Deep Enteroscopy in IBD
Stricture Dilation
- Balloon enteroscopy with stricture dilation has a reported perforation risk of 0-3%
- Comparable to risk of dilation of colonic strictures
- Single center in Australia
  - 15 patients with 25 dilations – 10 with Crohn’s disease
  - 80% had clinical improvement after dilation
  - Complication rate was 8% with 2 perforations – both in patients with Crohn’s (both had strictures with mild ulceration and were dilated to 15mm)


Patient Failing Remicade Therapy for Crohn’s – CT showing small bowel thickening

Path = Histoplasmosis

Tools of the Future...
Power Spiral
- Disassemble a pediatric colonoscopy
- Insert a motor in the handle with a drive shaft down the insertion tube
- Different spiral configurations mounted on the scope
- Forward/reverse rotation controlled by a foot pedal
- Currently in clinical trials

Conclusion
- Although deep enteroscopy is invasive, it can be used safely as a complementary tool to capsule endoscopy and small bowel imaging for the diagnosis and management of Crohn’s disease
- Larger, prospective trials comparing the different modalities, especially in Crohn’s disease, are needed

Introduction
Deep enteroscopy in order to examine the small bowel is performed by capsule, double balloon enteroscopy or by the use of a motorized endoscope. These modalities have been found to be effective in detecting lesions missed on radiology. However, these modalities are limited by the need for repeated imaging, the risk of capsule retention and the potential for perforation. Newer technology such as the power spiral enteroscope can be used to achieve total enteroscopy with relative ease and a short procedure time compared to other modalities. We suspect that the Meckel’s diverticulum was not visualized using other modalities. We report the case of a patient with recurrent gastrointestinal bleeding secondary to a Meckel’s diverticulum that was successfully treated with a novel motorized spiral enteroscope.

Case Presentation
A 33 year-old white male with no significant past medical history presented with recurrent red blood per rectum. In the past, he had a total of 5 colonoscopies and 3 EGDs and a PillCam SB3 study but all have been unrevealing. He has never had hematemesis or melena. Denies NSAIDs use.

The most common source of the lower gastrointestinal bleeding is colon, Treitz. Nearly 80% of this bleeding in adults originates proximal to the ligament of

Medications: No NSAIDs or OTC medications. Not on any regular medications.

Allergies: No known allergies.

Family history: No IBD or known GI diseases or cancers.

Social history: Denies tobacco, ETOH or illicit drug use.

Past history: recurrent GI bleeding, underwent procedures as mentioned in past history.

ROS negative except as mentioned in HPI

HPI
This episode started 3 weeks ago when he had a large episode of painless hematochezia that continued for about 3 days. This episode started 3 weeks ago when he had a large episode of painless hematochezia. His hemoglobin was 8.0. He underwent an uneventful laparoscopic Meckel’s diverticulectomy which revealed a large Meckel’s diverticulum with gastric mucous and ulceration. He has had no further bleeding.

Two days after the total enteroscopy, the patient presented with further hematochezia. His hemoglobin was 10.7 at that time. EGD was unrevealing. Colonoscopy showed blood in the rectum. He was admitted with symptomatic anemia and was given 5 units of PRBCs. Hgb was 14.3 at discharge.

Subsequently, ileocecal valve was examined. Shortly after colonoscopy, he underwent a CT angiogram that was negative and the next day had a tagged RBC scan that was also negative. 150 cm proximal to the ileocecal valve was negative and the next day had a tagged RBC scan that was also negative.

Course of events:

Rectal exam: no blood, no external hemorrhoids or anal fissure.

Abdomen: soft, non tender, non distended, + bowel sounds, no palpable organs or masses.

Chest: clear, good air entry bilaterally.

Vital signs: BMI 28, BP 102/66, HR 67, Temp 97.2

Pertinent physical exam:

Power Spiral

Discussion
The motorized spiral enteroscope is a promising new technology that can achieve complete enteroscopy with relative ease and a short procedure time compared to other modalities. We suspect that the Meckel’s diverticulum was not visualized using other modalities. We report the case of a patient with recurrent gastrointestinal bleeding secondary to a Meckel’s diverticulum that was successfully treated with a novel motorized spiral enteroscope.

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Larger, prospective trials comparing the different modalities, especially in Crohn’s disease, are needed.

Deep Enteroscopy

Gastrointestinal bleeding is a major cause of emergency hospital admission, accounting for 2% of all admissions. It is estimated that 1 in 200 will experience gastrointestinal bleeding at some point in their lifetime. The lower gastrointestinal tract is the most common source of bleeding, occurring in up to 80% of cases. The most common source of the lower gastrointestinal bleeding is colon, Treitz. Nearly 80% of this bleeding in adults originates proximal to the ligament of

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