Participating in the Webinar

All attendees will be muted and will remain in Listen Only Mode.

Type your questions here so that the moderator can see them. Not all questions will be answered but we will get to as many as possible.
How to Receive CME and MOC Points

LIVE VIRTUAL GRAND ROUNDS WEBINAR
ACG will send a link to a CME & MOC evaluation to all attendees on the live webinar.

ABIM Board Certified physicians need to complete their MOC activities by December 31, 2021 in order for the MOC points to count toward any MOC requirements that are due by the end of the year. No MOC credit may be awarded after March 1, 2022 for this activity.

MOC QUESTION
If you plan to claim MOC Points for this activity, you will be asked to: Please list specific changes you will make in your practice as a result of the information you received from this activity.

Include specific strategies or changes that you plan to implement. THESE ANSWERS WILL BE REVIEWED.
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Somashekar G. Krishna, MD, MPH, FACG
May 13, 2021 at Noon Eastern

Week 20, 2021
ACG Clinical Guidelines: Colorectal Cancer Screening 2021
Aasma Shaukat, MD, MPH, FACG
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Visit gi.org/ACGVGR to Register

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Allyship and Action: In Solidarity Against Anti-Asian Racism
MONDAY, MAY 10, 8-9:30 PM EDT

Moderators
Samir A. Shah, MD, FACG
Immanuel K. H. Ho, MD, FACG

Speaker
Stella S. Yi, PhD, MPH

Panel
William D. Chey, MD, FACG
Monica Nandwani, NP
Linda Anh B. Nguyen, MD
Calvin Q. Pan, MD, FACG
Chung Sang Tse, MD

Register: gi.org/ACGVGR

#Glhomeschooling

American College of Gastroenterology
Small Bowel Bleeding

Carol E. Semrad, MD, FACP
Professor of Medicine
Director, Small Bowel Disease and Nutrition
Small Bowel Bleeding

• 5% of GI bleeders
• Most difficult and costly bleeders

Small Bowel Bleeding Outline

• Terminology
• Small Bowel Endoscopic and Imaging Modalities
• Making a Diagnosis/Therapy
### Terminology

#### Suspected Small Bowel Bleeding
- No source found at upper/lower endoscopy
- Blood in terminal ileum
  
  Micic et al. Plos One 2019;20:1-10

#### Obscure GIB (NEW Definition)
- No source after comprehensive endoscopic and radiologic evaluation of the GI tract

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#### Wireless Capsules
- 1998

#### Device-Assist Enteroscopy
- 2003

#### Mulphase CT Enterography
- 2011

- Radiofrequency
- Spiral Devices
- Electric Field Propagation
- Overube
- Motorized
- Through Scope Balloon

Huprich et al. Radiology 2011;260:744 Huprich et al. AJR 2013;201:65
### Small Bowel Bleeding Imaging Modalities

<table>
<thead>
<tr>
<th>Test</th>
<th>Diagnostic Yield</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small Bowel Barium</td>
<td>5%</td>
</tr>
<tr>
<td>Push Enteroscopy</td>
<td>30%</td>
</tr>
<tr>
<td>Multi-Phase CT Enterography</td>
<td>48%</td>
</tr>
<tr>
<td>Capsule Endoscopy</td>
<td>38-83%</td>
</tr>
<tr>
<td>Device-Assist Enteroscopy</td>
<td>51-80%</td>
</tr>
<tr>
<td>Intraoperative Enteroscopy</td>
<td>75-90%</td>
</tr>
</tbody>
</table>

Triester et al. Am J Gastroenterol 2005;100:2407
Huprich et al. Radiology 2011;260:744
Gerson et al. ACG Clinical Guideline, Am J Gastroenterol 2015;110:1265

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### Small Bowel Capsule Endoscopy

**What is it good for?**

- Flat mucosal lesions
- Yield highest
  - When performed within first 24-72 hrs in overt bleeding¹
- Guides therapeutic approach
  - Lesion < 60% SB transit time, upper DAE approach²
- Yield of repeat capsule ~ 40% when³
  - Change from occult to overt bleed
  - Hemoglobin drop > 4 g/dl

¹Rondonotti et al. ESGE guidelines. Endoscopy 2018;50:423.
²Li et al. Endoscopy 2009;41:762
³Viazis et al. Gastrointest Endosc 2009;69:850
Small Bowel Capsule Endoscopy Limitations

- No sampling, therapy
- Reliability
  - 30% false positive reads
  - 20% incomplete studies
  - 18% missed mass lesions
  - May miss jejunal/Meckel diverticulum
- Capsule retention in SB
  - CTE or patency capsule in high risk pt


Device-Assist Enteroscopy

Push and Pull

Rotational

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Comparison of Enteroscopy Devices
Double vs. Single Balloon vs. Spiral

- Diagnostic yields similar 50-80%
- Summary of small studies
  - DBE – deepest insertion
  - SBE – easiest set-up
  - Spiral – fastest
- Complications similar
  - Perforation, pancreatitis (0.3%)
- All get deeper than push enteroscopy
  - 80 cm vs 230 cm depth
  - 44% vs 62% diagnostic yield

May et al. Am J Gastro 2010;105:575
Morgan et al. Gastro Endosc 2010;72:992
Domagk. Endoscopy 2011;43:472
Takano. Gastro Endosc 2011;73:734
Messer. Gastro Endosc 2013;77:241

Device-Assist Enteroscopy

Advantages
- Allows therapy
- Best yield when performed within 24-72 hrs of overt bleed\(^1,2\)
- Sampling, lesion marking
  - Minimally invasive surgery
- Best modality for Meckel diverticulum
  - 40% false negative, adult Meckel scans

Limitations
- Labor intensive
- Steep Learning Curve
  - 150 cases to achieve total exam\(^3\)
- Incomplete examinations

\(^1\) Aniwan et al. Endosc Int Open 2014;2:E90-5
\(^2\) Rodrigues et al. Eur J Gastroenterol Hepatol 2018;30:1304
\(^3\) Gross, Stark. Gastrointest Endosc 2008;67:898
CT Enterography

Advantages
- Best at detecting
  - Mass lesion > 5mm size
  - Wall thickening, stenosis
- Localization, size

Disadvantages
- Poor for vascular lesions unless brisk bleed
- Limited ability for embolization in small bowel

Suspected Small Bowel Bleeding

- Making a diagnosis
- What is the best initial test?
Causes of Small Bowel Bleeding

- AVM: 60%
- Ulcer: 16%
- Tumor: 10%
- Other: 14%

DBE - U.S.A. multi-center study
Mehdizadeh et al. Gastrointest Endosc. 2006;64:740

Small Bowel Bleeding
Age Guides Best Initial Test for Diagnosis

Young age (< 40 yrs)
- Ulcer (Crohn/NSAID)
- Tumor/polyp
- Meckel diverticulum
- Hereditary vascular lesions

Older age/Co-morbidities
- Vascular lesions
- NSAID injury
Important Physical Findings

• Mucocutaneous telangiectasias
  - HHT

• Hyperpigmentation lip/skin
  - Peutz Jeghers Syndrome

• Skin hemangiomas
  - Blue Rubber Bleb Nevus Syndrome

• SEM of severe aortic stenosis
  - Anigoectasias, Heyde’s Syndrome

Case

• 26 y.o. woman, 35 wks pregnant

• History of unprovoked GI bleed (melena) 2 yrs ago
  – EGD, colonoscopy, CE, Meckel scan: All negative
  – Told to have CTA if she had recurrent bleeding

• Now with recurrent overt GI bleeding (melena)

• Transfused 8 Units PRBC

• ? Best test for diagnosis
  – 40% yield on repeat CE
  – CTE/MRE
• Mother given steroid injections to mature fetal lung at 35 wks
• Admitted to hospital for induced delivery
• Standby for emergency C section and tumor resection if GI bleeding with delivery

Lessons

• Beware unexplained overt GI bleeding in the young
• CE misses ~ 20% of small bowel mass lesions
• Retrospective review of her first CE showed debris in proximal SB
• Yield of repeat CE good when recurrent overt bleeding
• Consider CTE/MRE as the first test in young with overt bleeding
What is Safe to Remove in Small Bowel?

<table>
<thead>
<tr>
<th>Lesion</th>
<th>Technique/Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>Polyps</td>
<td>Hexagonal snare if large, inject epinephrine to shrink Tattoo stalk, clip site ↑ bleeding risk with piecemeal resection</td>
</tr>
<tr>
<td>Foreign body</td>
<td>Retrieval net for capsules overtube as shield for sharps</td>
</tr>
<tr>
<td>Hemangiomas</td>
<td>↑ size, depth If small size, polypectomy, APC, sclerosing agent using EUS</td>
</tr>
<tr>
<td>Submucosal mass</td>
<td>Perforations reported for polypectomy of carcinoid, lipoma</td>
</tr>
</tbody>
</table>

Treatment of Polyps – Hamartomas (PJS)

- Find polyp stalk
- Position polyp
- Use hexagonal snare
- If large polyp
  - Inject epinephrine 1:100,000, shrink head
  - Mark stalk with ink
  - Clip stalk after resection
Lesion Marking, Laparoscopic Resection

• Indication
  – Subepithelial mass lesion
  – Ulcer/stenosis

• Device-assist Enteroscopy
  – Biopsy lesion
  – Tattoo at 2 sites

• Surgical resection
  – Intracorporeal (laparoscopic, internal)
  – Extracorporeal (open, mini-lap, external)

Tapaskar et al Abstract DDW 2018
Yeh et al. Surg Endosc 2009;23:739

Small Bowel Vascular Lesions

• Acquired most common
  – Angioectasias
  – Dieulafoy lesion

• Hereditary hemorrhagic telangiectasia (HHT)
  – Autosomal dominant, 1:5,000 worldwide
  – Mutations disrupt TGF-β pathways in vascular endothelial cells
  – Epistaxis most common cause of bleeding/anemia
  – GI bleeding in 30%
  – AVMs liver, lung, brain
  – Juvenile polyposis-HHT with SMAD4 mutation

1McDonald et al. Int J Colorectal Dis 2020;35:1963
Angioectasia

- Most common cause of SB bleeding in elderly
- Upper SB most common site
- Overt or occult GI bleeding
- Risk factors
  - Aortic Stenosis (Heyde syndrome)
  - Von Willebrand disease
  - Chronic renal failure
  - Left Ventricular Assist Device (LVAD)
  - Smoking
- Most common finding on CE performed for OGIB in U.S.A.

VEGF = Vascular Endothelial Growth Factor

Modified from Sami et al.
Aliment Pharmacol Ther 2014;39:15

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Diagnosis Small Bowel Vascular Lesions

- Capsule Endoscopy
  - Best test for flat lesions
  - Least invasive, best tolerated
  - Guides therapy

- Device-Assisted Enteroscopy
  - Invasive
  - Allows therapy

- Multiphase CT Enterography
  - Uncertain yield for vascular lesions
  - Embolization therapy in SB limited due to ischemia risk

Endoscopic Classification Guides Therapy

**Venous Angioectasias**
- Patchy Erythema > 1 mm

**Arterial AVM**
- Red Protrusion, Venous Dilation

**Dieulafoy lesion**
- Red Protrusion
- Pulsatile

References:
Yano. Gastrointest Endosc 2008;67:169
Yano. Gastrointest Endosc 2016;83:809
CASE

- 73 y.o. with CHF S/P LVAD on warfarin
- Recurrent overt bleeds
- Duodenal angioectasias treated in past
- Presents with melena, EGD negative
- VCE:
  - Red blood without underlying lesion
  - Starting at 17% of SB transit time

Outcomes in Small Bowel Bleeding

<table>
<thead>
<tr>
<th>Study DBE</th>
<th>Age yrs</th>
<th>Bleed type</th>
<th>Lesions</th>
<th>F/U mo</th>
<th>Rebleed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sun¹, China N=119</td>
<td>42</td>
<td>overt &gt; occult</td>
<td>AVM 30%</td>
<td>18</td>
<td>11%</td>
</tr>
<tr>
<td>Arakawa², Japan N=162</td>
<td>63</td>
<td>overt &gt; occult</td>
<td>AVM 23%</td>
<td>18</td>
<td>7%</td>
</tr>
<tr>
<td>Gerson³, USA N=135</td>
<td>68</td>
<td>overt = occult</td>
<td>AVM 43%</td>
<td>30</td>
<td>42%</td>
</tr>
<tr>
<td>May⁴, Germany N=50</td>
<td>68</td>
<td>overt &gt; occult</td>
<td>AVM 80%</td>
<td>55</td>
<td>41%</td>
</tr>
</tbody>
</table>

²Gastrointest Endosc 2009;69:866   ⁴Endoscopy 2011;43:759
Which Patients Will Rebleed? Unrelated to NSAID/warfarin use

- Small bowel non-vascular diseases (n=30)
- Small bowel vascular disease (n=37)
- Absence of comorbidities (n=17)
- Presence of comorbidities (n=13)

Medical Therapy

<table>
<thead>
<tr>
<th>Agent</th>
<th>Mechanism</th>
<th>Re-bleeding</th>
<th>Side Effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Octreotide1</td>
<td>splanchnic flow, vascular resistance, inhibits angiogenesis</td>
<td>decreased p &lt;0.04</td>
<td>low</td>
</tr>
<tr>
<td>Thalidomide2</td>
<td>inhibits angiogenesis</td>
<td>decreased p &lt;0.001</td>
<td>high</td>
</tr>
<tr>
<td>Anti-VEGF3</td>
<td>inhibits VEGF</td>
<td>case reports in HHT</td>
<td>high</td>
</tr>
</tbody>
</table>

2. Gastroenterology 2011;141:1629
**Suspected Small Bowel Bleeding**

- **Brisk (rare)**
  - Angiography
  - DAE
  - Surgery

- **Overt/Occult**
  - VCE
  - CTE/MRE
  - Negative patency capsule

- **Young, obstructive sx, CD**
  - DAE
  - Surgery
  - Multiple, HHT
  - Recurrent bleeding
  - Medical or Conservative Therapy
  - LVAD, co-morbidities

- **vascular lesion**
  - DAE Therapy
- **mass ulcer**
  - DAE Surgery

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**DAE** = Device-Assist Enteroscopy  
**HHT** = Hereditary hemorrhagic telangiectasia  
**Gerson ACG Clinical Guideline, Am J Gastroenterol 2015;110:1265**

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**Small Bowel Bleeding**

**Take Home Points**

- Age, clinical presentation guides differential and best initial test for diagnosis
- In the young overt bleeder with a negative capsule study
  - Further assess for tumor (CTE/MRE) and Meckel diverticulum (DAE)
- CE and DAE have highest diagnostic yield
  - When performed within the first 2 weeks of overt bleeding
- Re-bleeding common after endoscopic therapy of vascular lesions
  - Second DAE for therapy may be of benefit
  - If co-morbidities, medical or conservative therapy (iron/transfusions)
  - If severe AS, fix valve
- Tattoo small bowel lesions to allow minimally invasive surgery
Questions?

Speaker: Carol E. Semrad, MD, FACG

Moderator: Dejan Micic, MD