Small Bowel Bleeding
Diagnosis and Management
Diagnosis and management

• Definition
Diagnosis and management

• **Definition**
  
  – **Gastrointestinal bleeding from a source** of bleeding identified **distal to the ampulla of Vater and proximal to the ileocecal valve**

  • **Overt small bowel bleeding** refers to patients presenting with either melena or hematochezia

  • The term **occult small bowel bleeding** is reserved for patients presenting with iron-deficiency anemia w/o a positive FOBT
• **Definition**

  – *In the past* the term **obscure GI bleeding** included patients with overt or occult GI bleeding who underwent normal upper and lower endoscopic examinations revealing no source of bleeding.

  – *Today* the term **obscure GI bleeding** should be reserved for patients not found to have a source of bleeding after performance of upper and lower endoscopy and small bowel evaluation (VCE and/or enteroscopy and radiographic testing)
Diagnosis and management

Upper gastrointestinal bleeding

Small bowel bleeding
- Source of bleeding is identified distal to the ampulla of Vater and/or proximal to the ileocecal valve

Lower gastrointestinal bleeding

## Categories of GI bleeding

<table>
<thead>
<tr>
<th></th>
<th>Prevalence</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Upper GI-bleeding</strong></td>
<td>80-90 %</td>
<td>Proximal to the ampulla of Vater</td>
</tr>
<tr>
<td><strong>Small bowel GI-bleeding</strong></td>
<td>ca. 5 %</td>
<td>Distal to the ampulla of Vater and/or proximal to the ileocecal valve</td>
</tr>
<tr>
<td><strong>Lower GI-bleeding</strong></td>
<td>10-20 %</td>
<td>Distal to the ileocecal valve</td>
</tr>
</tbody>
</table>

*Up to 30-40% of unexplained iron deficiency anemia is due to SB bleeding*

---

Diagnosis and management

- Etiology of small bowel bleeding
- Endoscopic visualization of the small intestine
  - Intraoperative enteroscopy
  - Push enteroscopy
  - Balloon-assisted enteroscopy
  - Video capsule enteroscopy
- Radiographic techniques
- Treatment of small bowel bleeding
- Algorithms for small bowel bleeding
Diagnosis and management

• Etiology of small bowel bleeding
Diagnosis and management

• **Etiology of small bowel bleeding**
  
  – The *cause of SB bleeding* is *manifold*
  
  – The type of lesion responsible for small bowel bleeding is *dependent on patient age*.
  
  – *Common causes* of small bowel bleeding are found *75%* of patients with suspected small bowel bleeding
  
  – *Rare causes* account for roughly *25%* of patients
Diagnosis and management

• Etiology of small bowel bleeding

<table>
<thead>
<tr>
<th>Common causes of mid-gastrointestinal bleeding</th>
</tr>
</thead>
<tbody>
<tr>
<td>75% of patients with suspected small bowel bleeding</td>
</tr>
<tr>
<td>Age &lt; 40 years</td>
</tr>
<tr>
<td>---</td>
</tr>
<tr>
<td>• Inflammatory bowel disease</td>
</tr>
<tr>
<td>• Dieulafoy’s lesions</td>
</tr>
<tr>
<td>• Neoplasia</td>
</tr>
<tr>
<td>• Meckel’s diverticulum</td>
</tr>
<tr>
<td>• Polyposis syndromes</td>
</tr>
</tbody>
</table>
## Diagnosis and management

- **Etiology of small bowel bleeding**

### Rare causes of mid-gastrointestinal bleeding

<table>
<thead>
<tr>
<th>Causes</th>
<th>Rare Causes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Henoch–Schoenlein purpura</td>
<td>Osler–Weber–Rendu syndrome</td>
</tr>
<tr>
<td>Small bowel varices a/o portal hypertensive enteropathy</td>
<td>Kaposi’s sarcoma with AIDS</td>
</tr>
<tr>
<td>Amyloidosis</td>
<td>Ehlers–Danlos syndrome</td>
</tr>
<tr>
<td>Blue rubber bleb nevus syndrome</td>
<td>Hematobilia</td>
</tr>
<tr>
<td>Aorto-enteric fistula</td>
<td>Plummer–Vinson syndrome</td>
</tr>
</tbody>
</table>
• Etiology of mid-GIB
  – Angioectasia are the most common cause of small bowel bleeding
  – Risk factors
Diagnosis and management

• **Etiology of mid-GIB**
  – *Angioectasia* are the **most common cause** of small bowel bleeding
  – **Risk factors**
    • Advancing age
    • Presence of aortic stenosis (Heyde`s syndrome)
    • Chronic renal failure
    • Left ventricular assist devices
Diagnosis and management
Diagnosis and management

Small bowel CD

Small Bowel Bleeding
Diagnosis and management

**NSAID-enteropathy** (Ulcers/erosions)

Albert et al.; DMW 208;133:1136-1141
Diagnosis and management

Vascular malformation
Diagnosis and management

Vascular malformation

Meckel's diverticulum
Diagnosis and management

Tumor

Polyposis syndromes

F. Wiedbrauck, Endo
heute 2010;23:129-136
Diagnosis and management

Endoscopic evaluation of the small intestine
# Endoscopic evaluation of the small intestine

<table>
<thead>
<tr>
<th>Technique</th>
<th>Clinical available since</th>
</tr>
</thead>
<tbody>
<tr>
<td>„sonde“ method</td>
<td>First described in 1972</td>
</tr>
<tr>
<td>„ropeway“ method</td>
<td>First described in 1972</td>
</tr>
<tr>
<td>Intraoperative enteroscopy</td>
<td>1970</td>
</tr>
<tr>
<td>Push enteroscopy</td>
<td>1980</td>
</tr>
<tr>
<td>Video capsule endoscopy</td>
<td>2001</td>
</tr>
<tr>
<td>Double-balloon enteroscopy</td>
<td>2004</td>
</tr>
<tr>
<td>Single-balloon enteroscopy</td>
<td>2006</td>
</tr>
<tr>
<td>Spiral enteroscopy</td>
<td>First described 2007</td>
</tr>
</tbody>
</table>
Intraoperative enteroscopy (IOE)

- Performed since 1970
- In generell performed through a surgical incision in the small bowel
Intraoperative enteroscopy (IOE)

- Performed since 1970
- In general performed through a surgical incision in the small bowel
- Most reliable method to achieve complete SB evaluation
- It is highly invasive
- Major complications
  - Serosal tears
  - Avulsion of mesenteric vessels
  - Prolonged ileus
  - Mortality rate of 17%
Intraoperative enteroscopy (IOE)

- Performed since 1970
- In general performed through a surgical incision in the small bowel
- Most reliable method to achieve complete SB evaluation
- It is highly invasive
- **Major complications**
  - Serosal tears
  - Avulsion of mesenteric vessels
  - Prolonged ileus
  - Mortality rate of 17%

**IOE is generally regarded as a last resort or for patients requiring lysis of adhesions for successful deep enteroscopy.**
**Push enteroscopy**

- Performed with a long endoscope
  - Pediatric colonoscope or
  - Commercially available push enteroscope (250 cm in length)
    - Available since 1980
- May be used with an overtube (to reduce looping in the stomach)
**Diagnosis and management**

**Push enteroscopy**

- Performed with a long endoscope
  - Pediatric colonoscope or
  - Commercially available push enteroscope (250 cm in length)
    - Available since 1980
- May be used with an overtube (to reduce looping in the stomach)
- Allows **limited evaluation of the proximal SB** (between 45-70 cm distal to the ligament of Treitz)
- **Ideal second-look procedure**
Push enteroscopy

- Performed with a long endoscope
  - Pediatric colonoscope or
  - Commercially available push enteroscope (250 cm in length)
    - Available since 1980
- May be used with an overtube (to reduce looping in the stomach)
- Allows **limited evaluation of the proximal SB** (between 45-70 cm distal to the ligament of Treitz)
- **Ideal second-look procedure**
  - because it allows to examine the distal duodenum and proximal jejunum (SB segment not always well seen with VCE)
Video capsule endoscopy (VCE)

- Introduced for clinical use in 2001
- Four VCE platforms:
  1. PillCamSB3, Given Imaging
  2. Endocapsule, Olympus
  3. MiroCam, IntroMedic
  4. OMOM, JinshanScience

- Technique
Diagnosis and management

Video capsule endoscopy (VCE)

• Introduced for clinical use in 2001
• Four VCE platforms:

1. PillCamSB3, Given Imaging
2. Endocapsule, Olympus
3. MiroCam, IntroMedic
4. OMOM, JinshanScience

• Technique
  – VCE measures 26 mm x 11 mm
  – adaptive frame rate technology (2-6 frames/s)
  – 50000-60000 images over a period of 8 – 12 h
Diagnosis and management

Video capsule endoscopy (VCE)

• Introduced for clinical use in 2001
• Four VCE platforms:

1. PillCamSB3, Given Imaging
2. Endocapsule, Olympus
3. MiroCam, IntroMedic
4. OMOM, JinshanScience

• Technique
  – VCE measures 26 mm x 11 mm
  – adaptive frame rate technology (2-6 frames/s)
  – 50000-60000 images over a period of 8 – 12 h
Previous capsules limited by fixed frame rate
Diagnosis and management

Video capsule endoscopy (VCE)

• Compared to intraoperative enteroscopy VCE has a sensitivity of 95% and a specificity of 75%
  (Hartmann et al., Gastrointest Endosc 2005;61: 826-32)

• Main advantages:
Video capsule endoscopy (VCE)

• Compared to intraoperative enteroscopy VCE has a sensitivity of 95% and a specificity of 75%
  (Hartmann et al., Gastrointest Endosc 2005;61: 826-32)

• Main advantages:
  – VCE allows noninvasive evaluation of the entire SB in 79-90% of patients
  – Well tolerated by patients
  – High positive (94-97%) and negative predictive value (83-100%) in the evaluation of GI bleeding
Video capsule endoscopy (VCE)

• Compared to intraoperative enteroscopy VCE has a sensitivity of 95% and a specificity of 75%
  (Hartmann et al., Gastrointest Endosc 2005;61: 826-32)

• Main advantages:
  – VCE allows noninvasive evaluation of the entire SB in 79-90% of patients
  – Well tolerated by patients
  – High positive (94-97%) and negative predictive value (83-100%) in the evaluation of GI bleeding

Diagnostic yield
Video capsule endoscopy (VCE)

• **Compared to intraoperative enteroscopy** VCE has a sensitivity of 95% and a specificity of 75%
  
  (Hartmann et al., Gastrointest Endosc 2005;61: 826-32)

• **Main advantages:**
  – VCE allows noninvasive evaluation of the entire SB in 79-90% of patients
  – Well tolerated by patients
  – High positive (94-97%) and negative predictive value (83-100%) in the evaluation of GI bleeding

Diagnostic yield

• The likelihood that a test or a procedure will provide the information needed to establish a diagnosis
Diagnosis and management

Video capsule endoscopy (VCE)

The diagnostic yield of VCE is influenced by multiple factors
Video capsule endoscopy (VCE)

The diagnostic yield of VCE is influenced by multiple factors

• **Timing** of performing VCE
  – Performance within 2 weeks of the bleeding episode with a higher likelihood of positive findings (91% vs. 34%; J Gastroenterol 2005 Mar;40(3):256-9)
  – VCE has the highest yield of diagnosis when it is performed within 48 to 72h of overt suspected SB bleeding (World J Gastroenterol 2011;17:774-8, Gastrointest Endosc 2013;77:761-6)

• **Higher likelihood of positive findings in patients with**
  – Hemoglobin < 10 g/dl
  – Longer duration of bleeding episodes (>6 months)
  – More than one bleedig episode
  – Overt as compared with occult bleeding
Diagnosis and management

Video capsule endoscopy (VCE)

- Main limitations
Diagnosis and management

Video capsule endoscopy (VCE)

• **Main limitations**
  – Lack of therapeutic capabilities
  – Inability to control its movement
  – Difficulty in localizing the lesion
  – Lack of specificity
    • 14% incidental findings in healthy volunteers
    • 10-36% false negative rate
Diagnosis and management

Video capsule endoscopy (VCE)

- **Main limitations**
  - Lack of therapeutic capabilities
  - Inability to control its movement
  - Difficulty in localizing the lesion
  - Lack of specificity
    - 14% incidental findings in healthy volunteers
    - 10-36% false negative rate
  - **VCE misses clinically important duodenal and proximal jejunal lesions**
**Video capsule endoscopy (VCE)**

- **Main limitations**
  - Lack of therapeutic capabilities
  - Inability to control its movement
  - Difficulty in localizing the lesion
  - Lack of specificity
    - 14% incidental findings in healthy volunteers
    - 10-36% false negative rate
  - **VCE misses clinically important duodenal and proximal jejunal lesions**
Diagnosis and management
Diagnosis and management

VCE fails to identify the major papilla in a majority of cases
Diagnosis and management

Video capsule endoscopy (VCE)

Main complication:
Diagnosis and management

Video capsule endoscopy (VCE)

Main complication:

– Capsule retention
Diagnosis and management

Video capsule endoscopy (VCE)

Main complication:
  – Capsule retention

- Occurs in roughly 1.5% of patients undergoing evaluations for potential SB bleeding
- VCE is complicated by retention in up to 13% in Crohn’s disease patients
Video capsule endoscopy (VCE)

Main complication:

- Capsule retention

• Occurs in roughly 1.5% of patients undergoing evaluations for potential SB bleeding
• VCE is complicated by retention in up to 13% in Crohn`s disease patients
• Causes of capsule retention in the SB besides Crohn`s disease
**Diagnosis and management**

**Video capsule endoscopy (VCE)**

**Main complication:**

- Capsule retention

  - Occurs in roughly 1.5% of patients undergoing evaluations for potential SB bleeding
  - VCE is complicated by retention in up to 13% in Crohn’s disease patients
  - Causes of capsule retention in the SB besides Crohn’s disease
    - NSAID-induced enteropathy with diaphragm strictures
    - Radiation enteritis
    - Postsurgical adhesions
    - Surgical anastomoses
    - Small bowel tumors
Diagnosis and management

Video capsule retention
Balloon-assisted deep enteroscopy

1. Double-balloon enteroscopy (DBE)

• First described in 2001 (Yamamoto) and has been available for clinical use since 2004

• Technique
  – Enteroscop (working length of 200 cm) and an overtube (length of 140 cm), outer diameter of 9.4 mm
  – Balloons (latex) at the distal end of the enteroscope and the overtube
  – A series of steps called advanced cycles are performed using push-and-pull technique
Diagnosis and management

Balloon-assisted deep enteroscopy

1. Double-balloon enteroscopy (DBE)
Diagnosis and management

Balloon-assisted deep enteroscopy

1. Double-balloon enteroscopy (DBE)
   • DBE can be advanced a distance of 240-360 cm distal to the pylorus (oral approach) and 100-140 proximal to the ileocecal valve (anal approach)
   • Total enteroscopy with a single or combined approach (oral and rectal) is not feasible in all patients (success rate: 16-86 %)
Balloon-assisted deep enteroscopy

2. Single-balloon enteroscopy (SBE)
   - SBE was introduced in 2006
   - Technique
Balloon-assisted deep enteroscopy

2. Single-balloon enteroscopy (SBE)

• SBE was introduced in 2006

• Technique
  – Enteroscop (working length of 200 cm) and an overtube (length of 140 cm), outer diameter of 9.4 mm
  – The technique is very similar to that of DBE, but there is just one balloon (silicone) at the distal end of the overtube
  – During the reduction maneuver the overtube balloon is inflated and the distal end of the enteroscope is hooked over a fold
Diagnosis and management

Balloon-assisted deep enteroscopy

2. Single-balloon enteroscopy (SBE)

1. Insert the scope as deep as possible.
2. Angulate the scope to hold the intestinal tract and deflate the balloon.
3. Advance the splinting tube.
4. Inflate the balloon.
5. Release the angulation.
6. Withdraw the splinting tube and scope to shorten the intestinal tract.

: Scope motion  : Splinting tube motion

Small Bowel Bleeding
Balloon-assisted deep enteroscopy

1. Single-balloon enteroscopy (SBE)
   • SBE was introduced in 2006
   • Technique
     – Enteroscop (working length of 200 cm) and an overtube (length of 140 cm), outer diameter of 9.4 mm
     – The technique is very similar to that of DBE, but there is just one balloon (silicone) at the distal end of the overtube
     – During the reduction maneuver the overtube balloon is inflated and the distal end of the enteroscope is hooked over a fold
   • SBE has a significantly lower total enteroscopy rate than DBE (May et al., Am J Gastroenterol 2010;105:575-81)
Spiral enteroscopy

- **Technique**
  - Spiral shaped overtube
  - Enteroscope (length 200 cm, diameter < 9.4 mm)
  - By rotating the overtube clockwise, the SB is pleated onto the overtube, and the enteroscope is advanced
Diagnosis and management

**Spiral enteroscopy**

- **Technique**
  - Spiral shaped overtube
  - Enteroscope (length 200 cm, diameter < 9.4)
  - By rotating the overtube clockwise, the SB is pleated onto the overtube, and the enteroscope is advanced

- **Main advantage:**

Small Bowel Bleeding
Spiral enteroscopy

- Technique
  - Spiral shaped overtube
  - Enteroscope (length 200 cm, diameter < 9.4)
  - By rotating the overtube clockwise, the SB is pleated onto the overtube, and the enteroscope is advanced

- Main advantage:
  - Reduction in examination time
Diagnosis and management

Spiral enteroscopy

• Technique
  – Spiral shaped overtube
  – Enteroscope (length 200 cm, diameter < 9.4)
  – By rotating the overtube clockwise, the SB is pleated onto the overtube, and the enteroscope is advanced

• Main advantage:
  – reduction in examination time

• Comparing DBE and spiral enteroscopy the median maximum insertion depth was greater in the DBE group

• In patients with known or occult small-bowel strictures and surgical altered anatomic features with possible adhesions there may be a higher risk for perforation
Radiographic techniques

- **Barium studies** should not be performed in the evaluation of patients with suspected small bowel bleeding (low diagnostic yield)

- Cross-sectional imaging techniques
  - CT and MR enterography/enteroclysis
Rad
iographic techniques

- **Barium studies** should not be performed in the evaluation of patients with suspected small bowel bleeding (low diagnostic yield)

- **Cross-sectional imaging techniques**
  - CT and MR enterography/enteroclysis
  - Fluid should be a neutral contrast or near water density to improve detection of hyperenhancing abnormalities/bleeding
  - Enteric contrast improves detection of intraluminal masses
  - Higher yields for detecting small bowel masses compared to VCE
  - Lower yields for detecting vascular and inflammatory lesions
Diagnosis and management

Radiographic techniques

• **Barium studies** should not be performed in the evaluation of patients with suspected small bowel bleeding (low diagnostic yield)

• **Cross-sectional imaging techniques**
  – CT and MR enterography/enteroclysis
  – Fluid should be a neutral contrast or near water density to improve detection of hyperenhancing abnormalities/bleeding
  – Enteric contrast improves detection of intraluminal masses
  – Higher yields for detecting small bowel masses compared to VCE
  – Lower yields for detecting vascular and inflammatory lesions

CT and MRI enteroclysis and VCE are complementary examinations
Radiographic techniques

• **Barium studies** should not be performed in the evaluation of patients with suspected small bowel bleeding (low diagnostic yield)

• **Cross-sectional imaging techniques**
  - **CT and MR enterography/enteroclysis**
  - Fluid should be a neutral contrast or near water density to improve detection of hyperenhancing abnormalities/bleeding
  - Enteric contrast improves detection of intraluminal masses
  - Higher yields for detecting small bowel masses compared to VCE
  - Lower yields for detecting vascular and inflammatory lesions

**CT and MRI enteroclysis and VCE are complementary examinations**

- Ability to screen for contraindications to VCE
Diagnosis and management

Radiographic diagnosis for overt bleeding

- **CT angiography**
  - Detects bleeding rates as low as 0.3 ml/min
  - **Advantage:**
Radiographic diagnosis for overt bleeding

- CT angiography
  - Detects bleeding rates as low as 0.3 ml/min
  - Advantage:
    - widely available an can be performed rapidly during the time of bleeding
Radiographic diagnosis for overt bleeding

- **CT angiography**
  - Detects bleeding rates as low as 0.3 ml/min
  - **Advantage:**
    - widely available and can be performed rapidly during the time of bleeding
  - Inferior compared with VCE in patients with suspected small bowel bleeding (yield of 45% compared with 94%)
- **Limitations:**
Radiographic diagnosis for overt bleeding

- **CT angiography**
  - Detects bleeding rates as low as 0.3 ml/min
  - **Advantage:**
    - widely available and can be performed rapidly during the time of bleeding
  - Inferior compared with VCE in patients with suspected small bowel bleeding (yield of 45% compared with 94%)
  - **Limitations:**
    - to detect contrast extravasation the patient must be actively bleeding
    - risk for renal complications in patients with renal dysfunction
Diagnosis and management

Scintigraphy

$^{99m}$ Tc-labeled RBC scintigraphy

$^{99m}$ Tc-pertechnetate scan
Scintigraphy

**$^{99m}$ Tc-labeled RBC scintigraphy**

- Evaluation of overt acute GI bleeding
- Advantages
  - Ability to detect lower rates of bleeding (rates as low as 0.2 ml/min)
  - Ability to perform delayed imaging improves detection of intermittent or delayed bleeding
- Limitations
  - Reported variability in localisation of bleeding
  - Inability to characterize the source of bleeding

**$^{99m}$ Tc-pertechnetate scan**
Scintigraphy

**99m Tc-labeled RBC scintigraphy**

- Evaluation of overt acute GI bleeding
- Advantages
  - Ability to detect lower rates of bleeding (rates as low as 0.2 ml/min)
  - Ability to perform delayed imaging improves detection of intermittent or delayed bleeding
- Limitations
  - Reported variability in localisation of bleeding
  - Inability to characterize the source of bleeding

**99m Tc-pertechnetate scan**

- Detection of Meckel`s diverticulum
- Ectopic gastric can be seen in 10-60% of Meckel`s diverticulae
Endoscopic therapy

- Small bowel angiodysplastic lesions (angioectasia) are the most common cause of small bowel bleeding
Endoscopic therapy

- **Small bowel angiodyplastic lesions** (angioectasia) are the *most common* cause of small bowel bleeding
- **Argon plasma coagulation** is the *treatment of choice* (since 2001)
Endoscopic therapy

- **Small bowel angiodysplastic lesions** (angioectasia) are the **most common** cause of small bowel bleeding
- **Argon plasma coagulation** is the **treatment of choice** (since 2001)
- To date, there have not been any published trials comparing endoscopic therapy of angioectasia compared with sham therapy or trials where only actively bleeding lesions or lesions of a certain size are treated compared with therapy of all visualized lesions
- Recurrence of rebleeding after endoscopic treatment has been used as a measure of its effectiveness in several studies
Diagnosis and management

Endoscopic therapy

- Rebleeding rate of small bowel angioectasia after endoscopic therapy:
Diagnosis and management

Endoscopic therapy

- **Rebleeding rate** of small bowel **angioectasia after endoscopic therapy:**
  - 34% after a mean of 22+/− 13 months (Am J Gastroenterol 2014;109:474-83)
Diagnosis and management

Endoscopic therapy

• **Rebleeding rate** of small bowel angioectasia **after endoscopic therapy:**
  – 34% after a mean of 22+/- 13 months (Am J Gastroenterol 2014;109:474-83)

• **Risk factors for recurrent bleeding**
Endoscopic therapy

• **Rebleeding rate** of small bowel angioectasia after endoscopic therapy:
  – 34% after a mean of 22+/- 13 months (Am J Gastroenterol 2014;109:474-83)

• **Risk factors for recurrent bleeding**
  – Number of vascular lesions
  – Age over 65 years
  – Presence of lesions in the jejunum
  – Cardiac vavular disease
  – Chronic renal disease
  – Usage of anticoagulant medication
  – Need for transfusion
Diagnosis and management

Endoscopic therapy

- **Rebleeding rate** of small bowel angioectasia after endoscopic therapy:
  - 34% after a mean of 22 +/- 13 months (Am J Gastroenterol 2014;109:474-83)

- **Risk factors for recurrent bleeding**
  - Number of vascular lesions
  - Age over 65 years
  - Presence of lesions in the jejunum
  - Cardiac vascular disease
  - Chronic renal disease
  - Usage of anticoagulant medication
  - Need for transfusion

Despite endoscopic therapy small bowel angioectasia demonstrate a high recurrence rate
Medical treatment

• **Hormonal therapy**
  - A multicenter double-blind randomized study of the use of hormonal therapy (ethinyl estradiol plus norethisterone) vs. Placebo in patients with GI angioectasia showed no benefit (number of bleeding episodes or transfusion requirement) after a year of treatment (39% vs. 46%) (Gastroenterology 2001;121:1073-9)

• **Sandostatin analogs**
  - Proposed mechanism of action
    - Inhibition of angiogenesis
    - Decrease in splanchnic flow
    - Increase in vascular resistance
    - Improved platelet aggregation
  - **Somatostatin analogs reduce transfusion requirements in patients resistant to previous treatment** (Aliment Pharmacol Ther. 1999 Nov;13(11):1429-36)
Medical treatment

• Thalidomide
  – Mechanism of action: Properties as an antiangiogenic agent
  – Thalidomide reduces the number of bleeding episodes by > 50% in patients with vascular malformations throughout the GI tract (predominantly in the SB) in 71% (20/28) compared with a reduction of bleeding episodes in 4% (1/27) of patients on iron supplementation (Gastroenterology 2011;141:1629-37)
Suspected small bowel bleeding

• Normal upper and lower endoscopy

Occult
• iron-deficiency anemia w/o FOBT

Overt
• Melena or hematochezia

Consider second-look endoscopy

Small bowel evaluation

Possible obstruction

CT/MR-enteroclysis

VCE

Positive

Further evaluation?

Yes

Specific management
• Push or deep endoscopy
• Surgery +/- IOE

Younger patients with ongoing bleeding (ectopic gastric mucosa in 10-60% of Meckel’s diverticulae)

Negative

Observation/iron supplementation

Consider repeat
• Endoscopy
• VCE
• Meckel’s scan
• Surgery +/- IOE

No

24.3% of patients referred for DBE showed non-SB lesions definitely explaining the source of GIB (Aliment Pharmacol Ther. 2009 Apr 15;29(8):918-9)

Push enteroscopy: ideal second-look procedure allows to examine the distal duodenum and proximal jejunum (SB segment not always well seen with VCE)

Most SB bleeding is undramatic in presentation
Suspected small bowel bleeding
• Normal upper and lower endoscopy

Occult
• iron-deficiency anemia w/o FOBT

Overt
• Melena or hematochezia

Consider second-look endoscopy

Small bowel evaluation

CT/MR-enteroclysis

VCE

Further evaluation?

No
• Observation/iron supplementation

Yes
• Consider repeat
  • Endoscopy
  • VCE
  • Meckel’s scan
  • Surgery +/- IOE

Specific management
• Push or deep endoscopy
• Surgery +/- IOE

Most SB bleeding is undramatic in presentation

24.3% of patients referred for DBE showed non-SB lesions definitely explaining the source of GIB (Aliment Pharmacol Ther. 2009 Apr 15;29(8):918-9)

Push enteroscopy: ideal second-look procedure allows to examine the distal duodenum and proximal jejunum (SB segment not always well seen with VCE)

Younger patients with ongoing bleeding (ectopic gastric mucosa in 10-60% of Meckel’s diverticulae)
Sub-acute ongoing SB bleeding

- Stabilize patient
  - Consider VCE vs. MR/CT enteroclysis
    - Deep enteroscopy
      - VCE guided deep enteroscopy (Oral/anal approach)
    - Treatment
  - Consider RBC scan and/or angiography or surgery +/- IOE

Increased risk for capsule retention
- Crohn’s disease patients
- NSAID-induced enteropathy (diaphragm strictures)
- Radiation enteritis
- Postsurgical adhesions
- Surgical anastomoses
- Small bowel tumors
Suspicion of acute overt massive SB bleeding

Most SB bleeding is undramatic in presentation

Stabilize patient

Widely available and can be rapidly performed during the time of bleeding

CT angiography (or red cell scan)

Studies have shown sensitivities of 79-94% and specificity of 95-100% for detecting active bleeding throughout GI tract

- Ability to detect lower bleeding rates (0.2 ml/min)
- Reported variability in localisation of bleeding
- Inability to characterize the source of bleeding

Unstable

Angiography

Specific management
- Deep enteroscopy
- Surgery with IOE

Emboliisation
(superselective, transarterial)