Introduction

- 42 y/o woman with fatigue / weakness; no other symptoms
  - Menses normal
  - Normal physical examination
  - Bloodwork: HGB 8, MCV 77, Ferritin 10, TIBC sat 8%
  - EGD + colonoscopy normal incl TI to 10 cm proximal to ICV
- What would you do next?
Introduction

- 78 y/o woman with abdominal pain, distention with meals, 15 lb weight loss over 3 months
  - Normal physical examination
  - Bloodwork: HGB 11, MCV 88, alb 2.9
  - EGD nl; colonoscopy 2 small tubular adenomas, TI normal, both by you
  - CT with thickening proximal jejunum
- What would you do next?

Terminology

- Occult bleeding
  - Positive fecal occult blood test (FOBT) and/or iron-deficiency anemia (IDA)
  - No evidence of visible blood loss
- Obscure bleeding
  - Persistent or recurrent bleeding from GI tract without obvious etiology after EGD, colonoscopy, and standard radiologic evaluation of small bowel
    - Overt = clinically evident bleeding
    - Occult = no clinical evidence of bleeding
Diagnostic and therapeutic options

- Colonoscopy with ileoscopy
- Video Capsule Endoscopy (VCE)
- Push Enteroscopy (with or without overtube)
- Balloon Enteroscopy (peroral or peranal)
- Intraoperative Enteroscopy (laparoscopic or open)
- Rotational Enteroscopy
- *UGIS / SBFT (for evaluation of masses, strictures)
- CT enterography / MR enterography
- Contrast angiography
- Tagged-RBC scan
- Meckel’s scan

Value of repeating EGD / colonoscopy

- Missed lesions identified in 4-15% of patients referred for obscure gastrointestinal bleeding\(^1\),\(^2\)
- Strongly consider repeating EGD and colonoscopy prior to small bowel evaluation
  - Elderly patients
  - Patients in whom you did not perform the initial exams

\(^1\) Vlachogiannakos J et al, Dig Dis Sci, 2011
\(^2\) Tee HP et al, World J Gastroenterol, 2010

Images courtesy Rajesh Keswani, MD
**Background**

- **Enteroscopy indications**
  - **Diagnostic**
    - Obscure GI bleeding
    - IBD / enteropathy / small intestinal disease
    - Other abnormal radiologic findings
    - Small intestinal lesions (polyps, masses)
    - Post-surgical complications
  - **Therapeutic**
    - Hemostasis
    - Stricture dilation / stent placement
    - Polypectomy / neoplasm excision
    - Foreign body retrieval

- **Origins of modern enteroscopy**
  - Crosby capsule
  - Colonoscope
    - With and without fluoroscopy
  - Sonde enteroscope
  - Push enteroscope
  - Push enteroscope with overtube
  - Intraoperative enteroscopy
    - Open
    - Laparoscopic
Background

- Enteroscopic options today
  - Push enteroscopy using colonoscope
  - Push enteroscope without overtube
  - Push enteroscope with overtube
  - Intraoperative enteroscopy
    - *Open
    - Laparoscopic
  - Deep enteroscopy
    - Video-capsule endoscopy (VCE)
    - Balloon enteroscopy (push + pull)
    - Rotational overtube enteroscopy (push + pull)

Background

- Deep enteroscopy: the entire small bowel can (potentially) be visualized
  - Deep capsule endoscopy
  - Deep flexible enteroscopy
    - Balloon enteroscopy
      - Single-balloon (SBE)
      - Double-balloon (DBE)
    - Rotational enteroscopy
  - Caveats
    - Long procedure time
    - Non-capsule methods may require GA
    - Technically challenging; may require fluoro
Background

- Deep enteroscopy: diagnostic only
  - Video-capsule enteroscopy (VCE)

Beware of potential strictures and risk of obstruction…role of patency capsule

Yield of VCE for Anemia

- Diagnostic yield of VCE in occult GI bleed ~56%\(^1\)
- Sensitivity ~95% in small study\(^2\).
- Yield likely highest when VCE performed urgently after overt bleeding (i.e., within 48 hours of bleeding)

\(^1\) Triester S et al, Am J Gastroenterol 2005
\(^2\) Hartmann D et al, GIE, 2005

Image courtesy Rajesh Keswani, MD
VCE for evaluation of mass lesions: suboptimal

- Retrospective study of 18 patients with small bowel mass lesions (of 183 patients with enteroscopy)
  - 15 also had capsule endoscopy

| Findings on Capsule Endoscopy in Patients with SB Tumors on Enteroscopy (n=15) |
|---------------------------------|-----------------|
| Mass Lesion Seen                | 5 (33%)         |
| Fresh blood, no lesion          | 7 (44%)         |
| Erythema or erosions            | 3 (19%)         |

Ross AS et al., Dig Dis Sci, 2008

CT Enterography

CT Enterography → Recently developed tool for evaluation of small bowel. It has distinct advantages over other imaging modalities enabling evaluation of submucosal and serosal abnormalities. CTE combines:

- Neutral Enteral Contrast
  - Optimizes luminal distension and in combination with intravenous contrast improves depiction of bowel wall features, lumen and adjacent mesenteric fat.

- Latest MDCT Technology
  - High spatial resolution (submillimeter collimation) and temporal resolution (imaging acquisition in one breath hold).

- Intravenous Contrast
  - Multiphasic study: designed to optimize the detection of the most common cause of OGIB (vascular lesions and tumor) and depict contrast extravasation.
Background

- Deep enteroscopy: diagnostic and therapeutic
Background

- Deep enteroscopy: diagnostic and therapeutic
Background

- Deep enteroscopy: diagnostic and therapeutic
  - Rotational enteroscopy

Courtesy Patrick Pfau, MD, Univ of Wisconsin.
Performance characteristics

- Deeper insertion = superior visualization compared to push enteroscopy
- Total small intestinal examination in 12-25%; diagnostic yield 40%
- Clinical yield for VCE and DBE equivalent: 60%


Balloon enteroscopy caveats

- It takes a long time...
  - 120-200 minutes peroral or retrograde
- Effortful
  - May require anesthesia (logistical issues, risk, cost)
  - Skill acquisition
- Requisite expertise
  - Diagnostic
  - Therapeutic
**Balloon enteroscopy caveats**

- Surgical anatomical caveats: fixed bowel
  - Peritoneal adhesions
  - Anastomotic strictures
  - Esophageal strictures

- Roux-en-Y anatomy
  - Anastomoses
    - Ectatic anastomoses
    - Hairpin turns
      - Fixed
      - Scope radius
      - Scope stiffness
  - Peritoneal windows
  - Gastric looping
    - Hiatal hernia
Balloon enteroscopy caveats

- Surgical anatomical caveats: fixed bowel
  - Roux-en-Y anatomy
    - Anastomoses
      - Ectatic anastomoses
      - Hairpin turns
        - Fixed
        - Scope radius
        - Scope stiffness
  - Peritoneal windows
  - Gastric looping
    - Hiatal hernia

Choosing Your Equipment

- In randomized trials, double balloon and single balloon enteroscopy achieved comparable antegrade insertion distances\(^1,2\)
  - In a single study, insertion depth with DBE was ~ 50 cm greater than SBE but this did not hold significance after comparisons

- In a study comparing total enteroscopy (both antegrade and retrograde in same patients), total enteroscopy rate for SBE was 0% and 57.1% in DBE groups\(^3\)

### Enteroscopy for Small Bowel Bleeding

**Effective?**

<table>
<thead>
<tr>
<th>Study</th>
<th>Follow-up Duration</th>
<th>Findings</th>
<th>Rebleeding rate (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Double Balloon Enteroscopy</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gerson (2009)</td>
<td>30 months</td>
<td>Vascular lesions</td>
<td>45</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Normal DBE</td>
<td>42</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Overall</td>
<td>42</td>
</tr>
<tr>
<td>Shinozaki (2010)</td>
<td>29.7 months</td>
<td>Vascular lesions</td>
<td>60</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Normal DBE</td>
<td>37</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Overall</td>
<td>39</td>
</tr>
<tr>
<td>May (2011)</td>
<td>55 months</td>
<td>Vascular lesions</td>
<td>42</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Normal DBE</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Overall</td>
<td>N/A</td>
</tr>
<tr>
<td>Samaha (2012)</td>
<td>22.6 months</td>
<td>Vascular lesions</td>
<td>46</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Normal DBE</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Overall</td>
<td>N/A</td>
</tr>
<tr>
<td><strong>Single Balloon Enteroscopy</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kushnir (2013)</td>
<td>23.9 months</td>
<td>Vascular lesions</td>
<td>48</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Normal SBE</td>
<td>56</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Overall</td>
<td>45</td>
</tr>
</tbody>
</table>

### Deep enteroscopy complications

- **Balloon enteroscopy**
  - Post-procedure distention/pain common (> 20%)
  - Major complication rate 0.8 – 5 %
    - Perforation 1-3%
    - Higher when intervention added
    - Rare pancreatitis

Deep enteroscopy: indications

- Suspected Small Bowel Bleeding
  - Obscure Occult
  - Obscure Overt
- Detection or Resection of small bowel polyps/tumors
- Suspected inflammatory bowel disease/enteropathy
- Therapy of small bowel stricture
- Altered anatomy ERCP

Clinical application

- Capsule enteroscopy and balloon / rotational enteroscopy are complimentary
  - Consider capsule first given non-invasive, with lower complication risk and no sedation requirement
  - Consider going straight to rotational or balloon enteroscopy if suspicion for treatable lesion is high
Clinical application

- Capsule enteroscopy and balloon / rotational enteroscopy are complimentary (continued)
  - Positive capsule findings
    - Tissue acquisition
    - Treatment
  - Negative capsule findings
    - …with persistent strong clinical suspicion for intestinal pathology

Clinical application

- Choice of deep enteroscopy platform is largely institution-dependent, and institutionally-driven
  - Endoscope manufacturer holding contract for unit
  - Availability of local operator experience and expertise
  - Applies to capsule as well as balloon / rotational enteroscopy
Clinical application

- In general:
  - Choose capsule if
    - Purely diagnostic
    - Stricture unlikely or excluded
    - Radiologic studies are negative
  - Choose push enteroscopy with colonoscope if likely to be near ligament of Treitz or TI
    - Easier, faster
    - Larger channel for aspiration, accessories
    - Dial-in stiffening feature, flushing pump capability
  - Consider quick repeat EGD first in appropriate cases, particularly if you didn’t perform the index EGD

Clinical caveats
Clinical caveats

- 62 y/o man 2 years s/p lap RYGB; persistent anemia, no pain, lost 120 lbs

Illustration: John E. Pandolfino, MD

Look beyond!
Clinical caveats

- 62 y/o man 2 years s/p lap RYGB; persistent anemia, no pain, lost 120 lbs

Wash well, look carefully!

Clinical caveats

- 27 y/o man with cerebral palsy, admitted with maroon stools for 24 hrs; no abdo pain, no N/V, no NSAIDs
  - Dark maroon blood per rectum
  - In ED: P 150, BP 80/50, orthostatic
  - Bloodwork: HGB 7.9, MCV 88, alb 2.9
  - Now in ICU hydrated, transfused
  - Still with maroon blood per rectum
  - What would you do next?
Clinical caveats

- EGD normal
- Colonoscopy: red blood oozing from ICV; TI mucosa nl 5 cm upstream
- Meckel’s scan normal

Clinical caveats

- CT enterography
  - “bleeding protocol”
Clinical caveats

- Mesenteric arteriography

Clinical caveats

- Balloon enteroscopy
Clinical caveats
Clinical caveats
Conclusion

- Capsule and balloon overtube / rotational overtube enteroscopy are complementary technologies
- Present-day enteroscopic technology provides the capability to visualize the entire small bowel
- All possess greater potential to visualize and lead to successful endoscopic treatment of small bowel lesions than conventional small bowel endoscopic techniques
- Balloon and rotational enteroscopy techniques still possess a steep learning curve, and require substantial investments of time and resources
OBJECTIVES

- Discuss the management of acute non-variceal upper gastrointestinal bleeding
  - Initial management
  - Preparation for endoscopy
  - Endoscopic therapy
  - Pharmacological therapy
  - Secondary prophylaxis
INITIAL MANAGEMENT

Initial resuscitation

- Hemodynamic status should be assessed immediately upon presentation and resuscitative measures begun as needed (Strong recommendation).

*Laine, Jensen, AJG 2012*
### The Rockall Score

<table>
<thead>
<tr>
<th>Variable</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (yrs)</td>
<td>&lt; 60</td>
<td>60-79</td>
<td>≥ 80</td>
<td></td>
</tr>
<tr>
<td>Comorbidity</td>
<td>No or mild coexisting</td>
<td>Moderate coexisting (e.g., hypertension)</td>
<td>Severe coexisting (e.g., CHF)</td>
<td>Life threatening (e.g., RF)</td>
</tr>
<tr>
<td>Hemodynamic status</td>
<td>No shock</td>
<td>P &lt; 100 Syst BP ≥ 100</td>
<td>P ≥ 100 plus Syst BP ≥ 100</td>
<td>Hypotension</td>
</tr>
<tr>
<td>Diagnosis</td>
<td>MW tear, normal endoscopy with no blood seen</td>
<td>All other diagnosis</td>
<td>Malignancy of UGI tract</td>
<td></td>
</tr>
<tr>
<td>Major stigmata of recent hemorrhage</td>
<td>None or dark spot</td>
<td>Blood in UGI tract</td>
<td>Adherent clot, visible or spurting vessel</td>
<td></td>
</tr>
</tbody>
</table>

*Determination of low-risk patients*

- Discharge from emergency without inpatient endoscopy may be considered in patients with:
  - BUN < 18.2 mg/dl
  - Hgb ≥ 13.0 g/dl for men (12.0 g/dl for women)
  - systolic BP ≥ 110 mm Hg, pulse < 100 beats/mn
  - absence of melena, syncope, cardiac failure, and liver disease

- These patients have < 1 % chance of requiring intervention (Conditional recommendation)

*Gralnek, NEJM, 2008; Laine, Jensen, AJG 2012*
Portal Pressure rose significantly within 5 days with liberal strategy (P<0.03).

921 UGIB pts randomized to transfusion (trfX) thresholds of Hgb < 7 or 9 gm/dL, stratified by cirrhosis: 15% vs 51% trfX rates, P<0.001.

Rebleeding rates: Lower in restrictive strategy 10% vs 16%, P=0.01.

Two issues:

a) Generalizability (EGD @6hrs, tight hgb control, 30% cirrhosis; excl CV, massive)

b) Power adequacy for Non-Variceal UGI Bleeding: awaiting TRIGGER in UK.

95% vs 91%*, OR=0.55, 0.33-0.92.

What about an elevated INR/platelets and endoscopy?

"In patients on anticoagulants, correction of coagulopathy is recommended but should not delay endoscopy."

Platelets >50-100,000.

PREPARATION FOR ENDOSCOPY

IV erythromycin / metoclopramide

- Nasogastric lavage – RCT-proven yet requires orogastric insertion of large-bore tube and may compromise the airway

Should not be used routinely, but can be used in selected cases

- Also decreased likelihood of blood in the stomach
- No improvements in rebleeding, surgery, mortality, transfused units, or length of stay

Barkun, GIE, 2010
The benefits of early endoscopy

- Early endoscopy (first 24 hours) allows for
  - safe and prompt discharge of patients classified as low risk
  - improves patient outcomes for patients classified as high risk
  - reduces resource utilization for patients classified as either low or high risk
- Earlier timing for endoscopy (2, 12 hrs RCTs) show no advantage; ?week-end effect?
- ? Highly selected very sick bleeders may benefit from earlier intervention?

PPI pre-endoscopy for UGI bleeding

- Efficacy at best marginal: downgrades lesion, yet does not alter outcomes
- so PPI should **NOT** replace the role of adequate resuscitation and early endoscopy
ENDOSCOPIC THERAPY

INJECTION

CONTACT THERMAL THERAPY


“Footprint” post contact thermal therapy
Endoscopic clips

Which is the best modality?

- Treat only high-risk lesions
- Equivocal data for “adherent clots”

* Number of trials

<table>
<thead>
<tr>
<th>Modality</th>
<th>Rebleeding Odds Ratio (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thermal + Epi vs. Epi alone</td>
<td>0.27</td>
</tr>
<tr>
<td>Clips + Epi vs. Epi alone</td>
<td>0.38</td>
</tr>
<tr>
<td>Thermal + Epi vs. Thermal alone</td>
<td>0.79</td>
</tr>
<tr>
<td>Clips+ Epi vs. Clips alone</td>
<td>1.30</td>
</tr>
</tbody>
</table>

Thermal + Epi vs. Epi alone (2*)
Clips + Epi vs. Epi alone (3*)
Thermal + Epi vs. Thermal alone (4*)
Clips+ Epi vs. Clips alone (2*)

PHARMACOTHERAPY

Effect of PPIs on outcomes in patients with PUD bleeding

Outcome at 30 days after randomization
Odds Ratio (95% CI)

<table>
<thead>
<tr>
<th></th>
<th>Odds Ratio</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mortality</td>
<td>0.53</td>
<td>0.46</td>
</tr>
<tr>
<td>Re-bleeding</td>
<td>0.59</td>
<td></td>
</tr>
</tbody>
</table>

*Number of trials

PPIs improve mortality in patients with HRS only if they have initially undergone endoscopic haemostasis (highest quality data for high dose IV: 80mg + 8mg/hour x 3 days)

Modified from Leontiadis et al. The Cochrane Database of Systematic Reviews 2005 + update in 2006; Barkun et al., AJG 2004
“Second-look” endoscopy

- Routine second-look endoscopy, in which repeat endoscopy is performed 24 h after initial endoscopic hemostatic therapy, is not recommended (Conditional recommendation)

- Should be reserved for select patients at very high risk of rebleeding (large ulcers, hi-risk locations)

El Ouali, GIE, 2012; Laine AJG, 2012; Barkun AIM 2010

REFRACTORY CASES
Repeat endoscopy is superior to surgery in NVUGIB rebleeding

**Table 2. Outcomes after Endoscopic Retreatment or Surgery.**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Endoscopic Retreatment (N=48)</th>
<th>Surgery (N=44)</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Duration of hospitalization (days)</td>
<td>10</td>
<td>11</td>
<td>0.59</td>
</tr>
<tr>
<td>Range</td>
<td>2–111</td>
<td>4–42</td>
<td></td>
</tr>
<tr>
<td>Hospitalization in intensive care unit</td>
<td>59</td>
<td>59</td>
<td>0.16</td>
</tr>
<tr>
<td>Length of stay (days)</td>
<td>5</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>No. of patients</td>
<td>8</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>Units of blood transfused</td>
<td>1–21</td>
<td>3–150</td>
<td></td>
</tr>
<tr>
<td>Complications</td>
<td>22</td>
<td>28</td>
<td>0.08</td>
</tr>
<tr>
<td>No. of complications</td>
<td>22</td>
<td>28</td>
<td></td>
</tr>
<tr>
<td>No. of patients</td>
<td>7</td>
<td>16</td>
<td></td>
</tr>
<tr>
<td>30-Day mortality (no. of patients)</td>
<td>5</td>
<td>8</td>
<td>0.37</td>
</tr>
<tr>
<td>Abdominal sepsis</td>
<td>2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Bronchopneumonia</td>
<td>2</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Acute myocardial infarction</td>
<td>1</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Multiorgan dysfunction</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Hepatic failure</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Ventricular arrhythmia</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

Lau, NEJM, 1999

Role of angiographic embolization

- Superselective embolization effective (69-100%) and safe (63-97%)
- The technique can be performed guided by endoscopic clips
- Angiographic embolization has replaced surgery as next step in most patients with NVUGIB refractory to endoscopic therapy
- Prophylactic embolization post endotherapy


Courtesy of Pr. Romaric Loffroy, Vascular and Interventional Radiology, University of Dijon, France
EMERGING TECHNOLOGIES: THE HEMOSTATIC POWDERS

The powder ADHERES to an active bleeding lesion, and ADSORBS water, forming a mechanical “barrier” with local “tamponade” to terminate bleeding.

Barkun, GIE, 2013
HEMOSTATIC POWDERS

- Massive bleeding
- Unsuccessful use of conventional hemostatic therapies
- Low risk of delayed rebleeding
- Malignant bleeding
- High risk of delayed rebleeding
- No role for Hemostatic powder application

- Hemostatic powder to achieve control of the bleeding field
- Hemostatic powder to achieve control of the bleeding field
- Hemostatic powder as sole hemostatic modality
- Hemostatic powder as sole immediate hemostatic modality
- Hemostatic powder as adjuvant hemostatic modality

**Figure 5.** Algorithm for approach to management of acute nonvariceal bleeding and the role of hemostatic agents.

*Adapted from Barkun and Moosavi, GIE, 2013*
SECONDARY PROPHYLAXIS

How should I diagnose *H pylori* in this setting?
What about the patients having bled on ASA?

PUB bleeder on ASA – acute management

- ASA non-adherence/withdrawal carries a 3x risk of major adverse cardiac events
- The delay to the thrombotic event is usually 7-10 days
- Immediate reintroduction of ASA in patients with PUB on ASA was recently studied

Risks/benefits of immediate reintroduction of ASA

ASA-related bleeding ulcers, N=156

Log rank test, P=0.25
Hazard ratio 1.9, 95% CI 0.6-6

BUT

ASA 10.3%
Placebo 5.4%

A statistically non significant increase in recurrent PUD bleeding,

ASA discontinuation causes significantly increased CV mortality

BUT

Placebo 12.9%
ASA 1.3%

PUB bleeder on ASA – secondary prophylaxis

- Hp eradication

Experimental | Control
---|---
Study or Subgroup | Events | Total | Events | Total | Weight | M-H, Fixed, 95% CI | Odds Ratio | M-H, Fixed, 95% CI | Odds Ratio
Chan 2005 | 1 | 159 | 13 | 161 | 57.3% | 0.07 [0.01, 0.56] | 0.01
Lai 2006 | 0 | 86 | 9 | 94 | 42.7% | 0.05 [0.00, 0.80] | 0.1
Total (95% CI) | 1 | 245 | 245 | 100.0% | 0.06 [0.01, 0.32] | 10

Heterogeneity: Chi² = 0.06, df = 1 (P = 0.80), I² = 0%
Test for overall effect: Z = 3.30 (P = 0.0010)

If clopidogrel / dual antiplatelet Rx related bleed, suggest PPI (not H2RA) secondary prophylaxis yet few data; RECOMMENDED BY AHA, ACC, ACG

Controversy about a possible “clopidogrel – PPI interaction” is NOT warranted

Barkun, AIM, 2010; Abraham, AJG, 2010; Katz, AJG, 2013
Conclusions – Non variceal UGIB

- Established recommendations
  - Appropriate resuscitation
  - Risk stratification
  - Early endoscopic hemostasis for high-risk
  - High-dose PPI
  - Secondary prophylaxis (Hp, Anti-platelets)

- Hemostatic powders: promising, optimal role?
VARICEAL BLEEDING

Loren A. Laine, MD, FACG
Professor of Medicine
Yale University School of Medicine
New Haven, CT

MANAGEMENT OF ESOPHAGEAL VARICEAL BLEEDING

• Acute Bleeding Episode
  – Vasoactive medication (e.g., octreotide)*
  – Antibiotics*
  – Endoscopic ligation
  – Consider TIPS in high-risk patients

• Prevention of Recurrent Bleeding
  – Endoscopic ligation
  – β-blocker

* Begin before EGD

García-Tsao et al. Hepatology 2008;47:1764;
de Franchis J Hepatol 2010;53:762
MANAGEMENT OF ACUTE VARIENCEAL BLEEDING

FRESH FROZEN PLASMA FOR PROLONGED PROTHROMBIN TIME?
PT IS NOT A RELIABLE INDICATOR OF COAGULATION STATUS IN CIRRHOSIS

- PT measures procoagulant activity only
  - Cirrhosis: parallel decrease in pro- and anti-coagulant factors
    - Thrombin generation in cirrhotics ≈ healthy subjects
- Elevated PT or INR not predictive of peri-procedural bleeding in SR of 25 studies
- Procoagulants (e.g., rFVII) shorten prolonged PT, but fail to prevent bleeding

INITIAL MEDICAL THERAPY

ANTIBIOTIC PROPHYLAXIS IN CIRRHOTIC PATIENTS WITH UGI BLEEDING

Meta-Analysis of 12 RCTs (N=1241) vs. Placebo/No Antibiotic

- Bacterial infection: 13% vs. 36%; RR=0.43 (0.19-0.97)
  - Bacteremia: 0.25 (0.15 - 0.40)
  - Pneumonia: 0.45 (0.27 - 0.75)
- Death: 19% vs. 22%; RR = 0.79 (0.63 - 0.98)
- Rebleeding: 24% vs. 45%; RR = 0.53 (0.38 - 0.74)
- Quinolones or ceftriaxone
  - Oral quinolones first line unless
    - Area of high quinolone use, known resistance
    - Advanced cirrhosis

**PHARMACOLOGIC THERAPY FOR ACUTE VARICEAL BLEEDING**

- Splanchnic artery vasoconstriction
  - Vasopressin, terlipressin
  - Somatostatin and analogs
    - Somatostatin, octreotide, vapreotide

**VASOACTIVE MEDICATIONS**

Placebo-Controlled RCTs without Endoscopic Therapy

- Somatostatin/Octreotide (3 DB RCTs)
  - Decreased further bleeding in 1; no benefit in 2
  - No benefit in mortality in any trial

- Terlipressin (4 DB RCTs*)
  - Benefit in bleeding control in 4
  - Benefit in mortality in 2

- Terlipressin not superior in head-to-head RCTs

* Terlipressin + NTG patch in 1 RCT

VASOACTIVE DRUGS PRE-EGD FOR SUSPECTED VARICEAL BLEEDING
Three Double-Blind Placebo-Controlled Trials

• Less active bleeding at EGD in 2 trials
  – 13% vs. 25% at mean 4 hrs
  – 31% vs. 46% at mean 3 hrs
• Improved bleeding control at 12 hrs in 3rd trial
  – 71% vs. 47%
• Did not compare to vasoactive drugs started at time of EGD in placebo group
  – Later endpoints don’t reflect utility of pre-EGD drugs

**SCLEROTHERAPY FOR ACTIVE ESOPHAGEAL VARICEAL BLEEDING**
Subgroup Analysis of RCT of Sclerotherapy vs. Sham Sclerotherapy

<table>
<thead>
<tr>
<th></th>
<th>Sham (N=43)</th>
<th>Sclerotherapy (N=44)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hemostasis</td>
<td>26 (60%)</td>
<td>40 (91%)*</td>
</tr>
<tr>
<td>Rebleed in hospital</td>
<td>22 (51%)</td>
<td>9 (20%)*</td>
</tr>
<tr>
<td>Bleeding episode source**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Esophageal varices</td>
<td>21</td>
<td>4*</td>
</tr>
<tr>
<td>Esophageal ulcer</td>
<td>0</td>
<td>6*</td>
</tr>
<tr>
<td>Blood transfusion</td>
<td>8 units</td>
<td>4 units*</td>
</tr>
<tr>
<td>Mortality</td>
<td>21 (49%)</td>
<td>10 (23%)*</td>
</tr>
</tbody>
</table>

* p < 0.05; ** Patients may have >1 bleeding episode  
Hartigan et al. GIE 1997;46:1

---

**SCLEROTHERAPY VS. LIGATION FOR ACUTE VARICEAL BLEEDING**

<table>
<thead>
<tr>
<th></th>
<th>Lo (N=71)</th>
<th>Villanueva (N=179)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Population</td>
<td>Active Bleeding</td>
<td>Acute bleeding: EGD ≤ 6 hrs (SMT)</td>
</tr>
<tr>
<td>Endpoint</td>
<td>Persistent bleeding: 3 days</td>
<td>Further bleeding: 5 days</td>
</tr>
<tr>
<td>Sclero</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>Ligation</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* P < 0.05  
## Endoscopic Therapy vs. Medical Therapy

### Emergent Ligation vs. Somatostatin for Acute Esophageal Variceal Bleeding

RCT with EGD Within 12 Hrs of Presentation

<table>
<thead>
<tr>
<th>Results at 48 hrs</th>
<th>Ligation (N=62)</th>
<th>Somatostatin (N=63)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treatment failure</td>
<td>3 (5%)</td>
<td>20 (32%)</td>
<td>0.0001</td>
</tr>
<tr>
<td>Units transfused</td>
<td>4.7</td>
<td>6.9</td>
<td>0.03</td>
</tr>
<tr>
<td>Hospital days</td>
<td>7.7</td>
<td>10.2</td>
<td>0.07</td>
</tr>
<tr>
<td>Serious AEs</td>
<td>2 (3%)</td>
<td>4 (6%)</td>
<td>&gt; 0.2</td>
</tr>
<tr>
<td>Mortality</td>
<td>0</td>
<td>0</td>
<td>----</td>
</tr>
</tbody>
</table>

SMT: 250 µg bolus, 250 infusion

COMBINED ENDOSCOPIC PLUS MEDICAL THERAPY VS. ENDOSCOPIC THERAPY

LIGATION ± OCTREOTIDE FOR ACUTE VARICEAL BLEEDING

* P < 0.001

TIPS FOR ACUTE VARICEAL BLEEDING

EARLY TIPS AS PRIMARY THERAPY FOR ACUTE VARICEAL BLEEDING

• 2 RCTs of TIPS within 24-72 hrs
• High-risk patients
  – HVPG ≥ 20 mm Hg
  – Childs C (score 10-13); Child B + active bleeding
• Significant decreases in further bleeding and mortality

**EARLY TIPS VS. LIGATION + MEDICAL THERAPY**

RCT for Acute Variceal Bleeding in High-Risk Patients*

---

**EARLY TIPS AS PRIMARY THERAPY FOR ACUTE VARICEAL BLEEDING**

- 2 RCTs of TIPS within 24-72 hrs
- High-risk patients
  - HVPG ≥ 20 mm Hg
  - Childs C (score 10-13); Child B + active bleeding
- Significant decreases in further bleeding and mortality
  - Non-significant decreases in encephalopathy
    - 31 vs. 35%; 25 vs. 39%

---

*Child C or B with active bleeding; randomized within 24 hrs of admission; coated TIPS within 72 hrs of randomization*  

FAILURE OF ENDOSCOPIC AND MEDICAL THERAPY: ACUTE VARICEAL BLEEDING

FAILURE OF THERAPY FOR ACUTE VARICEAL BLEEDING

• Defined as persistent or recurrent bleeding in first 5 days despite endoscopic and pharmacologic therapy
• Repeat endoscopic therapy or TIPS
  – TIPS if persistent bleeding or severe rebleeding
  – Covered esophageal stents: initial reports promising

SELF-EXPANDING METAL STENT FOR ESOPHAGEAL VARICEAL HEMORRHAGE


FAILRE OF THERAPY FOR ACUTE VARICEAL BLEEDING

• Defined as persistent or recurrent bleeding in first 5 days despite endoscopic and pharmacologic therapy

• Repeat endoscopic therapy or TIPS
  – TIPS if persistent bleeding or severe rebleeding
  – Covered esophageal stents: Initial reports promising
    • Bleeding stopped without recurrence in 34/34
    • Stent migration to stomach in 7 patients
      – Repositioned with EGD at 24-48 hrs
    • Stent extraction at mean of 5 days (1-14)

LIGATION VS. SCLEROTHERAPY
Meta-Analysis of 7 Trials (N=547)

<table>
<thead>
<tr>
<th></th>
<th>OR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Rebleeding</strong></td>
<td></td>
</tr>
<tr>
<td>Due to varices</td>
<td>0.5 (0.4 - 0.7)</td>
</tr>
<tr>
<td>Due to Rx-induced ulcers</td>
<td>0.5 (0.3 - 0.8)</td>
</tr>
<tr>
<td></td>
<td>0.6 (0.3 - 1.1)</td>
</tr>
<tr>
<td><strong>Mortality</strong></td>
<td>0.7 (0.5 - 0.98)</td>
</tr>
<tr>
<td><strong>Esophageal stricture</strong></td>
<td>0.1 (0.03 - 0.3)</td>
</tr>
</tbody>
</table>

6/7 trials required fewer treatment sessions with ligation to achieve variceal obliteration


INTERVALS FOR LIGATION THERAPY

AASLD-ACG Guideline Recommendation

- **Initial eradication therapy**
  - Every 1-2 weeks until variceal eradication
- **After variceal eradication**
  - 1st EGD at 1-3 months
  - Subsequent EGDs at 6-12 month intervals depending on variceal recurrence

**PHARMACOLOGICAL THERAPY**

**β-BLOCKERS FOR PREVENTION OF RECURRENT VARICEAL BLEEDING**

- β-blockers superior to placebo, inactive Rx
  - Systematic review of RCTs
    - Rebleeding: ARR = 21% (13 to 30%)
    - Mortality: ARR = 7% (2 to 12%)
- Adding ISMN may further decrease HVPG
  - Not documented to decrease rebleeding
    - Meta-analysis: decreased variceal rebleeding but not overall rebleeding

CARVEDILOL VS. NADOLOL + ISMN FOR 2° PREVENTION OF VARICEAL BLEEDING
Open-Label RCT at 5 Days of Stability after Emergency EVL (No Serial EVL)

<table>
<thead>
<tr>
<th></th>
<th>Carvedilol (N=61)</th>
<th>Nadolol + ISMN (N=60)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rebleeding</td>
<td>37 (61%)</td>
<td>37 (62%)</td>
</tr>
<tr>
<td>Blood transfusions</td>
<td>3.1 u</td>
<td>3.3 u</td>
</tr>
<tr>
<td>Mortality</td>
<td>15 (25%)</td>
<td>17 (28%)</td>
</tr>
<tr>
<td>Side effects → D/C of drug</td>
<td>0</td>
<td>18 (30%)*</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(15 ISMN, 3 nadolol)</td>
</tr>
</tbody>
</table>

Median F/U: 30 mos


COMBINED ENDOSCOPIC PLUS MEDICAL THERAPY VS. EITHER THERAPY ALONE
<table>
<thead>
<tr>
<th></th>
<th>Combination vs. Ligation (6 trials)</th>
<th>Combination vs. Medical Therapy (3 trials*)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Esophageal variceal rebleeding</td>
<td>0.65 (0.40-0.93)</td>
<td>0.60 (0.43-0.84)</td>
</tr>
<tr>
<td>Mortality</td>
<td>0.71 (0.45-1.11)</td>
<td>1.08 (0.73-1.60)</td>
</tr>
</tbody>
</table>

Medical therapy = β-blocker ± isosorbide mononitrate

* β-blocker + isosorbide mononitrate

Thiele, et al. APT 2012;35:1155

FAILURE OF ENDOSCOPIC AND MEDICAL THERAPY IN PREVENTION OF RECURRENT VARICEAL BLEEDING
RECURRENT VARICEAL BLEEDING DESPITE 2° PROPHYLACTIC THERAPY

• TIPS*
  – If well-compensated liver disease may consider surgical decompression
    • Similar clinical outcomes
    • Fewer re-interventions (TIPS shunt dysfunction)

*PTFE-coated preferred to decrease shunt dysfunction, recurrent bleeding


GASTRIC VARICES
N-BUTYL-CYANOACRYLATE (BCA) FOR GASTRIC VARICEAL BLEEDING

• BCA superior to ligation
  – Active bleeding in 1 of 3 RCTs
  – Less further bleeding in 3 of 3 RCTs
• BCA superior to β-blockers
  – Lower rebleeding and mortality in 1 RCT
• TIPS superior to BCA
  – Less rebleeding (11 vs. 38%) in 1 RCT
    • No significant difference in mortality, complications
      – More encephalopathy with TIPS (26 vs. 3%)


MANAGEMENT OF ESOPHAGEAL VARICEAL BLEEDING

• Acute Bleeding Episode
  – Vasoactive medication (e.g., octreotide)*
  – Antibiotics*
  – Endoscopic ligation
  – Consider TIPS in high-risk patients
• Prevention of Recurrent Bleeding
  – Endoscopic ligation
  – β-blocker (?β-blocker + ISMN; carvedilol)
• TIPS if failure of medical/endoscopic therapy
  – ?surgical decompression if well-compensated

* Begin before EGD

Garcia-Tsao et al. Hepatology 2008;47:1764;
de Franchis, J Hepatol 2010;53:762
Traditional Management of Severe Hematochezia in Adults

Hospitalization for Severe Hematochezia

- Ongoing Hematochezia
  - Angiogram
    - Embolization &/or Surgery
    - Rebleed?
      - Yes
      - RBC scan or repeat angiogram
        - Embolization &/or Surgery
      - No
    - Self Limited Hematochezia
      - Rebleed?
        - Yes
        - Elective colonoscopy or BE
        - No
        - Colonoscopic, Medical, or Elective Surgical Rx
Angiography for Severe Hematochezia

- Threshold bleeding rate is > 0.5 cc/min
- Can show abnormal vessels of tumors or AVM’s
- Can localize colonic, small bowel, or UGI lesions
- Does not usually give an etiologic diagnosis.
- Diagnostic yields are from 12 – 69%
- Hemostasis possible with coils, clots, drugs, glue
- Complications include bowel infarction, renal failure, artery occlusion

Jensen DM. CURE DDRC 2013.

Jensen & Machicado. GI Endo Cl NA 1997; 7: 477.
Emergency Angiography vs. Colonoscopy for Final Diagnosis of Severe Hematochezia


* p < 0.05

RBC Scan for Ongoing Hematochezia 60 minutes

Jensen DM. CURE DDRC 2013.
RBC Scans for Hematochezia Diagnosis

- Threshold bleeding rate is 0.1 cc/min
- Technetium tagged RBC’s stay in vascular space over 24 hrs
- Surgical yield of positive early scans (1 or 4 hrs) scans is high (70-80%)
- Late scans (12 or 24 hrs) have poor yield (<40%) & localization at laparotomy
- Can localize but does not give an etiologic diagnosis.

Jensen & Machicado. GI Endo Cl NA 1997; 7: 477.

Randomized Trial of Urgent Colonoscopy vs. Standard Management for Acute LGI Bleeding

- 100 patients randomized between 7/93 – 6/95 to urgent colonoscopy vs. standard management (RBC scan→angio, or elective colon).
- Significant differences reported for urgent colonoscopy vs. standard group in rates of definitive diagnosis (42% vs. 22%) & no source (4% vs. 24%).
- No significant differences in early rebleeding (22% vs. 30%), hospital stay (5.8 vs. 6.6 days), total RBC (4.2 vs. 5.0 units), surgery (14% vs. 12%) or death from bleeding (2% vs. 4%).
- Results of tests were not utilized for patient triage.

Limitations of Duke RCT & Recommendations for Improvement

1. Diagnostic procedures or medical therapy alone do not change natural history or acute outcome of LGIB. Use triage to level of care & early discharge for minor stigmata & effective hemostasis for major stigmata.

2. 64% of urgent colonoscopy group had fair or poor preps. Rec purge until clear of stool, clots, & blood.


4. Rebleeding rate was very high – 22% vs. other study (5%). Use combination therapy for focal hemorrhage.

5. Premature termination of study before complete. Rec large RCT – probably multicenter.


Severe Hematochezia Case

- 58 y/o Hispanic man admitted with ongoing painless hematochezia – no melena or hematemesis.
- Hgb 12.4 → 8.5 ; INR 1.3 ; Platelets 75K ; Creat 2.0
- NG aspirate → clear & orthostatic in ER
- Hx DM, HTN, Obesity, & CRI
- Former heavy drinker quit 5 yrs ago; No NSADS on ASA.
- No prior GI bleeds, colonoscopy or EGD
- Your DDx & recommendations after resuscitation?

Jensen DM. CURE DDRC 2013.
Severe Hematochezia:
Bleeding Site Locations

- Gastric fundal varix with a platelet plug

* p<0.05

Jensen DM. CURE DDRC 2013.
**Appearance & Prevalence of Major Stigmata of Definitive Diverticular Hemorrhage on Urgent Colonoscopy (100 patients)**

<table>
<thead>
<tr>
<th>Adherent Clot</th>
<th>Non-Bleeding Visible Vessel</th>
<th>Active Bleeding</th>
</tr>
</thead>
<tbody>
<tr>
<td>(42%)</td>
<td>(28%)</td>
<td>(30%)</td>
</tr>
</tbody>
</table>

*Jensen DM. CURE DDRC 2013.*

---

**Comparison of RBC Scan Angiogram & Colonoscopy for Diagnosis & Treatment of Hematochezia**

<table>
<thead>
<tr>
<th></th>
<th>RBC Scan</th>
<th>Angiogram</th>
<th>Colonoscopy</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Colon Prep</strong></td>
<td>None</td>
<td>None</td>
<td>Purge</td>
</tr>
<tr>
<td><strong>Minimum Bleed Rate</strong></td>
<td>0.2cc/min</td>
<td>0.5cc/min</td>
<td>None</td>
</tr>
<tr>
<td><strong>Therapeutic Capability</strong></td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Etiologic Diagnosis</strong></td>
<td>No</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Detection of Non-Bleeding Stigmata</strong></td>
<td>No</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Detection of Mucosal Lesions</strong></td>
<td>No</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Usual Diagnostic Yield</strong></td>
<td>15 – 30%</td>
<td>10 – 20%</td>
<td>≥ 85%</td>
</tr>
</tbody>
</table>

*Jensen DM. CURE DDRC 2013.*
Severe Hematochezia Management

Hx Cirrhosis, Ulcers
- melena, hematemesis, or + NG
EGD or Enteroscopy
+ Treat -

Hx hemorrhoids,
XRT, colitis, diarrhea
Anoscopy & flex sig
+ Treat -

Negative Hx,
painless hematochezia
Purge & urgent
colonoscopy

Push enteroscopy
+ Treat

Capsule Endoscopy; RBC scan or Angio
Treat

Deep Enteroscopy or surgery

Jensen DM. CURE DDRC 2013.

Management of Severe Hematochezia

Hx, PE, NG tube
- Resuscitate

Surgery
- Oral purge

RBC Scan-Angio
- Consult GI
(± Surgery)

Colonoscopy-enteroscopy

Severe Hematochezia Management

- NG lavage - to document bile or blood
- Resuscitation & monitoring
- Purge-NG tube if unable to drink – 1 liter/30-45 min until clear effluent
- Metaclopramide 10 mg IV 30 min before & q 4-6 hrs
- Dialysis if severe CRF; diuresis for severe CHF or cirrhosis with ascites


Hematochezia Rebleed

- 73 y/o African F with polymyositis, DM, obesity, & arthritis on steroids.
- Admitted with painless hematochezia.
- Hgb 13.5 →10 & normal coagulation tests.
- No hypotension, melena or abdominal pain.
- What are your DDX & recommendations?
Combination Treatment (Epi Injection+Clip) of Pulsatile Visible Vessel in Diverticulum Base

Jensen DM. CURE DDRC 2013.

Sigmoid TIC with NBVV (pulsatile), DUP, Hemostasis (Epi Inj, hemoclipping) & Tattoos

Jensen DM. CURE DDRC 2013.
Natural History & Outcomes of Definitive Diverticular Hemorrhage on Medical Therapy

<table>
<thead>
<tr>
<th></th>
<th>Major Rebleed</th>
<th>Intervention For Rebleed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Active bleed</td>
<td>83%</td>
<td>56%</td>
</tr>
<tr>
<td>(N = 18)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NBVV</td>
<td>60%</td>
<td>40%</td>
</tr>
<tr>
<td>(N = 5)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clot</td>
<td>43%</td>
<td>29%</td>
</tr>
<tr>
<td>(N = 14)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Totals</td>
<td>65%</td>
<td>43%</td>
</tr>
<tr>
<td>(N = 37)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

DM Jensen, GV Ohning CURE Hemostasis Research Group May 2012

Doppler Ultrasound Probe Vascular Technology Inc.

Jensen DM. CURE DDRC 2013.
Doppler Ultrasound Probe for Diverticular Hemorrhage: Definitive vs. Presumptive

<table>
<thead>
<tr>
<th>Stigmata of Hemorrhage</th>
<th>Number</th>
<th>+ DUP</th>
<th>Totals (Rate + DUP)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Major SRH</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clot</td>
<td>5</td>
<td>4</td>
<td>4/5 (80%)</td>
</tr>
<tr>
<td>NBVV</td>
<td>12</td>
<td>11</td>
<td>11/12 (92%)</td>
</tr>
<tr>
<td>Ooze</td>
<td>3</td>
<td>3</td>
<td>3/3 (100%)</td>
</tr>
<tr>
<td><strong>Definitive Tic Bleed</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clean Base</td>
<td>20</td>
<td>18</td>
<td>18/20 (90%)*</td>
</tr>
<tr>
<td>Presumptive</td>
<td>20</td>
<td>0</td>
<td>0/20 (0%)</td>
</tr>
</tbody>
</table>

*p < 0.05  Jensen DM. GIE 2009; 69:AB289:T1411 & 2011.

Jensen DM & CURE Hemostasis Research Group 2013
Gold injection probe
Diverticulosis & Severe Hematochezia

**Definitive diverticular bleed** – stigmata of hemorrhage on a tic found on urgent colonoscopy &/or surgery; or active bleeding on RBC scan or angiogram confirmed to be diverticulosis by other tests.

**Presumptive diverticular bleed** - diverticulosis without stigmata & no other bleeding lesions found by colonoscopy, anoscopy, enteroscopy, & capsule endoscopy.

**Incidental diverticulosis** - diverticulosis present but another site of bleeding is identified.


Prevalence of Definitive, Presumptive, & Incidental Diverticular Hemorrhage
(405 patients with diverticulosis & severe hematochezia)

- **Definitive Tic Bleed** 21.0%  
  \(N = 85\)

- **Presumptive Tic Bleed** 31.9%  
  \(N = 129\)

- **Incidental Diverticulosis** 47.2%  
  \(N = 191\)

Jensen DM. CURE DDRC 2013.
**True Diverticular Hemorrhage: Prevalences of Definitive & Presumptive Bleeding (N=214)**

- **Presumptive Diverticular Bleed**
  - 60.3%
  - (N = 129)

- **Definitive Diverticular Bleed**
  - 39.7%
  - (N = 85)

**Outcomes: 100 Definitive Diverticular Bleeds (CURE prospective, cohort studies)**

<table>
<thead>
<tr>
<th></th>
<th>Med-Surg-Angio Rx</th>
<th>Med-Endo Rx</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patients</td>
<td>37</td>
<td>63</td>
</tr>
<tr>
<td>More bleeding</td>
<td>24 (64.9%)*</td>
<td>3 (4.8%)*</td>
</tr>
<tr>
<td>Severe rebleeding</td>
<td>16 (43.2%)*</td>
<td>2 (3.2%)*</td>
</tr>
<tr>
<td>Surgery or Embolization</td>
<td>16 (43.2%)*</td>
<td>2 (3.2%)*</td>
</tr>
<tr>
<td>Median time to discharge</td>
<td>8.5 days*</td>
<td>2 days</td>
</tr>
<tr>
<td>Complications</td>
<td>2 (5.5%)</td>
<td>2 (3.2%)**</td>
</tr>
</tbody>
</table>

* p < 0.05  *After anticoagulation  **1 post coagulation syndrome
1 pneumoperitoneum

Location of Diagnoses for Severe Hematochezia (N=795)

- Colonic Sites: 73.5% (N=584)
- Small bowel: 4.8% (N=38)
- No source: 2.5% (N=20)
- UGI sources: 19.2% (N=153)

Eight Most Common Colonic Sources of Severe Hematochezia (584 cases)
(Expressed as percent of colonic sources)

- Diverticulosis: 31.9%
- Internal hemorrhoids: 12.8%
- Ischemic Colitis: 11.9%
- Rectal ulcers: 7.6%
- Colon angiomas/XRT: 7.0%
- UC, Crohn’s, other colitis: 6.2%
- Other LGI sources: 5.6%
- Post Polypectomy Ulcer: 4.7%
- Focal stigmata amenable to colonoscopic hemostasis

Jensen DM. CURE DDRC 2013.
Bleeding Internal Hemorrhoids – Emergency Banding

Jutabha R. Tech GI Endo 2001; 3: 199

Inpatient Severe Hematochezia Case

- 52 y/o Hispanic man with ESLD 2° to ALD.
- Ascites, PSE, entubated in SICU; CRF on dialysis awaits OLT.
- Very severe inpatient hematochezia with shock.
- Hgb 11→5; platelets 45K, INR 2.5, PTT 60.
- 12U RBC, 8U FFP, 4 platelet Pacs in 24 hrs.
- Negative emergency abdominal angiogram.
What Diagnosis to Think of for Inpatient Hematochezia?
(6 most common diagnosis)

<table>
<thead>
<tr>
<th></th>
<th>Diagnosis</th>
<th>Count (Percentage)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>UGI lesions (ulcers/varices etc.)</td>
<td>25 (19.4%)</td>
</tr>
<tr>
<td>2</td>
<td>Colon Ischemia</td>
<td>19 (14.7%)</td>
</tr>
<tr>
<td>3</td>
<td>Rectal ulcers</td>
<td>15 (11.6%)</td>
</tr>
<tr>
<td>4</td>
<td>Diverticulosis</td>
<td>10 (7.8%)</td>
</tr>
<tr>
<td>5</td>
<td>Other colon</td>
<td>9 (7.0%)</td>
</tr>
<tr>
<td>6</td>
<td>Internal Hemorrhoids</td>
<td>6 (4.7%)</td>
</tr>
</tbody>
</table>


Spurting Rectal Ulcer: Hemostasis with Injection-Hemoclippping

Post-Polypectomy Ulcer – NBVV
9 days after 2 cm polypectomy

Gralnek IM. Tech GI Endosc 2001; 3: 216

Ascending Colon Large Angiomas

Machicado G. Tech GI Endo 2001; 3: 185
Severe Ischemic Colitis on Colonoscopy

89% of patients had diffuse lesions

Estimated Direct Costs in 1990 for Management of Patients Hospitalized for Severe Hematochezia Before vs. After CURE Practice of an Urgent Colonoscopy Approach

Estimated mean direct cost savings of $10,065 / patient with urgent colonoscopy.

Jensen & Machicado. GI Endo CI NA 1997; 7: 477
Severe Hematochezia Management

- **Hx Cirrhosis, Ulcers**
  - melena, hematemesis, or +NG
  - Enteroscopy
  - + Treat

- **Hx hemorrhoids, XRT, colitis, diarrhea**
  - Anoscopy & flex sig
  - + Treat

- **Negative Hx, painless hematochezia**
  - Purge & urgent colonoscopy
  - +

**Push enteroscopy**

- **Treat**
- **RBC scan or Angio**
  - +

**Capsule Endoscopy &/or Deep Enteroscopy or surgery**

**End of Slide Presentation**