New Hemostatic Tools and Techniques

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Objectives

- Be able to apply new GI bleed prognostic indicators and scores
- Detect bleeding lesions using current techniques
- Understand new endoscopic treatments for control of bleeding
- Be aware of future improvements
Initial Assessment and Risk Stratification

- Assess hemodynamic status immediately
- Insert 2 large bore IV’s and begin resuscitation
- Blood transfusions
  - Target hemoglobin ≥ 7 g/dl
    (> 10 g/dl if intravascular volume depletion or CAD/PVD)
  - Target INR < 2.5
- Risk stratification into higher and lower categories
  - Patient triage
  - Timing of endoscopy

Laine L, Jensen D. Am J Gastroenterol 2012;107:345

Survival according to Transfusion Strategy

Initial Assessment and Risk Stratification Recommendations

“Early risk stratification, by using validated prognostic scales”

- International Consensus Guidelines

“Risk assessment should be performed to stratify patients into higher and lower risk categories”

- ACG 2012 Practice Guidelines

Rockall Risk Score
(Gut 1996;38:316-21)

- Assesses mortality
- Incorporates clinical and endoscopic data

Glasgow Blatchford Risk Score
(Lancet 2000;356:1318-21)

- Assesses need for intervention
- Incorporates only information available at presentation
### Rockall Scoring System

<table>
<thead>
<tr>
<th>Score / Variable</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>&lt;60</td>
<td>70-79</td>
<td>&gt;80</td>
<td>-</td>
</tr>
<tr>
<td>Shock</td>
<td>None</td>
<td>Tachy (p&gt;100)</td>
<td>Hypotension (SBP&lt;100)</td>
<td>-</td>
</tr>
<tr>
<td>Comorbidity</td>
<td>No major comorbidity</td>
<td>-</td>
<td>CHF, CAD Any other</td>
<td>Renal or liver failure Met cancer</td>
</tr>
<tr>
<td>Endoscopic Diagnosis</td>
<td>MWT No SRH</td>
<td>All Other</td>
<td>Upper GI cancer</td>
<td>-</td>
</tr>
<tr>
<td>Endoscopic Major SRH</td>
<td>None or spot</td>
<td>-</td>
<td>Clot, vessel or spurting</td>
<td>-</td>
</tr>
</tbody>
</table>

Rockall Gut 1996;38:316

### Predictive Value of Rockall Score

- Rebleeding
- Mortality

![Graph showing the predictive value of Rockall Score](image-url)
**Blatchford Scoring System**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Value</th>
<th>Variable</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>BUN (mg/dL)</td>
<td>&gt;18.2 &lt;22.4</td>
<td>2</td>
<td>Systolic BP (mmHg)</td>
</tr>
<tr>
<td></td>
<td>&gt;22.4 &lt;28</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>&gt;28 &lt;70</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>&gt;70</td>
<td>6</td>
<td>Other Markers</td>
</tr>
<tr>
<td>Hgb g/dL (men)</td>
<td>&gt;12 &lt;13</td>
<td>1</td>
<td>Heart rate</td>
</tr>
<tr>
<td></td>
<td>&gt;10 &lt;12</td>
<td>3</td>
<td>Melena</td>
</tr>
<tr>
<td></td>
<td>&lt;10</td>
<td>6</td>
<td>Syncope</td>
</tr>
<tr>
<td>Hgb g/dL (women)</td>
<td>&gt;10 &lt;12</td>
<td>1</td>
<td>Cardiac</td>
</tr>
<tr>
<td></td>
<td>&lt;10</td>
<td>6</td>
<td>Liver</td>
</tr>
</tbody>
</table>

Blatchford Lancet 2000;356:1318-21

**AIMS65 Score**

1. Albumin <3.0 mg/dL
2. INR >1.5
3. Mental status change (GCS <15)
4. Systolic blood pressure <90 mmHg
5. Age >65 years

Saltzman JR. Gastrointest Endosc 2011;74(6):1225-9
Mortality Correlates with AIMS65 Score

Mortality: AIMS65 vs. GBRS

Hyett B. Gastrointest Endosc in press
Is there a role for NG lavage?

- Retrospective study of patients with upper GI bleeding receiving NG lavage (193 pts) or no NG lavage (193 pts)

**Results:**
- Patients with NGL associated with earlier times to endoscopy (hazard ratio 1.49)
- Bloody NG aspirate associated with high risk lesions
- NGL lavage did not affect main study outcomes of mortality, LOS, surgery or transfusions

**Conclusion:** NG lavage should not be routinely performed in patients with upper GI bleeding

Huang ES et al. Gastrointest Endosc 2011;74(5):971-80
Pallin DJ, Saltzman JR. (editorial) Gastrointest Endosc 2011;74(5):981-4

The Role of NG Tube Lavage

“NG or orogastric lavage is not required in patients with upper GI bleeding for diagnosis, prognosis, visualization, or therapeutic effect”

- ACG 2012 Practice Guidelines

Laine L, Jensen D. Am J Gastroenterol 2012;107:345-60
Detection of Bleeding Lesions: We Can Only Treat What We See

- Double or large channel endoscopes
- External large suction device
- IV erythromycin
- Water pump/jet
- Lavage pre-endoscopy
- Hydrogen peroxide
Role of Erythromycin Before Endoscopy in UGI Bleeding

- IV erythromycin powerful prokinetic
- Erythromycin 3 mg/kg or 250 mg IV over 30 minutes 1-hour before EGD
- Quality of gastric exam significantly better
- Decreased need for a repeat upper endoscopy
- No difference in:
  - Length of hospital stay
  - Need for surgery
  - Adverse events

Barkun AN et al. Gastrointest Endosc 2010;72:1138
Role of Erythromycin in UGIB

“Intravenous infusion of erythromycin (250 mg ~30 min before endoscopy) should be considered to improve diagnostic yield and decrease the need for repeat endoscopy”

- ACG 2012 Practice Guidelines

Laine L, Jensen D. Am J Gastroenterol 2012;107:345-60

Timing of Endoscopy

“Early endoscopy (within 24 hours of presentation) is recommended for most patients with acute upper GI bleeding”


“Patients with UGI bleeding should generally undergo endoscopy within 24 hours of admission, following resuscitative efforts to optimize hemodynamic parameters”

Urgent Endoscopy (< 12 hours)

- Always after hemodynamic resuscitation and stabilization
- Hemodynamically unstable initially
- Hematemesis
- Suspected active bleeding
- Suspected variceal bleeding

Laine L, Jensen D. Am J Gastroenterol 2012;107:345-60
Tsoi KKF. Nat Rev Gastroenterol Hepatol 2009; 6:463-469

Indications for Endoscopic Therapy

<table>
<thead>
<tr>
<th>Stigmata</th>
<th>Endoscopic Therapy?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Active Bleeding</td>
<td>Yes</td>
</tr>
<tr>
<td>Non-Bleeding Visible Vessel</td>
<td>Yes</td>
</tr>
<tr>
<td>Adherent Clot</td>
<td>+/-</td>
</tr>
<tr>
<td>Flat Spot</td>
<td>No</td>
</tr>
<tr>
<td>Clean Ulcer Base</td>
<td>No</td>
</tr>
</tbody>
</table>

Laine L, Jensen D. Am J Gastroenterol 2012;107:345-60
Role of Endoscopic Therapy and Adherent Clots

“Endoscopic therapy may be considered for patients with an adherent clot resistant to vigorous irrigation. Benefit may be greater in patients with clinical features associated with a higher risk of rebleeding (e.g., older age, concurrent illness, inpatient at time bleeding began)”

- ACG 2012 Practice Guidelines

Laine L, Jensen D. Am J Gastroenterol 2012;107:345-60
Endoscopic Therapeutic Options

- Injection
- Thermal (contact)
  - Heater probe
  - Bipolar probe
  - Monopolar
- Thermal (non-contact)
  - Argon plasma coagulation
- Mechanical
  - Hemoclips
  - Banding
- Combination

Combination Therapy

- Inject first with dilute epinephrine
- Combine with thermo-coagulation therapy
- May also combine injection with hemoclips

Combination therapy is safe and effective

Monopolar Cautery

- **Monopolar device**
  - Designed for endoscopic bleeding
  - Flat jaws for grasping
  - Rotational ability
  - Grounding pad required
- **Optimal settings (stomach)**
  - 50 Watts for 2 or 3 seconds

Role of monopolar cautery in the management of upper GI bleeding needs to be determined

Saltzman JR. Gastrointest Endosc 2010;72(4):796

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**Hemoclips**
Hemoclips

Combination Therapy vs. Hemoclips Study

- Prospective randomized controlled trial of acute non-variceal upper GI bleeding
- All pts on high dose proton pump inhibitors

Primary Control

Rebleeding Rate

Saltzman JR. Am J Gastroenterol 2005;100:1503
Hemoclips for Upper GI Bleed

- Meta-analysis of 15 RCT’s of 1156 patients
  - 390 clips alone
  - 242 clips and injection
  - 359 injection alone
  - 165 thermocoagulation with or without injection
- Hemoclips superior to injection therapy alone
  - Definitive hemostasis 87% vs. 75%
- Hemoclips comparable to thermal coagulation
  - Definitive hemostasis 82% vs. 81%

Sung JJ. Gut 2007;56:1364

When to Use Hemoclips

- Ideal for hemoclips
  - Lesion pliable
  - Lesion accessible
  - ≤2 mm vessel
  - ≤2 cm ulcer defect
- Difficult for hemoclips
  - Indurated or fibrotic base
  - Challenging locations
    - Lesser curve stomach
    - Posterior wall stomach
    - Posterior duodenum
Doppler Ultrasound

Wong RC. Gastroenterology 2009;137:1897
Doppler Signal Before and After Endoscopic Therapy

Application of Doppler guided hemostasis has the potential to help reduce ulcer rebleeding

Jensen DM. DDW 2010

Hemoglobin Monitoring

ACG Regional Postgraduate Course - Los Angeles, CA
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Hemostatic Nanopowder Spray

Mechanism of action:
- Tamponade (rapid velocity application)
- Dehydration of fluid within blood
- Activation of clotting cascade
- Activation of platelets

Aims: To assess the efficacy and safety of a novel hemostatic nanomaterial in short and long term hemostasis in a survival GI bleeding animal model

Conclusions: Endoscopic application of this nanopowder is safe and highly effective in achieving hemostasis in an anticoagulated severe GI bleeding animal model

Giday SA. Endoscopy 2011;43:296
### Table: Bleeding Indication and Outcome

<table>
<thead>
<tr>
<th>Bleeding Indication</th>
<th><em>Forrest Scope</em></th>
<th>Ulcer Location</th>
<th>Acute Hemostasis (procedural)</th>
<th>Hemostasis 72 hours post procedure</th>
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<tbody>
<tr>
<td>Melena</td>
<td>1b</td>
<td>Duodenum</td>
<td>Yes</td>
<td>Yes</td>
</tr>
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<td>1b</td>
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<tr>
<td>Hematemesis, Melena</td>
<td>1b</td>
<td>Stomach</td>
<td>Yes</td>
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**Human Hemostatic Spray Initial Trial**

Sung JYY. Endoscopy 2011;43:291
Hemospray Considerations

- Effective only in actively oozing or spurting bleeding lesions
- Does not require special expertise
- Can be rapidly used if bleeding occurs after polypectomy or sphincterotomy
- May be effective in difficult locations
- Further clinical studies are needed

Over-the-scope Clip

Kirschniak A. Gastrointest Endosc 2007;66:162
Therapeutic Capsule Endoscopy

Valdastri P et al. Endoscopy 2008;40:979
Upper GI Bleeding Summary

- Incorporate GI bleeding risk scores in practice
- Overcome limitations of endoscopic visualization by using several methods
- Perform endoscopy in a timely manner
- Use effective endoscopic treatments (hemoclips and combination therapies)
- Further improvements are coming