GI Bleeding: Hemostasis Techniques

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Sources of UGIB

- Non-variceal UGIB
  - Ulcer (33-56%)
  - Erosions (19%)
  - Mallory-Weiss tear (4%)
  - Vascular lesions (3%)
  - Tumor (1%)

- Portal-hypertension
  - Esophageal varices

- Hemosuccus pancreaticus
- Hemobilia
- Iatrogenic (post-sphincterotony, etc)
- Dieulefoy lesion
- Fistula (aortoenteric, etc)
- Polyps
- Gastric or duodenal varices
- Portal hypertensive gastropathy
- GAVE

Enestvedt et al. Nonvariceal upper-GI hemorrhage. GIE 2008 (CORI), Barkun A et al. RUGBE, Am J Gastro 2004
Results of Endoscopic Therapy
Where it all began...

<table>
<thead>
<tr>
<th></th>
<th>Sham (n=23)</th>
<th>MPEC (n=21)*</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hemostasis (%)</td>
<td>3 (13)</td>
<td>19 (90)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Blood Transfusions</td>
<td>5.4 ± 0.9</td>
<td>2.4 ± 0.9</td>
<td>0.002</td>
</tr>
<tr>
<td>Emergency Intervention (%)</td>
<td>13 (57)</td>
<td>3 (14)</td>
<td>0.005</td>
</tr>
<tr>
<td>Hospital Stay (days)</td>
<td>7.2 ± 1.1</td>
<td>4.4 ± 0.8</td>
<td>0.02</td>
</tr>
<tr>
<td>Deaths (%)</td>
<td>3 (13)</td>
<td>0</td>
<td>NS</td>
</tr>
<tr>
<td>Hospital Cost ($)</td>
<td>7,550 ± 1,480</td>
<td>3,420 ± 750</td>
<td>0.001</td>
</tr>
</tbody>
</table>

For actively bleeding lesions
* MPEC=multipolar electrocoagulation


Endoscopic Therapy

Endoscopic therapy reduces
- Bleeding (active or recurrent)
- Need for surgery
- Mortality

Results driven by high risk stigmata:
- Active bleeding (NNT 2)*  * recurrent bleeding
- Visible vessels (NNT 5)*
- Adherent clot & flat spot—not reduced*

Endoscopic Therapeutic Choices

- **Injection**
  - Epinephrine (1:10,000-100,000) or saline
  - Sclerosant
  - Thrombin/Fibrin Glue

- **Thermal**
  - Bipolar electrocoagulation (heat + pressure)
  - Heater probe (heat + pressure)
  - APC (heat only)
  - RFA

- **Mechanical**
  - Clip (theoretical advantage of no tissue injury)
  - Ligating devices

New Treatments

- OTS Closure Devices
- Hemospray
- EUS-guided hemostasis
Is Injection Enough?

Ulcer with visible vessel
Injection therapy

- Epinephrine: 1:10,000 – 1:100,000
- Less effective than:
  - Other monotherapies (NNT 9)
  - When combined with 2\textsuperscript{nd} therapy (NNT 5)

- TWO IS BETTER THAN ONE
  - Two modalities—epi + thermal/mechanical


Thermal therapy

- Bipolar electrocoagulation
  - Coaptive coagulation: compress vessel (pressure), then coagulate (heat) to seal
  - Low wattage (15-20W) for 5-10 seconds
- Heater Probe
- Argon Plasma Coagulation
  - Less well-studied
  - No difference in RCT for high risk stigmata when compared to epi + heater probe
Thermal Therapy

- When compared to no therapy, reduced:
  - Bleeding (NNT 4)
  - Surgery (NNT 8)
  - Mortality (NNT 33)

- Can be used as monotherapy

Laine L, McQuaid KR. CGH 2009, Chau CH et al. GIE 2003

Endoscopic Hemoclips

- Initial hemostasis lower than other endoscopic treatments:
  - RR 0.78 (0.64 – 0.95)

- When clips do not work
  - Challenging locations
    - Lesser curvature/posterior wall of stomach
    - Posterior duodenum
    - Retroflexed view
  - Fibrotic lesions

Endoscopic Hemoclips

■ No difference in outcomes compared to other endoscopic therapies:
  ■ The Big 3: Rebleeding, surgery, mortality
  ■ Blood transfusions, LOS
■ SUMMARY: When able to be placed, clips appear as successful as thermal therapy

Hemostatic Forceps
Use of Hemostatic Forceps

- Provide immediate tamponade with the addition of soft coag mode with attention not to provide excessive coag (Coumaros D, World J Gastroenterol 2010;16:2061-2064)

- Prospective study in bleeding gastric ulcers forceps found as effective as hemoclips
  - (Arima S, J Gastroenterol 2010;45:501-5)

OTS Closure Device

- Over the scope clipping device

- Applicator tip on cap with clip release via hand wheel
Over-the-scope (OTSC) represents an effective endoscopic treatment for acute GI bleeding after failure of conventional techniques

- 30 patients, 6 centers
- All prior conventional Rx failures
- Hemostasis 97%
- 2 rebleeds (6%)
  - Rx’d with injection
### GI tract Bleeding lesion

<table>
<thead>
<tr>
<th>GI tract</th>
<th>Bleeding lesion</th>
<th>n</th>
<th>No. OTSC, N/T</th>
<th>Primary hemostasis, n</th>
<th>Rebleeding, n</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upper</td>
<td>Duodenal ulcer</td>
<td>12*</td>
<td>3/9</td>
<td>11</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Gastric ulcer</td>
<td>6*</td>
<td>2/4</td>
<td>6</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Mallory-Weiss</td>
<td>2</td>
<td>2/0</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Dieulafoy</td>
<td>2</td>
<td>2/0</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Surgical anastomosis</td>
<td>1</td>
<td>1/0</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Lower</td>
<td>EMR</td>
<td>5</td>
<td>3/2</td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>ESD</td>
<td>1</td>
<td>0/1</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Colonic diverticulum</td>
<td>1</td>
<td>1/0</td>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>

*Forrest 1a = 5; Forrest 1b = 4
*Forrest 1a = 2; Forrest 1b = 2

**Indications for OTSC placement and main results**

OTSC over-the-scope clip, GI gastrointestinal, N nontraumatic, T traumatic, EMR endoscopic mucosal resection, ESD endoscopic submucosal dissection

**Hemospray**

Sung JJ et al. Endoscopy 2011
Early Clinical Experience of the Safety and Effectiveness of Hemospray in Achieving Hemostasis in Patients with Acute PU Bleeding

- 20 Patients with bleeding ulcers
  - Hemostasis in 19

- Recurrent bleeding in 2 patients

- Second-look endoscopy at 72 hrs: Coagulum gone, clean-base ulcers

Hemospray

- Cancer-related UGIB
  - Yen-I Chen et al. GIE 2012
  - LeBlanc et al. GIE 2013

- After therapeutic interventions
  - LeBlanc et al. GIE 2013

- Acute variceal hemorrhage
  - Ibrahim et al. GIE 2013

- Lower Gl hemorrhage
  - Souhellis et al. GI 2013
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Gastric Antral Vascular Ectasia

Radiofrequency Ablation for Refractory Gastric Antral Vascular Ectasia

McGorisk et al. GIE 2013

- 21 patients transfusion dependent after APC therapy
- 1-to 4 RFA treatments
Radiofrequency Ablation for Refractory Gastric Antral Vascular Ectasia

McGorisk et al. GIE 2013

- Results at 6 months:
  - 18/21 (86%) transfusion independent
  - 2 limited AE’s

Esophageal Varices with Band Ligation
Gastric Varices

- Conventional approach (sclerosis, banding)
- Endoscopic obturation: Cyanoacrylate

Band Ligation vs. N-Butyl-2-Cyanoacrylate Injection in Acute Gastric Variceal Bleeding: A Prospective Follow-up Study

Tantau et al. Ann Hepatol 2014

- 39 patients
  - 19 cyanoacrylate injection
  - 18 band ligation
- Initial hemostasis 100 vs 89% (p=0.43)
- Rebleeding 32 vs 72% (p=0.03)
- No difference in survival rates (p=0.75)
Endoscopic therapy saves lives and reduces morbidity

PUD
  - Monotherapy with epinephrine *not* recommended in PUD
  - Mechanical therapy (clips) or thermal therapy can be considered for monotherapy if initial hemostasis can be attained
Summary

- New technology
  - Hemospray
  - OTSC
  - EUS-guided therapy

- Large prospective trials are needed