Endoscopic Therapy
For GI Bleeding in Children

Douglas S. Fishman, MD
Director, Therapeutic Endoscopy
Assistant Professor of Pediatrics
Baylor College of Medicine
Texas Children’s Hospital
Houston, TX

Goals

• Discuss the role of endoscopy in the management of variceal and non-variceal UGI bleeding

• Review the role of combined therapeutic modalities and demonstrate practical uses of endoscopic techniques

• Define potential limitations and complications of therapeutic endoscopy
Patient Assessment

• High risk stable vs. High risk unstable
• Hemodynamics, measures of hemostasis
• Where to do your endoscopy? (ED, ICU, OR, GI Procedure Unit)
• When?
• Co-morbidity (Cardiac, BMT)
• Antibiotics

The Team

• Technicians
• Nursing
  – Endoscopy Unit
  – OR
• Pediatric Endoscopists
  – Fellows
  – Attendings
  – Endoscopy “Back-up”
• Surgical Staff
• Adult Endoscopists

Equipment

• Bleeding kit ("tackle-box")
  – VBL kit, sclerotherapy needles, multiple clips
  – Injectables (epi, sodium morrhuate)
• Irrigation
• Suction
• Endoscopes
  – Scope size
  – Channel size
  – Duodensoscope
The techniques

- Injection therapy
- Thermal coagulation
  - MPEC
  - Argon Plasma
- Clip application
- Variceal band ligation

Endoscopic Criteria

- Acute hemorrhage
  - Forrest I a (Spurting hemorrhage)
  - Forrest I b (Oozing hemorrhage)
- Signs of recent hemorrhage
  - Forrest II a (Visible vessel)
  - Forrest II b (Adherent clot)
  - Forrest II c (Hematin on ulcer base)
- No signs of recent hemorrhage
  - Forrest III

Forrest 1a-"spurters"
Variceal Grading

- I, II, III (IV)
  - Small, medium, large
  - % obstruction of lumen
- Additional signs:
  - cherry red spots (petechiae of 1-2 mm on the variceal surface)
  - red wale marks (fine capillaries on the variceal surface, resembling whipping marks)

Gastroesophageal and Gastric Varices
- Sarin Classification

Sarin Classification of Gastric Varices
Sarin et al. Hepatology 1992
Benefits of Endoscopic Therapy

- Endoscopic therapy better than no therapy for risk of rebleeding and need for surgery:
  - ACTIVE BLEEDING
  - Non-bleeding visible vessels
- Epinephrine compared to other monotherapies or epinephrine + monotherapies: epinephrine alone was less effective (NNT=9, NNT=5)
  - Rebleeding or need for surgery

Laine and McQuaid, Clin Gastroenterol Hepatol 2009; 7: 33-49

Endoscopy Consensus Statement

- A finding of high-risk endoscopic stigmata (active bleeding or a visible vessel in an ulcer bed) is an indication for immediate endoscopic hemostatic therapy
- Monotherapy, with injection or thermal coagulation, is an effective endoscopic hemostatic technique for high-risk stigmata; however, the combination is superior to either treatment alone.

Barkun et al. Annals of Internal Medicine 2003

Endoscopy Consensus Statement

- A finding of low-risk endoscopic stigmata (a clean-based ulcer or a nonprotuberant pigmented dot in an ulcer bed) is not an indication for endoscopic hemostatic therapy
- A finding of a clot in an ulcer bed warrants targeted irrigation in an attempt at dislodgment, with appropriate treatment of the underlying lesion

Barkun et al. Annals of Internal Medicine 2003
Injection Therapies

- Epinephrine (vasoactive)
  - (1:10,000) 9 mL NS with 1 mL 1:1000
  - Best in combination with thermal or mechanical coagulation
- Sclerotherapy (lead to thrombosis)
  - Sodium morrhuate (2.5-5%)
  - Sodium tetradecyl sulfate
  - Absolute alcohol
- Polymers
  - Cyanoacrylate
    » N-butyl-2 (Histocryl and Lipiodol) or 2-octyl (Dermabond)
  - Fibrin glue (fibrinogen and thrombin)

Mechanical, Thermal and Biothermal

- Elastic band ligation
  - Esophageal Varices
  - Dieulafoy lesions
  - Polyps
- Endoclips
  - Single Clip (Resolution, QuikClip2, TriClip)
  - Multi Clip (InScope)
- Thermal coagulation
  - Heater Probe
  - Multi-polar Coagulation (MPEC)
  - Argon Plasma Coagulation (APC)
• Prime needle outside
• Identify lesion
• Insert catheter
• Leave space between lesion and scope to extend needle

• Inject 0.5 mL until bleb formed
• Pull catheter back
• Repeat in all quadrants
Multi-polar Electrocautery (MPEC)

- Generates heat indirectly by passage of current through tissue
- Allows for coaptation
- Leads to coagulation and vessel contraction

When to use multipolar or heater probe

- Duodenal ulcer
- Gastric ulcer
- Mallory-Weiss Tear
- Dieulafoy lesions
- Vascular malformations (GAVE, radiation-induced)

Multi-polar Electrocautery (MPEC)

- Use 7 or 10 French catheter
- Several available options
- No grounding necessary but requires electrosurgical unit
- Set power to 15 to 20W (less for colon)
- Apply pressure first
- Depress foot pedal 2-4 seconds
- Pull probe back gently and irrigate
MPEC Tips

- Due to various angulations, may need to bring catheter out prematurely (e.g., antrum for duodenal ulcer)
- Catheters with combined sclerotherapy needle may be difficult in retroflexion
- Larger vessels require larger catheter
- Less optimal for coagulopathy

Argon Plasma Coagulation

- Non-contact thermal hemostasis
- Tungsten electrode in probe ionizes argon gas
- Argon beam seeks nearest tissue
- Limited depth of coagulation (2-3 mm) with contact at surface
**APC Uses**

- Vascular ectasias (GAVE and DAVE)
- Mallory-Weiss tears
- Duodenal and Gastric Ulcers
- Radiation induced injury
- Destruction of sessile polyps (duodenal adenomas in FAP)

**APC Tips**

- Decompress frequently
- Use 7F or 10F catheter
- Set at 40W (15-20 in colon)
- Set flow 0.5-1L/min
- Use pulse setting and paint the area of interest
- Keep the black strip in view to avoid damage to endoscope

**Hemostatic Clips**

- Mucosal/sub-mucosal defects < 3 cm
- Bleeding ulcers
- Arteries < 2-3 mm
- Polyps < 1.5 cm in diameter
- Need endoscopes with working channels equal to or greater than 2.8mm.
- Active bleeding or lesions with coagulopathy
When to use clips for hemostasis

- Duodenal ulcer
- Gastric ulcer
- Mallory-Weiss Tear
- Early anastomotic bleeding
- Post-polypectomy
- Prophylaxis (pre-polypectomy, EMR)
- Post-variceal banding

Hemostatic Clip Options

- Boston Scientific (Resolution Clip)
- Olympus (Quick Clip2)
- Wilson Cool (Tri-Clip)
Clip Tips

• Practice with assistant prior to “in vivo” use
• May need to bring out in antrum and assess opening, closing and angle
• May need two hands to create POP
• To release, assistant should open their hand, endoscopist should keep catheter steady and even pull back slightly
• Have both lengths available

Hemostatic Clip Tips

• Be familiar with clips
• Have multiple available
• Work close
• Inject with epinephrine if oozing
• Head-on or tangential, don’t pinch the vessel
• Rotate clip
• Push into mucosa and suction
• Close

Hemostatic Clip Tips: Common Errors

• Deployment of clip too far from endoscope
• Knock off clips already deployed
• Premature closure of clip
• Insufficient number of clips available
• Failure to release clip
Variceal Band Ligation (VBL)

- Arrest bleeding and obliterate/eradicate the varix
- VBL is the use of a rubber band when placed over a varix, leading to thrombosis

Variceal Band Ligation

Wilson Cook
4, 6, 10 Shooter®
Boston Scientific
Super 7®
ConMed
Auto-Band Ligator®

VBL use in children

- In adults, compared to sclerotherapy
  - Decreased mortality (45% vs 28%)
  - Decreased complications (22% vs 2%)
  - Less recurrent hemorrhage and fewer sessions (NS)
- Majority of studies include patients with both intrahepatic and extrahepatic disease
- >90% variceal eradication in most series

Stiegmann GV et al. NEJM 1992; 326: 1527-1532
McKernan P et al. JPGN 2003; 34: 207-211
Celinska-Cedro et al. J Pediat Surg; 38: 1008-11
VBL technique

- Identify varix of concern (map out remainder)
- Remove scope and attach ligation device
- Start low in the distal esophagus with high risk lesions first

VBL technique

- Angle scope so that varix can roll into banding cap. All edges of the cap should surround the varix.
VBL technique

• Apply suction and when varix engorges ¾ of cap obstructing endoscopic view, be ready to turn the banding device when there is a full “red out”

VBL Tips

• Re-intubation with ligation device can be difficult
• Major limitation is age (18 months)
• Minimize touching bands with endoscope after placement
• Have sclerotherapy equipment available
Complications of VBL

- Bleeding (early and late)
- Infection
  - SBE prophylaxis not recommended
  - Antibiotics for acute bleeding only
- Perforation (rare)
- Stricture (rare)

Training

- Text/Journals
  - Handbook of Gastroenterologic Procedures (Drossman)
  - JPGN, AJG, Gastrointestinal Endoscopy (GIE) and Endoscopy
- Video
  - DAVE project
  - ASGE Training Library
- Computer Simulation (bleeding modules)
- "Hands-On" Training
  - NASPGHAN/ASGE courses
  - ASGE Center (Chicago, IL)
- Adult GI Collaboration (observation, preceptorship)

http://daveproject.org
Special Thanks
GI Procedure Suite Staff
Texas Children's Hospital Endoscopy Team:
– Bryan Vartabedian
– Anthony Olive
– Bruno Chumpitazi
– Kalpesh Thakkar
– Mark Gilger
– Isaac Rajman

Thank you!!
dsfishma@bcm.edu

What should you do with a CLOT?
What to do with adherent clots

- 56 patients at seven centers found to have fresh adherent clots with no active bleeding
- The clot was irrigated with 200 cc of forcibly injected water.
- Randomized into treatment with injection and heater probe or medical management
  - Those randomized to endoscopic therapy had the base of the adherent clot injected with 1/10,000 adrenaline in four quadrants with at least 1 cc in each quadrant.

To remove or not?

- The clot was removed and heater probe (30 J) a minimum of 3 coaptive pulses.
- Rebleeding rates were 34.3% (12/35) in the medical treatment arm vs 4.8% (1/21) in endoscopic group. (p<0.02).
- Endoscopic treatment with injection of the base of the clot, removal, and heater probe coagulation significantly reduces rebleeding rates.

Endoscopic Therapy vs. No Endoscopy for Treatment of Clots

- No significant benefit in further bleeding, surgery or mortality
- 2/5 favored endoscopy, 1/5 had n=5 patients
- Did not include rebleeding

Laine and McQuaid, Clin Gastroenterol Hepatol 2009; 7: 33-49
How to remove the clot

• Snare removal (like polyp)
• Probe with biopsy forceps
• Manipulate with endoscope
• Suction