Non-Variceal UGI Hemorrhage & Hemostasis

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Acute Upper Non-Variceal Bleed

Magnitude of the Problem

- Incidence: 36-100 per 170,000 persons
- 40% > 60 years old
- Self limited in 80%
- EGD in < 24 hours done in 90%
- Endoscopic hemostasis done in 25%

Acute Upper Non-Variceal Bleed
Mortality

- Mortality: 10,000 to 20,000 per year
  - Overall: 14 % (10-36%)
    - ***Admission*** for GI bleed: **11 %** mortality
    - GI bleed in ***the hospitalized patient***: **33 %** mortality

Acute Upper Non-Variceal Bleed
Effect of EGD Timing

- Timing of EGD ("< 6 h", VS. "within 48 h") (Gastrointest Endosc 2004; 60:1-8) :
  - No effect in transfusion needs nor LOS
  - No effect on need for surgery
  - **No effect on mortality**
  - More "high risk" lesions found on early EGD
    - good for training &
    - may decrease rebleeding rate.

Signs of GI Bleed

- **Hematemesis:** bleed above ligament of Treitz.
  - Red blood emesis, or
  - Coffee ground emesis
- **Melena:** may be upper or lower source
  - > 200 mL blood in stomach, or
  - Up to 150 mL blood in cecum)
- **Hematochezia:** - usually lower source;
  - 11% from upper source.
  - Needs > 1000 mL blood from upper source
    - orthostatic @ 3 min: BPs drop =/> 10 mmHg and/or HR increase > 20 bpm.

Upper

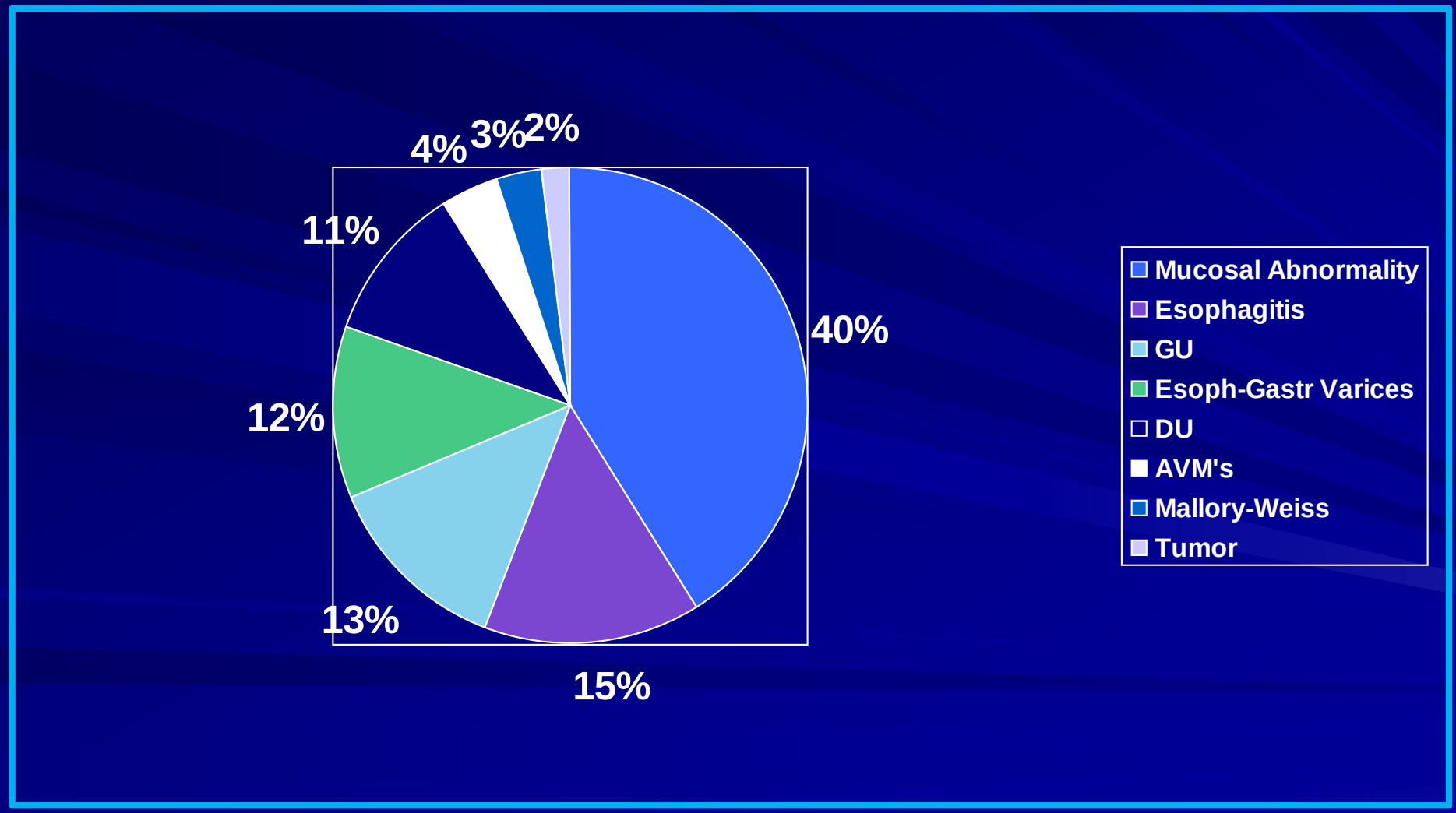
  - > 150 mL blood in Right colon, or
  - > 100 mL blood in Left colon.

Utility of NGT Aspiration

- 50% of bleedings from duodenal lesion have (-) NGT aspirate (Gastrointest Endosc 1981;27:94-103)
- Compared with endoscopy, NGT aspirate detects UGI bleeding with (Arch Intern Med 1990;150:1381-4) :
  - 79% Sensitivity &
  - 55% Specificity.
- Clear or bilious aspirate:
  - 14% have high-risk lesions (Gastrointest Endosc 2004;59:172-8).
- Aspirate of blood:
  - 42% have “clean base” or “pigmented spot”.
- **To do NGT aspiration has limited prognostic value and does not change management.**

Causes of UGI Bleeding

Boonpongmanee S et al. Gastrointest Endosc 2004;59:788



Severity Assessment

- Agitation
- Hypotension
- Pallor or Hemoglobin < 8 g/dL
- Tachycardia or Bradycardia (vagal)
- Orthostatic @ 3 minutes: 20% volume loss
  - Sytolic drop =/> 10 mmHg, or
  - HR rise > 20/min

Initial Management

- Oxygen supplementation
- Central line or two large bore needles
- Resuscitate first with “0.9% NaCl” or “Lactate Ringer” solution
- Start blood transfusion if needed: goal Hb/Hct is
  - 7-8 g/dL/21-24% in Variceal bleed & Non-Variceal bleed;
  - Exception: Consider transfusion when Hb < 8 g/dL in:
    - Acute coronary syndrome,
    - Exsanguination: Hypotension/tachycardia that indicates intravascular depletion with artificially high Hb.

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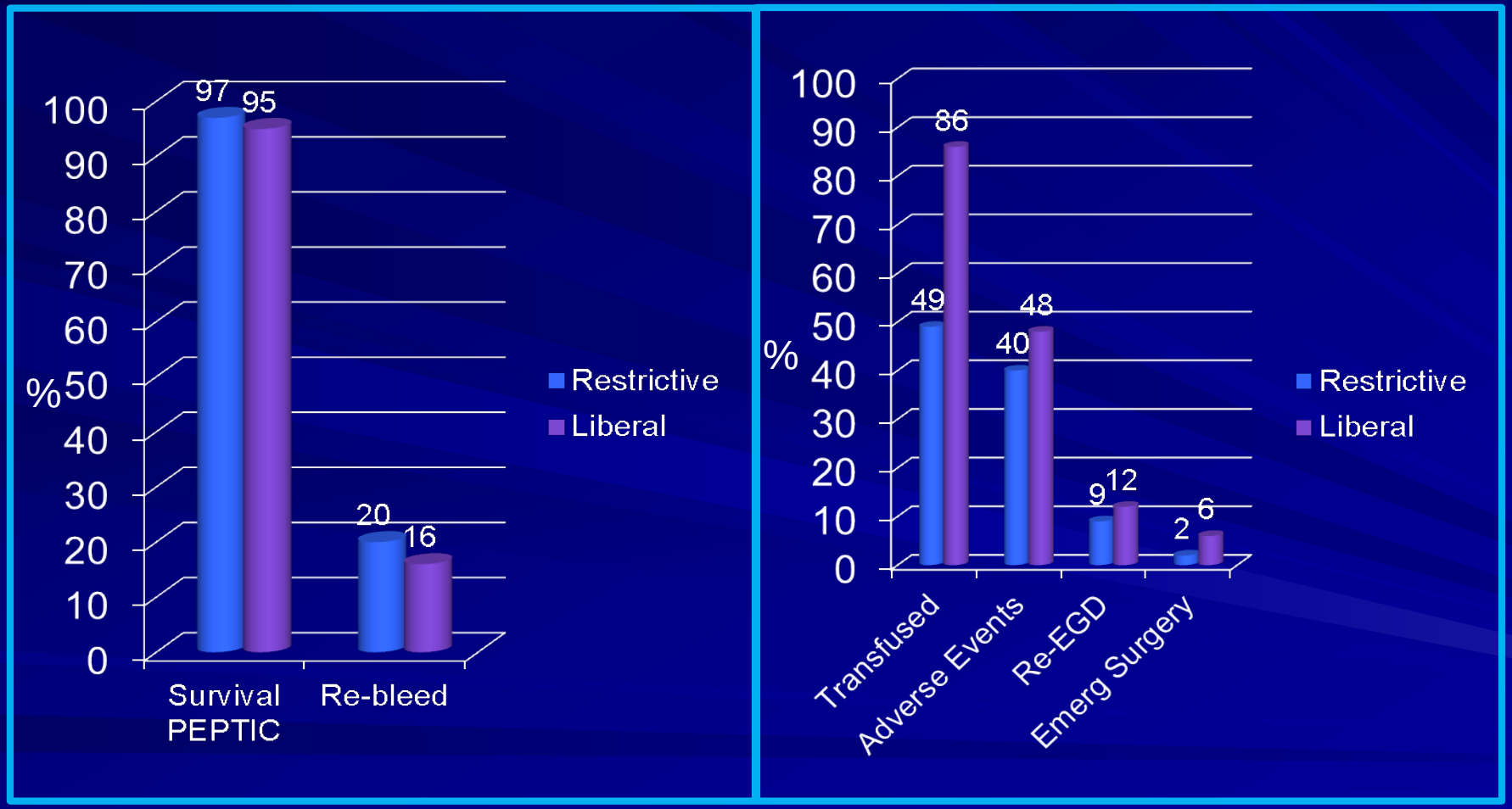
Initial Management

- Start PPI therapy (Cochrane Database Syst Rev. 2010 Jul 7;(7):CD005415)
  - Reduces rates of high-risk EGD stigmata (OR 0.67) and
  - Reduces need for endoscopic therapy (OR 0.68).
  - Esomeprazole or Pantoprazole 80 mg IV bolus + 40 mg IV BID
- Plan & Prepare for Endoscopy
  - Most patient need EGD within initial 24-48 hours.
  - Some patients need EGD within 12 hours if:
    - EGD will Change Management, or Patient has High Re-Bleeding Risk
  - Few patients (16%) do not need urgent EGD:
    - Glasgow-Blatchford Bleeding Score of 0.
- Surgery consult
- If cirrhosis is known or suspected:
  - Antibiotics: **Ceftriaxone** or Ciprofloxacin x 7 days.
  - **Octreotide** (or Somatostatin) drip

Non-Variceal UGI Bleed
Restrictive vs Liberal Transfusion in GI Bleed

Villanueva C; N Engl J Med 2013; 368:11-21



Excluded: Exsanguinating bleed, Acute coronary syndrome, TIA, Stroke and Symptomatic peripheral vascular disease

Early Disposition Tools

- **Glasgow-Blatchford score**
  - score of 0 predicts low risk of rebleeding; consider early discharge from ED.
  - http://www.mdcalc.com/glasgow-blatchford-bleeding-score-gbs
- **Rockall score**
  - score Before Endoscopy of 0, **or**
  - score After Endoscopy of 0 to 2
    - predicts no mortality in present episode or in case of rebleed;
    - consider early discharge from ED.
  - http://www.gastrotraining.com/calculators/rockall-score

Glasgow–Blatchford Score

Laine L. N Engl J Med 2016;374:2367-2376

Table 1. Glasgow–Blatchford Score.*

Values at Admission	Points
Blood urea nitrogen — mg/dl	
<18.2	0
18.2 to <22.4	2
22.4 to <28.0	3
28.0 to <70.0	4
≥70.0	6
Hemoglobin — g/dl	
≥13.0 (men); ≥12.0 (women)	0
12.0 to <13.0 (men); 10.0 to <12.0 (women)	1
10.0 to <12.0 (men)	3
<10.0 (men and women)	6
Systolic blood pressure — mm Hg	
≥110	0
100–109	1
90–99	2
<90	3
Heart rate — beats/min	
<100	0
≥100	1
Other variables	
Melena	1
Syncope	2
Hepatic disease according to history or clinical and laboratory evidence	2
Cardiac failure according to history or clinical and echocardiographic evidence	2

* Glasgow–Blatchford scores range from 0 to 23, with higher scores indicating higher risk. Positive predictive values were calculated in a study by Laursen et al.[10] Among 2305 patients presenting to a hospital with upper gastrointestinal bleeding, 313 (14%) had a score of 0 (positive predictive value, 99.0%), 562 (24%) had a score of 0 or 1 (positive predictive value, 98.8%), and 588 (26%) had a score of 0 to 2 and were younger than 70 years of age (positive predictive value, 99.0%). To convert the values for blood urea nitrogen to millimoles per liter, multiply by 0.357.

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Who can be D/C home from the ED without EGD?

(Glasgow-Blatchford Bleeding Score of 0)

- Frequency: 5-20% (mean 16%) of UGI bleeders.
- Risk of needing intervention: < 1%
- FULLFILLS ALL THE CRITERIA:
  - Males with Hb >/= 13 g/dL, or Females with Hb >/= 12 g/dL, AND
  - BUN < 18.2 mg/dL, AND
  - Systolic BP >/= 110 mm Hg, AND
  - Pulse < 100 bpm, AND
  - Absence of: Melena, syncope, heart failure, and liver disease.
- Disposition: Discharge home from ED after EGD or with plans for outpatient EGD in the next few days.

Evaluating Prognosis – Rockall Score (1996)

Rebleeding & Mortality Risk

CLINICAL ROCKALL

Points	0	1	2	3
Age	<60	60-79	>80	
Vitals	SBP>100 P<100	SBP>100 P>100	SBP<100	
Co-morbidity	None		CHF CAD	Renal failure Liver failure Cancer w/mets
EGD Diagnosis	MW tear	All other Dx	UGI cancer	
EGD Stigmata	Clean base Flat spot	Visible vessel Adherent clot Spurting vessel		

GLOBAL ROCKALL SCORE

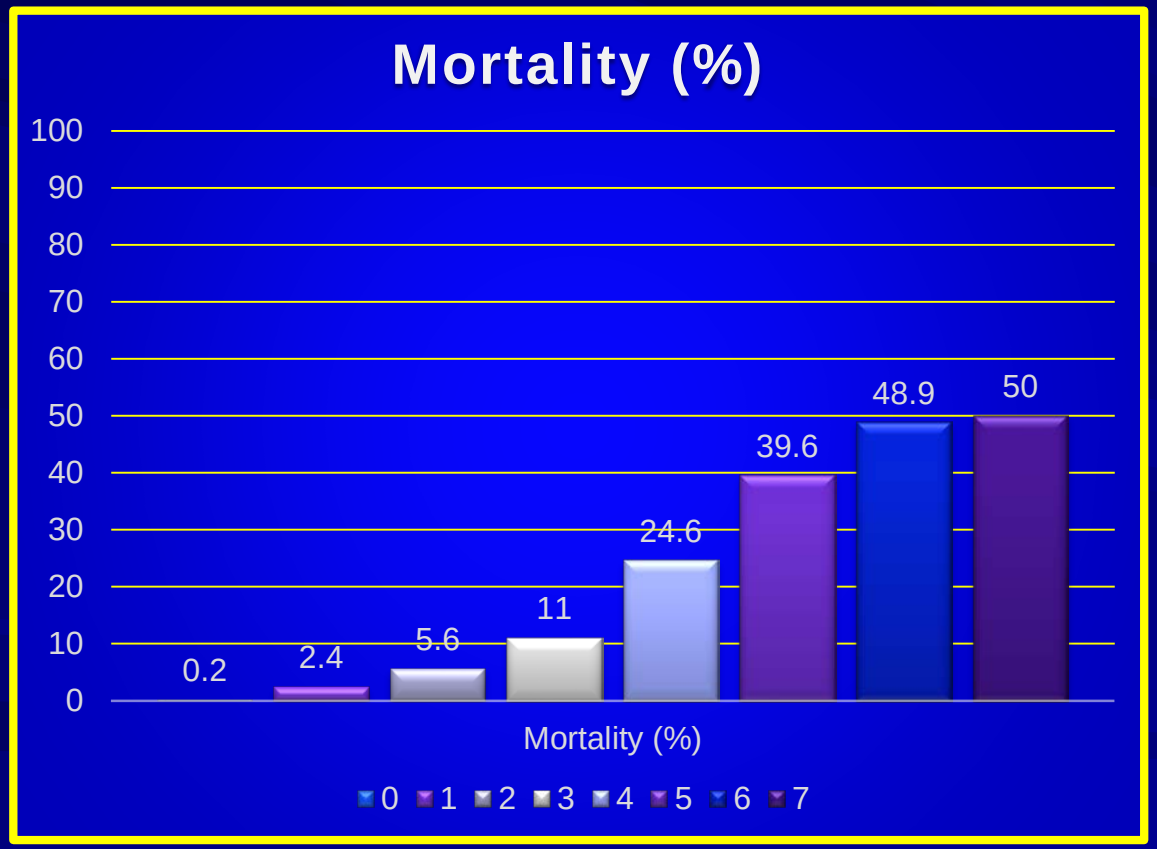
*Risk of rebleeding and mortality increases with score: Low (0-2), Intermediate (3-4), High (5-10)

Score before EGD of 0, or after EGD of </= 2, predicts NO Mortality (even in re-bleed)
Consider discharge from ED

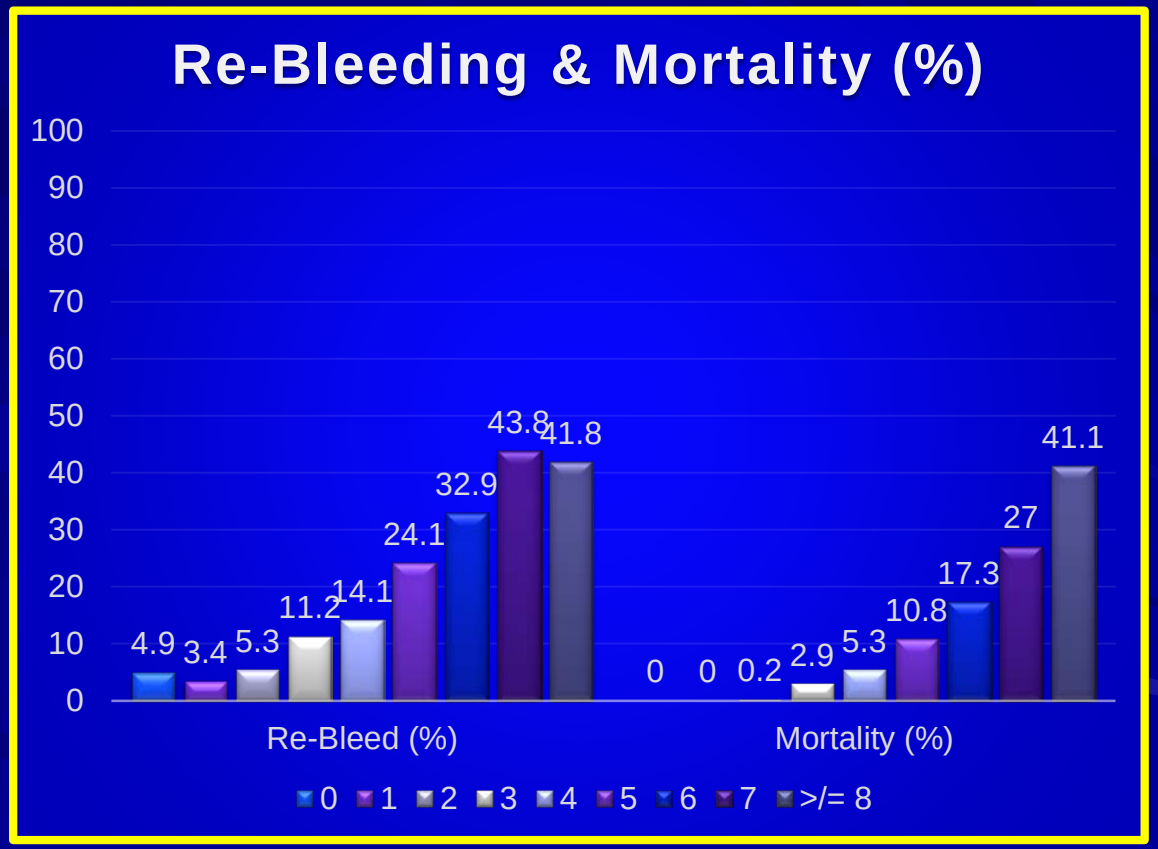
Pre-EGD and Post-EGD Rockall Score

Rockall TA et al. Gut 1996

Pre-EGD Rockall Score Effect



Post EGD Rockall Score Effect



Initial Management & Preparation for Urgent Endoscopy

- Asses Risk/ Benefit of: correcting therapeutic anti-coagulation or giving anti-platelet therapy.
  - Correct excessive coagulopathy:
    - If INR > 2.5 or if Fibrinogen < 1 g/L: FFP 15 mL/kg, or Vit K 1-2 mg IV slowly to INR of </= 2.5
    - Not recommended in High INR of cirrhosis.
  - Correct thrombocytopenia if platelets < 50K or antiplatelet agent.
    - Platelets: 1 single donor unit, or 1 random pooled unit/ 10 kg;
    - Unclear utility in cirrhosis.
- Erythromycin 250 mg IV, 30-120 minutes before EGD
  - clears stomach 82% vs. 33% with placebo;
  - decreases need for re-EGD (OR 0.55).

Initial Management & Preparation for Urgent Endoscopy

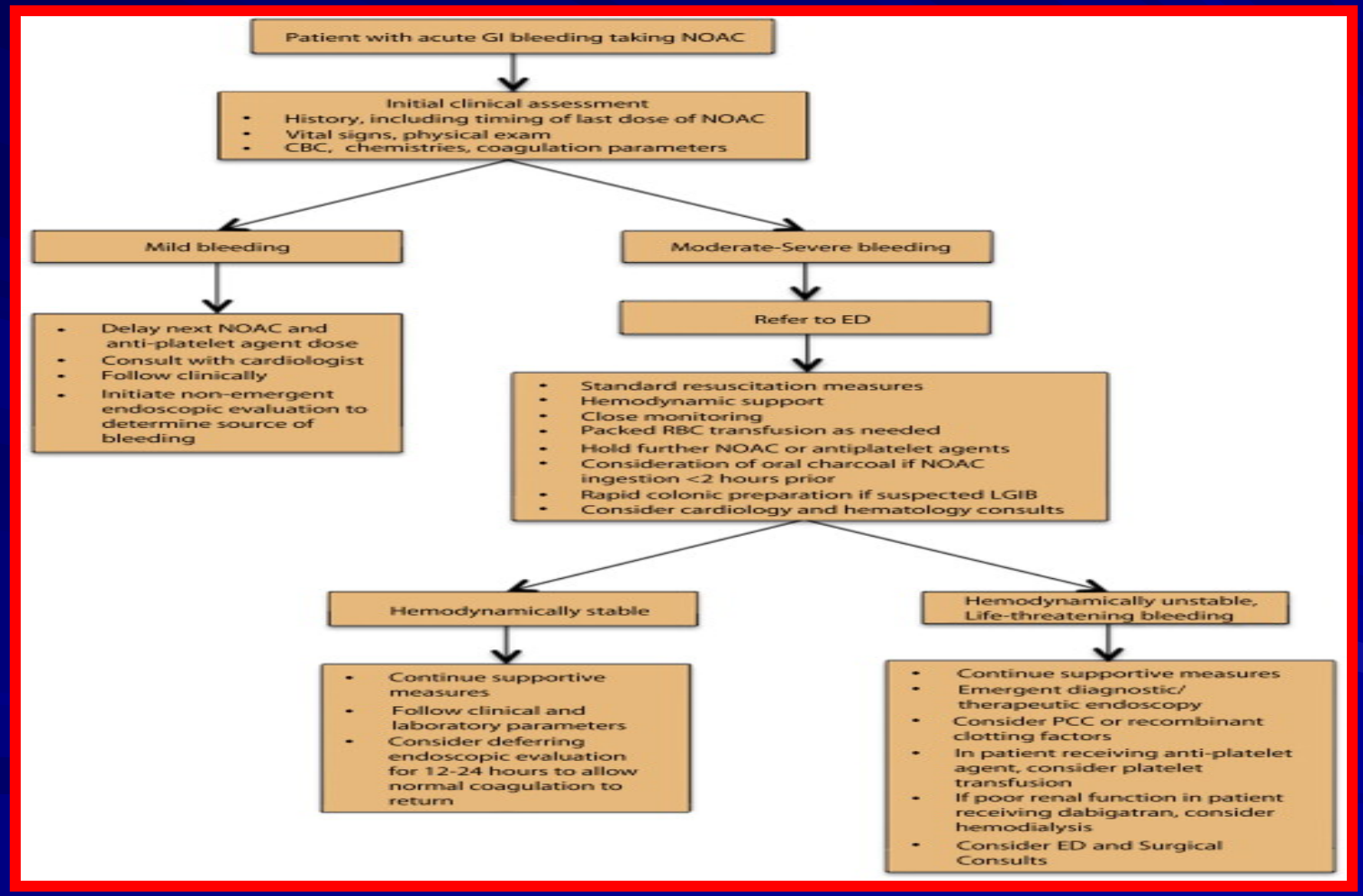
- Consider Oro-gastric lavage (34 Fr Code-Blue Easy-Lav tube) to facilitate endoscopic visualization.

- Consider airway protection (?)
  - no demonstrated benefit for prophylactic intubation in: aspiration pneumonia, cardio-respiratory complications or mortality. (Gastrointest Endosc. 2003 Jan;57(1):58-61. *Gastrointest Endosc*. 2009 June ; 69(7): e55–e59.)

- Consider anesthesia consult.

Suggested algorithm for GI bleeding management in the patient receiving novel oral anticoagulant therapy

Desai J et al. Gastrointestinal Endoscopy, 2013-08-01, Volume 78, Issue 2, Pages 227-239



NOAC, novel oral anticoagulant; *CBC,* complete blood count; *ED,* emergency department; *LGIB,* lower GI bleeding; *PCC,* prothrombin complex concentrate

Evaluating Prognosis: AIMS 65 Score

ER Prediction of Mortality, LOS, & Cost

Saltzman JR et al. Gastrointest Endosc 2011;74:1215-24

FACTOR at ER ARRIVAL	1 point for each	Alternative Description
Albumin	< 3 g/dL	
INR	> 1.5	
Mental status	Glasgow score < 14	disorientation, lethargy, stupor, or coma
Systolic Pressure	</= 90 mm Hg	
Age	> ***65***	

Points	Mortality (%)	Length of Stay (days)
0-1	0.3 - 1	3-4
2	3	5.5
3	10	6.5
4	15	7.5
5	24	9

13.5% of patients have score =/> 3, with mortality of 10% or higher

Indications for Very early EGD (Less than 12 h from onset)

- If likely to lead to Change in Management
- If patient has clinical features predictive of High Rebleeding Risk.

Indications for Very early EGD (<12 h)

Change in Management

- Portal hypertension
- Cirrhosis
- History of aortic graft or aortic aneurism
- Possible hemobilia, or hemosuccus pancreaticus.

Indications for Very early EGD (<12 h)

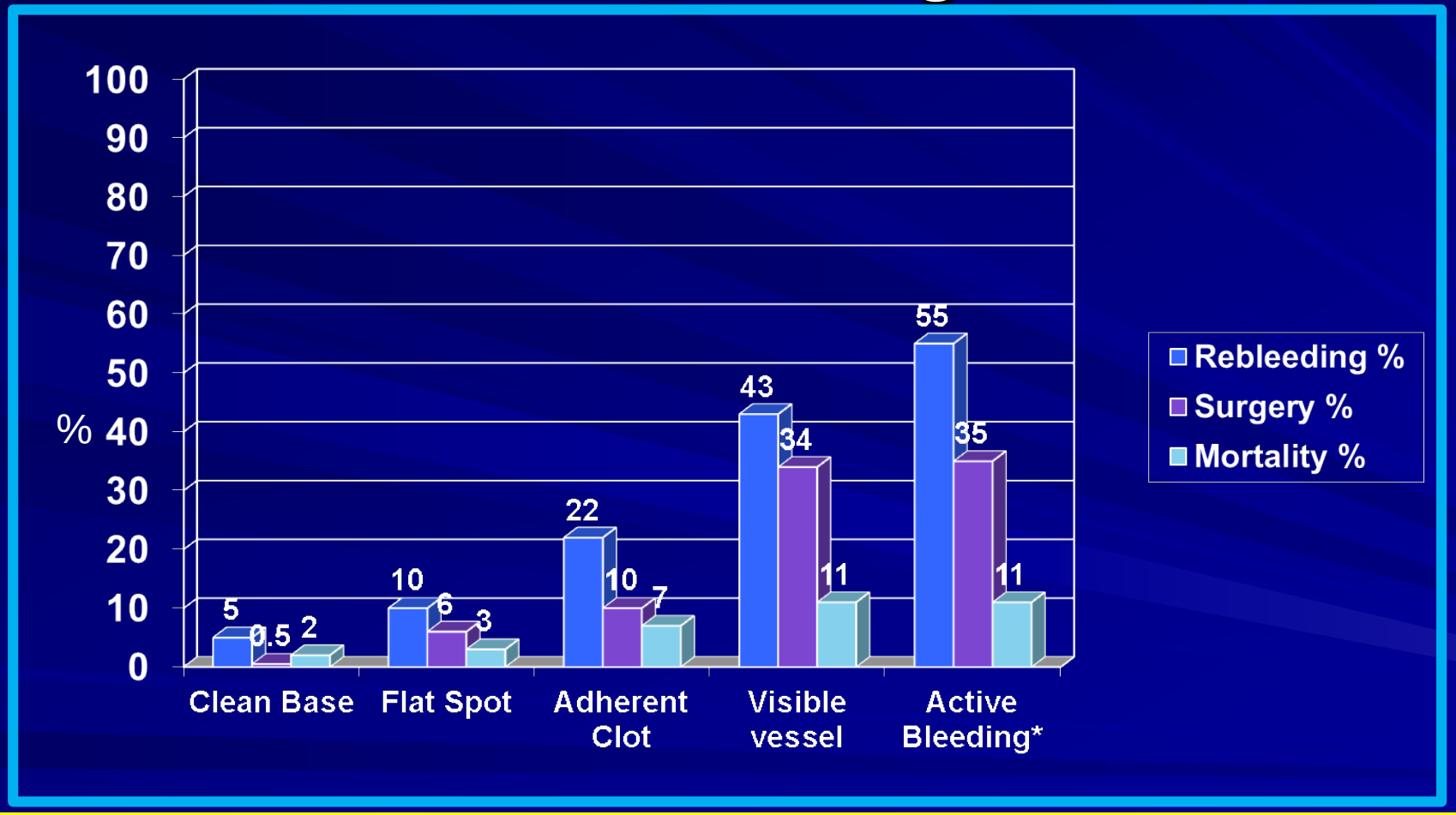
High Rebleeding Risk

- Presentation with shock
- Age > 60
- Rockall score =/> 3 (Intermediate or High)
- Glasgow-Blatchford score >/= 12
- Hemoglobin < 8 g/dL
- Hematemesis, hematochezia (or BRB in NGT)
- Already hospitalized at time of bleed
- Severe co-morbidity
- Continuous bleeding (RBC transfusion > 6 units)

Classification of Bleeding Ulcers

	Frequency
Forrest I: Active hemorrhage	
– Forrest I a: Spurting hemorrhage	12%
– Forrest I b: Oozing hemorrhage	
Forrest II: Signs of recent hemorrhage	
– Forrest II a: Visible vessel	8%
– Forrest II b: Adherent clot	8%
– Forrest II c: Hematin on ulcer base	16%
Forrest III: Lesions without active nor recent bleeding	55%

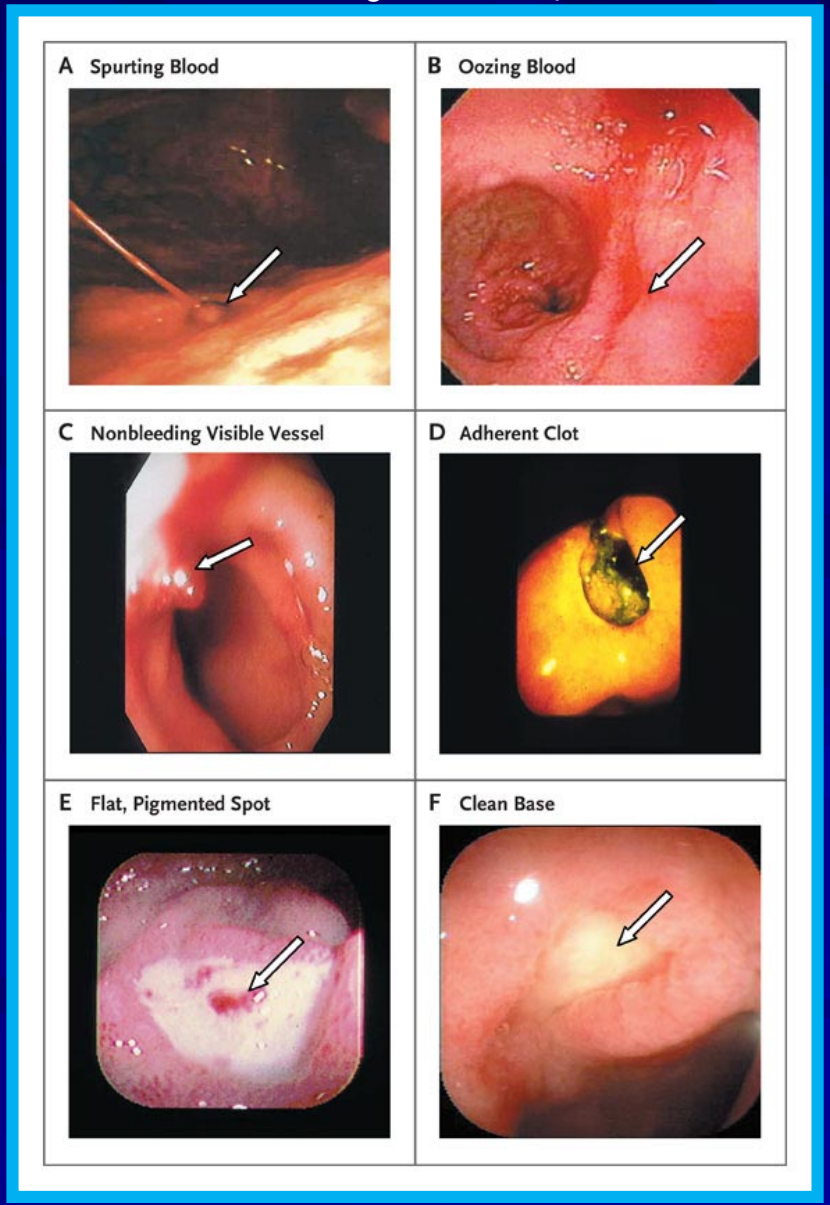
Prognosis by Endoscopic Stigmata of Recent Hemorrhage



*__Arterial bleeding:__ 90% re-bleeding rate (15-30% after endoscopic therapy; same as in visible vessel). Needs IV PPI therapy.
__Oozing without adherent clot nor visible vessel__: 10% re-bleeding risk (0-5% after endoscopic therapy).
Its re-bleeding rate is not affected by high-dose IV PPI. OK to give PO PPI.

Endoscopic Stigmata of Bleeding Peptic Ulcer, Classified as High Risk or Low Risk

Gralnek I et al. N Engl J Med 2008;359:928-937



Management of Adherent Clot

- Retrospective study of [clot removal + endoscopy therapy] vs [medical therapy] (Gastrointest Endosc 2003;58:707-14)
  - Decrease in rebleeding rate (27.4% vs 8.7%)
  - Less transfusion needs, LOS, need for re-EGD
- Prospective RCT [epi inject + clot removal + BICAP when indicated] vs [medical therapy] (Gastroenterol 2002;123:407-13) :
  - Decrease in rebleeding rate (35.3% vs 0%)
- **Meta-analysis (Gastroenterol 2005;129:855-62)**
  - **Decrease in rebleeding rate from 24.7% to 8.2%**

Non-Variceal Upper GI Bleed

Initial Treatment & Hemostasis

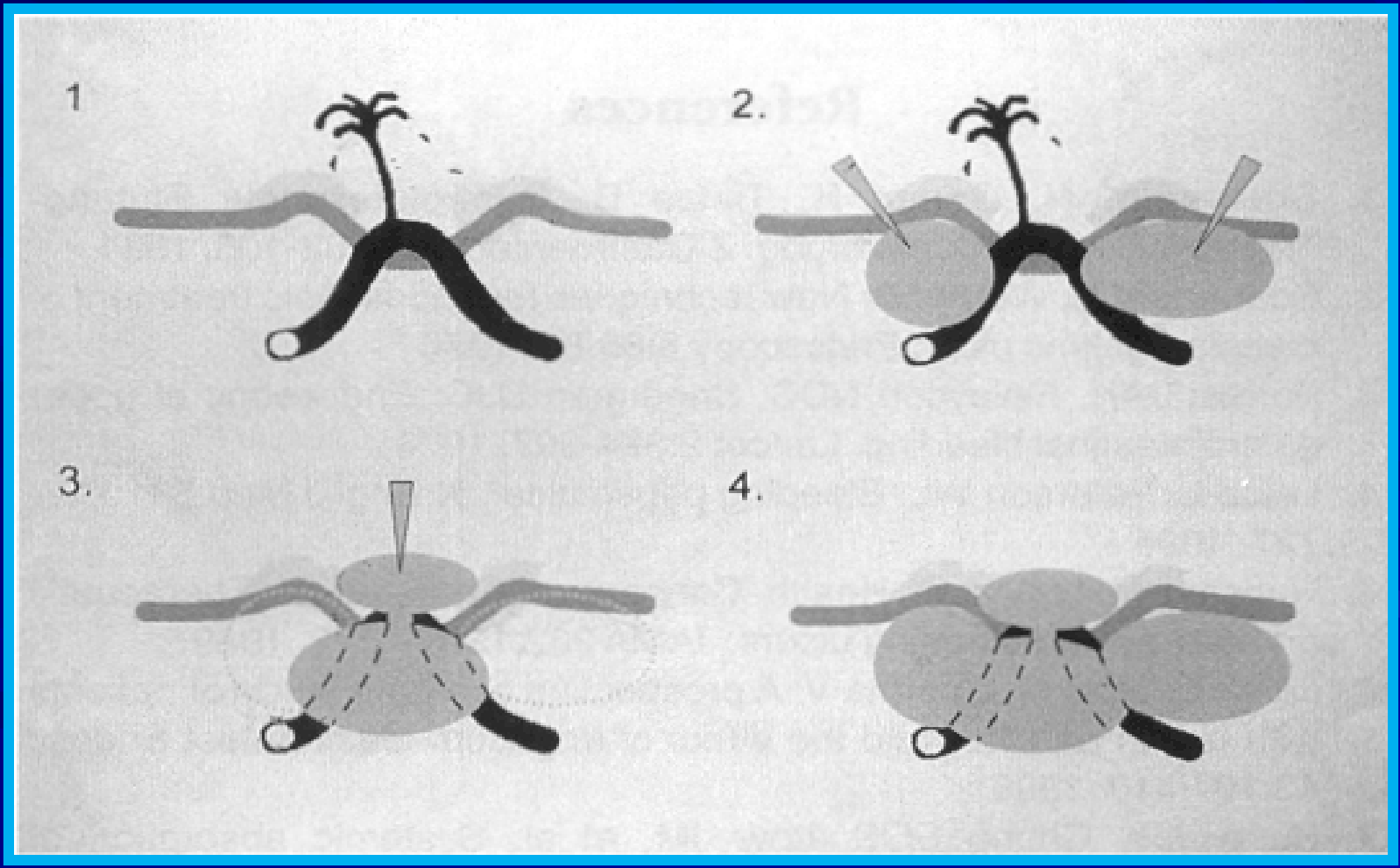
- Techniques equivalent in initial hemostasis
  - 0.9% NaCl 1/10000 epinephrine injection
  - Hypertonic saline + 1/10000 epinephrine injection
  - Thermocoagulation (Heater Probe),
  - BICAP electrocoagulation,
  - Hemoclipping,
  - Argon Plasma Coagulation, and
  - Laser thermocoagulation.
- Initial hemostasis: 95-97 %

Non-Variceal Upper GI Bleed

Initial Treatment & Rebleeding Rate

- Rebleeding rate: 15-20 % for visible vessel or active bleed (other than oozing without adherent clot nor visible vessel).
- Techniques equivalent in Rebleeding Rate:
  - Hemoclipping
  - Hypertonic saline (3.6 – 5%) + 1/10000 epinephrine injection
  - BICAP or Heater Probe alone ?
  - 0.9% NaCl 1/10000 epinephrine injection +
    - BICAP, or
    - Heater Probe, or
    - APC
- **RECOMMENDATION: If 0.9% NaCl 1/10000 epinephrine is used for hemostasis of active bleed or visible vessel, a second technique should be added to decrease rebleeding rate.**

Injection Technique



Indications for Combination Therapy
Injection + Heater Probe or BICAP

- In patients with ulcer actively bleeding or with visible vessel (Lin HJ et al. Gut 1999;44:715-9)
  - Decreases rebleeding & transfusion needs
  - No change in emergency surgery or mortality
- Mainly beneficial for patients with ***arterial spurting*** (Chung S et al. BMJ 1997;314:1307-11)
  - Shortens length of stay (4 d vs. 6 d)
  - Decreases emergency surgery (6.5 vs 29.6%)

TTS Hemoclips

	QuickClip2 **Olympus**	**QuickClipPro** **Olympus**	**Resolution** **Boston Scientific**	**Instinct** **Cook Medical**
Jaw span (mm)	7-11	11	11	16
Rotation	Yes	Yes	Limited (sheath off)	yes
Reopens	No	Yes	Yes	Yes
Retention length	2 weeks	Not stated	4 weeks	Not stated

Over The Scope Clip

Ovesco and Padlock

- Most data is with Ovesco.
- Most commonly used to re-treat after other endoscopic therapy fails.
- Can be used as first-line therapy.
- Can be placed over large and fibrotic lesions.
  - First-line therapy for these lesions.
- Success 78-100% in ulcers with median size of 2.5 cm
- Re-bleeding 8%

Endoscopic Band Ligation

- Extremely effective in esophageal varices; has less complications than sclerotherapy.
- Other uses:
  - Dieulafoy's lesions
  - Mallory-Weiss tears
  - Gastric angiodysplasia
  - Gastric post-polypectomy ulcer bleed
  - Colonic diverticular bleed (inversion + band)

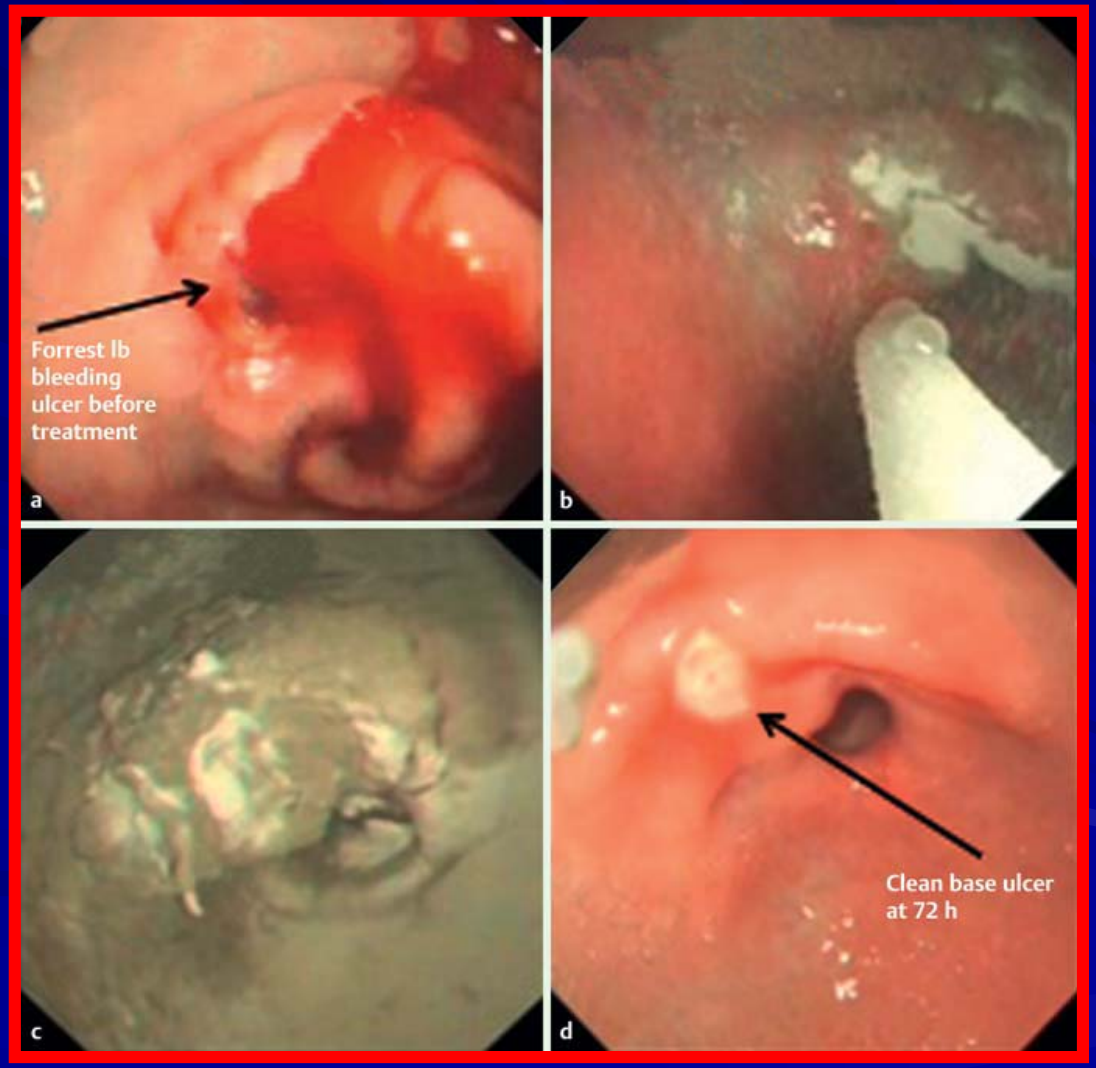
Hemospray

Endoscopy 2011;43:291-295

- Hemospray catheter gun: 21 g powder syringe + CO_2 propeller canister
  - Fire from 1-2 cm distance
  - Observe 5 min; re-spray if needed.
  - Maximun 150 g (7 canisters)
- Patients (20): Forrest 1a (1) (spurting) + Forrest 1b (19) (oozing)
  - mean age 60 (37-85);
  - melena 20, hematemesis 7;
  - GU in 6, DU in 14
- Hemospray
  - applications: 1 in 5%; 2 in 15%;
  - syringes: 1 in 65%, 2 in 25%, > 2 in 10%
- Hemostasis:
  - At 24h = 95%; (Initial failure in Forrest 1a)
  - At 72h = 85%;

Hemospray Effect

- Primary Monotherapy:
  - 85% primary hemostasis (all);
  - 76% primary hemostasis in hospitalized patients.
  - 15% re-bleed at 7 days.
- Rescue therapy
  - 96.5% hemostasis
  - Re-bleed: 26.7% at 8 days; 33.5% at 30 days.



Predictors of:
High-Risk of Re-bleeding After Endoscopic Hemostasis, and Failure of Endoscopic Therapy

Predictive Factor	% Re-bleeding Risk
Posterior-wall Duodenal ulcer (gastro-duodenal artery)	43-57
Hemodynamic Instability *	19-47
Active Arterial Bleeding	12-49
Lesser-curve Gastric Ulcer	23-35
Higher Lesser Curvature Gastric Ulcer (Lt gastric artery)	20-36
Ulcer size > 2 cm *	15-36

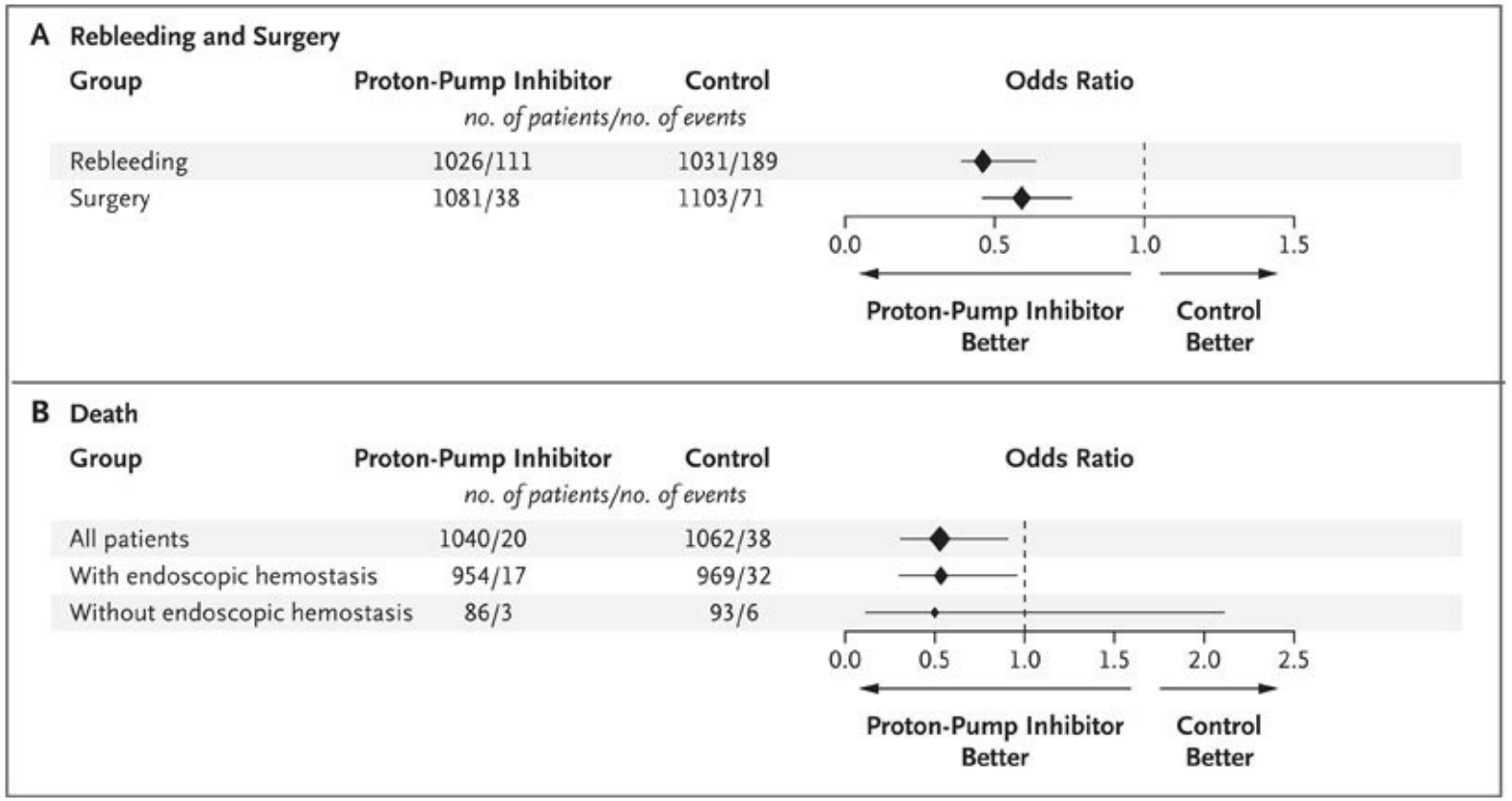
*__Predictor of failure for endoscopic therapy in re-bleeding:__
hypotension and/or ulcer > 2 cm are independent predictors
Do therapeutic angiography or surgery.

Medical Therapy

- Ulcer requiring Endoscopic therapy: PPI 80 mg IV bolus followed by high-dose continuous intravenous infusion 8 mg/hour or 80 mg BID for 3 days, decreases re-bleeding in patients with ulcers that require endoscopic intervention (6.7% vs 22.5% with placebo).
  - In a Cochrane Systematic Review (2006), only “High-dose PPI” after endoscopic hemostasis reduces the need for surgery with odds ratio of 0.61 (vs low-dose).
  - In active oozing, without adherent clot nor visible vessel, IV PPI does not decrease re-bleeding risk, which is only 5%; oral PPI once a day is OK.
  - In ulcers with “flat pigmented spot” or “clean base”: oral PPI once a day.
- Cirrhotic patients with GI bleed of any source, have less infections and lower re-bleeding rate with antibiotic therapy:
  - Ceftriaxone 1 gm/d x 7 days, or
  - Norfloxacin 400mg p.o. BID or Ciprofloxacine 500 mg BID x 7 days

Effect of Proton-Pump Inhibition in Peptic-Ulcer Bleeding

Gralnek I et al. N Engl J Med 2008;359:928-937



Intensive PPI therapy (IV bolus + infusion x 3 days) decreases mortality in patients who required endoscopic hemostasis

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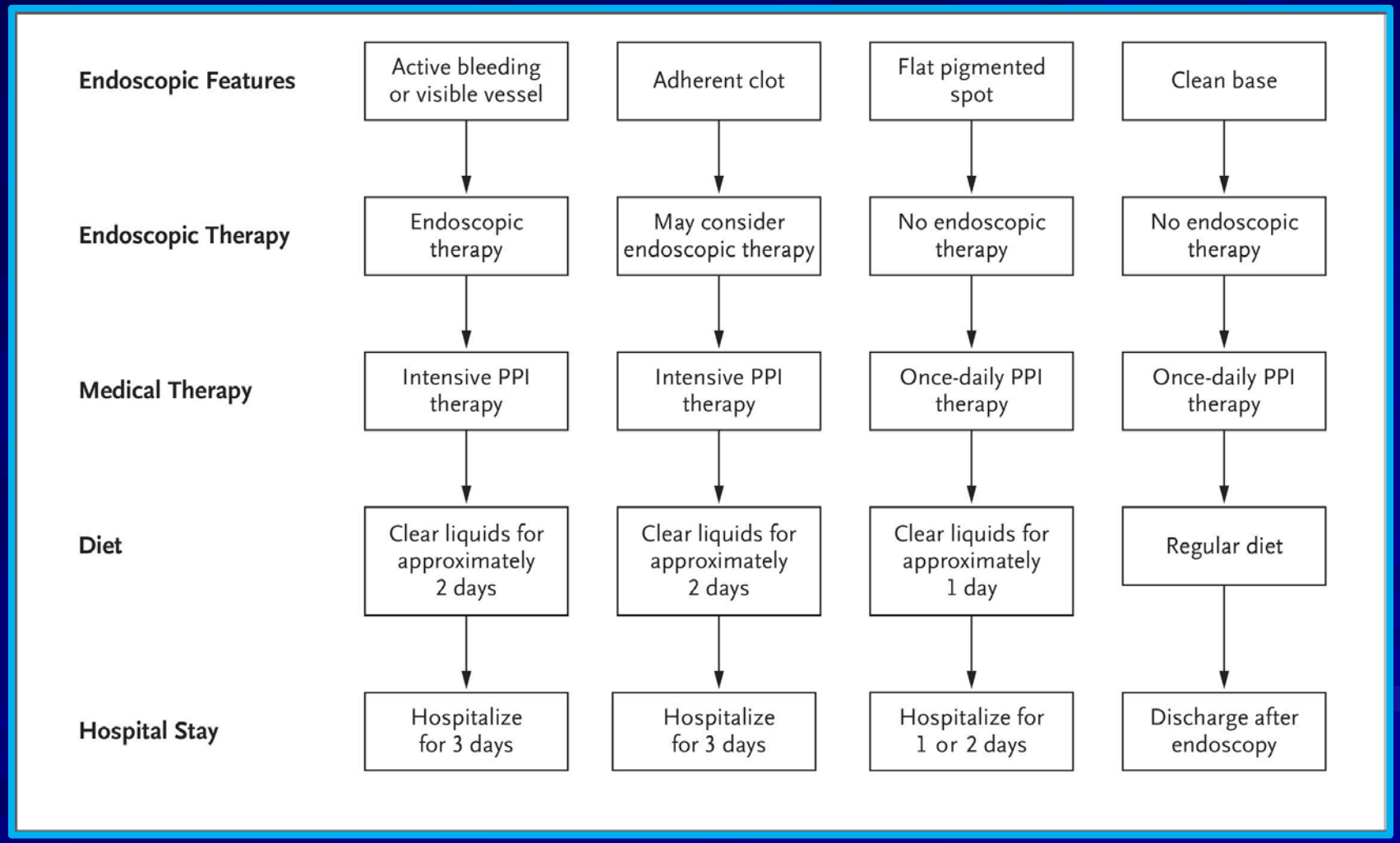
Initial Treatment of Patients with Ulcer Bleeding, According to the Endoscopic Features

Laine L. N Engl J Med 2016;374:2367-2376



Intensive PPI = 80 mg IV bolus + IV infusion 8 mg/h, or
80 mg IV bolus + 40 mg IV BID; change to PO if no re-bleed after 72 h, or
80 mg PO BID x 3 days + 40 mg PO BID x 11 days; then daily x 14 days

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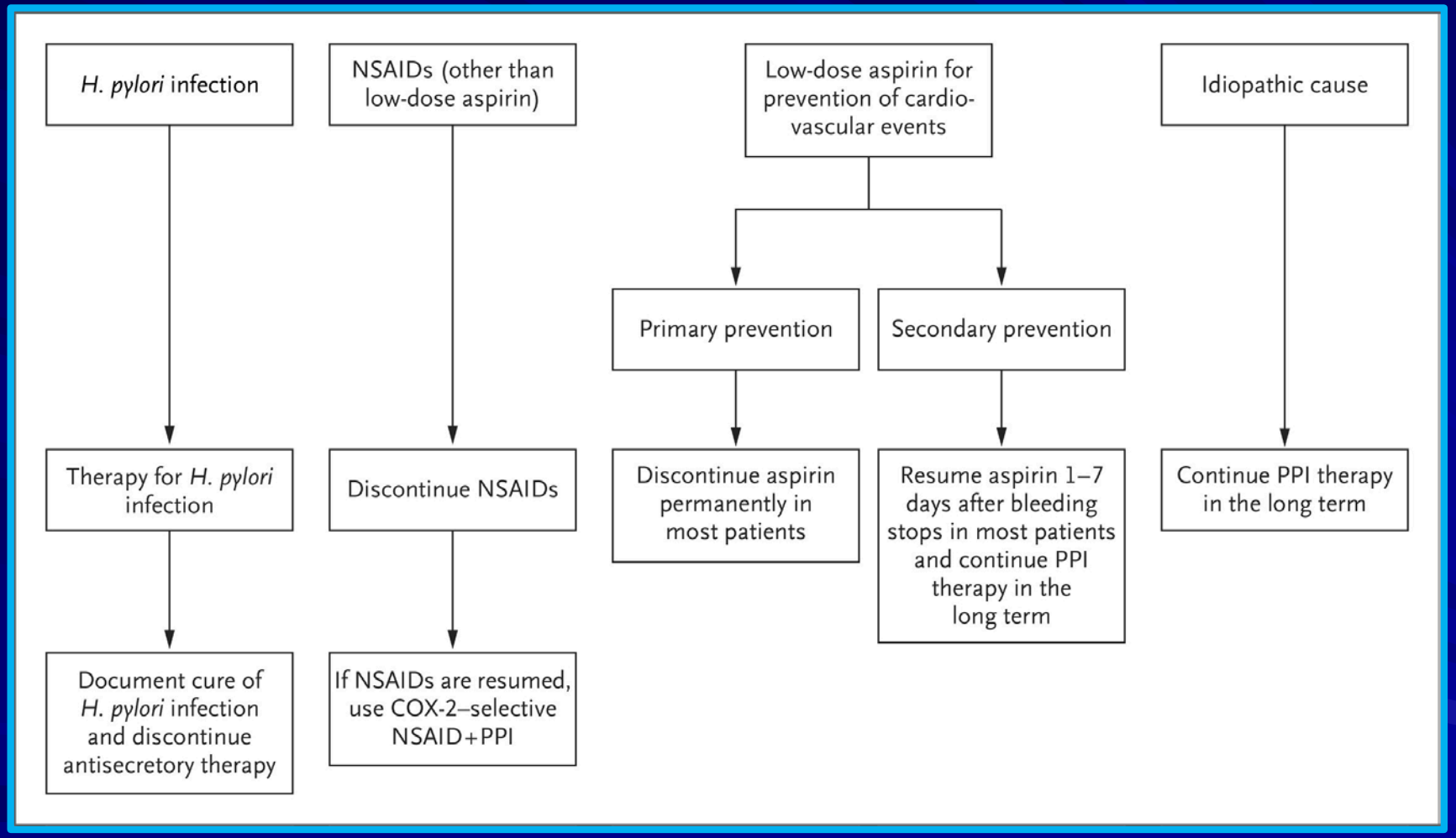
Medical Therapy

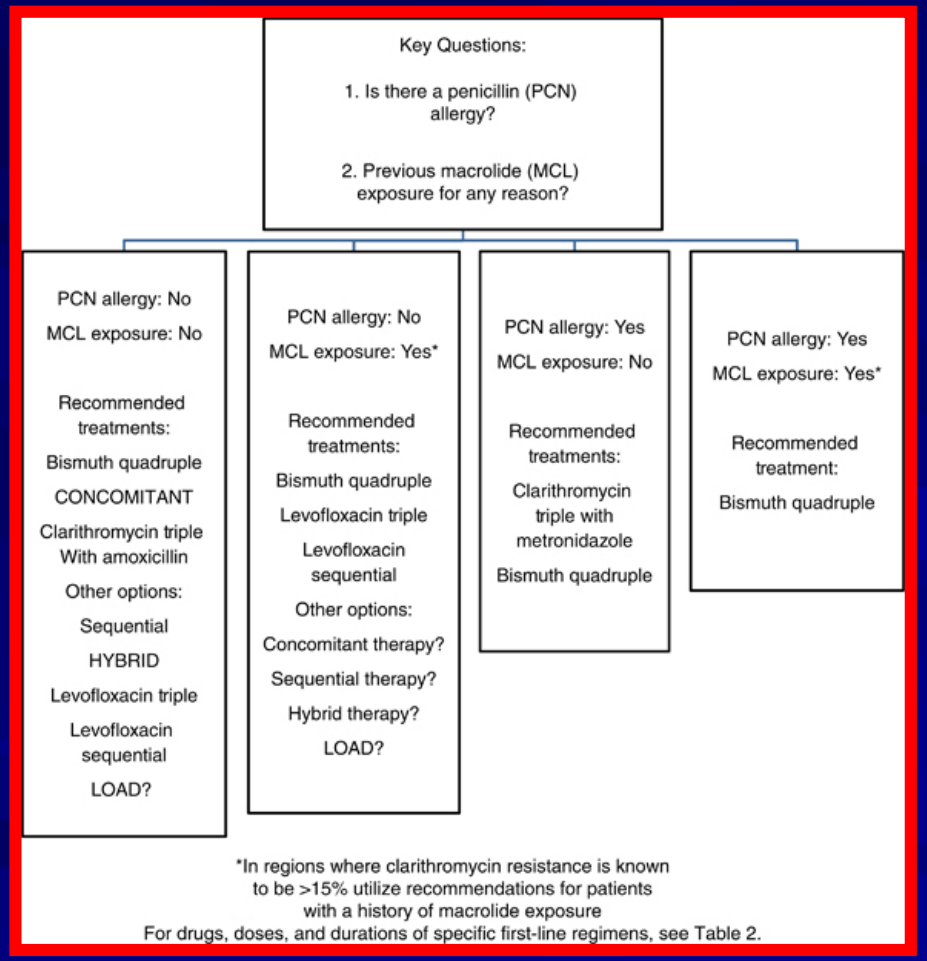
- In idiopathic PUD (non-H. pylori, non-NSAID),
  - give long term PPI or H_2 blocker.
- In cirrhosis with PUD,
  - propranolol decreases recurrence of PUD bleed by 22% (Hsu et al. Hepatology 2012;56:698-705)
- In H.Pylori(+) Peptic Ulcer: eradication decreases ulcer recurrence:
  - DU: from 67% to 6%, and
  - GU: from 59% to 4%.

Long-Term Treatment of Patients with Bleeding Ulcers, According to the Cause of the Ulcer.

Laine L. N Engl J Med 2016;374:2367-2376



H. Pylori Antibiotic Regimens Based in Allergy and Exposure



Antibiotic	Resistance rate (%)
Metronidazole	20
Clarithromycin	16
Levofloxacin	31
Tetracycline	<2
Amoxicillin	<2
Rifabutin	<2

Most patients with a history of penicillin allergy do not have true penicillin hypersensitivity.
After failure of first-line therapy, such patients should be considered for referral for allergy testing since the vast majority can ultimately be safely given amoxicillin-containing salvage regimens

Patients with past exposure to Metronidazole should use the 500 mg dose (partial resistance).

Regimen	Drugs (doses)	Dosing frequency	Duration (days)	FDA approval
Clarithromycin triple	*PPI (standard or double dose)*	*BID*	*14*	*Yes*[a]
	Clarithromycin (500 mg)	*BID*		
	Amoxicillin (1 grm BID) or Metronidazole (500 mg TID)			
Bismuth quadruple	PPI (standard dose)	BID	10–14 (14 if salvage therapy)	No[b]
	Bismuth subcitrate (120–300 mg) or subsalicylate (300 mg)	QID		
	Tetracycline (500 mg)	QID		
	Metronidazole (250–500 mg)	QID (250)		
		TID to QID (500)		
Concomitant	*PPI (standard dose)*	*BID*	*10–14 (same as salvage therapy)*	*No*
	Clarithromycin (500 mg)	*BID*		
	Amoxicillin (1 grm)	*BID*		
	Nitroimidazole (500 mg)[c]	*BID*		
Sequential	PPI (standard dose)+Amoxicillin (1 grm)	BID	5–7	No
	PPI, Clarithromycin (500 mg)+Nitroimidazole (500 mg)[c]	BID	5–7	
Hybrid	*PPI (standard dose)+Amox (1 grm)*	*BID*	*7*	*No*
	PPI, Amoxicillin, Clarithromycin (500 mg), Nitroimidazole (500 mg)[c]	*BID*	*7*	
Levofloxacin triple	PPI (standard dose)	BID	10–14 (14 if salvage therapy)	No
	Levofloxacin (500 mg)	QD		
	Amoxicillin (1 grm)	BID		
Levofloxacin sequential	*PPI (standard or double dose)+Amox (1 grm)*	*BID*	*5–7*	*No*
	PPI, Amox, Levofloxacin (500 mg QD), Nitroimidazole (500 mg)[c]	*BID*	*5–7*	
LOAD	Levofloxacin (250 mg)	QD	7–10	No
	PPI (double dose) (Omeprazole)	QD		
	Nitazoxanide (500 mg) (Alinia)	BID		
	Doxycycline (100 mg)	QD		

H. Pylori Therapy

- **First line:**
  - Esomeprazole 40 BID + Amoxi 1g BID + Levoflox 500 BID + Tinidazole 500 BID x 5 d + Lactobacillus GG x 13 d (during + 7 days after antibiotics)
  - PPI QD + Tetra 500 QID + Pepto 2 QID + Metro 500 QID x 14d + Lactob GG
  - [PPI BID + Amoxi 1g BID x 5d], then [PPI BID + Clari 500 BID + Tinidazole 500 BID x 5d] + Lactobacillus GG
  - PPI BID + Clari 500 BID + Amoxi 1g BID x 10-14d + Lactobacillus GG (?)
  - PPI BID + Clari 500 BID + Metro 500 BID x 10-14d + Lactobacillus GG (?)
- **Salvage Therapy:**
  - PPI QD + Tetra 500 QID + Pepto 2 QID + Metro 500 QID x 14d
  - PPI BID + Amoxi 1 g BID + Levoflox 500 QD x 10-14d
  - PPI BID + Levo 500 QD + Nitazoxanide 500 BID+ Doxycycline 100 mg QD x 10d

H. Pylori Therapy

- Patients who have received Macrolides should not use Clarithromycin regimen.
- If exposed to Metronidazole in past, give 500 mg (no 250 mg).
- Lactobacillus GG or Bifidobacteria **during therapy and for 1 week after therapy** improves tolerability and response to therapy.
- Post therapy testing:
  - Monoclonal Fecal Ag > 4 wk after, or UBT 4 wk after.

Indications for Surgery (or Angiographic Therapy)

- First re-bleeding after endoscopic hemostasis, with:
  - ulcer > 2 cm, or
  - hypotension/shock.
- Active bleeding not controlled after 2 endoscopic interventions (Lau J et al. N Engl J Med 1999; 340:751).
  - *First two endoscopic treatments have similar mortality but less complications (15% in endoscopy therapy vs. 36% with surgery).*
- Recurrent hemorrhage after stabilization and 2 endoscopies therapies.
- Hemodynamic instability despite vigorous resuscitation and 3 units of PRBC.
- Continuous slow bleed of > 3 units PRBC/day.

Embolic Agents for UGI Bleed

Temporary	Permanent
Vasopressin (less effective in duodenum)	Coils (20-30% larger than vessel); (need second agent in coagulopathy).
Autologous blood clot	
Gelfoam (high early re-bleeding; add second agent)	Large Vessel Occluders (Amplazter plug, MVP, Azur CX)
Microfibrillar bovine collagen (Avitene)	Particles (Polyvinyl alcohol, Microspheres)
Thrombin	Liquid Agents (N-Butyl Cyanoacrylate, Ethylene Vinyl); (rapid hemostasis even in coagulopathy)
Biodegradable Starch Microspheres (EmboCept)	

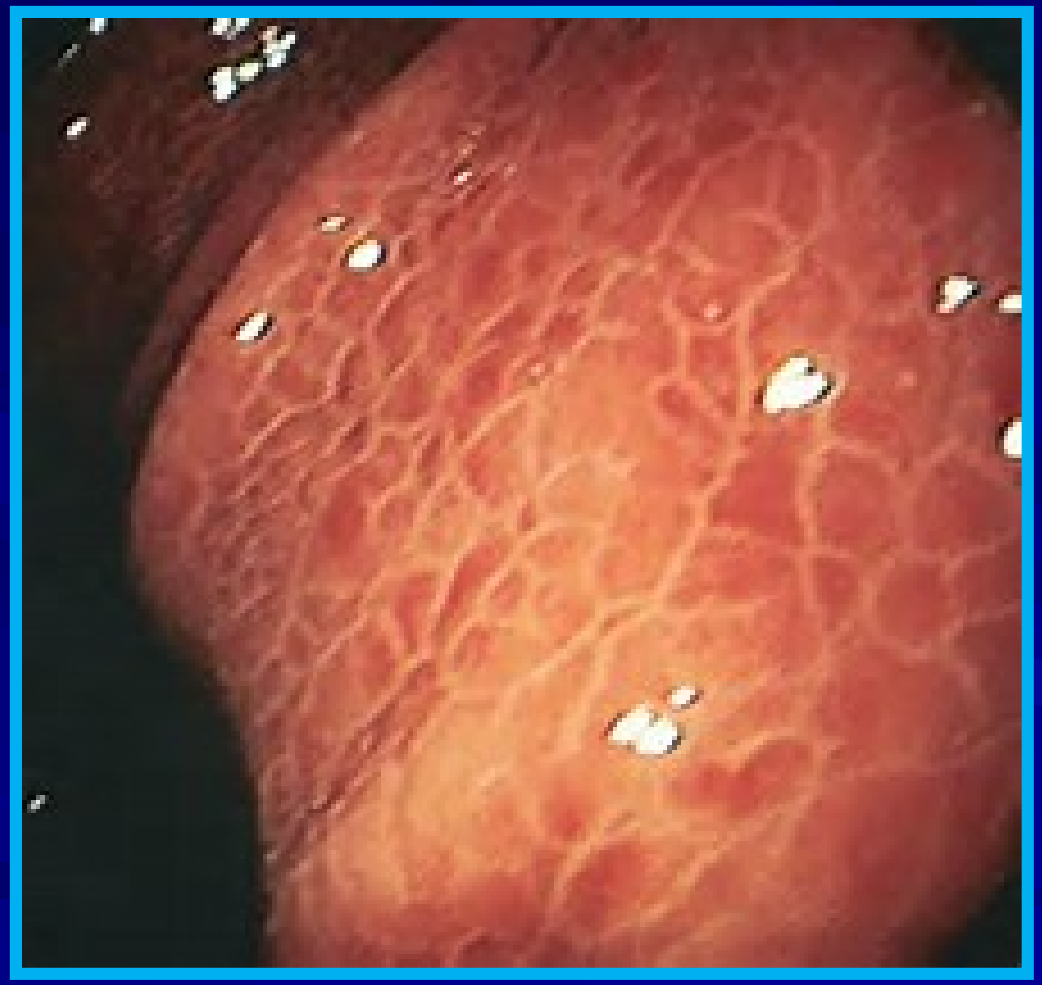
50% need re-embolization due to recurrent bleed

Selected Causes of Non-Variceal UGI Bleeding

Portal Hypertensive Gastropathy

- Cause: Increased gastric mucosal blood flow.
- Pathogenesis: related to both congestion and hyperemia in the stomach .
  - Mucosal ischemia and increased nitric oxide synthase activity.
  - No relationship with Helicobacter pylori infection.
- Aggravating factors:
  - Endoscopic sclerotherapy or ligation of esophageal varices increase hyperdynamic congestion.
  - Others: etiology of portal hypertension, and coexistence of gastric varices;
  - It is not directly correlated with intravariceal pressure.
- Diagnosis:
  - Fine white reticular pattern separating areas of pinkish mucosa on endoscopy, with "snakeskin" appearance.
  - Most evident in the fundus and body.
  - In severe cases: oozing, bleeding, subepithelial hemorrhages, and increased vascularity similar to angiomas, involving the fundus as well as body and antrum.

Portal Hypertensive Gastropathy



Portal Hypertensive Gastropathy

- Pathology: extensive edema. In severe cases has capillary and venous dilatation in the submucosa extending into the mucosa.
- Natural history: Over 3 years:
  - 29 % remain stable,
  - 23 % worsen,
  - 23% improved, and
  - 25% fluctuated.
  - Acute bleeding occurs in 2.5 %; death is rare.
  - Chronic bleeding occurs in 11% patients.
- Treatment: decrease portal pressure.
  - Portacaval shunt surgery, TIPS, propranolol, and liver transplantation.
  - Non-selective beta blockers and TIPS decrease transfusion needs.
  - Vasopressin, somatostatin, or octreotide may also decrease bleeding from portal hypertensive gastropathy.
  - Endoscopic thermal coagulation may be effective for focally bleeding angiomas associated with cirrhosis

Gastric Antral Vascular Ectasia (GAVE)
Watermelon Stomach

- Significance:
  - Causes 0.5% of nonvariceal upper gastrointestinal bleeding; 31% have portal hypertension.
- Endoscopy:
  - Longitudinal rows of flat, reddish stripes radiating from the pylorus into the antrum, that resemble the stripes on a watermelon.
  - The red stripes represent ectatic and sacculated mucosal vessels.
  - In cirrhosis: A punctate form is more common.
- Associations:
  - Most cases are idiopathic.
  - 31% have portal hypertension.
  - Has been associated with cirrhosis and systemic sclerosis.
- Clinical picture:
  - Elderly (mean age 74) female (80%) with iron deficiency anemia, slow GI blood loss (FOBT+), and no history of cirrhosis.
  - Presentation with portal HTN is similar.

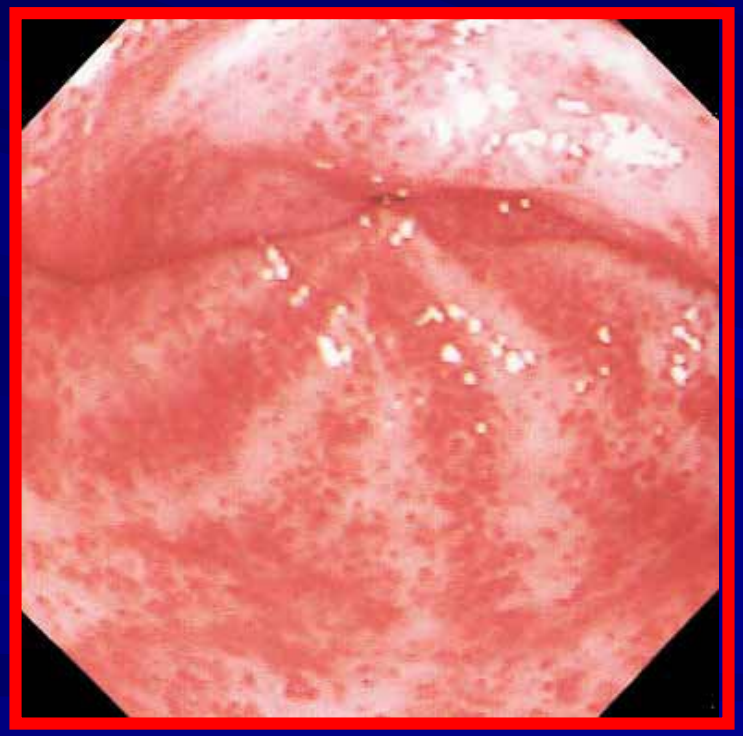
Gastric Antral Vascular Ectasia (GAVE)
Watermelon Stomach

- Diagnosis:
  - Endoscopic appearance.
  - It may be confirmed with endoscopic biopsy.
- Histopathology:
  - vascular ectasia, spindle cell proliferation, and fibrohyalinosis.
- Treatment:
  - Episodic transfusions are required in some chronic cases, but the bleeding is rarely acute and massive.
  - Endoscopic coagulation with a heater probe, Gold probe, Argon plasma coagulator, or laser therapy obliterates the vascular ectasia and decreases the degree of bleeding.
  - Antrectomy prevents recurrent bleeding, but is usually reserved for patients who fail endoscopic therapies.
- TIPS does **not** reduce bleeding.

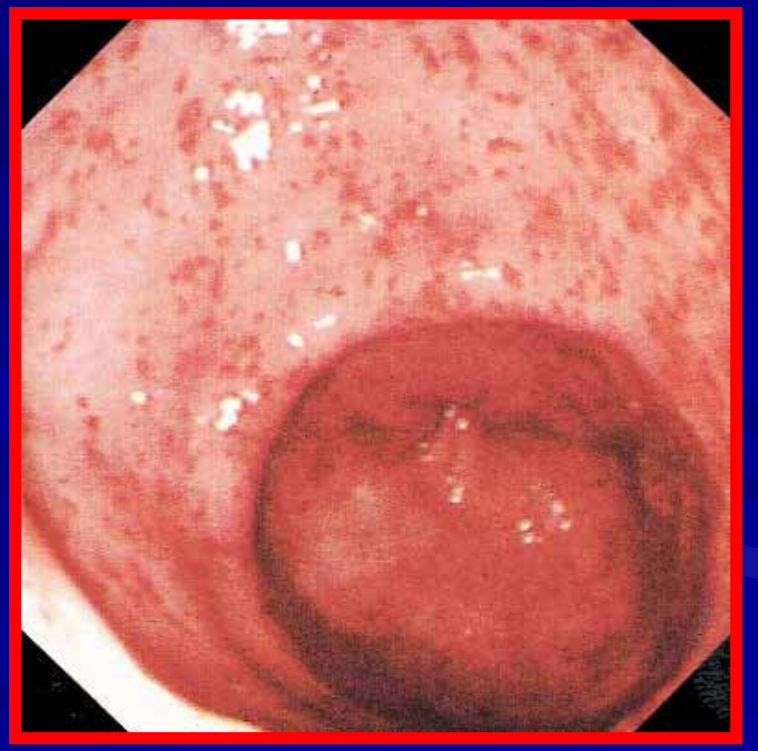
Endoscopic Types of GAVE

Ito M et al. **Gastrointest Endosc 2001;53:764-70**

Classic GAVE
(cirrhosis & non-cirrhosis)



Punctate GAVE
(cirrhosis)



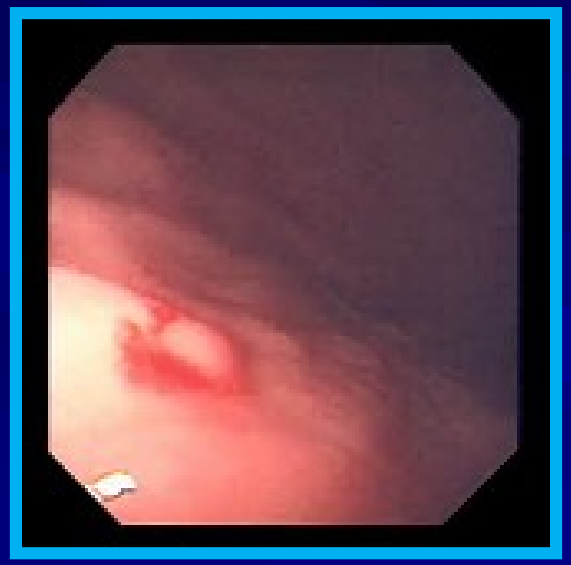
Portal HTN Gastropathy (PHG) vs GAVE

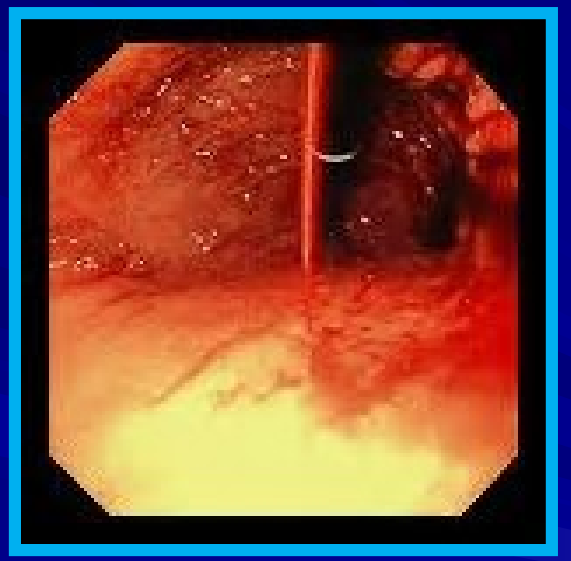
	PHG	GAVE
Mosaic Pattern	Present	Absent
Distribution	Proxim > Distal	Distal > Proxim
Red signs/spots	If severe	Always
Thrombi (Bx)	-	+++
Fibrohyalinosis (Bx)	+	+++
Spindle cell prolif (Bx)	+	++
Treatment	Beta-blocker, Fe, TIPSS	APC

Dieulafoy

- Definition: Aberrant submucosal artery, without ramification in gastric wall, which erodes the overlying epithelium in the absence of a primary ulcer.
  - Causes less than 1 percent of cases of severe UGI hemorrhage.
  - Caliber of the artery is 1 to 3 mm (10-times the caliber of mucosal capillaries).
  - Usually located in the upper stomach along the lesser curvature near the gastro-esophageal junction (fundus, within 6 cm of EGj).
  - May be found in all areas of the gastrointestinal tract, including the esophagus, duodenum, small bowel, and colon.
  - Bleeding is often self-limited, although it is usually recurrent and can be profuse (tattoo area)
- Etiology is unknown, likely congenital.
- Causes of bleeding are not well-understood.
  - Associations: cardiovascular disease, hypertension, chronic kidney disease, diabetes, or alcohol abuse.
  - Use of NSAIDs is common; NSAIDS may incite bleeding by causing mucosal atrophy and ischemic injury.

Dieulafoy lesion

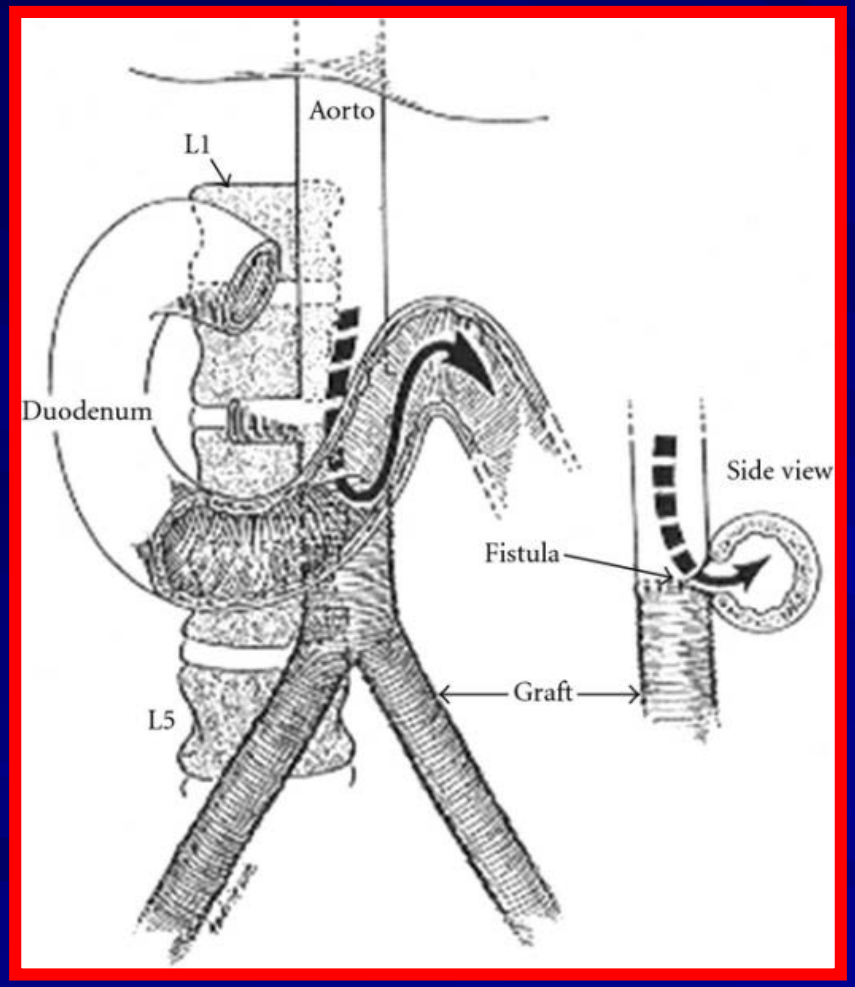


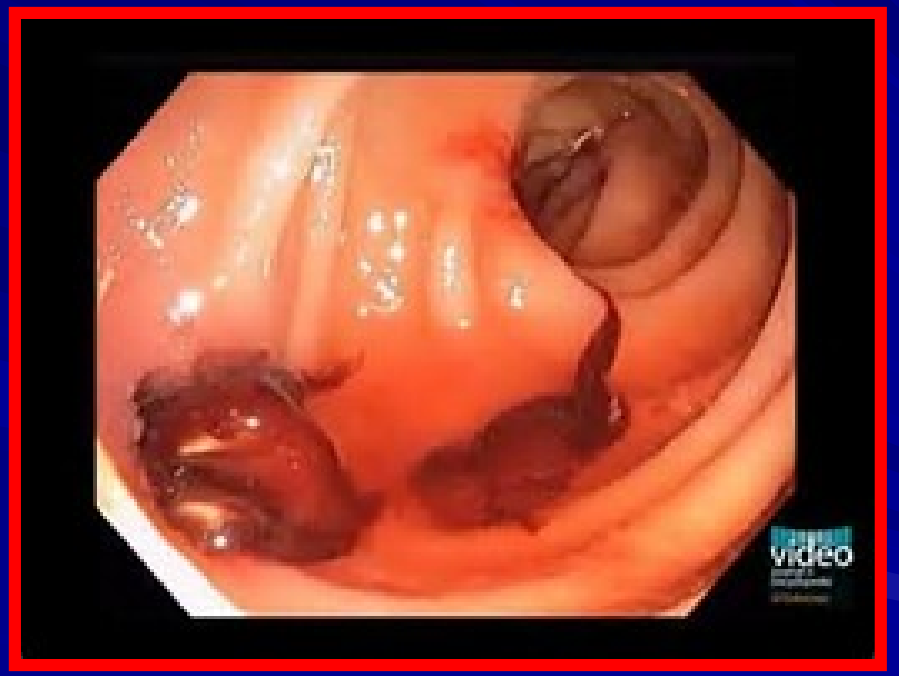


Aorto-Enteric Fistula

- Rare cause of acute UGI bleeding, but associated with high mortality if undiagnosed and untreated.
- Location: The third or fourth portion of the duodenum is the most common site for aortoenteric fistulas, followed by the jejunum and ileum .
- Presentation:
  - Repetitive herald bleed with hematemesis and/or hematochezia; this may be followed by massive bleeding and exsanguination.
  - Intermittent bleeding can be seen if clot temporarily seals the fistula.
  - Other signs and symptoms may include abdominal or back pain, fever, and sepsis.
  - Infrequently, an abdominal mass is palpable or an abdominal bruit is heard.
- Pathophysiology — Aortoenteric fistulas arise from direct communication between the aorta and the gastrointestinal tract.

Aorto-Enteric Fistula





Aorto-Enteric Fistula

- Causes:
  - Primary A-E fistula in USA are due to atherosclerotic aortic aneurysm.
    - In other parts of the world are infectious aortitis due to syphilis or tuberculosis.
  - Secondary A-E fistula most commonly due to prosthetic abdominal aortic vascular graft. May have pressure necrosis or graft infection causing the fistula.
    - Other secondary causes include penetrating ulcers, tumor invasion, trauma, radiation therapy, and foreign body perforation.
- Diagnosis:
  - A high index of suspicion.
  - Should be considered in all patients with massive or repetitive UGI bleeding and a history of a thoracic or abdominal aortic aneurysm, or prosthetic vascular graft.
  - Endoscopy is the procedure of choice for diagnosis and exclusion of other causes of acute UGI bleeding.
  - Endoscopy with an enteroscope or side-viewing endoscope may reveal a graft, an ulcer or erosion at the adherent clot, or an extrinsic pulsatile mass in the distal duodenum or esophagus.
  - Abdominal CT scan and aortography can be useful in confirming the diagnosis, but may be unreliable.

Aorto-Enteric Fistula

- Treatment:
  - Exploratory laparotomy is indicated for patients with suspected aortoenteric fistula and severe ongoing bleeding.
  - The mortality rate of an untreated aortoenteric fistula that presents with UGI hemorrhage is nearly 100 percent.
  - Surgical repair of the aortic aneurysm and fistula is the standard treatment regardless of the cause.
  - Therapy of an aortoenteric fistula due to an infected graft consists of intravenous antibiotics and emergency surgery with removal of the infected graft and extra-anatomic bypass. Infected graft removal with in situ graft replacement has been proposed as an alternative treatment.

Atrial-Esophageal Fistula

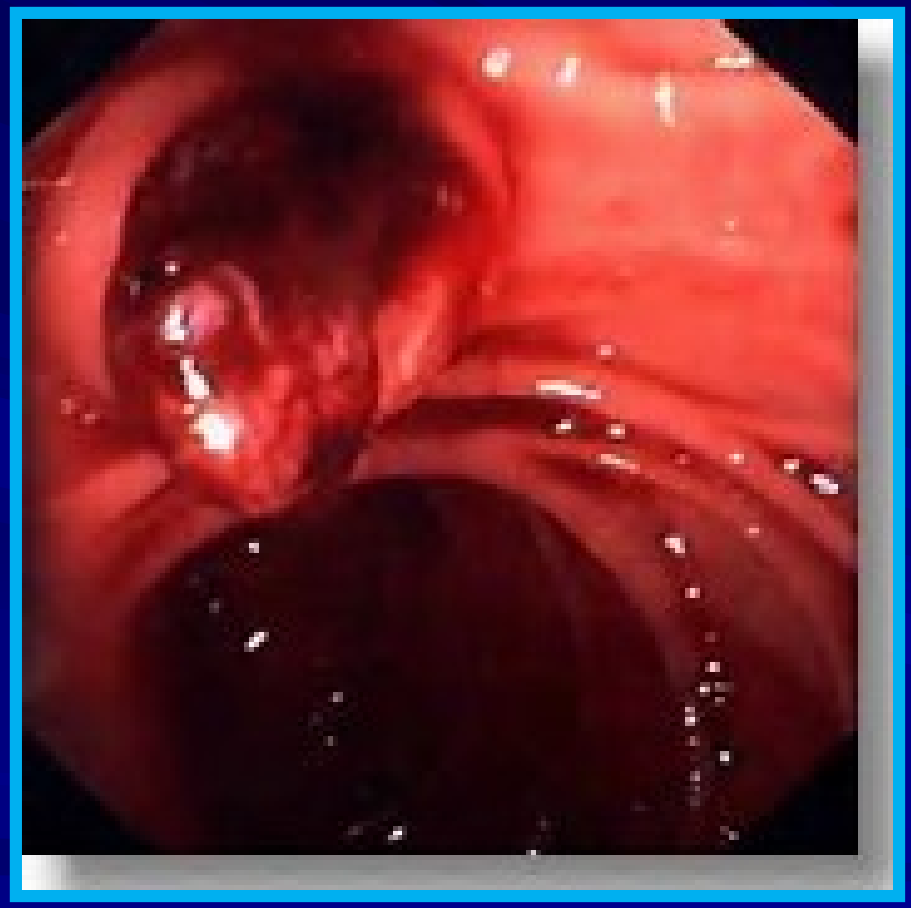
- Adverse event from cardiac catheter ablation for atrial fibrillation with thermal injury to atrium and esophagus.
- Occurs in 0.1-0.25% of procedures.
- Bleed 1-6 weeks after ablation.
- Forms 1-way valve from esophagus to atrium;
  - embolic strokes in > 50%.
- Positive esophageal pressure in endoscopy can cause embolic stroke.
  - Avoid endoscopy.
- Diagnosis: CT Scan
- Treatment: Surgery

Hemobilia

- Bleeding from the hepatobiliary tract;
  - rare cause of acute UGI bleeding.
- Should be considered in a patient with acute UGI bleeding and a recent history of:
  - hepatic parenchymal or biliary tract injury,
  - percutaneous and transjugular liver biopsy,
  - percutaneous transhepatic cholangiogram,
  - cholecystectomy,
  - endoscopic biliary biopsies or stenting,
  - TIPS,
  - Angioembolization (eg: TACE), or
  - blunt abdominal trauma .
  - Other causes include gallstones, cholecystitis, hepatic or bile duct tumors, intrahepatic stents, hepatic artery aneurysms, and hepatic abscesses.

Hemobilia

(blood flowing from Vater’s papillae)



Hemobilia

- Signs & Symptoms:
  - Classic triad is biliary colic, obstructive jaundice, and occult or acute GI bleeding.
  - Hemobilia can result in obstructive jaundice with or without biliary sepsis.
- Diagnosis:
  - Often overlooked in the absence of active bleeding.
  - A side-viewing duodenoscope is helpful for visualizing the ampulla or for performing diagnostic endoscopic retrograde cholangiography (ERCP).
  - Technetium-tagged red blood cell scan or
  - Selective hepatic artery angiography to reveal the source of hemobilia and for treatment.
- Treatment: directed at the primary cause of bleeding;
  - embolization or surgical resection of a hepatic tumor, or
  - arterial embolization following liver biopsy or PTC,
  - laparoscopic cholecystectomy

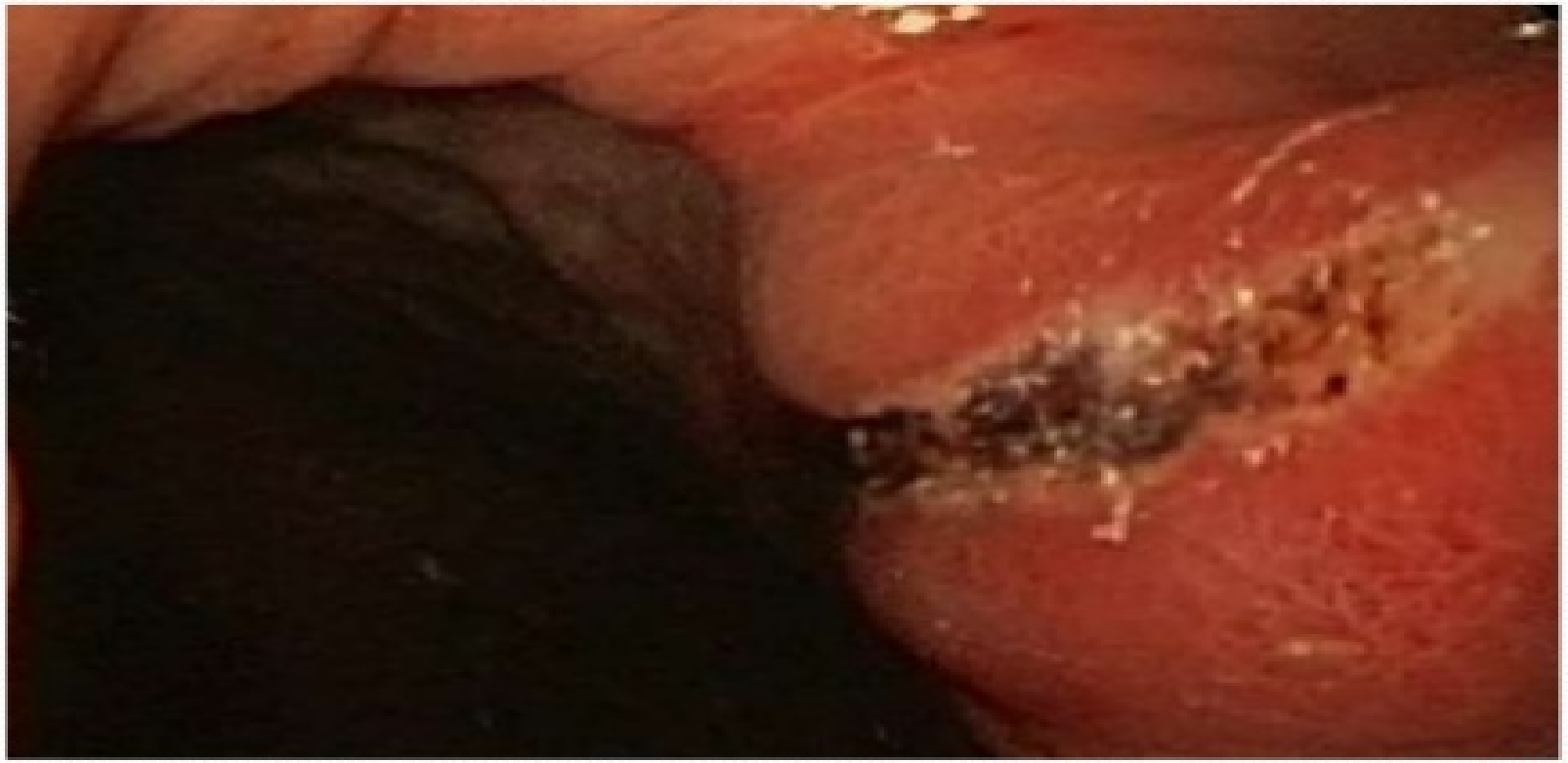
Hemosuccus Pancreaticus

- Definition: Bleeding from the pancreatic duct; rare cause of UGI bleeding.
- Causes: chronic pancreatitis, pancreatic pseudocysts, and pancreatic tumors.
- Pathogenesis:
  - Pseudocyst or tumor erodes into a vessel, forming a direct communication between the pancreatic duct and a blood vessel.
  - May be seen after therapeutic endoscopy of the pancreas or pancreatic duct, including pancreatic stone removal, pancreatic duct sphincterotomy, pseudocyst drainage, or pancreatic duct stenting.
- Diagnosis: confirmed by abdominal CT scan, ERCP, angiography, or intraoperative exploration.
  - CT scan is performed first (least invasive).
- Treatment:
  - Mesenteric arteriography with coil embolization can control acute bleeding.
  - If bleeding persists or is massive: pancreaticoduodenectomy or pseudocyst resection and ligation of the bleeding vessel.

Cameron Lesions

- **Definition:** erosions or ulcers occurring in the sac of a hiatal hernia.
- **Frequency:** up to 5 percent of patients with a hiatal hernia having EGD.
- **Significance:**
  - usually an incidental finding
  - rarely causes acute or chronic upper gastrointestinal bleeding and iron deficiency anemia.
- Pathogenesis: incompletely understood; trauma of diaphragm causing ischemia (?).
  - Contributing factors include reflux esophagitis and mechanical trauma.
- Management: depends upon the clinical setting and should thus be individualized.
  - Acute bleeding can be treated endoscopically.
  - Chronic bleeding with iron deficiency can be treated with a PPI after iron repletion, which may help prevent recurrence of anemia.
  - Surgery to repair the hiatal hernia can be considered in patients with recurrent bleeding despite the above measures.

Cameron's lesion



QUESTIONS ?