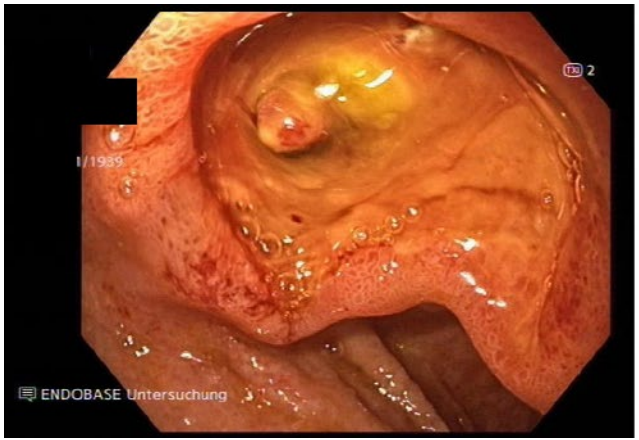
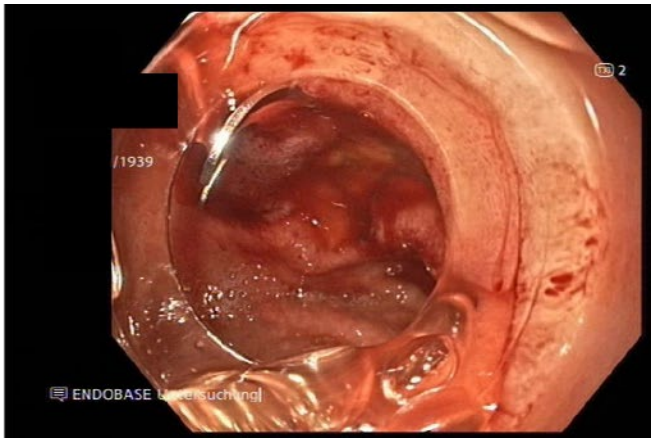
INSELGRUPPE

Acute Upper GI Bleeding

Bible Class 21.08.2024 - Gastroenterologie – Jonas Brunner & Roy Frei





INSELGRUPPE

Bett / Lokalisation / Problem

020-P-221-T

Gastrointestinale Blutung (Primäres stationär

020-P-451-F

Akute hämodynamisch relevante erstmalige …

INSELGRUPPE

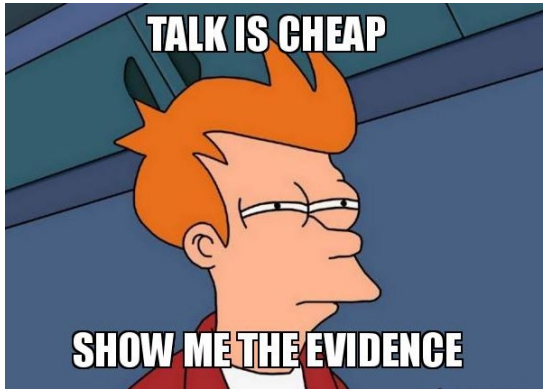
European Society of Gastrointestinal Endoscopy - 2021
American College of Gastroenterology - 2021
British Society of Gastroenterology - 2019

Goals

- 1. Practical: tools for everyday, **focus on non-variceal GIB**
- 2. Educational: ESEGH-like questions

Contents

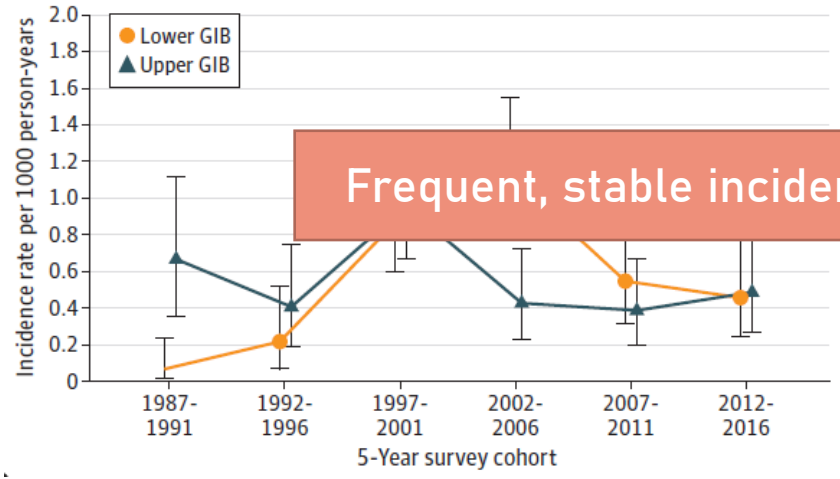
- Epidemiology and clinical presentation
- Risk factors and risk stratification
- Early management
- Endoscopy
  - Ulcer classification
  - Techniques and settings
- Post-endoscopy management



Epidemiology and clinical presentation

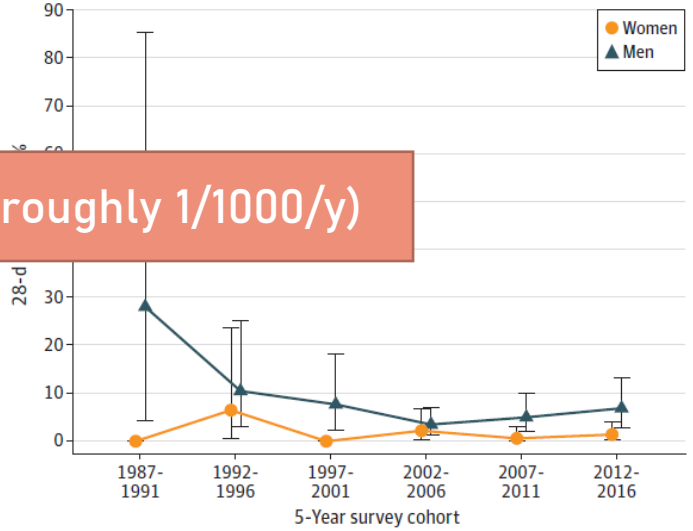
Epidemiology

Figure 1. Incidence Rate Trends in Major Upper and Lower Gastrointestinal Bleeding (GIB) for 5-Year Cohorts



Frequent, stable incidence (roughly 1/1000/y)

Figure 3. Twenty-Eight-Day Case Fatality Trends in Major Gastrointestinal Bleeding for 5-Year Cohorts



Error bars indicate 95% CIs.

Vora et al, JAMA Network Open. 2020;3(10):e2020172

Epidemiology

Table 4 Crude mortality by endoscopic diagnosis

Endoscopic diagnosis (n)	Crude mortality rate (%) Total* (5004) % (n)	New admissions (4109) % (n)	Inpatients (833) % (n)
Peptic ulcer	8.9 (162/1826)	5.8 (81/1403)	22 (70/322)
Varices	15 (82/544)	11 (51/469)	41 (29/70)
Malignancy	17 (31/187)	14 (22/156)	30 (9/30)
Oesophagitis	5.5 (65/1177)	2.8 (26/938)	17 (39/229)
Oesophagitis alone			10 (8/78)
Gastritis/erosions			24 (41/173)
Gastritis erosions alone			17 (9/54)
Erosive duodenitis	5.2 (33/640)	3.0 (16/539)	19 (17/90)
Erosive duodenitis alone	4.4 (5/114)	2.1 (2/94)	16 (3/19)
Mallory–Weiss	4.7 (10/213)	3.6 (7/193)	16 (3/19)
Mallory–Weiss alone	3.8 (4/106)	3.1 (3/96)	10.0 (1/10)
Other	12 (16/133)	11 (12/109)	17 (4/23)
Other alone	6.3 (5/80)	7.2 (5/69)	0 (0/10)
No diagnosis	5.8 (49/865)	3.7 (27/711)	15 (21/144)
All endoscoped	7.4 (371/5004)	5.0 (207/4109)	19 (162/833)
Not endoscoped	17 (304/1746)	12 (172/1441)	46 (126/274)
All patients	10 (675/6750)	6.8 (379/5550)	26 (288/1107)

30-d Mortality up to 10%

Hearshaw et al., Gut 2011;60:1327e1335. doi:10.1136/gut.2010.228437

Epidemiology - Costs

Table 3 Estimate of annual initial hospital costs for acute upper gastrointestinal bleeding (AUGIB) in the UK

Age bands (years)	UK Population*	AUGIB incidence per 100 000/year†	Annual number of patients with AUGIB in UK population	Mean total initial hospital cost estimates‡	Annual total costs
16–29	11 806 800			143 (n=91)	**£3 104 535**
30–44	12 843 400			053 (n=150)	**£10 811 709**
45–59	12 605 800			183 (n=224)	**£18 990 830**
60–64	3 624 400	109	3951	£2686 (n=78)	**£10 613 733**
65–74	5 820 900	214	12 457	£2749 (n=142)	**£34 248 977**
75+	5 020 000	485	24 347	£3190 (n=251)	**£77 667 271**
Total	**51 721 300**	–	**57 434**	–	**£155 437 055**

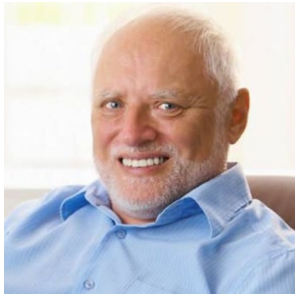
*Data on population from Office for National Statistics 2012.[19]
†AUGIB incidence figures taken from Rockall *et al*.[18]
‡Mean cost estimates based on analysis of TRIGGER data reported in this paper.

Significant cost and QoL decrease

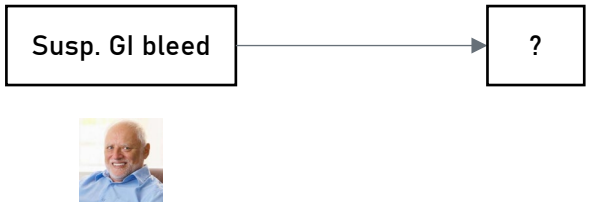
Campbell HE, et al. BMJ Open 2015;5:e007230. doi:10.1136/bmjopen-2014-007230

Risk factors and risk stratification

Clinical case 1

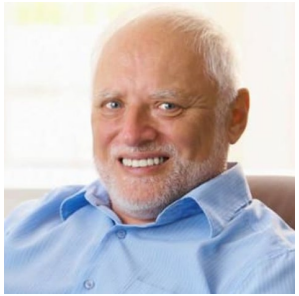


Patient brought to the ER with presyncope, coffee-ground emesis and melena in within the last 24h. No respiratory or cardiac complaints.



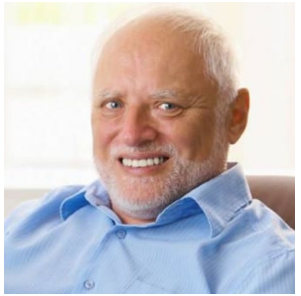
What do you want to know to better stratify this patient?

Risk stratification



1. History: Age? Melena? Hematemesis? Syncope? Medications?
2. Status: stable vs unstable (SBP, HR), melena present (DRU!)
3. Objective findings: Hb, coagulation studies
4. Associated comorbodities (hepatic? renal? cardiac?)

Clinical case 1 – Mr. Jones



85 yo male brought to the ER with presyncope, coffee-ground emesis and melena in within the last 24h. No respiratory or cardiac complaints.

- History: hip joint replacement 1 month earlier, hypertension, pseudogout, minor stroke '97.
- Medications: Enalapril, Dafalgan, Plavix, Clexane (prophyl.), Oxynorm (R)

47559839	47533258
NOTE	K NORD
04.01.2022 15:44	20.12.2021 07:00
04.01.2022 15:57	20.12.2021 08:03

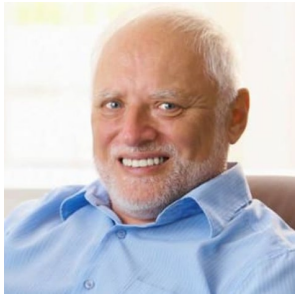
		venös	venös
Leukozyten	G/L	9.07	9.19
Hämoglobin	g/L	84 -	91 -
Hämatokrit	L/L	0.25 -	0.27 -
Erythrozyten	T/L	2.67 -	2.90 -
MCV	fL	95	94
MCH	pg	32	31
MCHC	g/L	332	335
RDW	%	13.1	13.7
Thrombozyten	G/L	425	275
MPV	fL	11.7 +	12.2 +
Normoblasten maschinell	/100 Leuk.	0.00	0.10 +

2 1301 - Bluterbrechen , Teerstuhl (Meläna)

Vitalparameter

Time	HF	Puls	AF	Zyan.	SpO2	O2	Kapno	ABPs	ABPd	BPS	BPD
19:42	78	76	16		99					102	54
19:02											
19:01	78	77	12		96					135	59

Mr. Jones

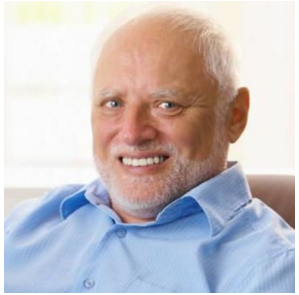


Of the highlighted elements, which one contributes the most to this patient's Rockall score (bonus - how many total points?)

Answer

?

Mr. Jones



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Normoblasten maschinell	/100 Leuk.	0.00	0.10 +

2

1301 - Bluterbrechen , Teerstuhl (Meläna)

Vitalparameter

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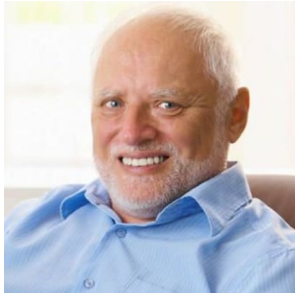
19:02											
19:01	78	77	12		96					135	59

Mr. Jones

Age	<60 years	0
	60-79 years	+1
	≥80 years	**+2**
Shock	**No shock (SBP ≥100 AND HR <100)**	**0**
	Tachycardia (SBP ≥100 AND HR ≥100)	+1
	Hypotension (SBP <100)	+2
Comorbidities	No major comorbidity	0
	Any comorbidity EXCEPT renal failure, liver failure, and/or disseminated malignancy	**+2**
	Renal failure, liver failure, and/or disseminated malignancy	+3



Answer

2 + 2 = 4 points!

Scores are plentiful!

Glasgow-Blatchford

Rockall

AIMS65

Progetto Nazionale Emorragia Digestiva (PNED)

Match the score and its use!

Mortalità

Need for intervention / safe discharge

Rebleeding

Mortality

Clinical scoring systems - a brief overview

Rockall - Gut

- National au
- 2,956 patie
- Outcomes:

Progetto Nazionale Emorragia Digestive (PNED) [24]. The GBS was reported to have the highest accuracy (AUROC 0.86) for predicting need for hospital-based intervention (RBC transfusion, endoscopic treatment, arterial embolization, surgery) or death. Moreover, a GBS ≤ 1 was the optimal threshold to predict patient survival without need for hospital-based intervention, with a sensitivity of 98.6% and specificity of 34.6%. However, none of the evaluated risk scores were able to predict other outcomes with acceptable ability (AUROC ≤ 0.80).

6: 1318–21

AIMS65 - Gas

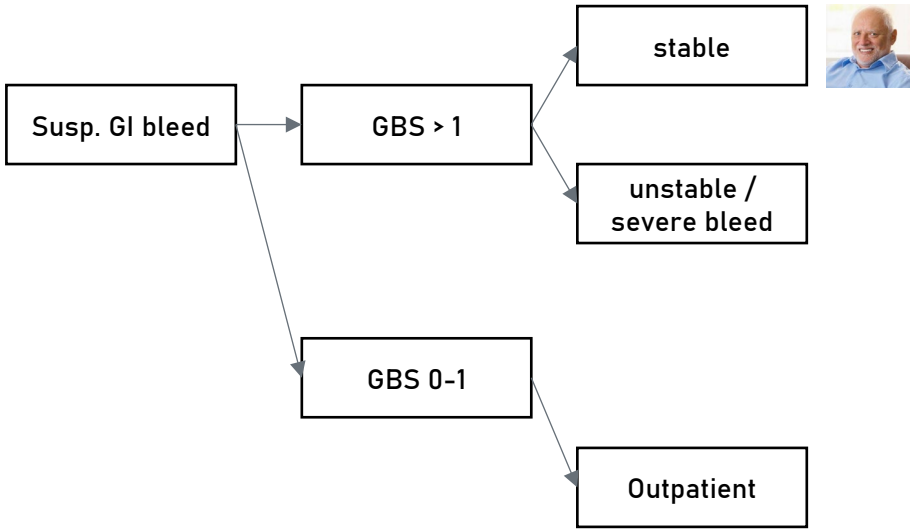
- Newer, sim
- Albumin, IN
- Much larger hospitals)
- Better predicts mortality, less so transfusion need

1639–1647

those only 8

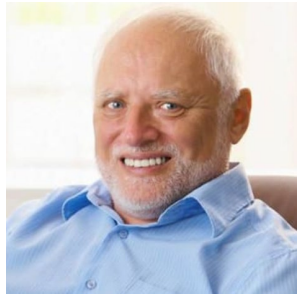
0 days

Risk stratification and triage



Early management

Back to Mr. Jones!



«He's received a **loading dose of Cyklokapron** on his way to the ER as well as a **loading PPI dose**. His haemoglobin fell from 91g/L to 84g/L and **we ordered 1 unit of packed RBCs**. Should I do something else while waiting for the GI consult?»

1. **Do you agree with treatments so far?**
2. **What do you propose?**

Resuscitation

- If unstable: restrictive fluid resuscitation regimen combined with an inotropic pharmacologic agent
- A restrictive RBC transfusion strategy is associated with significantly lower mortality (RR 0.65, 95%CI 0.44–0.97) and reduced rebleeding (RR 0.58, 95%CI 0.40–0.84).

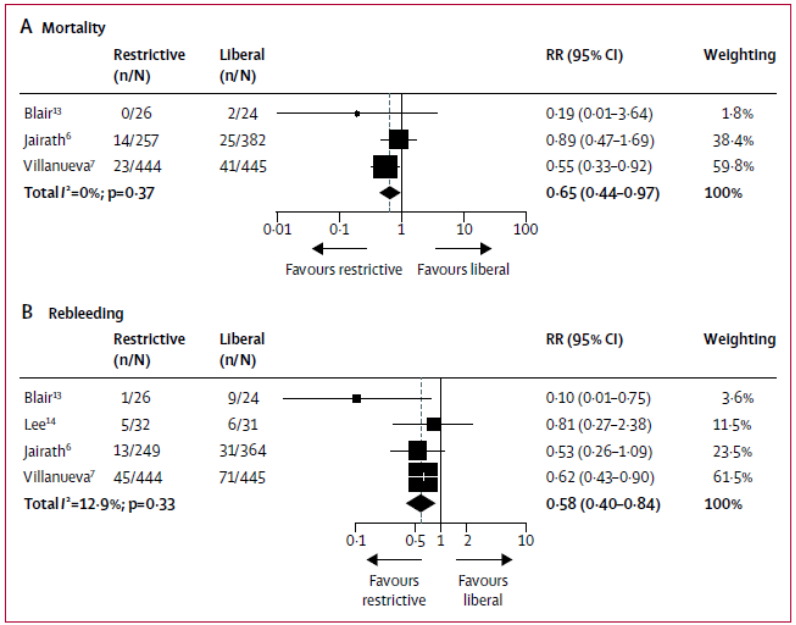


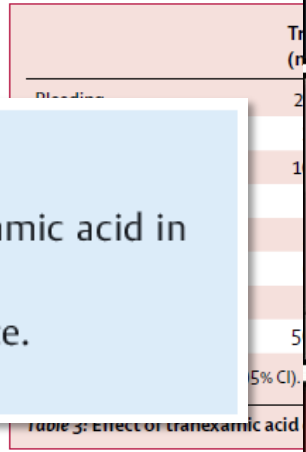
Figure 3: **Pooled RR of all-cause mortality (A) and rebleeding (B)**
No deaths occurred in either group in one trial (Villarejo and colleagues[15]) so it was not included in the meta-analysis. RR=relative risk.

Tranexamic acid

RECOMMENDATION

ESGE does not recommend the use of tranexamic acid in patients with acute NVUGIH.

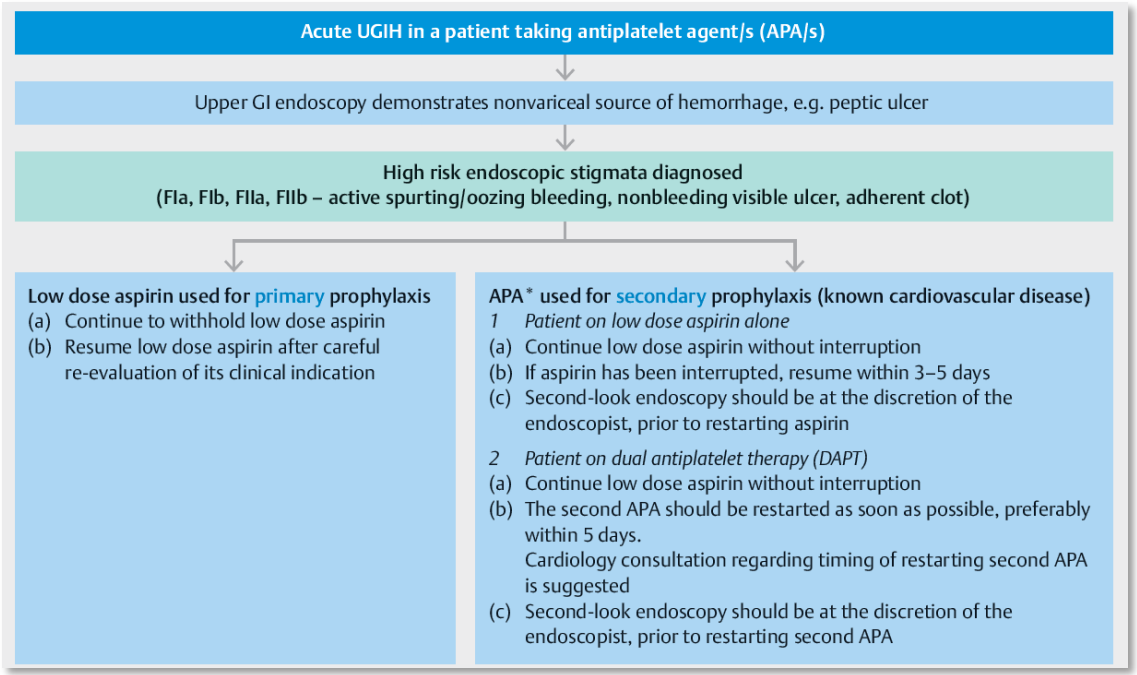
Strong recommendation, high quality evidence.



Taeuber et al., JAMA Surg. 2021;156(6):e210884

The HALT-IT Trial Collaborators, Lancet 2020; 395: 1927–36

Antiplatelets and anticoagulants



PPIs pre-endoscopy?

Why give them? To…..

- A. Decrease mortality?
- B. Decrease the need for surgery?
- C. Decrease rebleeding rate after endoscopy?
- D. Decrease the need for endoscopic treatment?
- E. Decrease in the blood transfusion requirement?

RECOMMENDATION

ESGE suggests that pre-endoscopy high dose intravenous proton pump inhibitor (PPI) therapy be considered in patients presenting with acute UGIH, to downstage endoscopic stigmata and thereby reduce the need for endoscopic therapy; however, this should not delay early endoscopy.

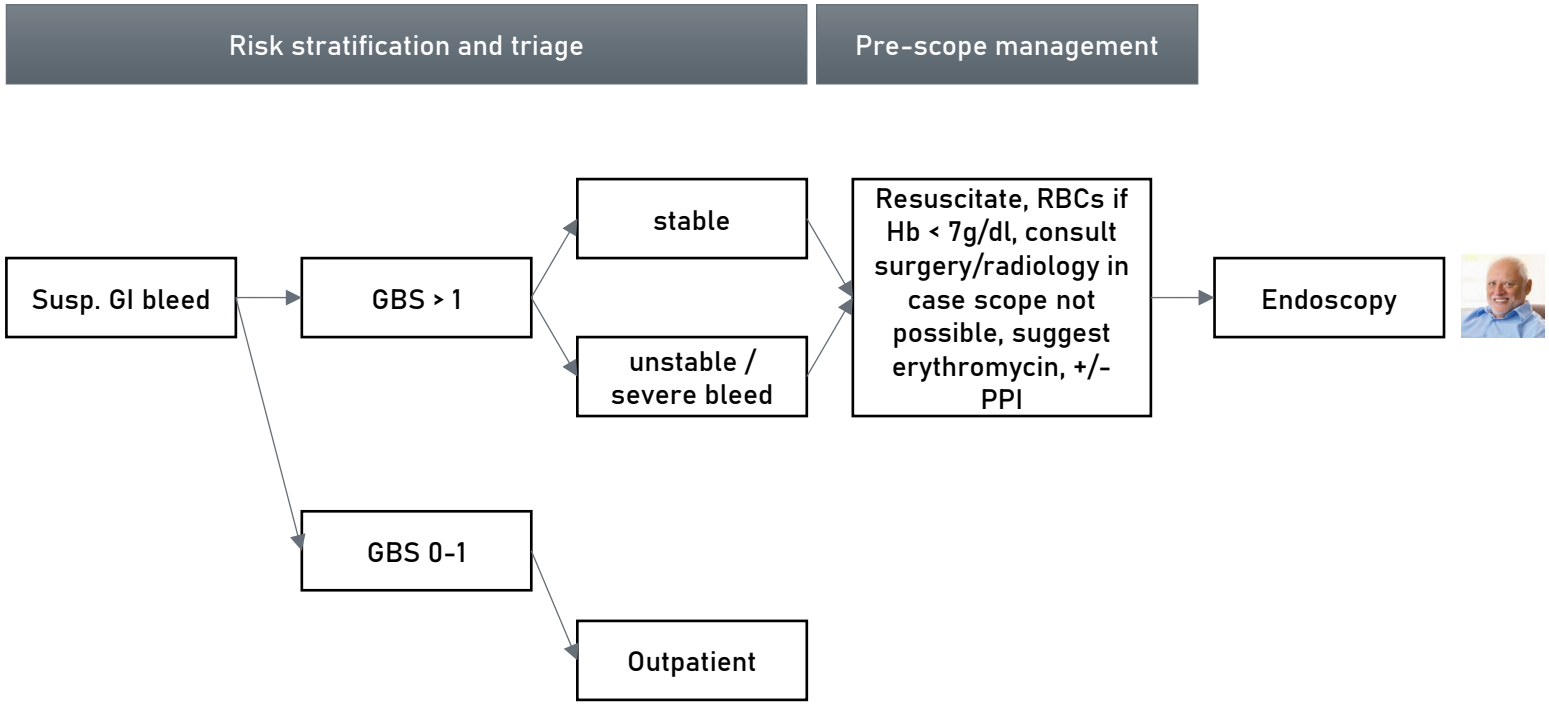
Weak recommendation, high quality evidence.

PPI therapy.

4. We could not reach a recommendation for or against pre-endoscopic PPI therapy for patients with UGIB.

Other measures

	Recommandation
NG tube	Does not differetiate U/LGIB
Sandostatin in NVUGIB	No benefit
Erythromycin	Selected patients w/ ongoing bleed


Risk stratification and triage
Pre-scope management
Susp. GI bleed
GBS > 1
stable
unstable / severe bleed
GBS 0-1
Outpatient
Resuscitate, RBCs if Hb < 7g/dl, consult surgery/radiology in case scope not possible, suggest erythromycin, +/- PPI
Endoscopy

Endoscopy

Timing

Emergent	Urgent	Early	Delayed

RECOMMENDATION

ESGE does not recommend emergent (≤ 6 hours) upper GI endoscopy since this may be associated with worse patient outcomes.

Strong recommendation, moderate quality evidence.

RECOMMENDATION

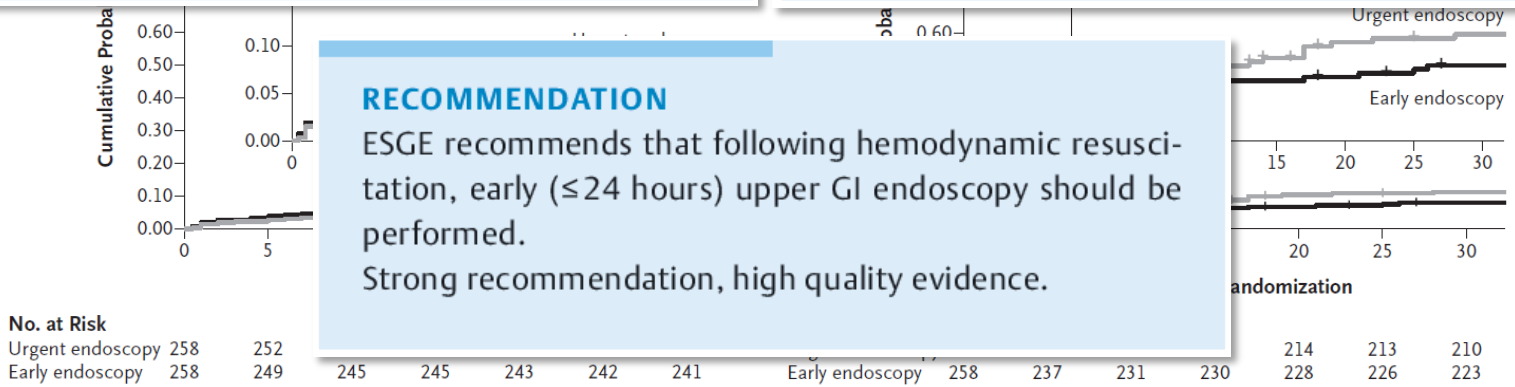
ESGE does not recommend urgent (≤ 12 hours) upper GI endoscopy since as compared to early endoscopy, patient outcomes are not improved.

Strong recommendation, high quality evidence.

RECOMMENDATION

ESGE recommends that following hemodynamic resuscitation, early (≤ 24 hours) upper GI endoscopy should be performed.

Strong recommendation, high quality evidence.



Lau et al., N Engl J Med 2020;382:1299-308.

INSELGRUPPE

*: Interventionsgrenze/indikation:
Hb < 70g/L

(V.a.) akute GI-Blutung

2 gross-lumige IV Zugänge
Blutdruckmonitoring, EKG, SpO_2
Endotracheale Intubation (GCS < 8)
Fluid-Resuscitation +/- Bluttransfusion (Testblut!) *

Consider
PPI IV
Erythromycin IV

Hb, Harnstoff, RRsys, HF
= Glasgow-Blatchford-Score(GBS)

GBS ≥ 12

RRsys < 90 mmHg instabil

RRsys > 90 mmHg, stabil

GBS < 12

Leberzirrhose/
portale Hypertonie
(V.a. Varizenblutung)

s.SOP
Varizenblutung

Adaptierte Volumengabe (Kristalloide/EK)

Non-Responder: RRsys < 90mmHg oder wiederholt/kont. Vasopressor oder Transf.bedarf > 1EK/h über ≥ 4h, um Ziel-Hb von 70 zu halten

Responder

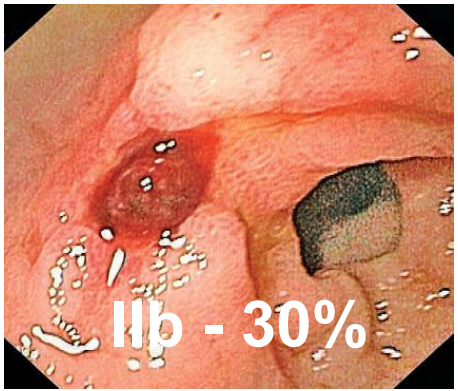
#: 12-24 h
Präferentiell
nächster morgen
ab 8.00 Uhr

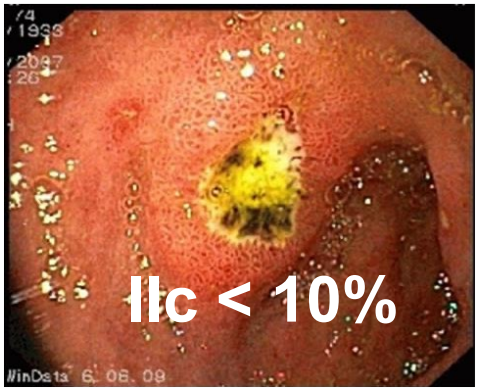
Notfall-Endoskopie

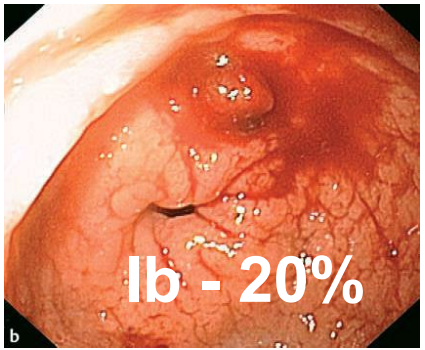
Endoskopie im Verlauf#

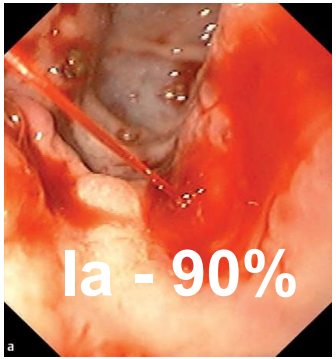
*: Ausnahmen:
akutes Koronarsyndrom,
Schlaganfall,sympt. periphere Ischämie

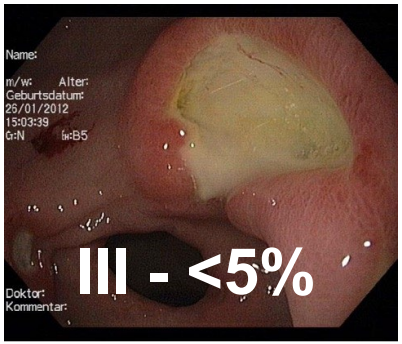
Endoscopic stratification – Stage and rebleeding risk (%)?











Endoscopic stratification – Stage and rebleeding risk (%)?

Class	Description	Rebleed rate	
Ia	Spurting haemorrage	90%	Endoscopic therapy
Ib	Oozing haemorrage	20%	
IIa	Visible vessel	50%	
IIb	Adherent clot	30%	
IIc	Haematin on ulcer base	<10%	No endo. therapy
III	Clean ulcer base	<5%	

Sleisenger and Fordtran's Gastrointestinal and Liver Disease - 10th Edition

Endoscopic treatment

Additional considerations if…

- **Size >2cm**
- **Location : GDA / left gastric territories**
- **Excavated / fibrotic ulcer**

RECOMMENDATION

FIa, FIb (active bleeding)

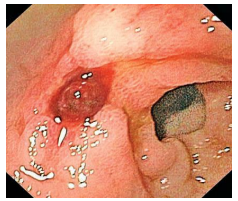
(a) ESGE recommends for patients with actively bleeding ulcers (FIa, FIb), combination therapy using epinephrine injection plus a second hemostasis modality (contact thermal or mechanical therapy) .

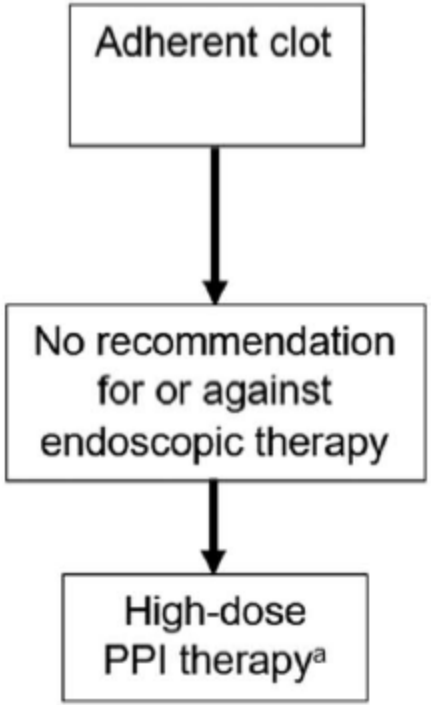
Strong recommendation, high quality evidence.

(b) ESGE suggests that in selected actively bleeding ulcers (FIa, FIb), specifically those > 2 cm in size, with a large visible vessel > 2 mm, or located in a high risk vascular area (e.g., gastroduodenal, left gastric arteries), or in excavated/fibrotic ulcers, endoscopic hemostasis using a cap-mounted clip should be considered as first-line therapy.

Weak recommendation, low quality evidence.

Adherent clots – ESGE / ACG





FIIb (adherent clot)

Consider performing clot removal followed by endoscopic hemostasis of underlying high risk stigmata[4]
OR
Medical management with high dose PPI (intravenous bolus + continuous infusion for 72 hours or minimum twice-daily intravenous bolus dosing for 72 hours or oral dosing)

Adherent clots – ESGE / ACG

Table 6. Meta-Analyses Assessing Endoscopic Therapy Versus No Endoscopic Therapy Related to Stigmata of Hemorrhage (Excluding Trials With Second-Look Endoscopies Specifying Re-Treatment)

Stigmata	End point	Number of comparisons	RR (95% CI)	Pooled rate: no endoscopic therapy n/N (%)	NNT (95% CI)
Active bleeding					2 (2–2)
					2 (2–3)
					2 (2–3)
Nonbleeding visible vessel					—
					5 (4–6)
					9 (7–19)
					7 (5–9)
Clot					—
					—
	Surgery	3[65,71,78]	0.47 (0.10–2.26)	6/76 (8%)	—
	Mortality	2[65,71]	0.90 (0.23–3.58)	5/52 (10%)	—

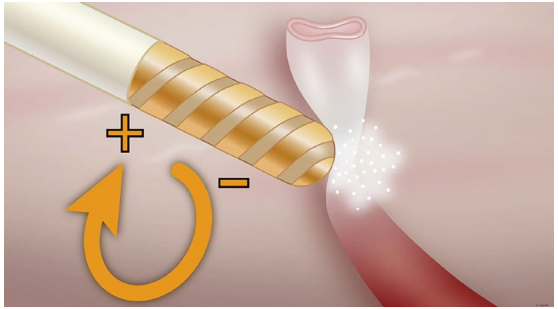
therapy may play a role in provider decisions. Accessibility for application of endoscopic therapy based on ulcer location and availability of interventional radiological or surgical back-up if uncontrollable bleeding is provoked are other factors to be considered. When performing endoscopic therapy for clots, some endo-

[a]Statistical heterogeneity ($P \leq .10$) and random-effects model used.

Laine et al, Clinical Gastroenterology and Hepatology, 2009;7:33– 47

Endoscopic treatment

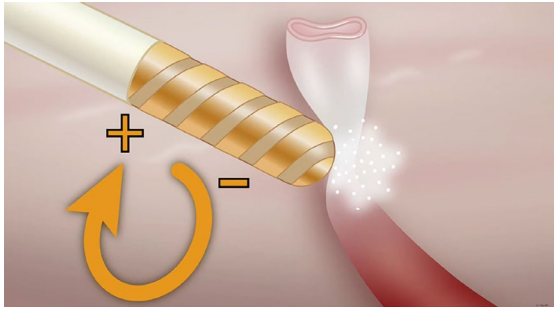
Contact thermal therapy – Settings?



- Cauterization of bleeding site
- Either direct contact (e.g. bipolar GoldProbe or monopolar Coaggrasper) or non-contact (APC)
- Concerning settings for bipolar probes, which of the following is true?
  - **A. High power (>50W) should be favored for adequate hemostasis**
  - **B. Moderate (8-10s) rather than short (<5s) application should be favored**
  - **C. Current is generated at the base of the probe**
  - **D. Heater probes can coagulate arteries up to 1mm**
  - **E. Heater probes can deliver a variable energy depending on tissue resistance**

Rrapi E., Narayan S., Siskin G., Stain S.C., Tadros M., Tafen M. (2021) Bipolar and Monopolar Cautery, Clips, Bands, Spray, Injections, Embolization, and Minimally Invasive Surgery. In: Tadros M., Wu G.Y. (eds) Management of Occult GI Bleeding. Clinical Gastroenterology. Humana, Cham.

Contact thermal therapy – Settings?



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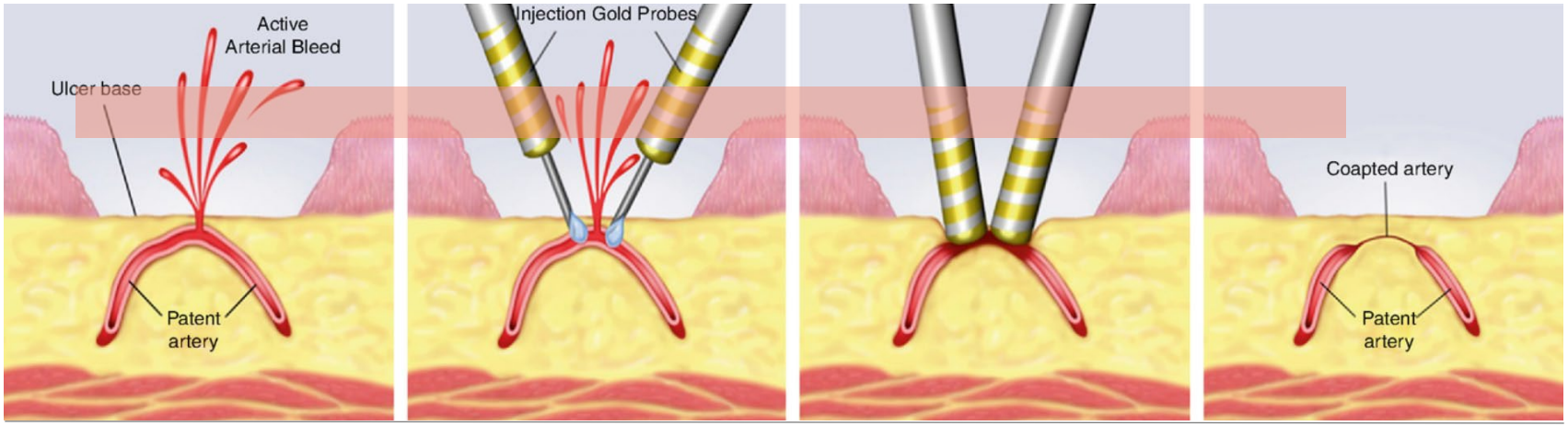
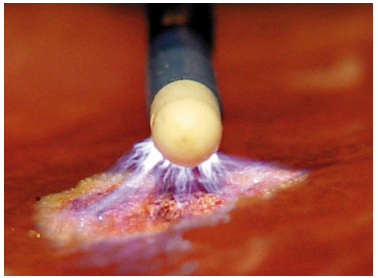


Contact thermal therapy – Settings?

Monopolar Coaggrasper:

safety. Monopolar hemostatic forceps are used for soft coagulation: The closed tip can be applied to the bleeding site or the forceps can be used to grasp the bleeding site (71–75). Soft monopolar electrocoagulation in RCTs was performed using soft coagulation mode at settings of 50–80 W with 1- to 2-second applications (72–75).

Argon plasma coagulation – Settings?



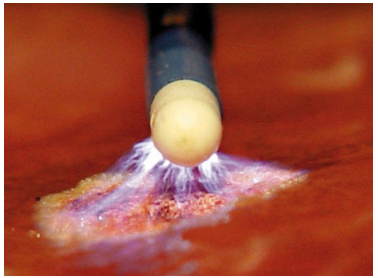
APC:

- helpful for targets that are difficult to reach by direct contact and for treating multiple lesions at the same session
- Gas: flow rate usually 0.8-1L/min
- Lower settings (20-30W) in thinner regions - colon and small bowel
- Higher settings (30-40W) for the thicker-walled stomach and for tumor ablation

- ACG 2021: in supporting RCTs 40-70W for duodenal and gastric ulcers, distance 2-8mm from tissue

https://www.uptodate.com/contents/argon-plasma-coagulation-in-the-management-of-gastrointestinal-hemorrhage, accessed 07.02.2022

Argon plasma coagulation – Settings?



forcedAPC

Effective devitalization with forcedAPC

preciseAPC®

The preciseAPC® mode used in thin-walled structures

pulsedAPC®

The pulsedAPC® mode used for tissue ablation and coagulation

https://www.uptodate.com/contents/argon-plasma-coagulation-in-the-management-of-gastrointestinal-hemorrhage, accessed 07.02.2022

Post-endoscopy management

PPIs after endoscopy

Table 2. Meta-analysis of Intermittent PPI vs Bolus With Continuous-Infusion PPI[a]

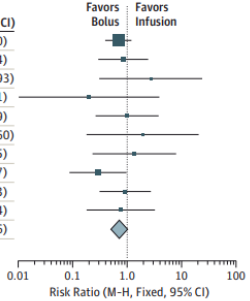
Outcome	No. of Studies	No. of Patients	(95% CI, Upper Boundary) Risk Ratio	(95% CI, Upper Boundary) Absolute Risk Difference, %
Recurrent bleeding				
Within 7 d	10[14,16,17,20-26]	1346	0.72 (0.97)	−2.64 (−0.28)
Within 30 d	13[14-26]	1691	0.89 (1.17)	−0.97 (1.49)
Within 3 d	9[14,16,17,20-24,26]	1146	0.73 (1.02)	−2.36 (0.17)
Mortality	11[14-16,18-24,26]	1453	0.64 (1.21)	−0.74 (0.43)
Surgery/RI	12[14-24,26]	1491	0.87 (1.49)	−0.30 (1.12)
Urgent interventions	9[14-20,22,23]	1283	0.95 (1.27)	−0.45 (2.43)
Length of hospital stay, d	8[14-16,18,21-23,26]	1204	−0.26 (0.09)[b]	
Blood transfusion, U	9[14-16,18,21-24,26]	1242	−0.22 (−0.02)[b]	

3. High-dose for 72 hours post-endoscopy
4. ACG 2021: high dose 14d or standard dose 1

Figure 3. Forest Plot of Studies Comparing Intermittent With Bolus Plus Continuous-Infusion Proton Pump Inhibitors in Patients With High-Risk Bleeding Ulcers

Source	Intermittent Bolus, No. Events	Intermittent Bolus, No. Total	Continuous Infusion, No. Events	Continuous Infusion, No. Total	Risk Ratio (M-H, Fixed, 95% CI)	Weight, %
Andriulli et al,[14] 2008	19	239	28	243	0.69 (0.40-1.20)	43.2
Chen et al,[16] 2012	6	101	7	100	0.85 (0.30-2.44)	11.0
Choi et al,[17] 2009	3	21	1	19	2.71 (0.31-23.93)	1.6
Jang et al,[24] 2006	0	19	2	19	0.20 (0.01-3.91)	3.9
Javid et al,[20] 2009	4	53	4	53	1.00 (0.26-3.79)	6.2
Kim et al,[21] 2012	2	54	1	52	1.93 (0.18-20.60)	1.6
Sung et al,[25] 2012	3	105	2	95	1.36 (0.23-7.95)	3.3
Ucbilek et al,[26] 2013	3	37	10	36	0.29 (0.09-0.97)	15.8
Yamada et al,[22] 2012	4	13	5	15	0.92 (0.31-2.73)	7.2
Yüksel et al,[23] 2008	3	49	4	50	0.77 (0.18-3.24)	6.2
Total (95% CI)	47	691	64	682	0.74 (0.52-1.06)	100.0

Heterogeneity: $\chi^2_9 = 5.96$ ($P = .74$) $I^2 = 0\%$
Test for overall effect: $z = 1.65$ ($P = .10$)



The outcome examined was rebleeding within 7 days in the intention-to-treat population. M-H indicates Mantel-Haenszel.

Sachar et al, JAMA Intern Med. 2014;174(11):1755-1762

PPIs after endoscopy

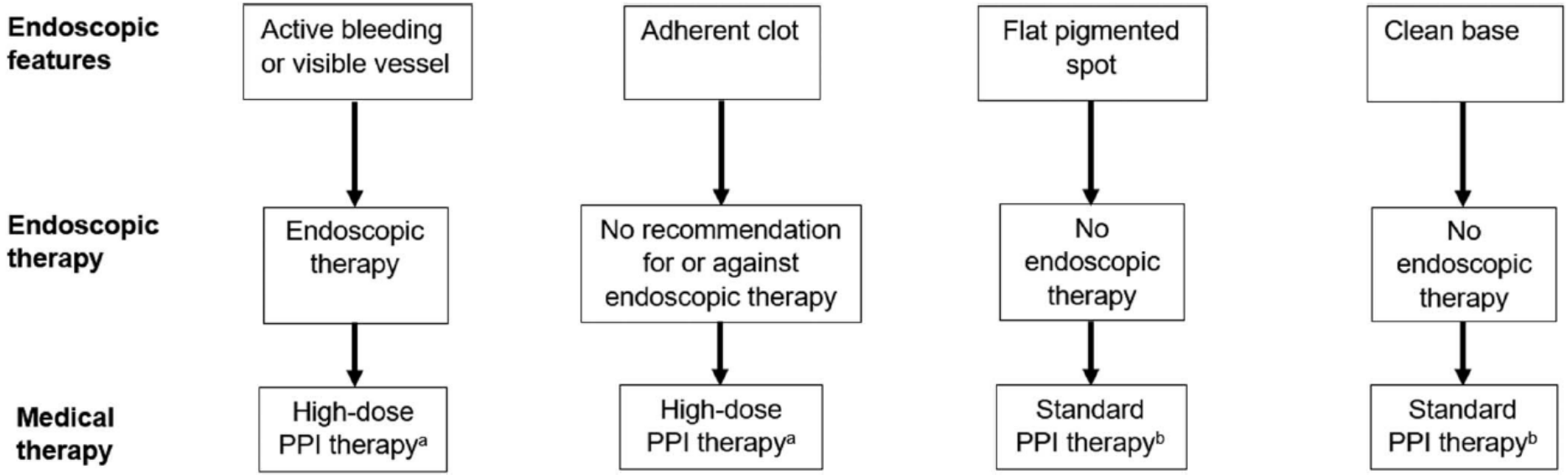


Figure 3. Endoscopic and medical therapy for ulcer bleeding based on endoscopic features of ulcer. [a]For continuous regimen, 80-mg bolus followed by 8-mg/min infusion for 3 days is recommended. For intermittent regimens, doses of 40 mg 2 to 4 times daily for 3 days are suggested, given orally if feasible, and an initial bolus of 80 mg may be appropriate. [b]Standard PPI therapy (e.g., oral PPI once-daily) has been recommended by previous guidelines (1,37) but is not assessed in the current document. PPI, proton pump inhibitor.

HP Eradication

What do you achieve by eradicating Helicobacter pylori?

1. Speeds up ulcer healing in HP-positive ulcers
2. Prevents recurrence of duodenal and gastric ulcers vs. no therapy

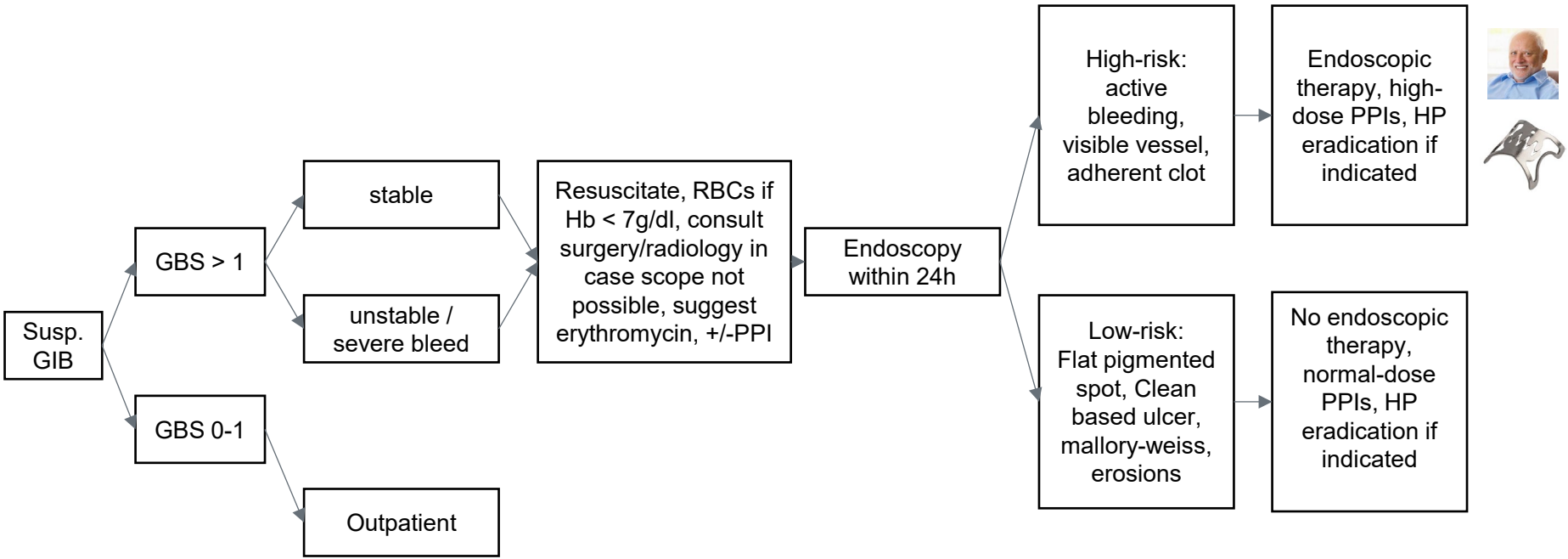
Cochrane Library

Cochrane Database of Systematic Reviews

Eradication therapy for peptic ulcer disease in *Helicobacter pylori*-positive people (Review)

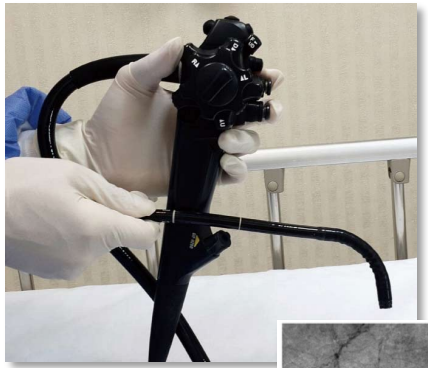
Ford AC et al. Eradication therapy for peptic ulcer disease in Helicobacter pylori-positive people. Cochrane Database of Systematic Reviews 2016, Issue 4.

Risk stratification and triage	Pre-scope management	Endoscopy + Post-endoscopy care



Recurrent bleeding / failed hemostasis

- On the next day, Mr. Jones, now on the ward, has a 20g/dL Hb loss and hematochezia



What now?

Recurrent bleeding / failed hemostasis

RECOMMENDATION

ESGE recommends that patients with clinical evidence of recurrent bleeding should receive repeat upper endoscopy, including hemostasis if indicated.
Strong recommendation, high quality evidence.

RECOMMENDATION

ESGE recommends that for patients with clinical evidence of recurrent peptic ulcer hemorrhage, use of a cap-mounted clip should be considered. In the case of failure of this second attempt at endoscopic hemostasis, transcatheter angiographic embolization (TAE) should be considered. Surgery is indicated when TAE is not locally available or after failed TAE.
Strong recommendation, moderate quality evidence.

RECOMMENDATION

ESGE recommends that in the case of failure of this second attempt at endoscopic hemostasis, transcatheter angiographic embolization (TAE) should be considered. Surgery is indicated when TAE is not locally available or after failed TAE.
Strong recommendation, high quality evidence.

Recurrent bleeding / failed hemostasis: surgery vs. TAE

Table 2. Results: treatment for active or recurrent bleeding.

	TAE, $n = 24$	Surgery, $n = 43$	p
Hemostasis achieved with first attempt, *n* (%)	16 (66.7)	36 (83.7)	NS
Negative angiography, TAE not feasible, *n* (%)	2 (8.3)		
Recurrent bleeding, *n* (%)	6 (25)	7 (16.3)	NS
Mortality rate ≤30 d, *n* (%)	3 (12.5)	11 (25.6)	NS
Complication rate, periprocedural, *n* (%)	6 (25)	8 (18.6)	NS
Complication rate ≤30 d, *n* (%)	9 (37.5)	29 (67.4)	0.018[a]
Clavien-Dindo I–II	3 (33.3)	11 (37.9)	NS
Clavien-Dindo IIIa–b	3 (33.3)	3 (10.3)	NS
Clavien-Dindo IVa–b	3 (33.3)	15 (51.7)	NS
Need for blood transfusions, units of RBCs[b]	24 (6–37)	19 (6–54)	NS
0–10 units of RBCs, *n* (%)	2 (8.3)	3 (7)	
11–20 units of RBCs, *n* (%)	8 (33.3)	22 (5.1)	
> 20 units of RBCs, *n* (%)	14 (58.3)	15 (34.9)	
Duration of ICU treatment, d[b]	0 (0–7)	0 (0–17)	NS
0 d, *n* (%)	12 (60)	21 (52.5)	
1–3 d, *n* (%)	2 (10)	6 (15)	
4–7 d, *n* (%)	0	3 (7.3)	
8–14 d, *n* (%)	6 (30)	6 (15)	
> 14 d, *n* (%)	0	4 (10)	
Duration of hospital stay, d[b]	11 (5–39)	11 (2–43)	NS

TAE: transcatheter arterial embolization; NS: non-significant; $p > 0.05$; RBC: red blood cell; ICU: intensive care unit.
[a]Fisher's exact test, [b]median (range).

Conclusions: Mortality and rebleeding rates did not differ between TAE and surgery. With less postoperative complications, TAE should be the preferred hemostatic method when endoscopy fails.

Conclusion. In patients who fail endoscopic therapy, TAE shows marked reductions in complications and hospital stay with no difference in mortality as compared to surgery, but does have a higher rate of further bleeding. New evidence led to a change from the 2012 ACG Guidelines, which stated that either surgery or TAE is generally used (1).

Nykänen et al, Bleeding gastric and duodenal ulcers: case-control study comparing angioembolization and surgery, Scandinavian Journal of Gastroenterology, Volume 52, 2017 - Issue 5

INSELGRUPPE

Thank you for your attention!