GI bleeding, when to embolize

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Introduction

- High → 100 à 200/100000
- Low → 20.5 à 27/100000 (USA).
- 143/100000 hab (France).
- 80% can spontaneously resolve → risk of massive hemorrhage and lead to death (5-10%).

Longstreth GF. Am J Gastroenterol 1995
Old classification
- High (80%) → Higher than Treitz ligament
- Low (20%) → distal to Treitz

New classification
- High → higher than Treitz ligament
- Low → colon or rectum
- Suspicion of Small bowel bleeding → No bleeding at the endoscopy

Occult bleeding → no lesion detected after all investigations

Longstreth GF. Am J Gastroenterol 1995
Introduction

• High GI tract bleeding ➔ endoscopic diagnostic & therapeutic intervention 1st

• Consultation with a gastroenterologist should not be delayed.

• Factors that predict endoscopic treatment failure:
  - Shock, Hg < 10mg/dl, greater than six units of blood transfused, and significant comorbidities.*
  - Larger ulcer size and location of an ulcer on the posterior wall of the duodenal bulb.**

* Ahmed A. Drugs Aging 2012
** Siva R. Saudi J Gastroenterol 2002
Introduction

• High GI tract bleeding excluded ➔ 90% colon and 10% small bowel  
  Wong RF. J Fam Pract 2004

• Colonoscopy ➔ gold standard for colonic screening, in prepared patient (emergency !!).
  Strate LL. Am J Gastroenterol 2016

• If colonoscopy not feasible or negative ➔ small bowel suspected origin ➔ radiological screening
  Gerson LB. Am J Gastroenterol 2015;
Non-diagnostic endoscopic results or refractory to medical and endoscopic treatment ➔ radiologic imaging and endovascular intervention are the next intervention of choice. Non-invasive radiologic imaging options include computed tomography angiography (CTA) and nuclear scintigraphy
• Technetium 99m scintigraphy with sulfured colloid or marked blood cell.

• Most sensitive technique (bleeding from 0.1 to 0.5ml/mn).  

  Alavi A. Radiology 1977

• But → less available, results after several hour, less sensitive for anatomical assessment of the bleeding site (colon vs small bowel)

Radiology

- TDM multiphase +++

- Diagnostic arteriography +/- embolization

Gerson LB. Am J Gastroenterol 2015
Huprich JE. Radiology 2008
CT Angiography

• Faster machine, more available.
• Quick diagnostic ➔ site of the hemorrhage and etiology.
• Cartography for endoscopist (colonic lesions) or for IR (small bowel lesions) ➔ preparation for intervention.
• Could be at first line for low GI tract bleeding.

Clerc D. World J Emerg Surg
2017;
CT Angiography

- Detect hemorrhage from 0.3ml/mn.
- **More sensitive than angiography** but less than scintigraphy.
- Arterial and venous bleeding.
- Etiology: Tumor, Vascular lesions.
- Less sensitive than enteroscopy for parietal lesions.
CT Angiography

NCT
Arterial
PORTAL
• Look for hematoma (30 à 70UH)
• Comparison with non contrast (High density foreign body)
• No oral preparation (positive or water)
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CT Angiography

• Vascular anatomy (MIP, 3D VR)
• Extravasation
• Aneurism, Pseudoaneurism, Amputation or irregularity in regard of a mass
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CT Angiography

Other:

- Arterio-portal fistula
- Vascular malformation.
- Tumor blush
CT Angiography

• **Sensitivity 85%, specificity 92%** for bleeding site detection.

• Better sensitivity in severe or instable patient (PAS < 100mm/Hg, FC > 100 bats/mn, Hb < 10mg/dl)

• Bleeding detection site after negative endoscopy.

• If negative ➔ Good prognostic factor

Scheffel H. Eur Radiol 2007
Ren JZ. World J Gastroenterol 2015
Sun H. J Clin Gastroenterol 2012;
CT Angiography

Inconvenient:

• **Irradiation**

• **No therapeutical effect** (delayed intervention).

• **Nephrotoxicity** in patient with creatinine clearance < 30ml/mn/1.73m², nevertheless no increased risk in unstable patient.

Jacovides CL, JAMA Surg 2015
Arteriography

- Femoral approach (more often)
- Rarely radial or brachial approach.
- SIM1 or Cobra C2 (5F or 4F), glide cath.
Arteriography

- Diagnostic: 3 axes catheterize (celiac trunk, SMA & IMA.
- If negative: gastroduodenal + selectively jejunal, ileal, ileo-colonic and right colonic arteries catheterize.
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- Aneurism / pseudoaneurism
- Irregularity/occlusions
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Arteriography

- Bleeding detection up to $0.5 \text{ à } 1 \text{ml/mn}$. 
- Diagnostic +/- therapeutic.
- Embolization: definitive (coils, glue) or temporary (PVA, sponge)
- Particles $< 250 \mu$ $\Rightarrow$ risk for GI ischemia.

Ramaswamy RS, World J Radiol 2014
When to embolize?

• When to not embolize
• Who and how: which agent
• What are the good indications
Contraindication

- Kidney failure
- Coagulopathy
  - Puncture site hematoma
  - Lowers the efficacy of embolization.
- Previous duodeno-pancratsectomy.
- Atheroma and tortuous anatomy
How to access

- 4 or 5F guiding catheter, rarely 6F or more
- Microcatheter 2.8F: Progreat (Terumo), Renagde (BS), Maestro (Merit), cantata (Cook)...
- Microguide wire, hydrophilic 0.014 or 0.018 inch: Transend (BS), GT wire (Terumo), Cougar (Medtronic)...

Which agent

- Coils:
  - Prefer microcoils (detachable), after securing the guiding catheter
  - Oversize the diameter (arterial spasm during hemorrhage and catheterization)
  - Avoid feeding technique for false aneurism.
Which agent

- Glue: Cyanoacrylate
- Coagulopathy.
- Tortuous, distal & small vessels.
- Vascular malformation
- Risk of non target embolization as for catheter gluing
**Embolization**

- **Gastro-duodenal ulcer**: Main artery embolization by sandwich technique.
- In case of diffuse hemorrhagic gastritis or duodenitis:
  - PVA or gelfoam (> 250µ).
- **LGI bleeding**: distal embolization closest to the site of extravasation (proximal to vasa-recta).
Particular cases

- Known hemorrhage site at endoscopy and no vascular lesion found in the gastro-duodenal area: Coiling the right gastric artery with coils, than embolization by gelfoam or PVA the GDA.
- Gastric hemorrhage: catheterization of the GDA, right and left gastric artery.
- Hemobilae and false aneurism: coiling by a sandwich technique (glue or rarely ONYX or PVA).
Embolization
Embolization

Dyna CT
Embolization
Embolization
Embolization
Embolization: results

- Clinical success up to 60% and 90% (IGIt 73/100%)
- Sometimes need for 2nd embolization (15%).
- 30% mortality in a retrospective study of 11 years (similar to other technique in unstable patient).
- Mortality divided by 1/6 in satisfactory embolization.
- No difference of mortality between the different embolization agents.

Lang EK. Radiology 1992
<table>
<thead>
<tr>
<th>Study</th>
<th>Transarterial Embolization Therapy</th>
<th>Surgical Therapy</th>
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<tr>
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<td>Age</td>
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<tr>
<td>Ripoll, 2004</td>
<td>31</td>
<td>75</td>
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<td>Larssen, 2008</td>
<td>36</td>
<td>80</td>
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Embolization: inconvenient

- Puncture site complication: hematoma, false aneurisme, FAV.
- Rebleeding 0 à 55%
- Duodenal or gastric infarct (rare).
- Colonic infarct 3 to 20% (particles < 250µ).
- Splenic infarct (No clinical impact).
- Kidney failure: clearance < 30ml/mn/1.73m²

Darcy MD. American College of Radiology website 2014.
GIB

Endoscopy

- or still unstable

CTA

Arteriography +/- embolization

surgery

Resuscitation

surgery
Conclusion

• GIB refractory to treatment are at higher risk for adverse outcome
• Consider prompt radiologic imaging studies and endovascular intervention to prevent morbidity and mortality
• CTA can localize lesions and provide information helpful for endovascular intervention and surgery
• Transcatheter embolization is a safe and effective therapy, alternative to surgery