Gastro-Intestinal Bleeding- Interventional Radiology turning off the tap

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Scale

- UK 100,000 /year
- Commonest Vascular IR on-call

- 75% UGIB
  - 65% NVUGIB
  - 10% Variceal
- 25% LGIB

- 15% In-patients

Blood Transfusion

- 2nd commonest medical reason
- 14% of all

- 31% receive blood
- 15% 4 or more units

- 25% avoidable*

*NCEPOD - Time to Get Control, 2015

Mortality vs. Blood Transfusion

England , Wales and NI – 4 months 2013

	Died	Total Number of Patients	Mortality
All Patients	3,093	29,796	10.4%
No blood	1,496	20,631	7.3%
1-3 Units	676	4,602	14.6%
≥ 4 Units	921	4,563	20.2%

- Patients rarely exsanguinate

IMAGING

Multi-Detector CT Angiography = MULTISLICE CT

Acute Gastrointestinal Bleeding: Emerging Role of Multidetector CT Angiography and Review of Current Imaging Techniques[1]

Christopher J. Laing, MD • Terrence Tobias, MD • David I. Rosenblum, DO • Wade L. Banker, MD • Lee Tseng, MD • Stephen W. Tamarkin, MD

RadioGraphics 2007; 27:1055–1070

Angiography = imaging of blood vessels

CT Angiography

- Diagnostic only

DSA (catheter angiography)

Radiology Theatre

- Embolisation
- Diagnostic with Rx intent

CT

- Active Bleeding –UGIB and LGIB
- Secondary signs
  - high attenuation clot
  - pseudo-aneurysm
  - vessel cut off
  - vessel irregularity

- DSA vs CTA similar signs

- Renal Impairment

CT angiography

Protocol – 3 phase study

- 5mm non-contrast volume
- IV contrast - bolus track triggering
- Arterial phase 1mm volume
- Delayed phase (100 secs) 1mm volume

Arterial Phase

Arterial Phase

Delayed Phase

CTA vs Catheter Angiography (DSA)

- GI bleeding is intermittent
  - Contrast in bleeding vessel
    - CTA – 60 seconds
    - DSA – 2-10 seconds
- Contrast sensitivity CTA > DSA
- Detectable bleeding rates
    - DSA - 0.5 ml / min
    - CTA - 0.1 - 0.3 ml / min
    - In vitro confirmation

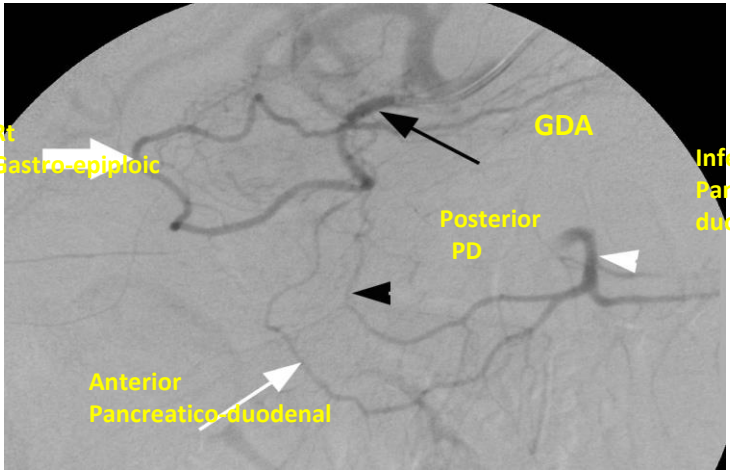
ie: -ve CT angiogram means DSA likely to be fruitless

EMBOLISATION

Anatomy

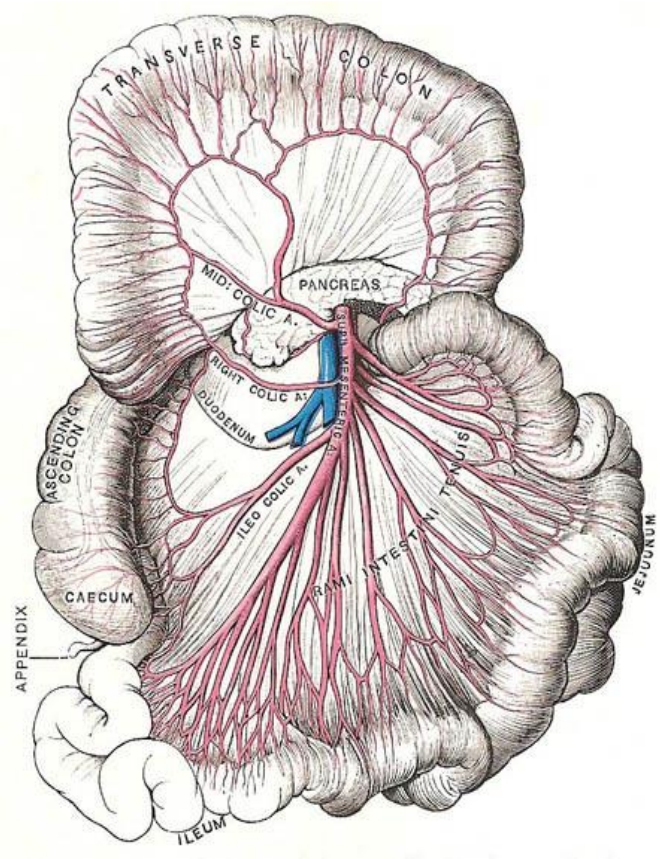
UGI tract

- Arcadal Supply
  - Extensive collaterals



LGI tract

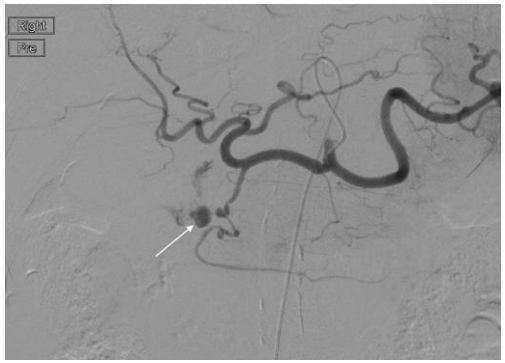
- End Vessels
  - Poor collaterals

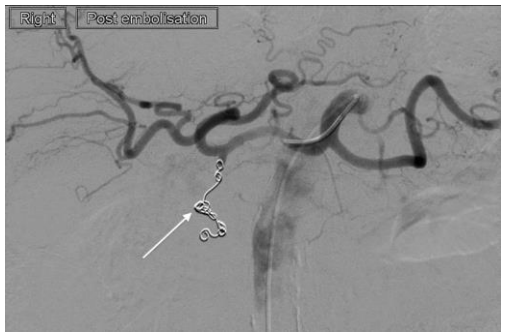


IR approach

UGIB

- Distal and proximal embolisation

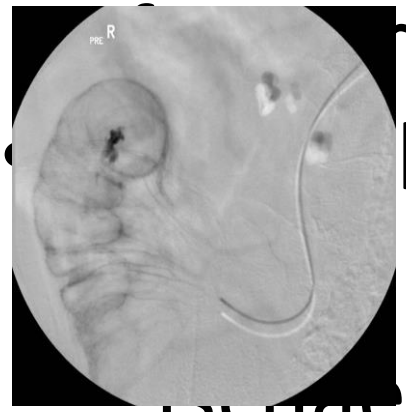




- Ischaemia rare
  - Surgery/pancreatitis
  - D3/D4

LGIB

- Getting to bleeding point
- Preserve viability of bowel
- Selective occlusion



Embolisation method

- Coils - size
  - Standard catheter
  - Micro-catheter
    - Agent of choice
    - Softer
    - Super-selective embolisation
  - Action
    - Slow flow
    - Initiate clotting
      - Fibres
      - Damage endothelium
    - May not work in coagulopathic

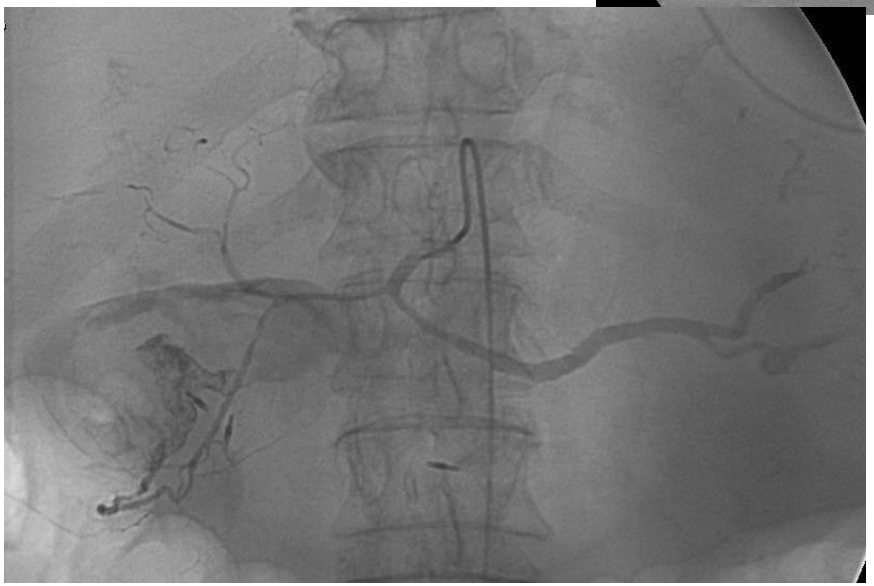
Embolisation method

Liquids

- Distal and proximal
- Coagulopathic
- Upper GI tract

- Glue +Lipiodil
  - Quick
  - Less controlled
  - Polymerises

Glue



Systematic Review: Factors affecting Outcome of Embolization NVUGIB

- No affect on outcome
  - Anatomical source of hemorrhage
  - Procedural variables

- Adverse clinical outcome
  - Shock severity
  - Transfusion
  - Multi-organ failure
  - Coagulopathy

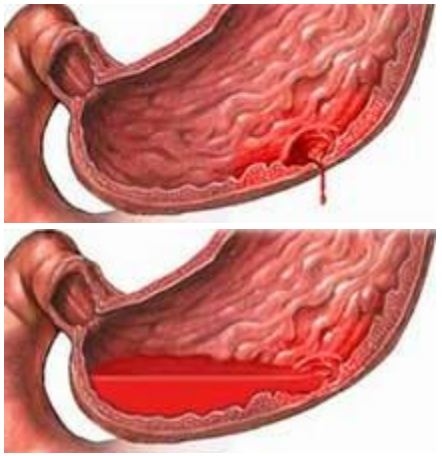
Reduce with Earlier Haemorrhage Control

Mirsadraee S, Tirukonda P, Nicholson A, Everett SM, McPherson SJ.

Embolization for non-variceal upper gastrointestinal tract haemorrhage: A Systematic Review. Clinical Radiology 2011;66: 500-509.

Practicalities - OGD vs. Radiology

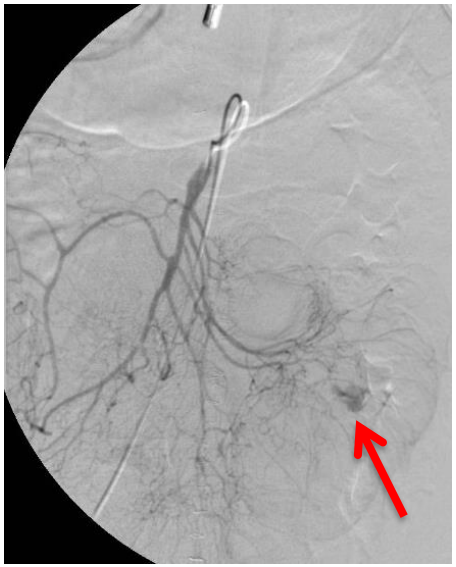
- OGD
  - Blood / bleeding obscures view
  - Resuscitate + pro-kinetics



- Radiology – CT and DSA
  - Contrast extravasation (active bleeding)
  - Secondary signs = false +ves
  - Active bleeding intermittent

    Move fast to CT or IR

    Resuscitate on the move
  - *Anaesthetic support*



DSA Patient Co-operation

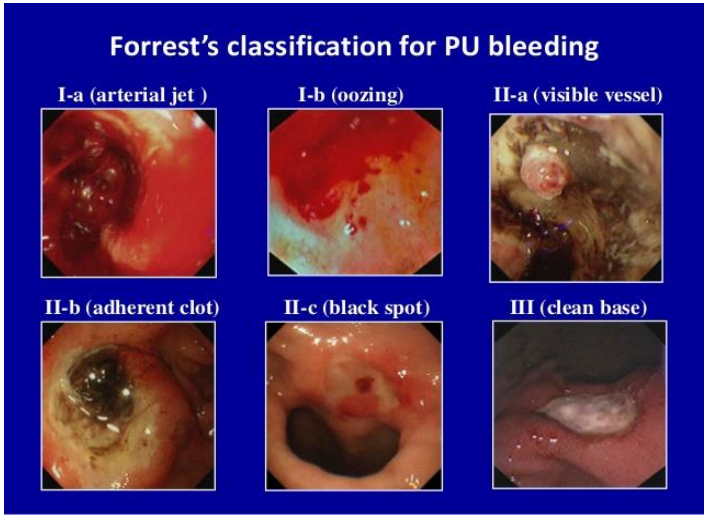
- Local anaesthesia
- Breath-hold for 5-10 seconds
- Elderly
- Co-morbidities
- Sedated post OGD

Limits chances of success  GA

NON-VARICEAL UPPER GI BLEEDING (NVGIB)

NVUGIB Treatment

- OGD 1st
  - Active bleeding
    - First treatment controls 95%
  - Re-bleed
    - Repeat OGD
  - High risk stigmata
    - Repeat OGD



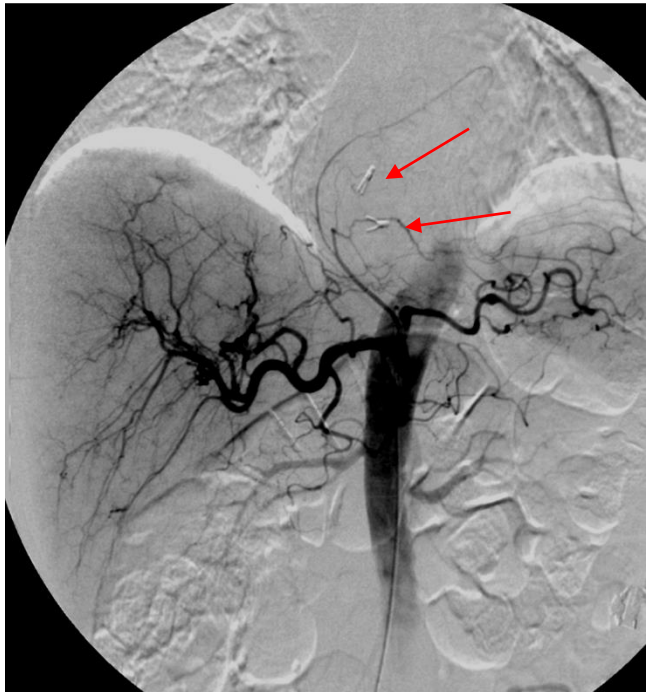
IR UGIB Treatment

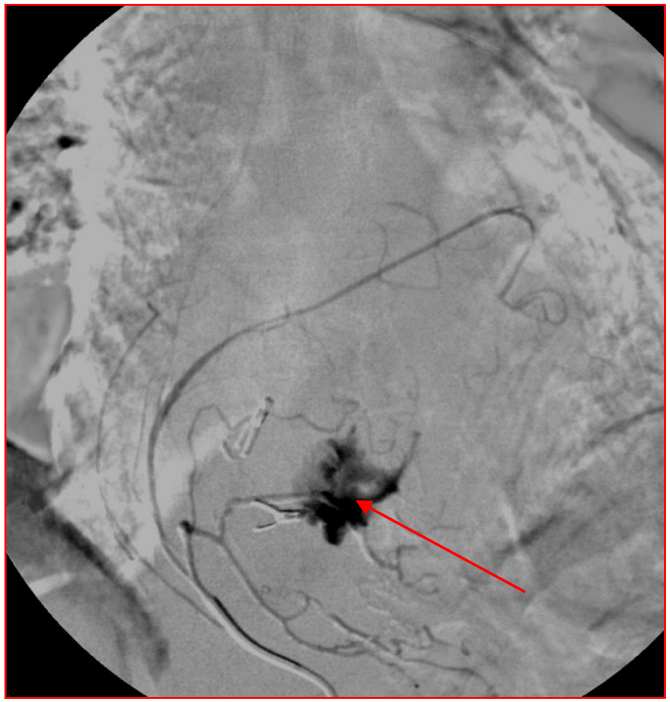
- ~ 3% OGD fails to control bleeding
- Embolisation 2nd line [NICE 2012]
- 4 scenarios

  [1] OGD culprit lesion seen

  - Not controlled
  - Max Rx + high risk re-bleeding
  - ≥ 3 Clips
  - Straight to IR/ to IR if rebleeds
  - No CT

Endoscopic Clips





Eriksson LG, et al. Endoscopic marking with a metallic clip facilitates transcatheter arterial embolisation in upper peptic ulcer bleeding. J Vasc Interv Radiol 2006;17:959

IR UGIB Treatment

- 4 scenarios

[2] Stomach full of blood + bleeding clinically

= CT – pre/arterial/delayed

- Bleeding point identified > IR (embolisation)
- If catheter angiogram –ve but bleeding clinically
  Consider empiric GDA/Lt Gastric if angio –ve
- CT-ve and stopped bleeding
  Repeat OGD when stomach empty

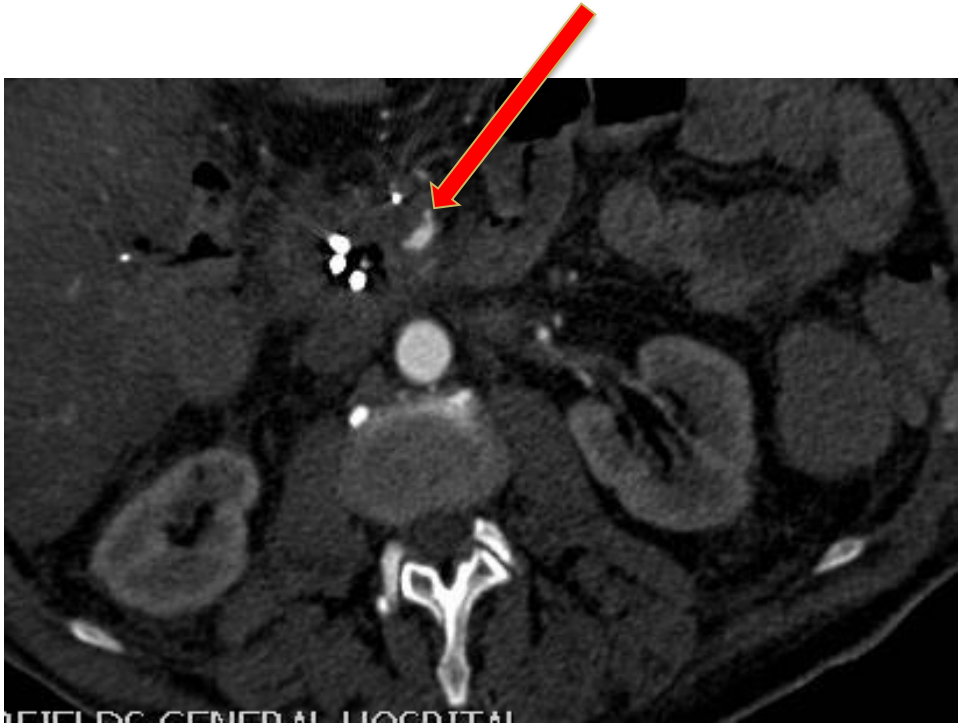
IR UGIB Treatment

- 4 scenarios

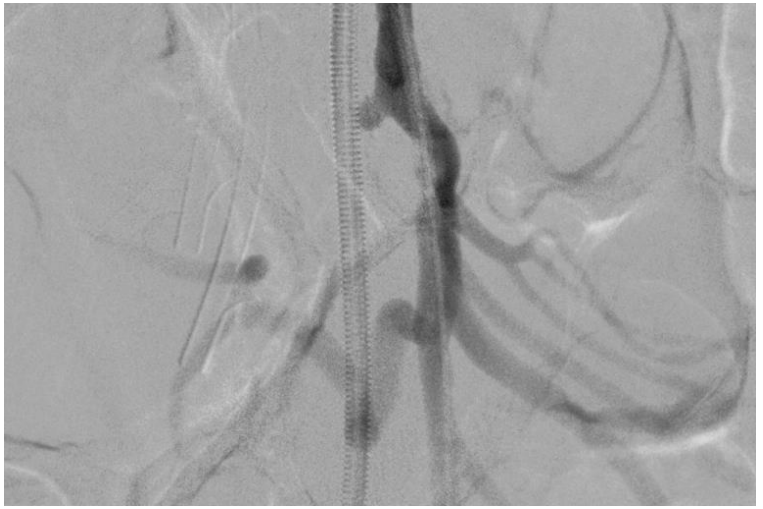
[3] Blood/clot at ampulla

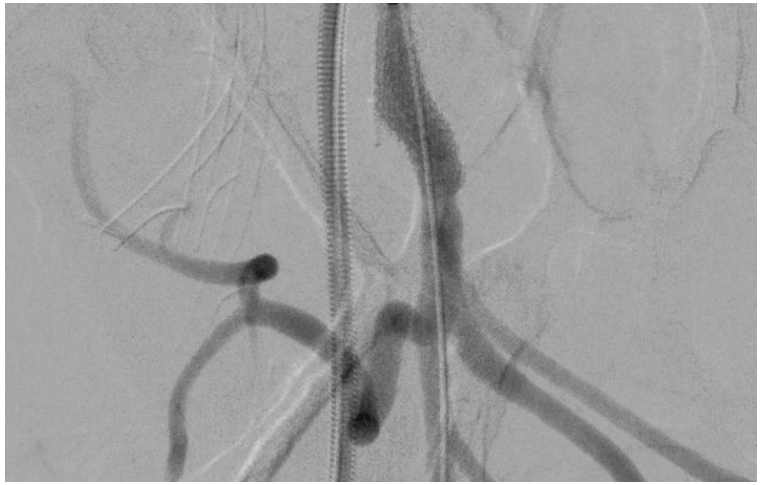
- Biliary or pancreatic source
- CT irrespective of haemodynamic status
- Pseudo-aneurysms
- Embolisation 1st line Rx

Transpapillary SMA bleed



Transpapillary SMA bleed





IR UGIB Treatment

- 4 scenarios

[4] Empty stomach - still bleeding clinically

- CT – pre/arterial/delayed
- Lower GIB

LOWER GI BLEEDING (LGIB)

LGIB Treatment

- Minor/ self-limited
- Supportive/Medical
- Acute colonoscopy - rare but increasingly

- Clinically active bleeding = Triple phase CT

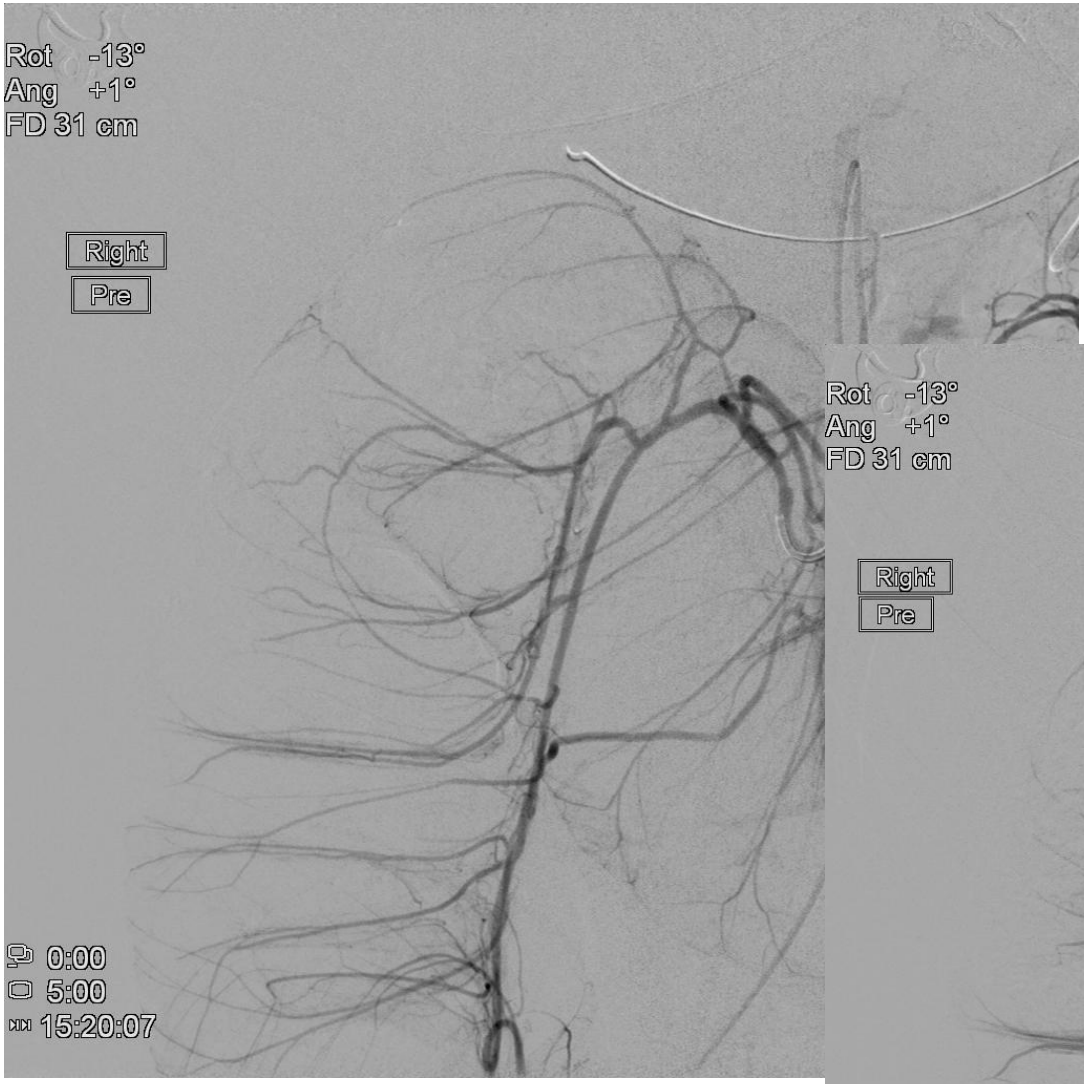
- IR 1st line
  - CT identifies bleeding
  - Negative CT - still bleeding clinically

- Surgery 2nd line
  - IR sometime stabilising [surgical intent]

Catheter Angiographic Technique

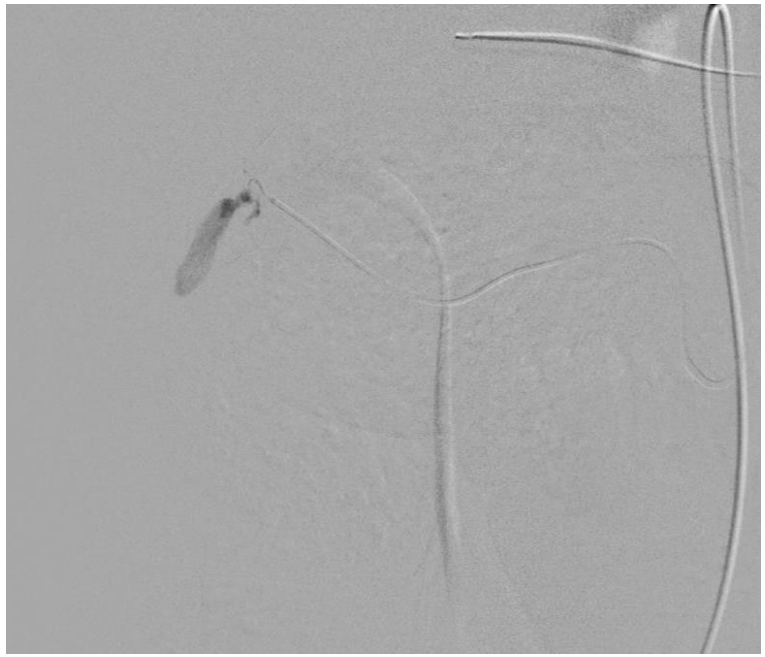
- Bleeding is intermittent

- Improve identification
  - Super-selective- smaller territory
  - Vasodilators
  - Multiple runs


Rot -13°
Ang +1°
FD 31 cm
Right
Pre
0:00
5:00
15:20:07


Rot -13°
Ang +1°
FD 31 cm
pump injection-16mls@4/sec
Right
Pre
0:00
5:00
15:22:16
8
1-11

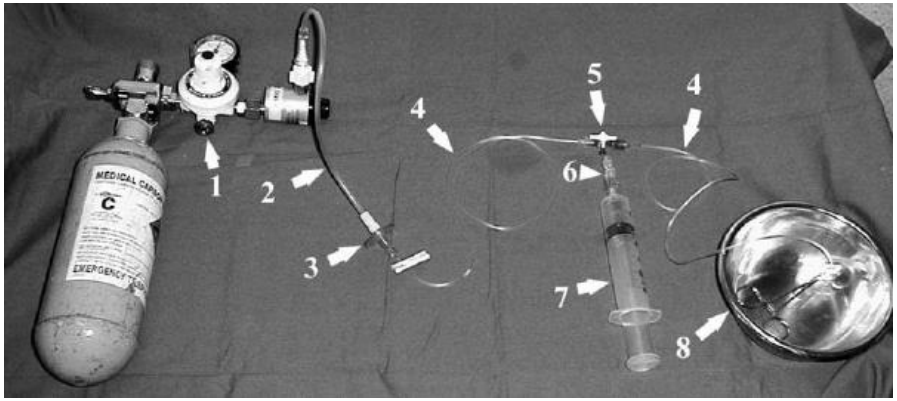

Right
Pre
24mls@6/sec




Right
Post

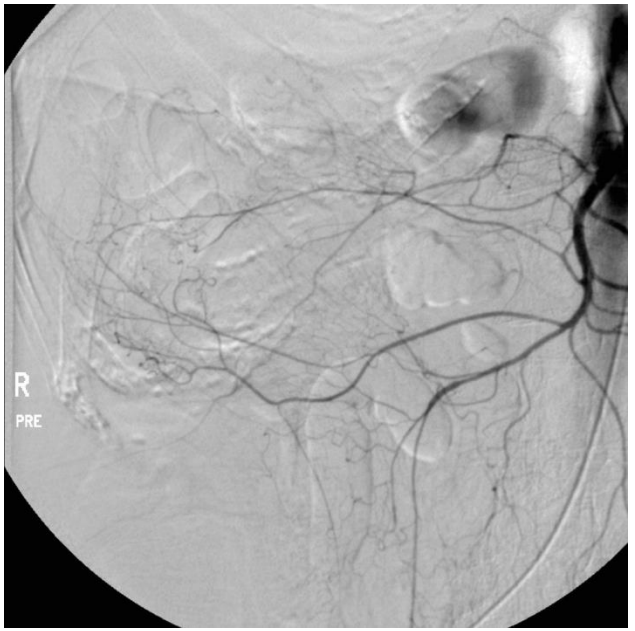
Carbon Dioxide Angiography

- Negative = software



- Advantages
  - Reduce / avoids iodinated contrast
  - Vasodilator
  - Low viscosity /gas expansion

CO2 Angiography



VARICEAL UPPER GI BLEEDING

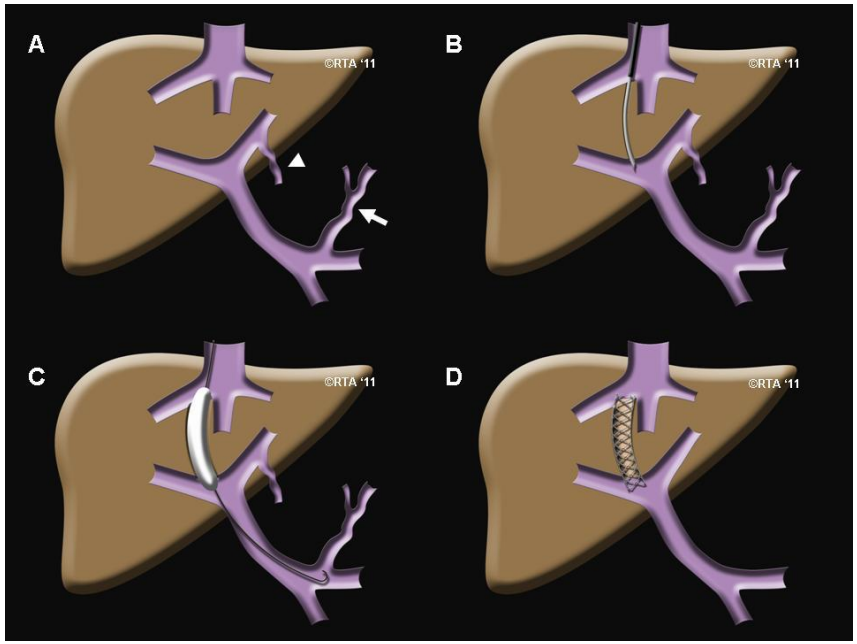
Variceal Upper GI Bleeding

- Endoscopy
- Endoscopy
- Endoscopy

- Sengstaken / Linton tube

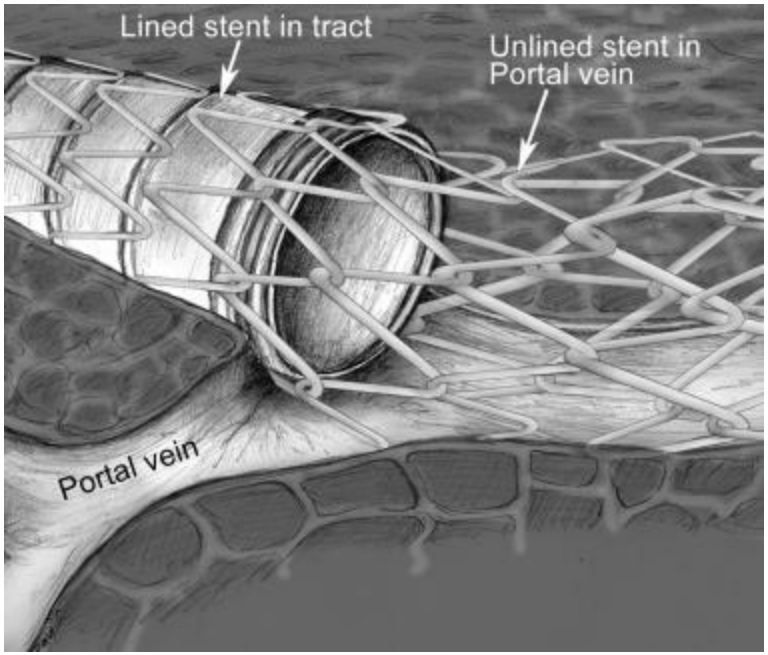
Trans-jugular Intra- hepatic Porto-Systemic Shunt (TIPSS)

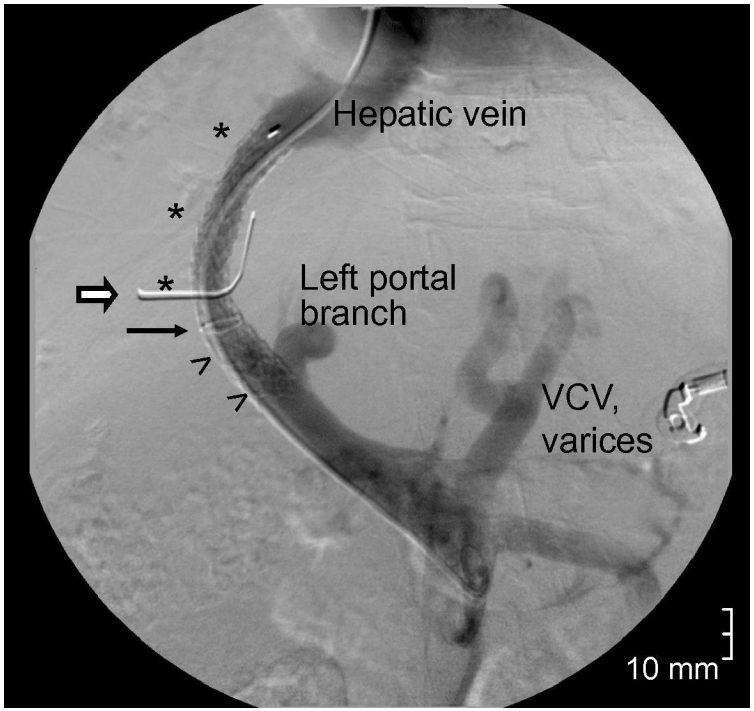
- GA
- RIJ Vn
- Reduce portal pressure
- Target
  - PS < 12mmHg
  - >20% portal drop



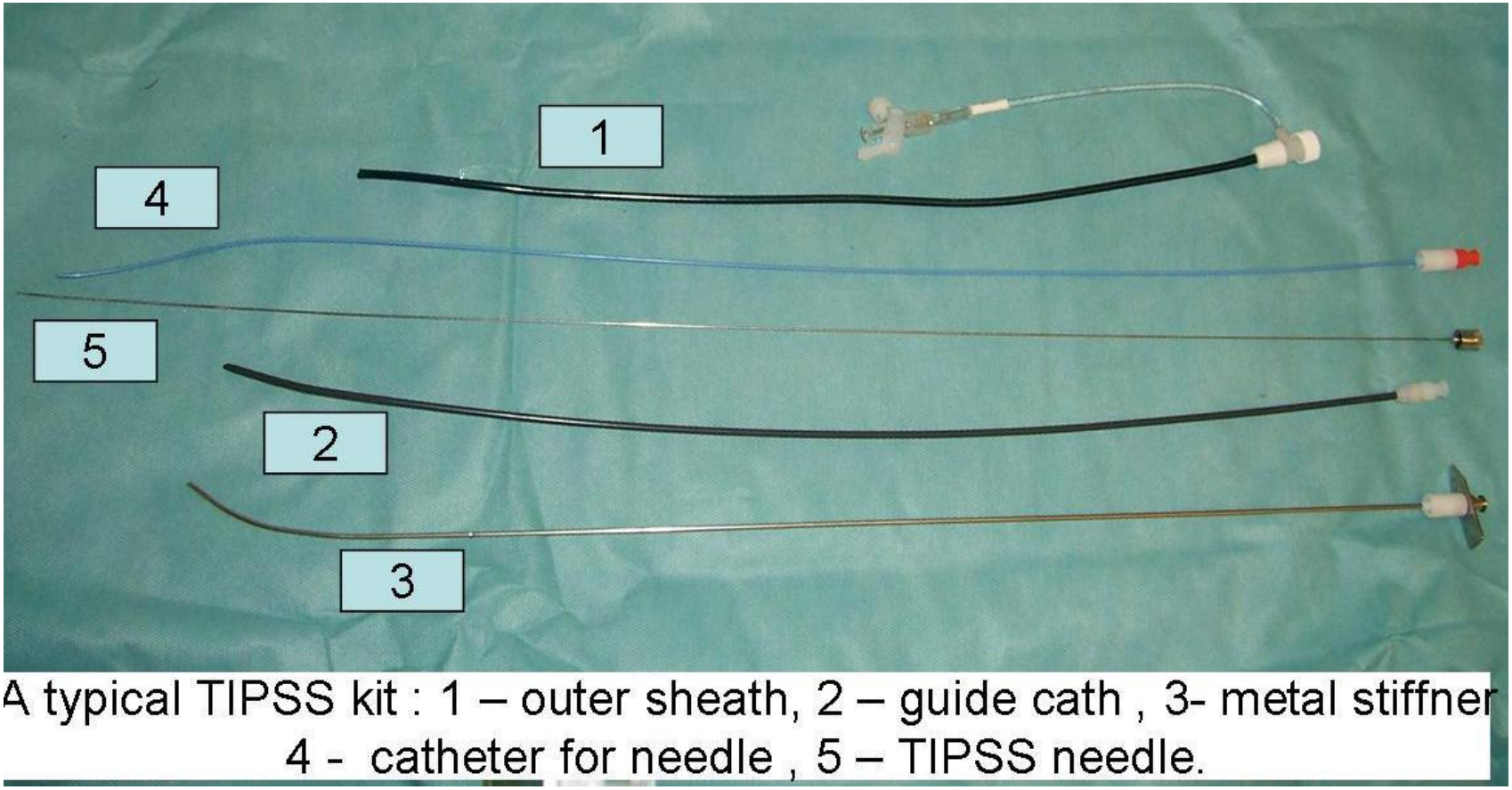
- +/- embolise varices
- Encephalopathy

TIPSS


Lined stent in tract
Unlined stent in Portal vein
Portal vein

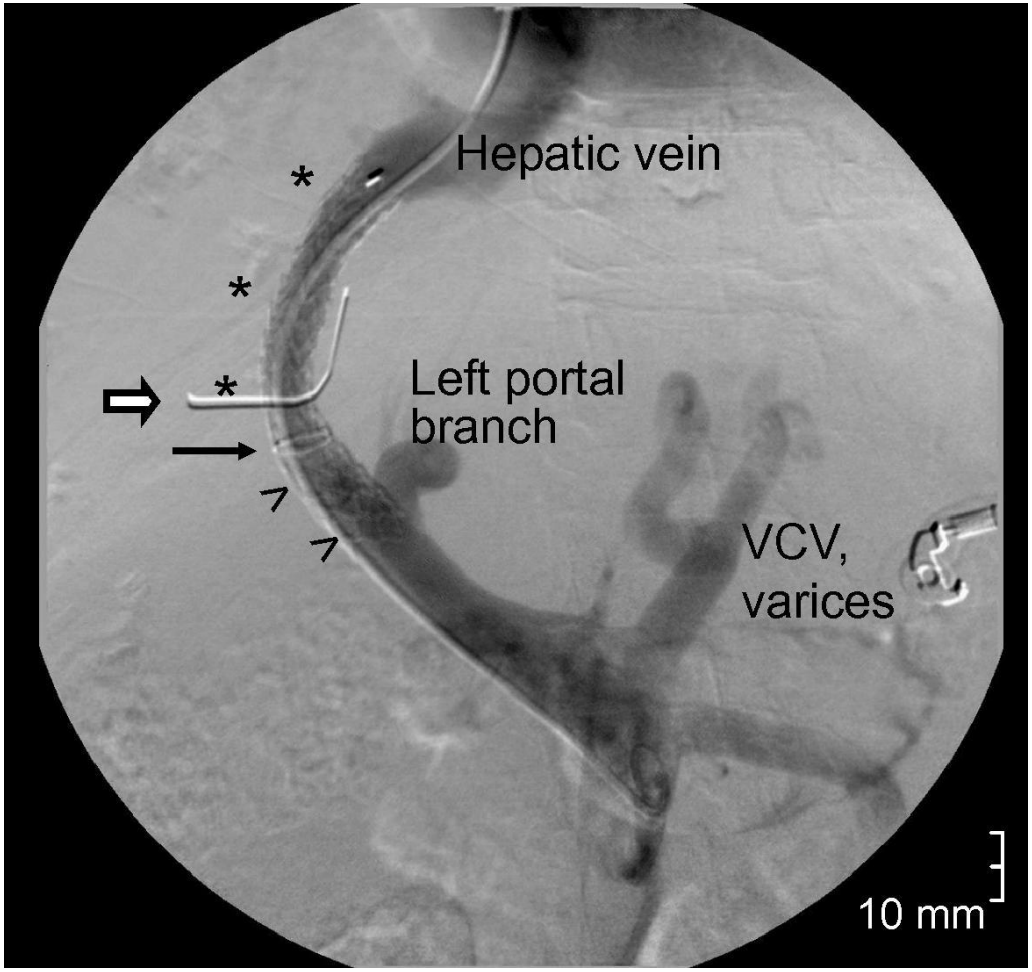

Hepatic vein
Left portal branch
VCV, varices
10 mm

TIPSS



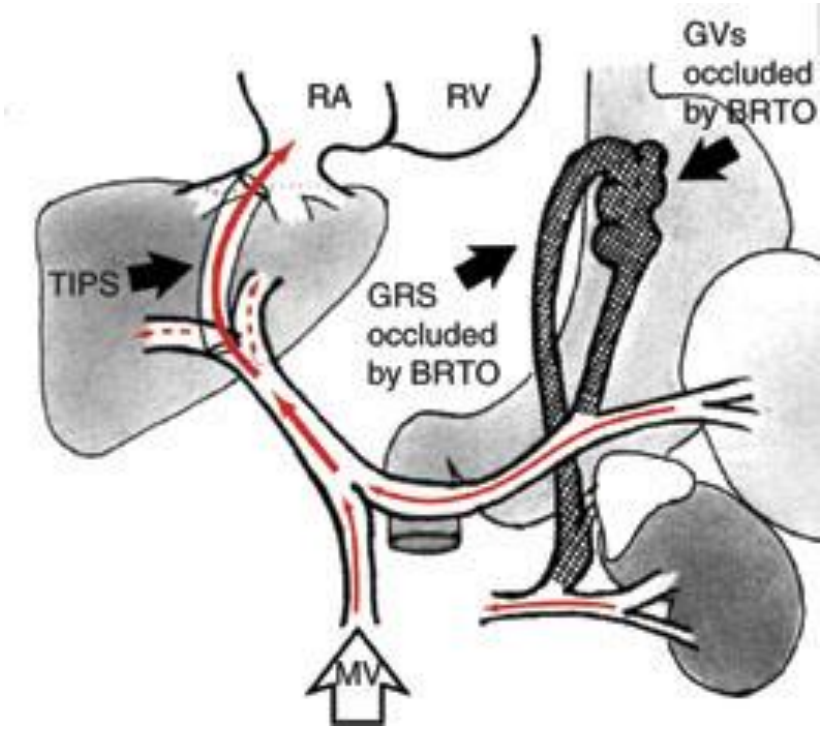
A typical TIPSS kit : 1 – outer sheath, 2 – guide cath , 3- metal stiffner
4 - catheter for needle , 5 – TIPSS needle.

TIPSS



Variceal Upper GI Bleeding

- BRTO (balloon-occluded retrograde transvenous obliteration)
- Gastric > oesophageal
- Left renal vein
- Azygous vein [SVC]



Post Embolisation Re-bleeding

- Collaterals
- Reperfusion of embolised artery – spasm/ volume depleted
- Secondary signs used = wrong vessel
- Multiple lesions [e.g. stress ulceration]

Balance - Haemostasis vs. Complication risk

Post-TIPSS Re-bleeding

- TIPSS Stenosis/occlusion
  - TIPSS salvage
- Pressurised varices
  - ? Shunt too small - maintained portal hypertension
    - Dilate TIPSS
    - Parallel TIPSS
    - Embolise varices
- Portal /splenic vein stenosis/thrombosis
- Alternative pathology
  - 50% ARLD NVUGIB

Re-bleeding

- 10 - 23% re-bleed
  - OGD
  - Colonoscopy / flexible sigmoidoscopy
  - IR
  - Surgery

Written and agreed Re-bleed Plan

Intervention – National Guidelines

- UGIB (NICE 2012)
  - Endoscopy 1st
  - IR 2nd
    - Trans-papillary 1st
  - Open surgery 3rd
- LGIB (BSG 2018)
  - IR/colonoscopy
  - Surgery 2nd/3rd

Trust/Hospital Board IR Capabilities

- 24% (48/202) embolise GI bleeding on-site 24/7
- TIPSS 24/7 = 13/202
- Formal network
- Total 44% (90/202) 24/7 capability

Time to Get Control?. NCEPOD 2015

Conclusions

- IR rarely required = 2-3000/year
- Networks for 24/7 access

- Active bleeding
- Speed and anaesthetic support
- IR treatments may be repeatable
- Re-bleed Plan