Interventional radiology in gastrointestinal hemorrhage - When and how we do it!

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Keywords:	Gastrointestinal tract, Interventional vascular, Arteries / Aorta, Catheter arteriography, CT-Angiography, Embolisation, Diagnostic procedure, Hemorrhage
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Learning objectives

•To review the role of the radiologist in the management of arterial and variceal gastrointestinal hemorrhage, emphasizing the role of the interventional radiologist.

•To review briefly the embolic agents used in this context.

•To illustrate several cases of embolization of gastrointestinal hemorrhage performed in the author's institution.

Background

Embolization is defined as nonsurgical minimally invasive procedure involving the introduction of embolic material in blood vessel in order to achieve its occlusion.

It has therapeutic purposes, namely in:

- Haemorrhage context
- Neoplasic situations
- Palliative care
- Vascular malformations

The majority of gastrointestinal haemorrhages, namely 75% of upper gastrointestinal haemorrhages (UGIH) and 80% lower gastrointestinal haemorrhages (LGIH) cease spontaneously. Therefore the remaining 20-25% of cases require further intervention, requiring a multidiscplinary approach, involving the interventional radiologist, the surgeon, and the gastroenterologist.

The radiologist acts as an element of a multidisplinary team, having a crucial role ranging between the diagnosis and treatment, and has two primordial functions:

1. to establish the location of the active bleeding
2. Try to establish the etiologic diagnosis

The imaging techniques used in the context of the gastrointestinal haemorrhage are:

- **Endoscopy** (Fig. 1 on page 10)

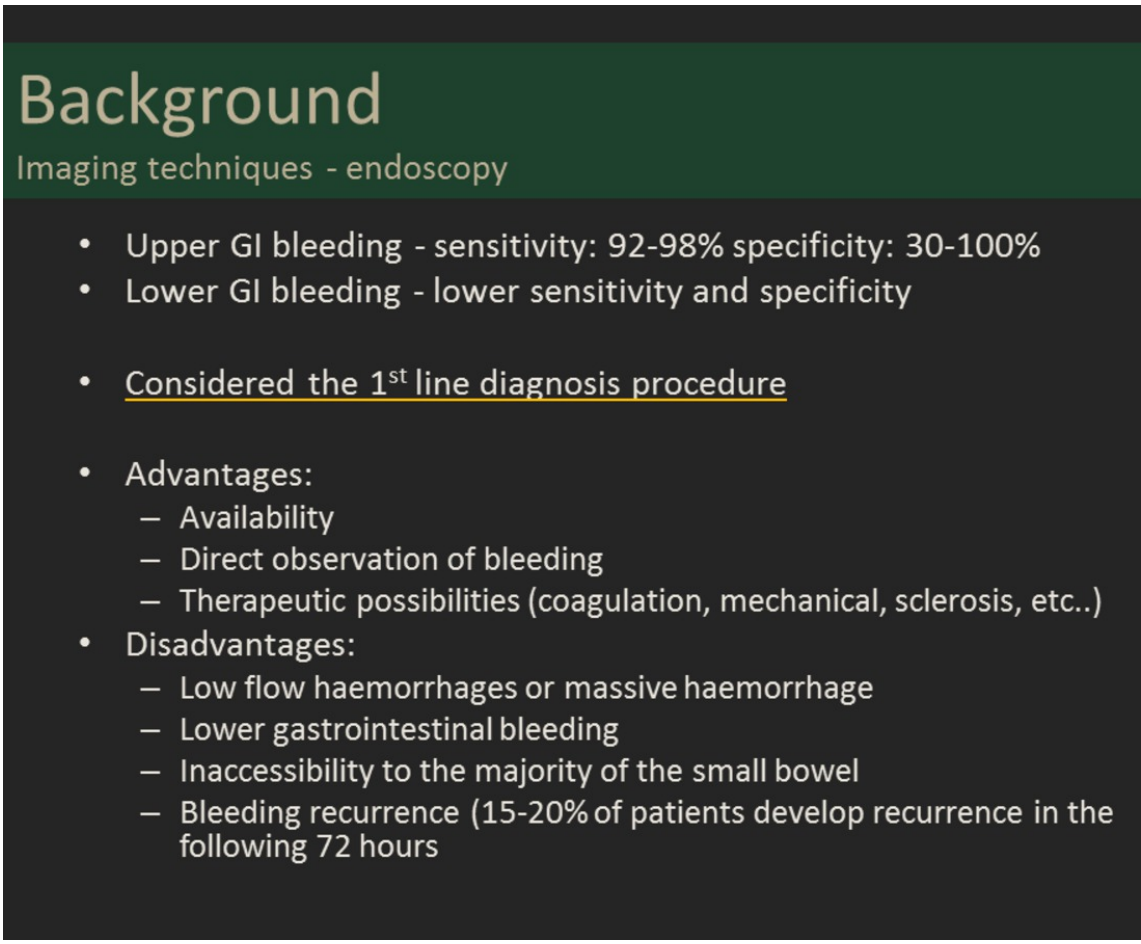


Fig. 1: Imaging techniques in gastrointestinal haemorrhage - endoscopy
References: Serviço de Imagiologia, Hospital S. Teotónio - Viseu/PT

- **Radionuclide imaging** Fig. 2 on page 11

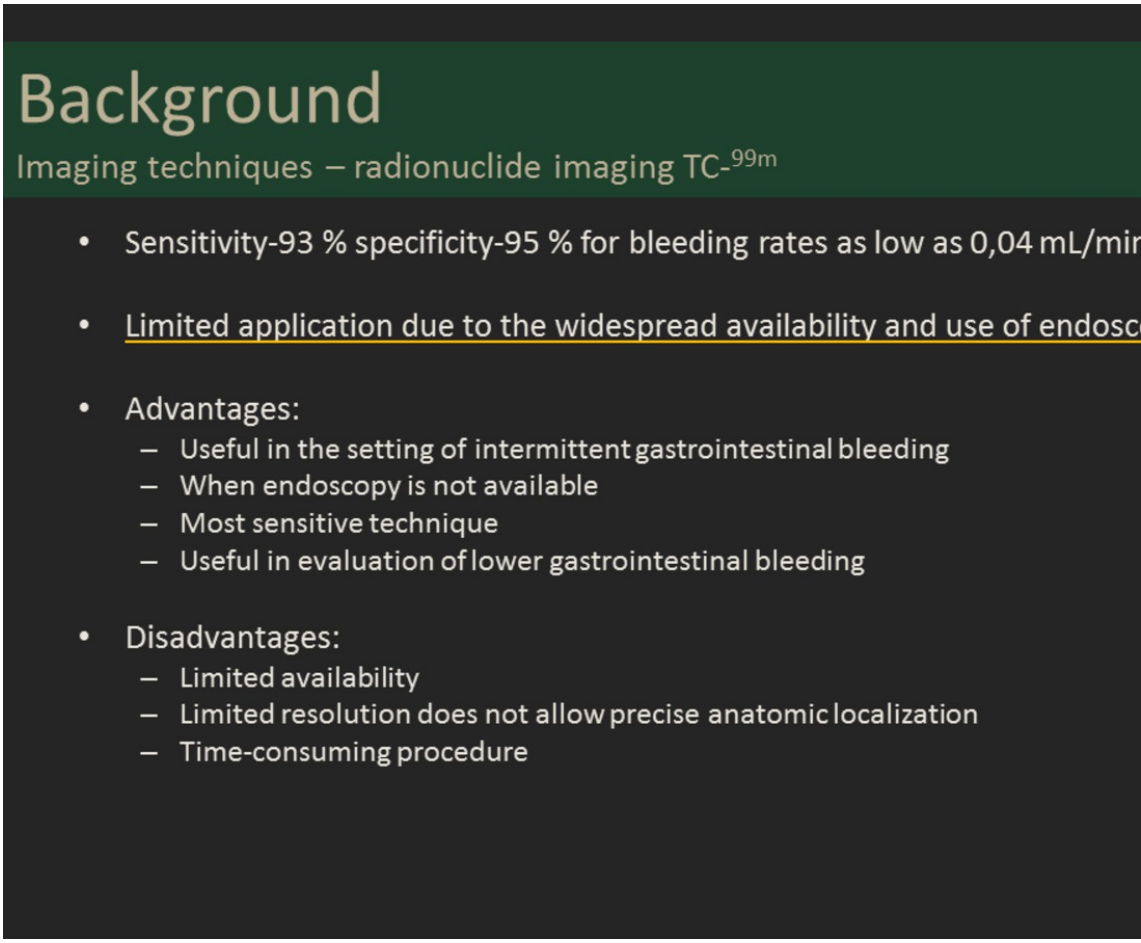


Fig. 2: Imaging techniques in gastrointestinal haemorrhage - radionuclide imaging
References: Serviço de Imagiologia, Hospital S. Teotónio - Viseu/PT

- **Computed tomography (CT) angiography** Fig. 3 on page 12

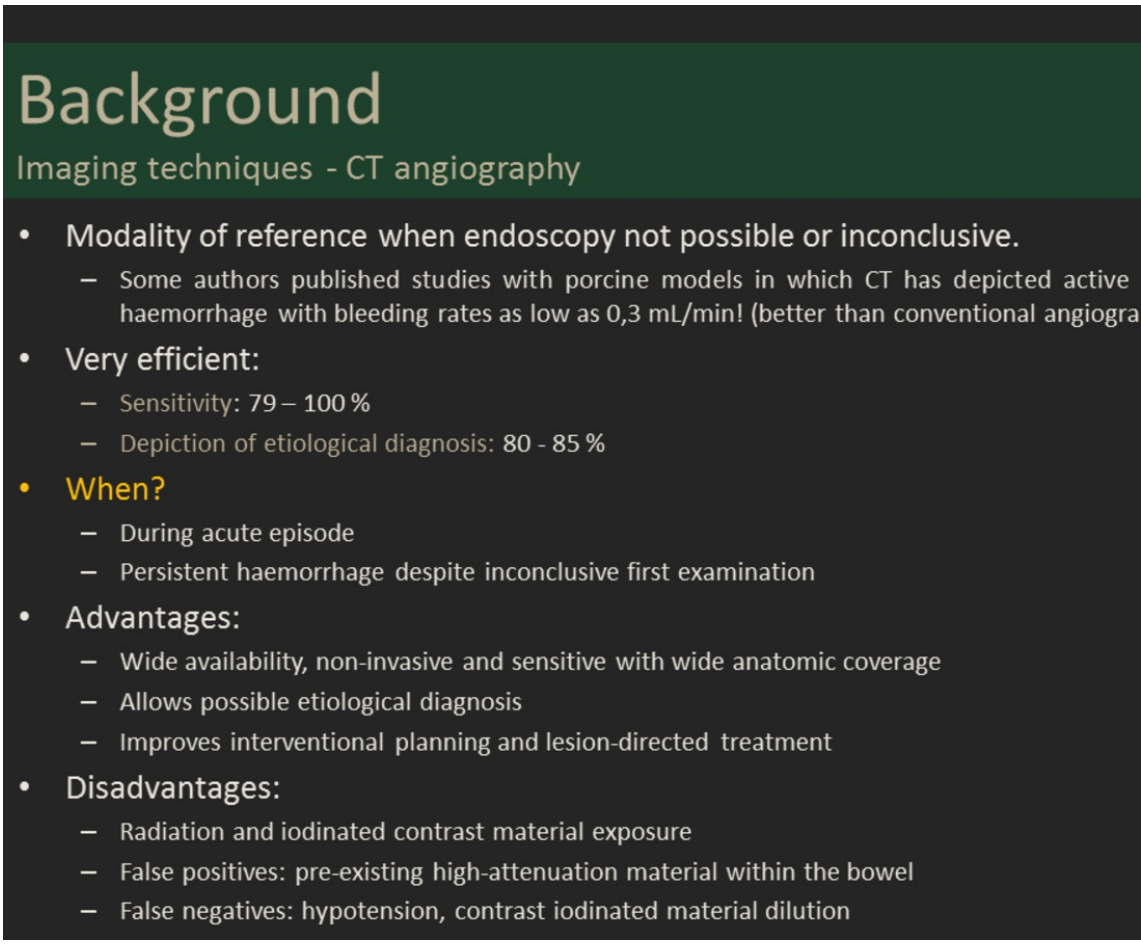


Fig. 3: Imaging techniques in gastrointestinal haemorrhage - computed tomography (CT) angiography
References: Serviço de Imagiologia, Hospital S. Teotónio - Viseu/PT

Protocol considerations for CT angiography are represented in Fig. 4 on page 13

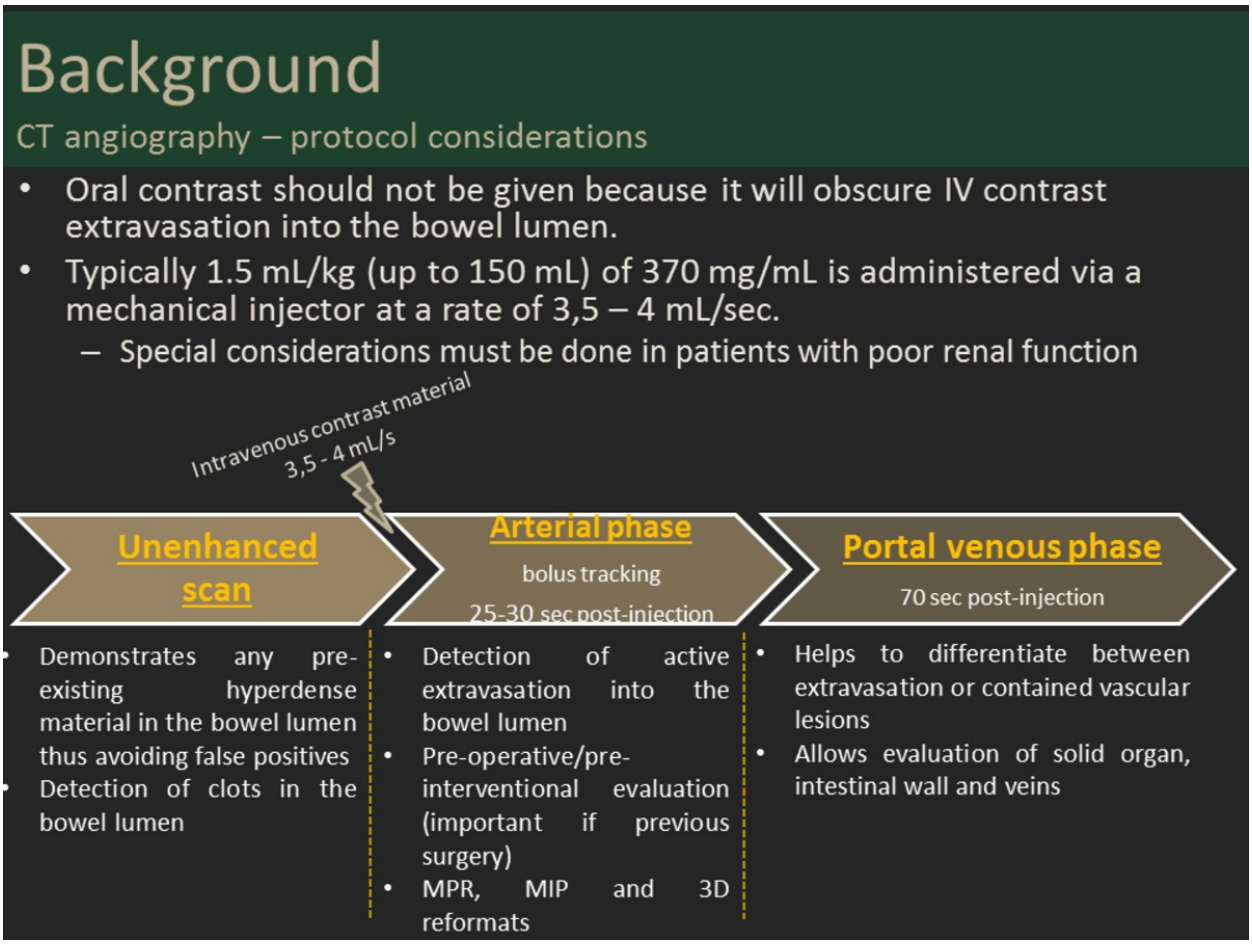


Fig. 4: Imaging techniques in gastrointestinal haemorrhage - computed tomography (CT) angiography protocol considerations
References: Serviço de Imagiologia, Hospital S. Teotónio - Viseu/PT

Analysis of CT angiography scans should reside in three keypoints:

1. bleeding detection and localization Fig. 5 on page 14

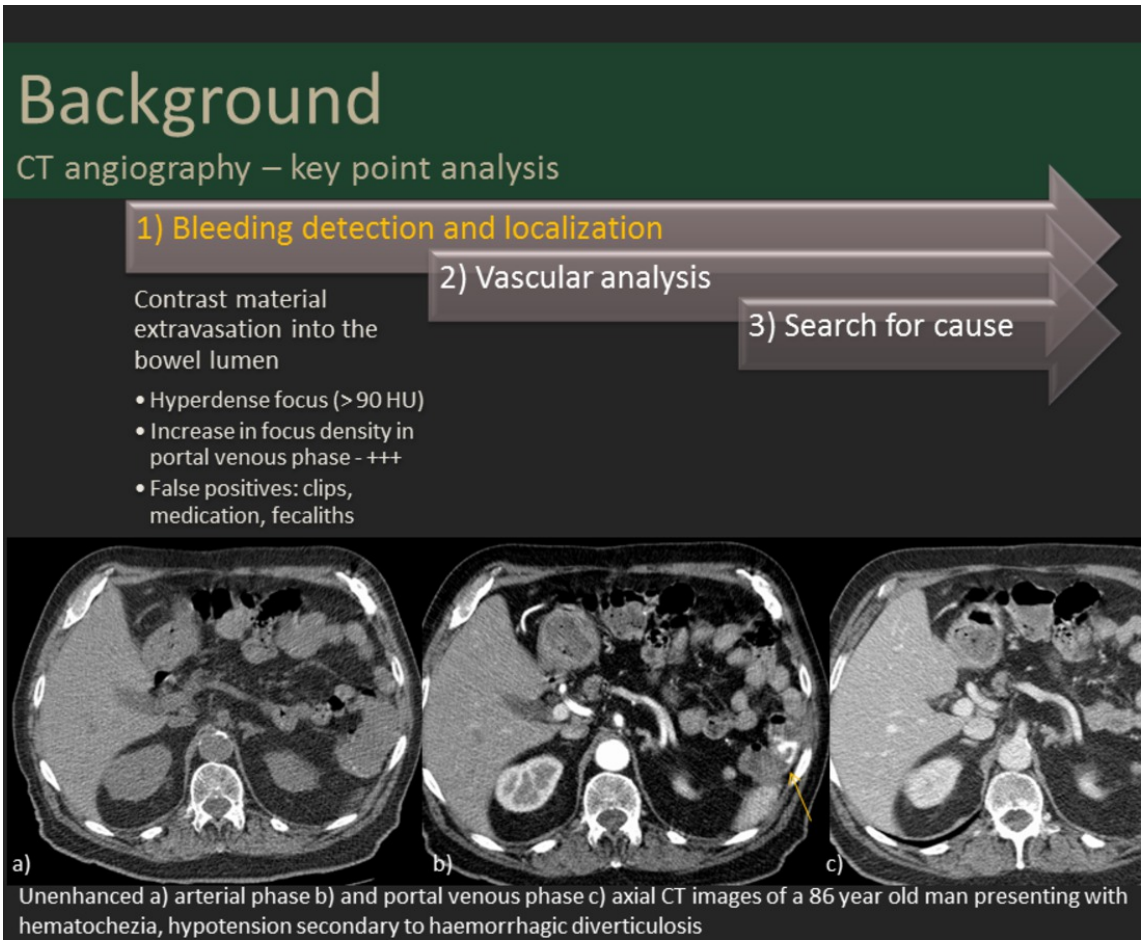


Fig. 5: Imaging techniques in gastrointestinal haemorrhage - computed tomography (CT) angiography key point analysis
References: Medical Imaging Department and Faculty of Medicine, University Hospital of Coimbra, Portugal

2. vascular analysis Fig. 6 on page 15

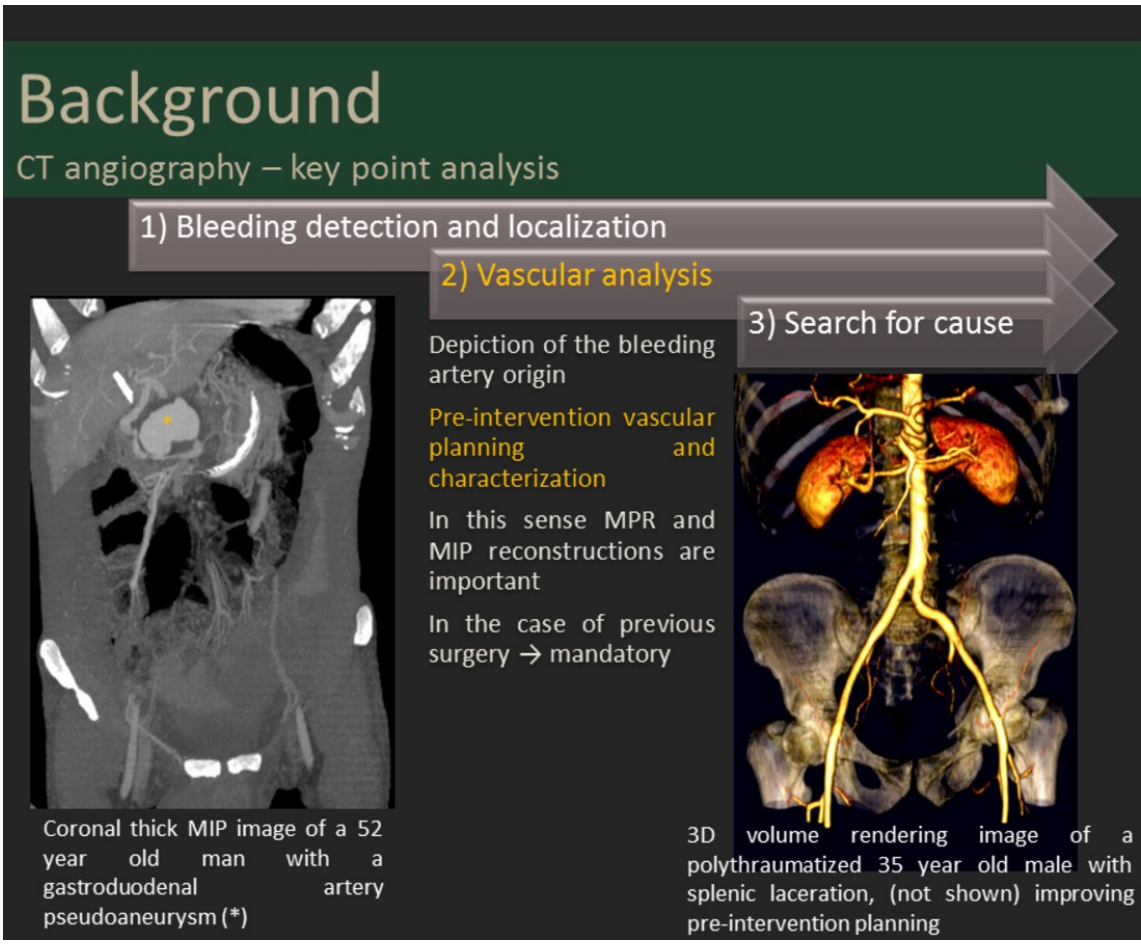


Fig. 6: Imaging techniques in gastrointestinal haemorrhage - computed tomography (CT) angiography key point analysis
References: Medical Imaging Department and Faculty of Medicine, University Hospital of Coimbra, Portugal

3. Search for a cause. Causes of upper and lower gastrointestinal haemorrhage are represented in Fig. 7 on page 16

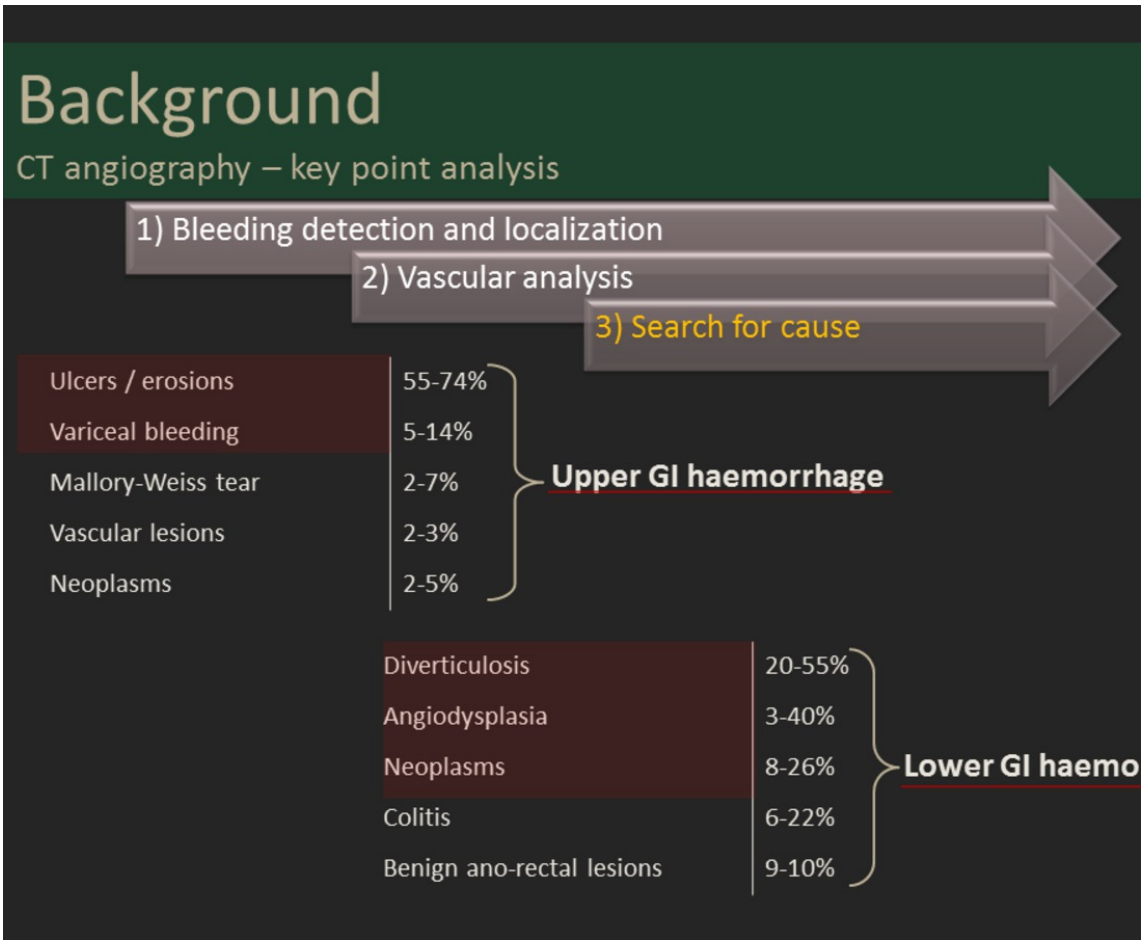


Fig. 7: Imaging techniques in gastrointestinal haemorrhage - computed tomography (CT) angiography key point analysis
References: Serviço de Imagiologia, Hospital S. Teotónio - Viseu/PT

- **Conventional angiography** Fig. 8 on page 17

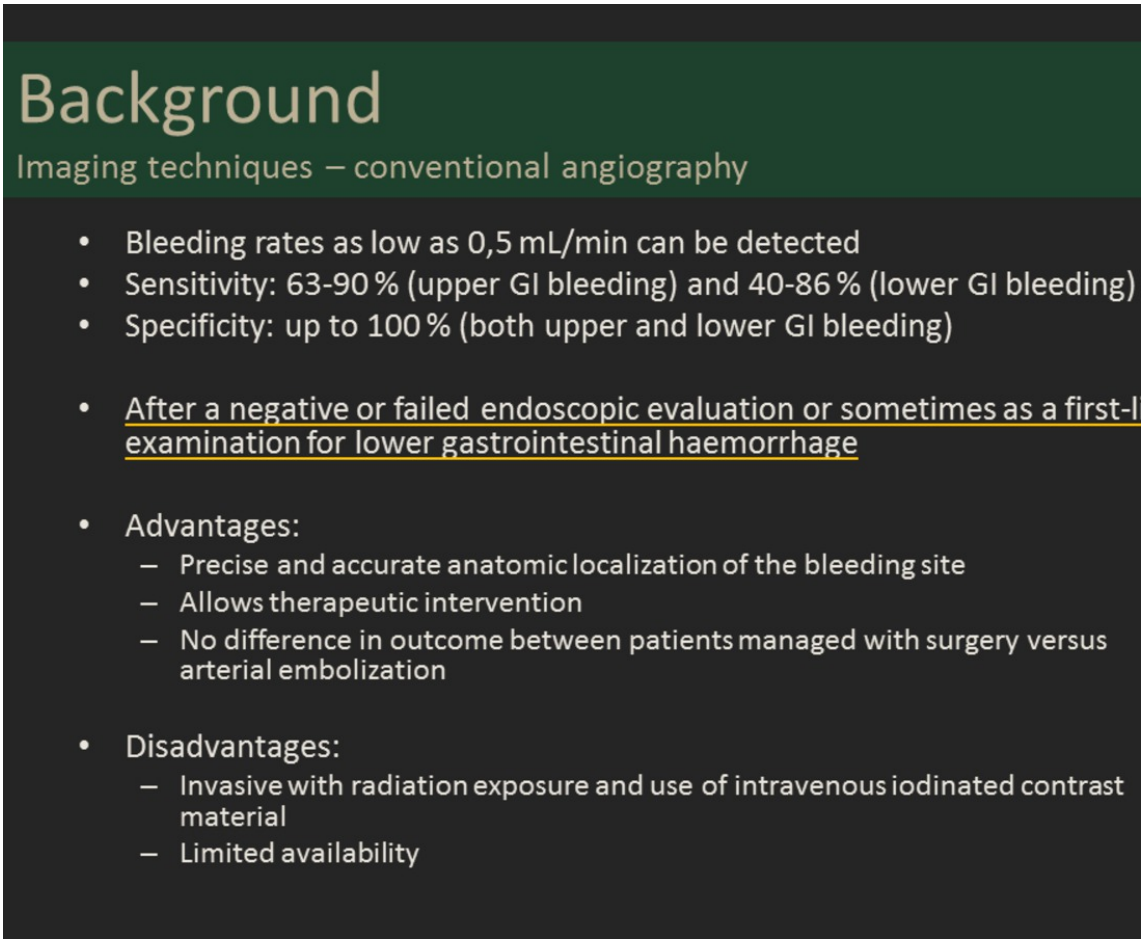


Fig. 8: Imaging techniques in gastrointestinal haemorrhage - conventional angiography
References: Serviço de Imagiologia, Hospital S. Teotónio - Viseu/PT

Images for this section:

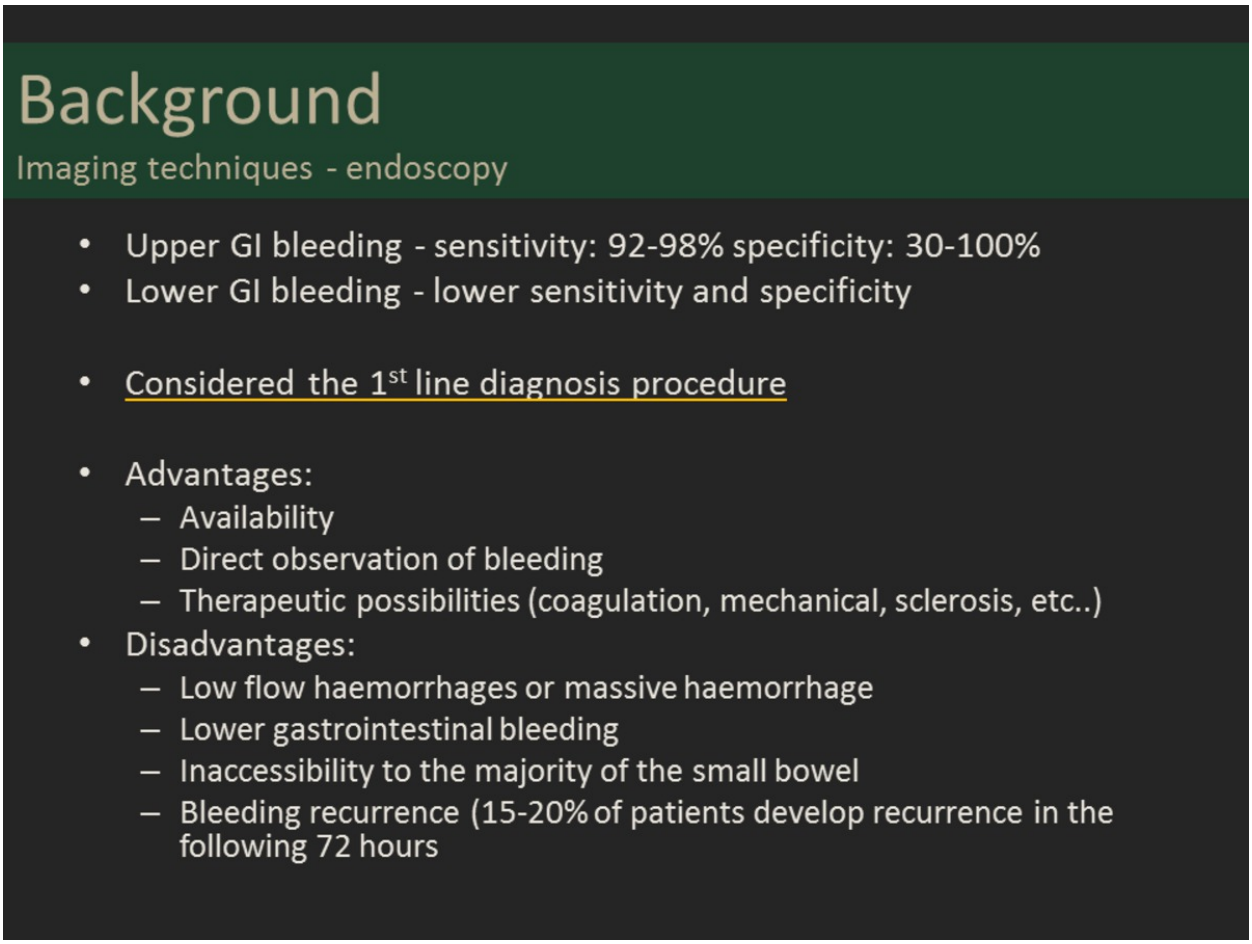


Fig. 1: Imaging techniques in gastrointestinal haemorrhage - endoscopy

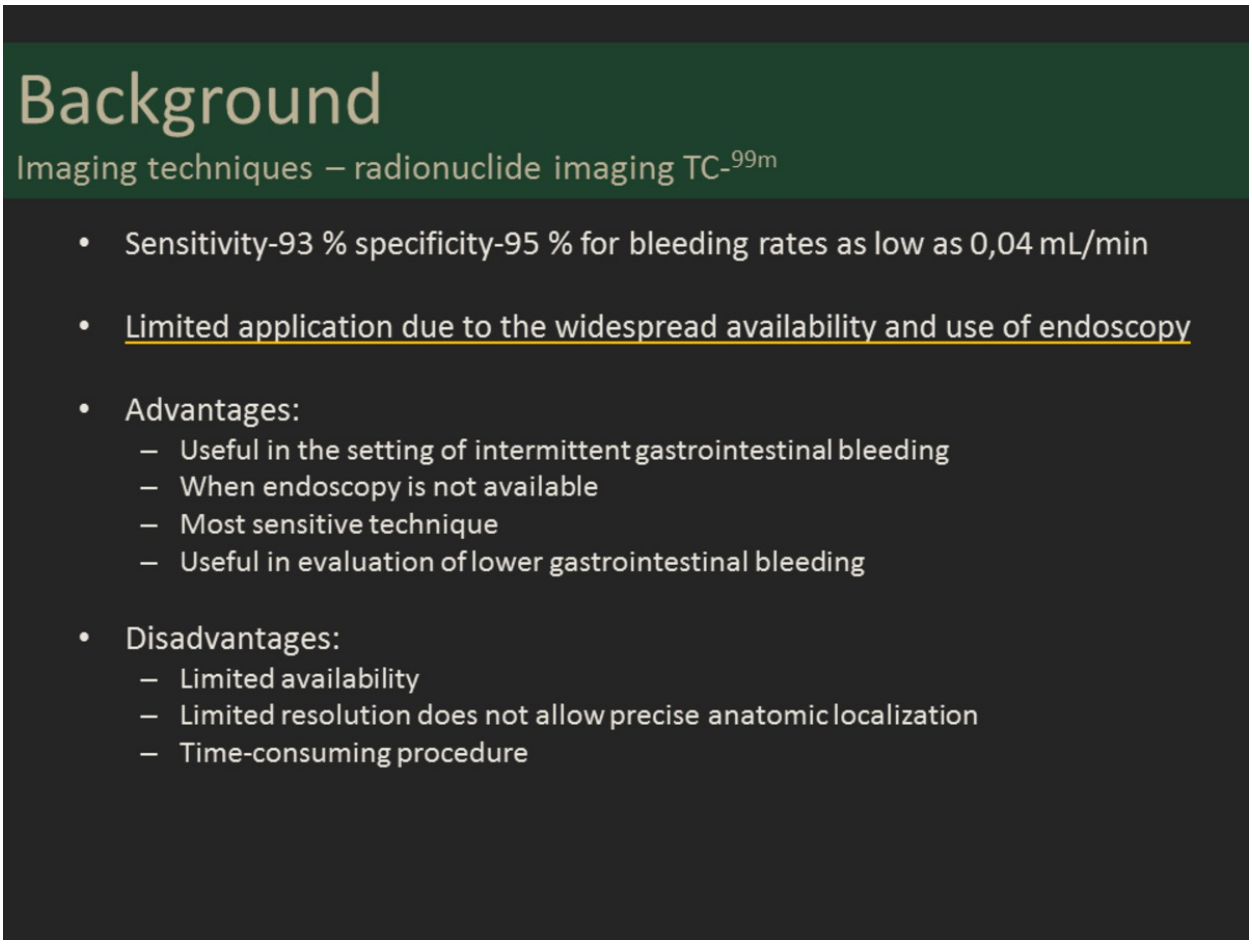


Fig. 2: Imaging techniques in gastrointestinal haemorrhage - radionuclide imaging

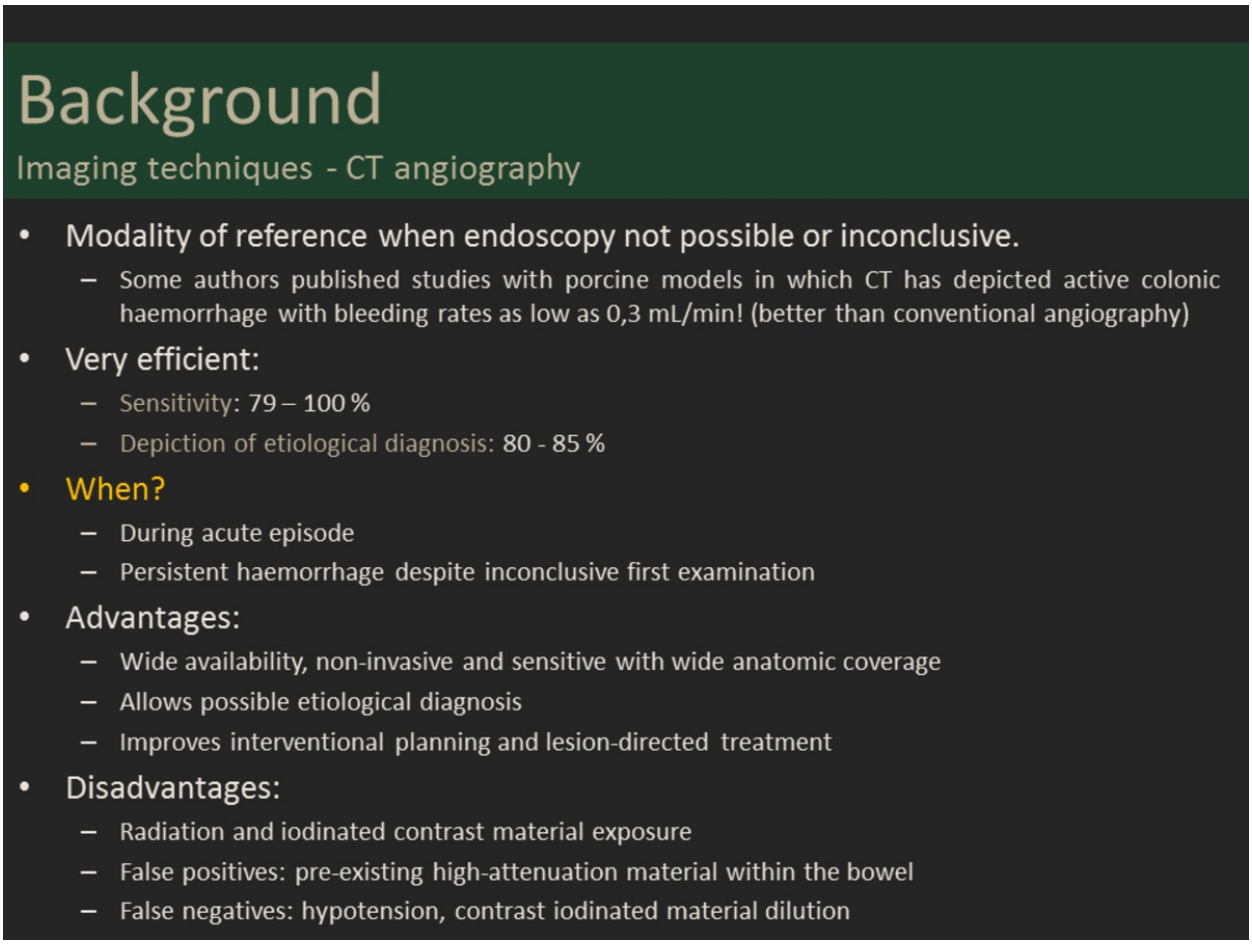


Fig. 3: Imaging techniques in gastrointestinal haemorrhage - computed tomography (CT) angiography

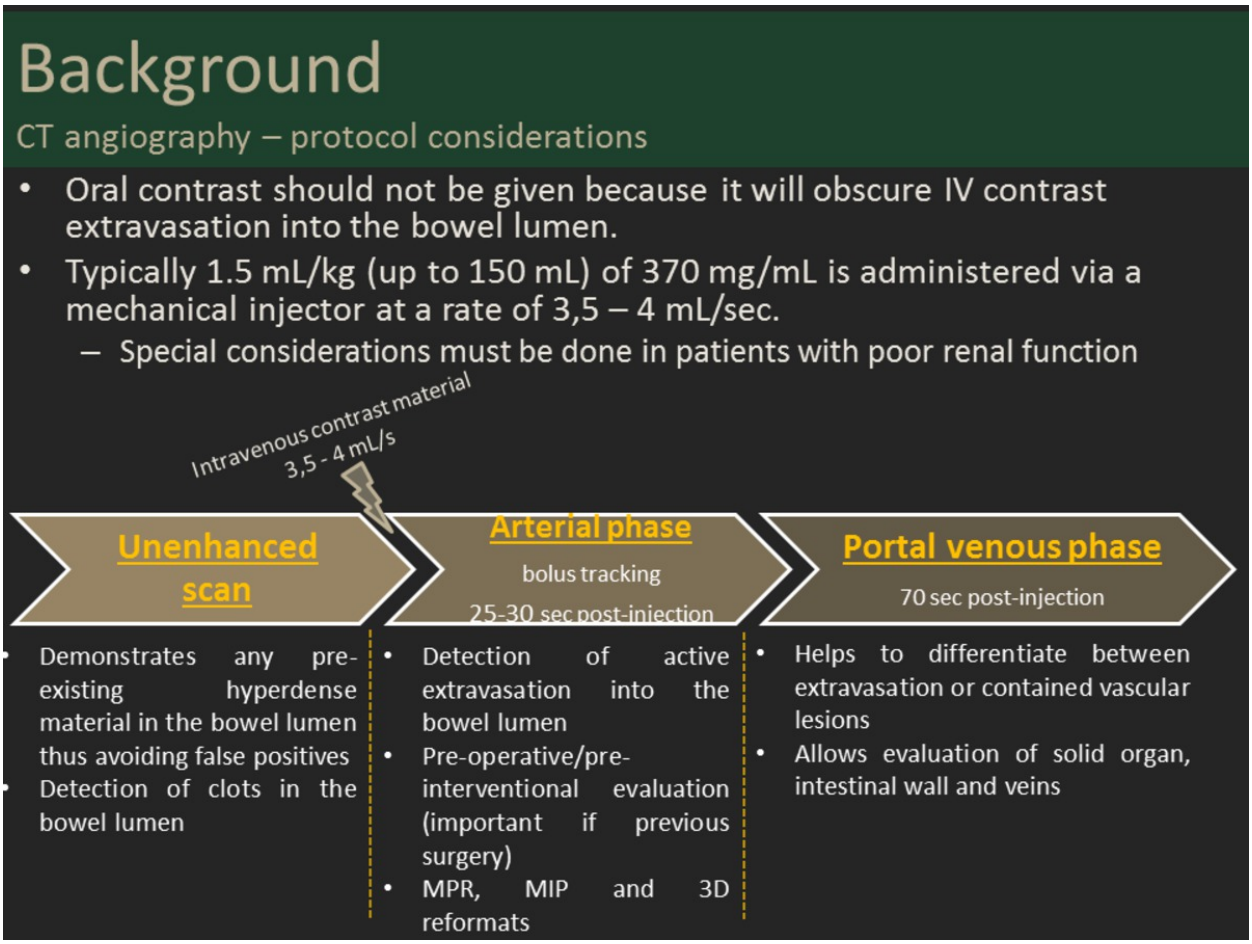


Fig. 4: Imaging techniques in gastrointestinal haemorrhage - computed tomography (CT) angiography protocol considerations

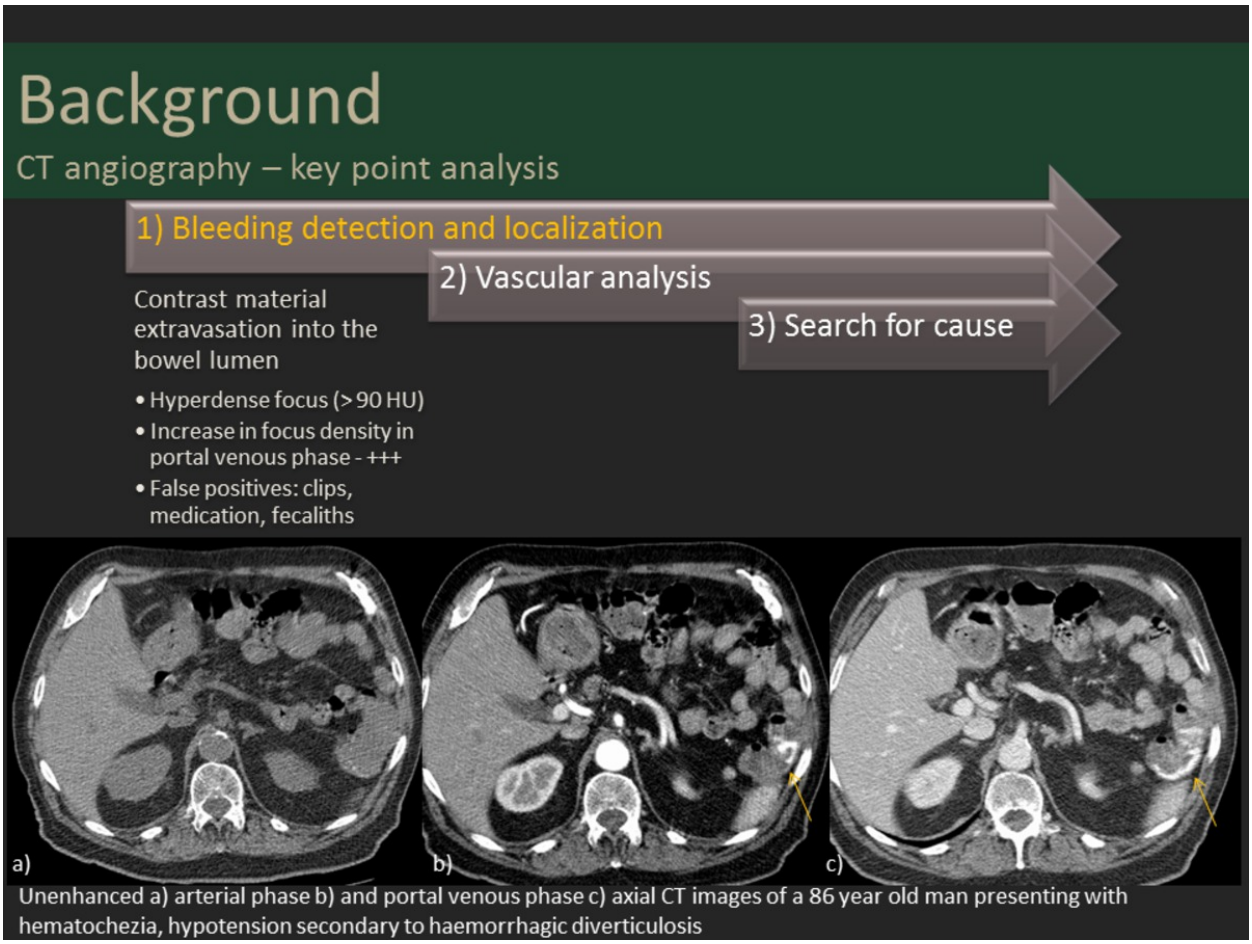


Fig. 5: Imaging techniques in gastrointestinal haemorrhage - computed tomography (CT) angiography key point analysis

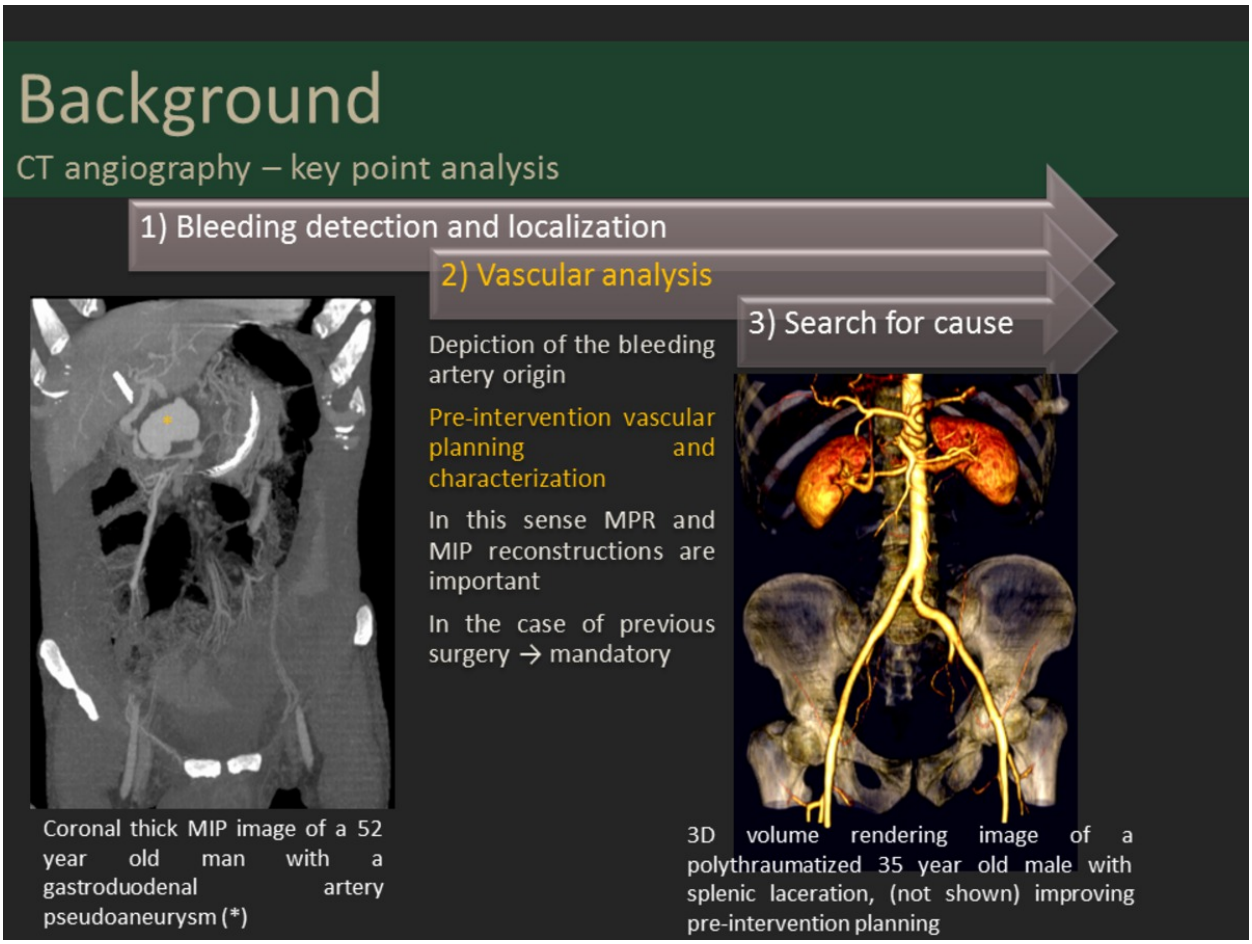


Fig. 6: Imaging techniques in gastrointestinal haemorrhage - computed tomography (CT) angiography key point analysis

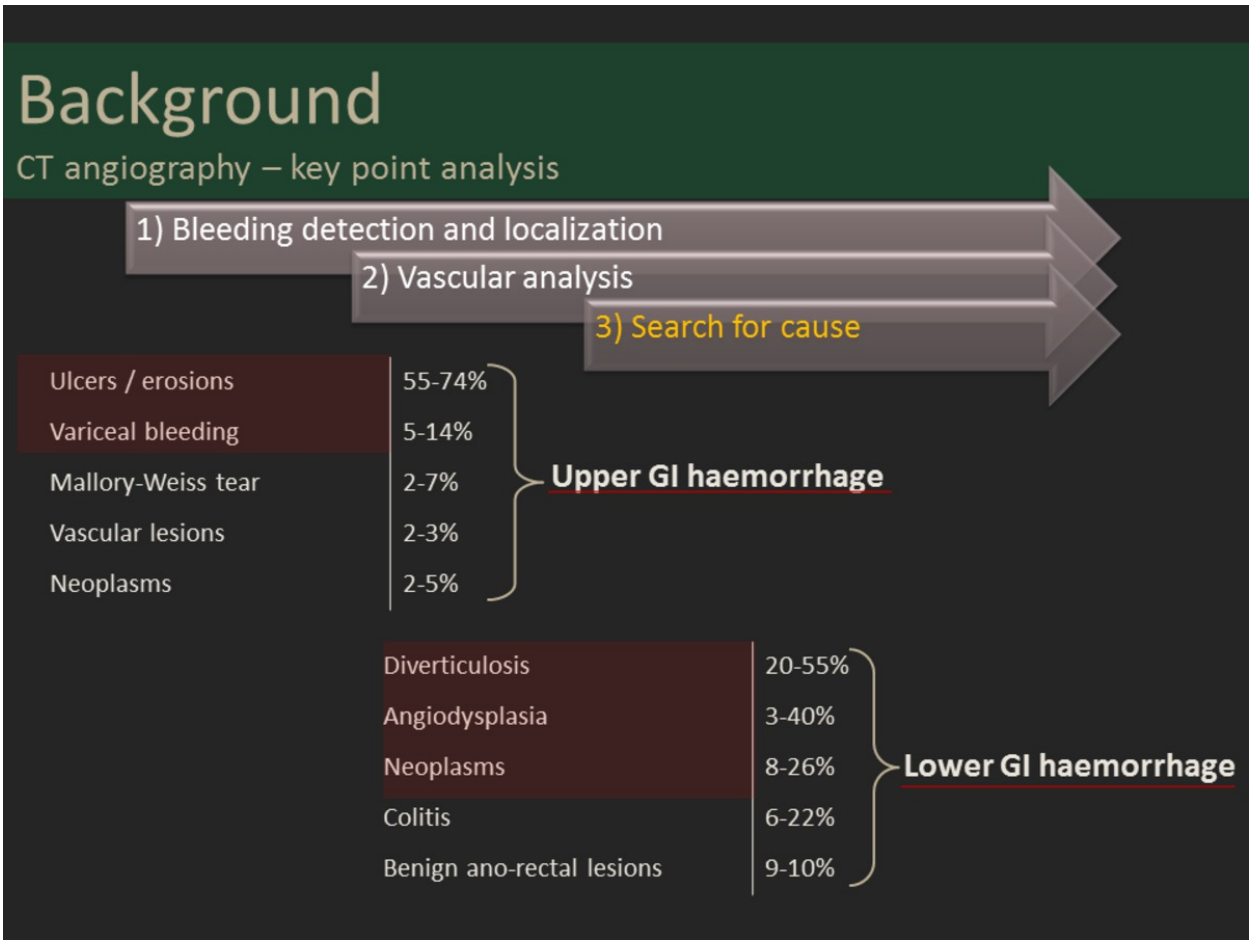


Fig. 7: Imaging techniques in gastrointestinal haemorrhage - computed tomography (CT) angiography key point analysis

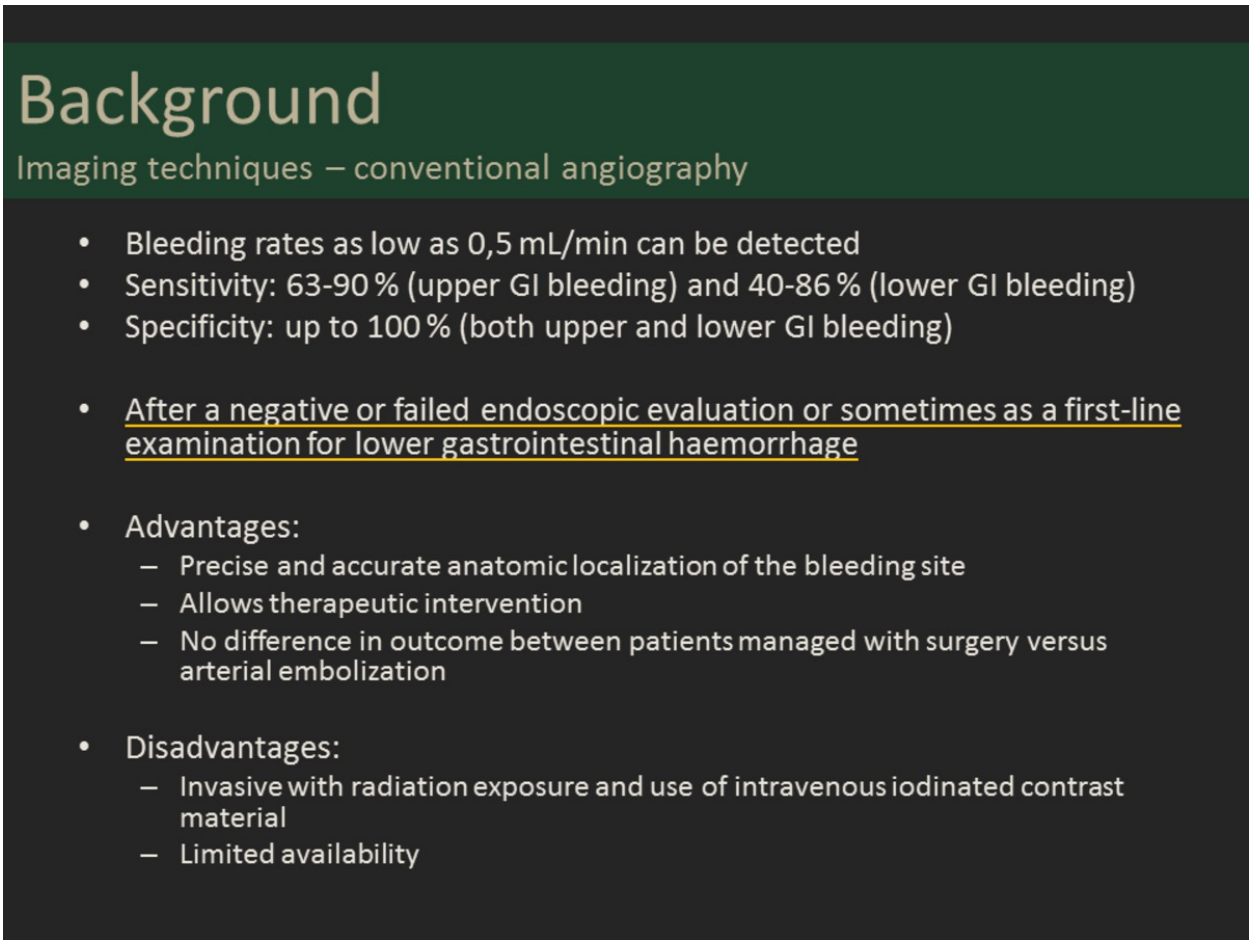


Fig. 8: Imaging techniques in gastrointestinal haemorrhage - conventional angiography

Findings and procedure details

Main indications of conventional angiography in gastrointestinal haemorrhage:

- The bleeding site cannot be identified by endoscopy or CT angiography.
- Source of bleeding cannot be controlled endoscopically.
- At least four red blood cell transfusion in less than 24 hours.
- Haemodynamic instability.

However we should refer that indications vary according to institution expertise and availability.

Conventional angiography technical considerations:

• *Mapping aortography using 5 Fr pigtail catheter.*

- 30-40 mL at 15-20 mL/sec.
- Can be skipped if recent CT angiography available, it reduces time delay and contrast administration
- Contrast extravasation is rarely visible on the mapping aortography.

• 1-2 mg intravenous glucagon® may be administered prior to angiography to limit peristalsis and respiratory motion artefacts on digital subtraction angiography (DSA)

• If feasible breath hold during DSA is ideal

• *Selective angiograms using 5 Fr Cobra or Simmons catheters*

- Celiac trunk: 12-15 mL at 4-6 mL/sec Fig. 9 on page 36

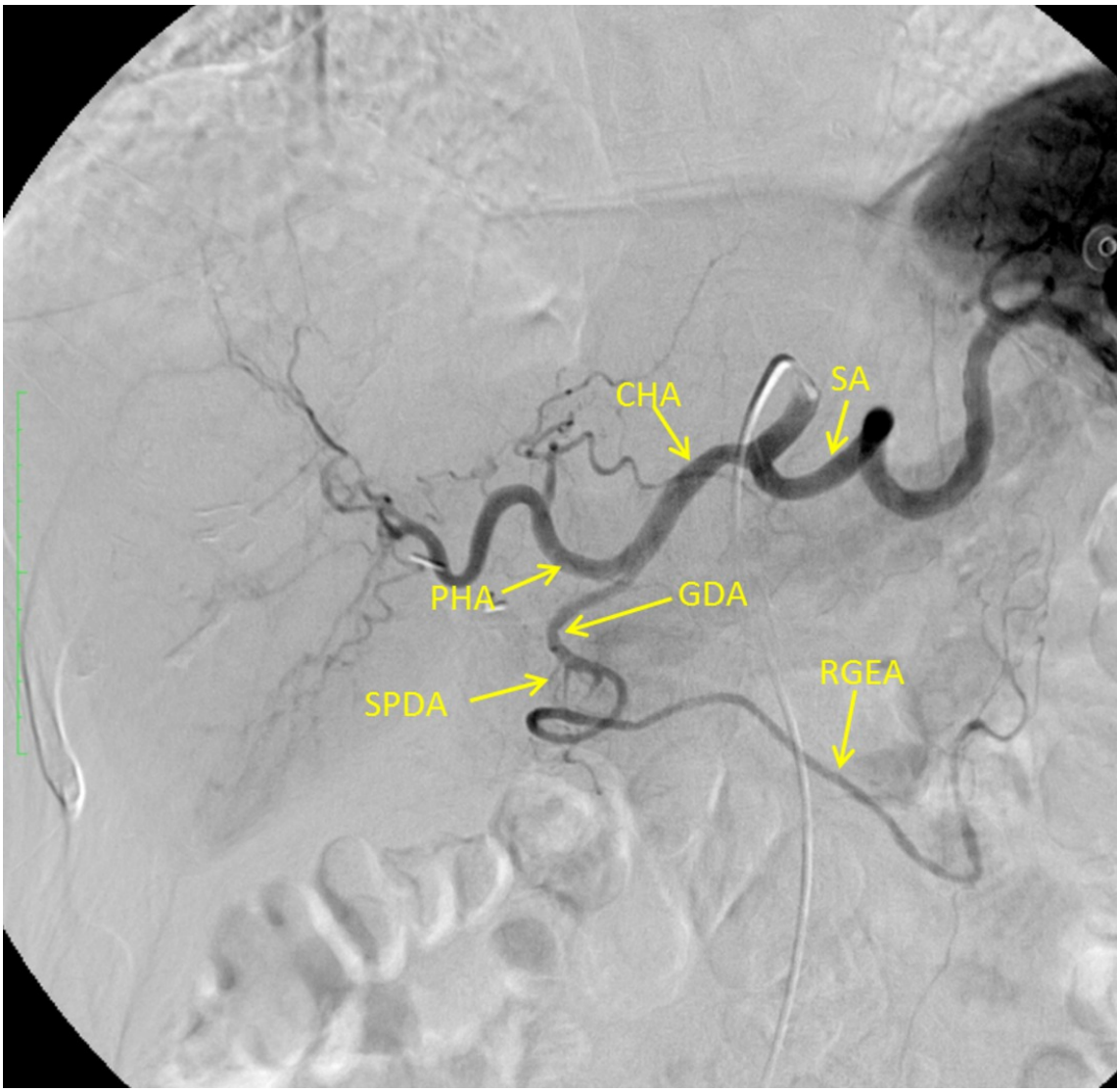


Fig. 9: Celiac trunk angiogram: CHA-Common hepatic artery; SA-Splenic artery PHA-Proper hepatic artery; GDA-Gastroduodenal artery; SPDA-Superior pancreaticoduodenal artery; RGEA-Right gastroepiploic artery. ***References:*** Medical Imaging Department and Faculty of Medicine, University Hospital of Coimbra, Portugal

- Superior mesenteric artery: 25-30 mL at 5-6 mL/sec Fig. 10 on page 37

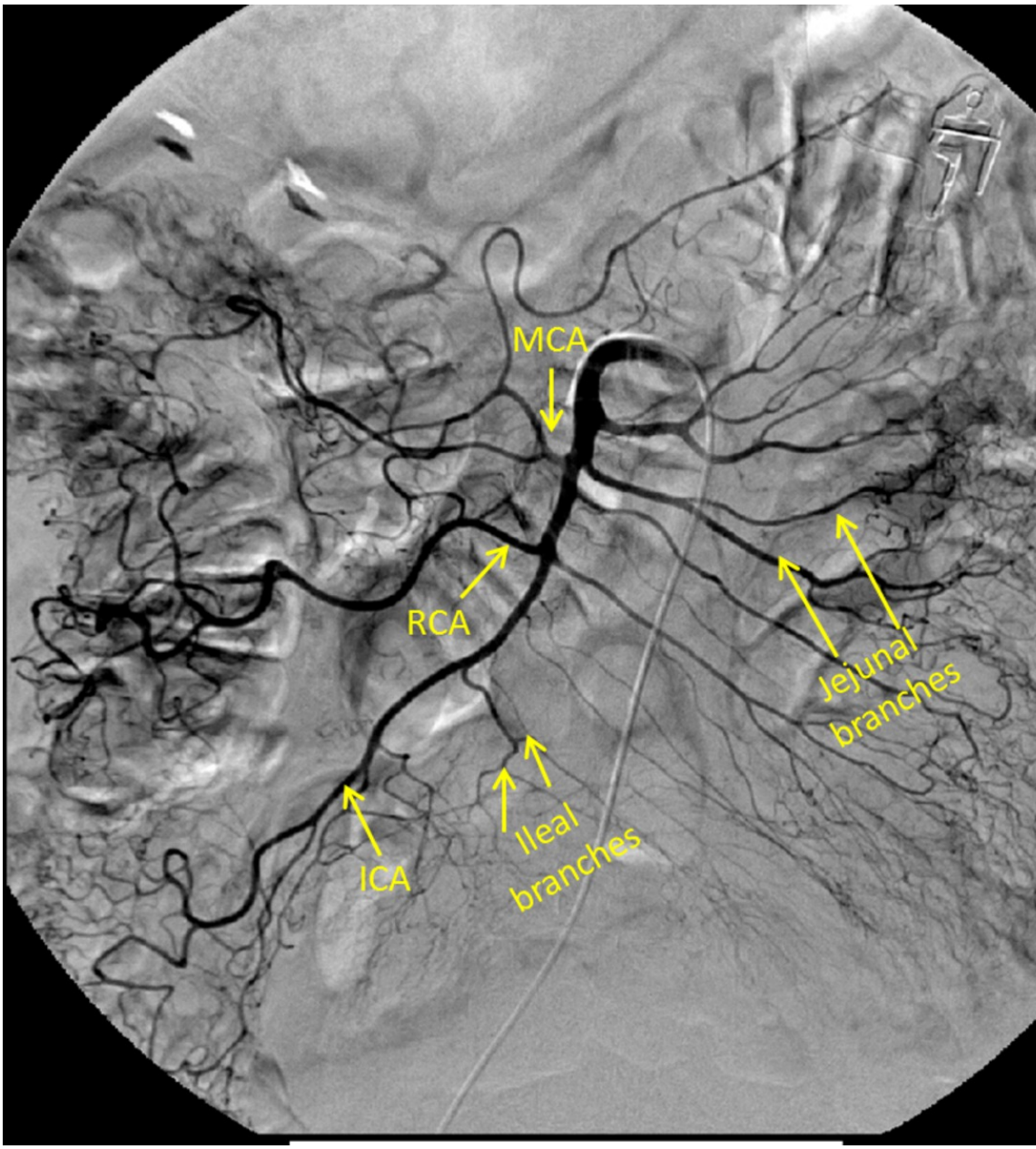


Fig. 10: - Superior mesenteric artery angiogram: MCA-Middle colic artery; RCA-Right colic artery; ICA-Ileocolic artery.
References: Medical Imaging Department and Faculty of Medicine, University Hospital of Coimbra, Portugal

In both celiac trunk and superior mesenteric artery angiograms imaging is performed until the portal venous phase to document patency of the portal vein Fig. 11 on page 38

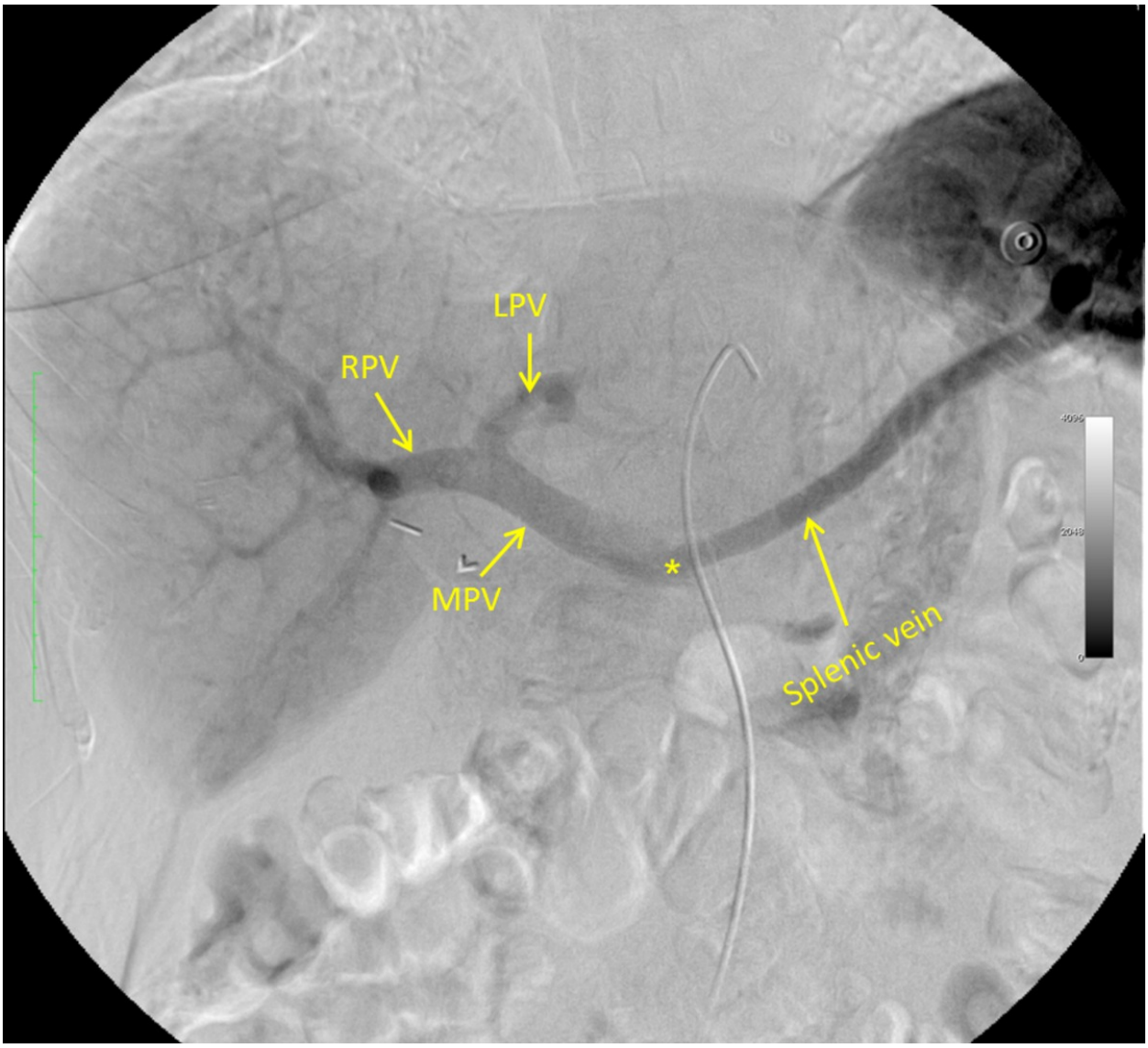


Fig. 11: Indirect portography after celiac trunk angiogram: MPV-Main portal vein; RPV-Right portal vein; LPV-Left portal vein; * - splenomesenteric confluence.
References: Medical Imaging Department and Faculty of Medicine, University Hospital of Coimbra, Portugal

- Inferior mesenteric artery: 12-15 mL at 3 mL/sec. Fig. 12 on page 39

In the suspicion of colonic bleeding it can be the first vessel to be catheterized.

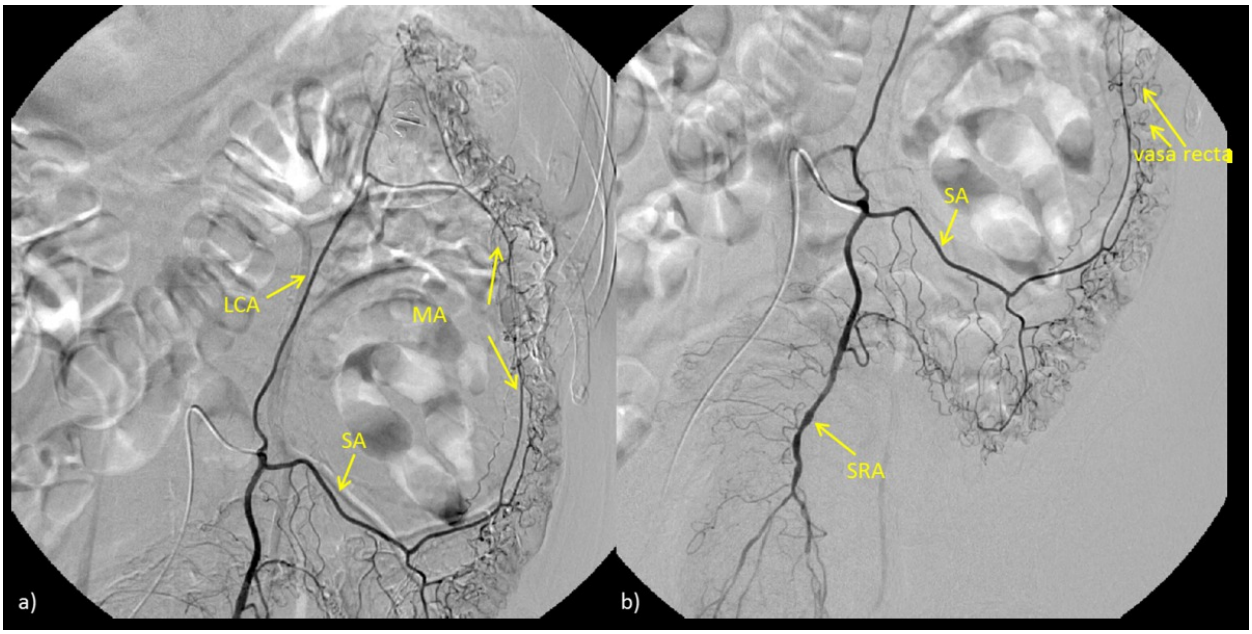


Fig. 12: Inferior mesenteric artery angiogram: LCA-Left colic artery; MA-Marginal artery; SA-Sigmoid artery; SRA-Superior rectal artery.
References: Medical Imaging Department and Faculty of Medicine, University Hospital of Coimbra, Portugal

• If hemorrhage not evident in the context of upper gastrointestinal bleeding, selective catheterization of the left gastric artery and gastroduodenal artery is performed.

• Once the bleeding site is identified coaxial placement of a 3 Fr microcatheter through a 5 Fr catheter is done.

Commonly used embolic agents Fig. 13 on page 40

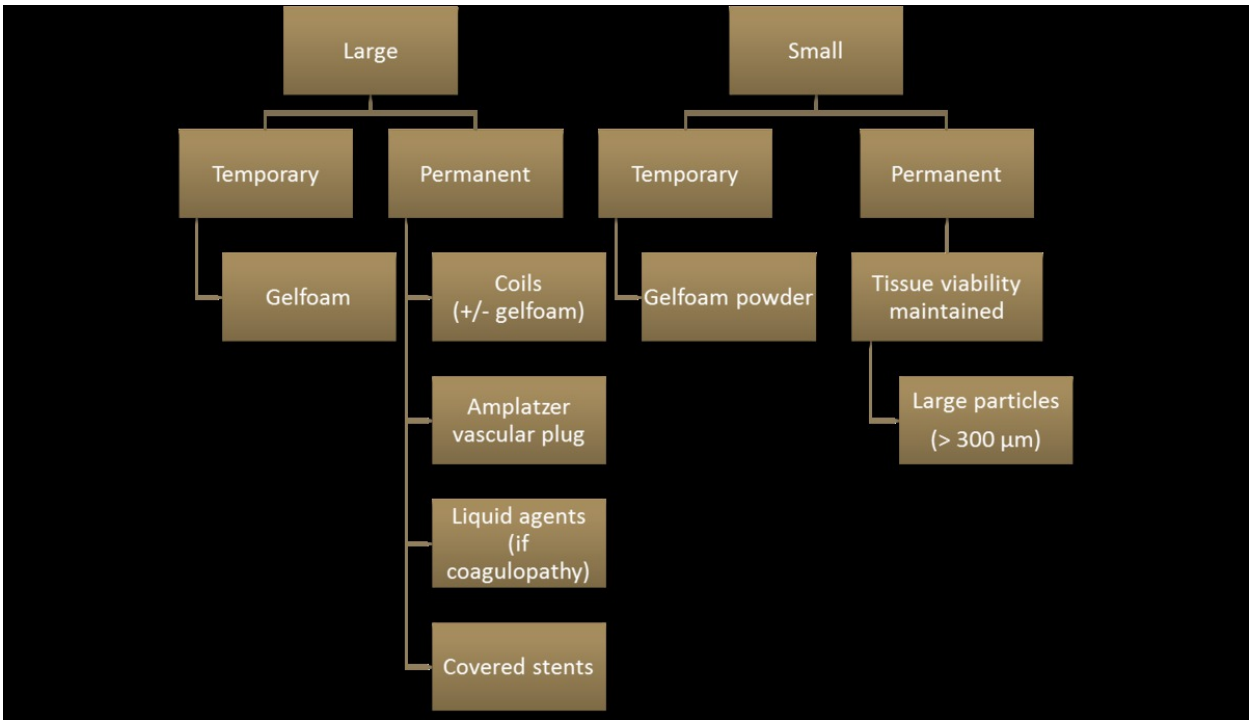


Fig. 13: Decision algorithm for embolic choice (adapted from Lubarsky M, Ray CE, Funaki B, 2009, Embolization agents-which one should be used when? Part 1: large-vessel embolization. Semin Intervent Radiol 26:352-357).
References: Serviço de Imagiologia, Hospital S. Teotónio - Viseu/PT
Microcoils (most widely used)

- In addition to a thrombogenic coating, most coils have small #bers attached to the metal component (steel or platinum)
- Diameter at least 20-30 % superior to the vessel to be embolized to prevent migration and non-desired embolization

Gelfoam (temporary embolic agent allows posterior recanalization)

Microparticles (>300 µm)

- Induces intraluminal thrombosis with associated inflammatory response

Amplatzer™ vascular plug (mainly in variceal bleeding)

Covered stents (although not an embolic agent it allows haemorrhage exclusion if favourable anatomy)

Vasopressin therapy abandoned due to:

- Elevated bleeding recurrence rate (> 15 %)

- Complex administration regimen
- Significant local and systemic side-effects
- Not effective for upper gastrointestinal bleeding

Angiographic signs of bleeding

The primary angiographic findings of bleeding are direct visualization of active contrast extravasation and contrast pooling in the venous phase.

Indirect signs of bleeding include pseudoaneurysm, vessel spasm or cut-off, early venous filling and hypervascularity. The presence of abnormal blush may indicate an inflammatory process, which may represent a bleeding source.

Angiography can detect bleeding rates as low as 0.5 mL/min in superselective catheterizations (it corresponds to 3 red blood cell units/24h). In mapping aortography detection is only possible with massive bleeding rates (6 mL/min).

Cases of lower gastrointestinal haemorrhage

- Diverticulosis Fig. 14 on page 40

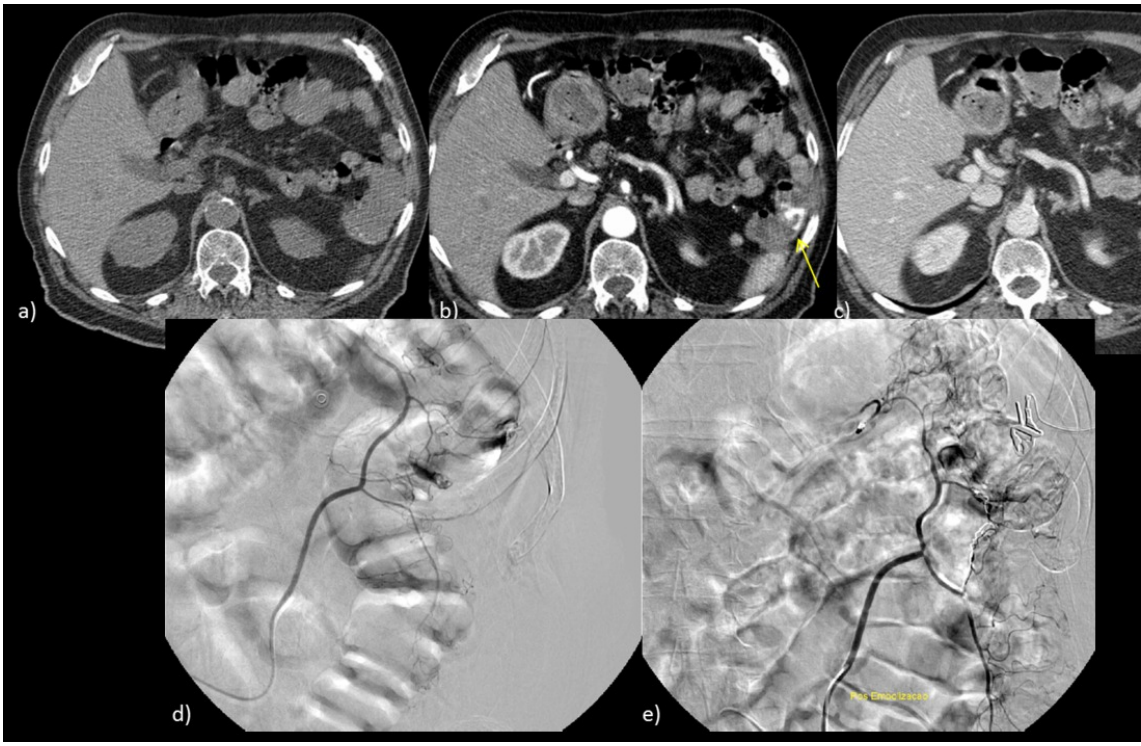


Fig. 14: Unenhanced a) arterial phase b) and portal venous phase c) axial CT images of a 86 year old man presenting with hematochezia and hypotension secondary to haemorrhagic diverticulosis, previous shown

in figure 5. This patient went to the angiography room and the selective catheterization of the inferior mesenteric artery identified the bleeding site at the vasa recta of the marginal artery (image d). A microcatheter was coaxially introduced into the 5 Fr catheter and successful microcoil embolization of the bleeding vessel was achieved (image e). Pre-procedural knowledge of the haemorrhage allowed for initial catheterization of the inferior mesenteric artery resulting in less delay.
References: Medical Imaging Department and Faculty of Medicine, University Hospital of Coimbra, Portugal

- Angiodysplasia Fig. 15 on page 41

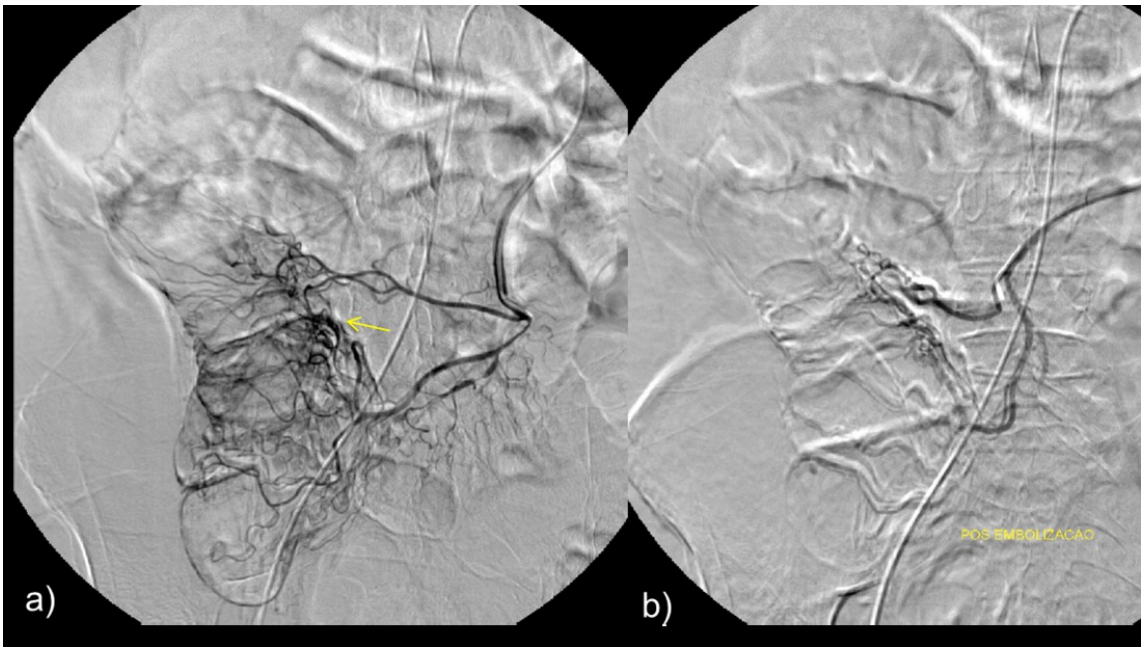


Fig. 15: 96 year old man who was referred by right colon bleeding, no other examinations were given. In fact this was the second angiography in 3 days, in the first one no active bleeding was detected. So in this case superselective catheterization of the superior mesenteric artery branches was performed and suggestion of bleeding was found in branches of the right colic artery were a small cluster of small arteries was found (arrow in image a). These findings were consistent with angiodysplasia and superselective microcoil embolization at the vasa recta was performed (image b), the patient underwent uneventful clinical and laboratorial recovery.
References: Medical Imaging Department and Faculty of Medicine, University Hospital of Coimbra, Portugal

Cases of upper gastrointestinal haemorrhage

- Gastroduodenal pseudoaneurysm Fig. 16 on page 42

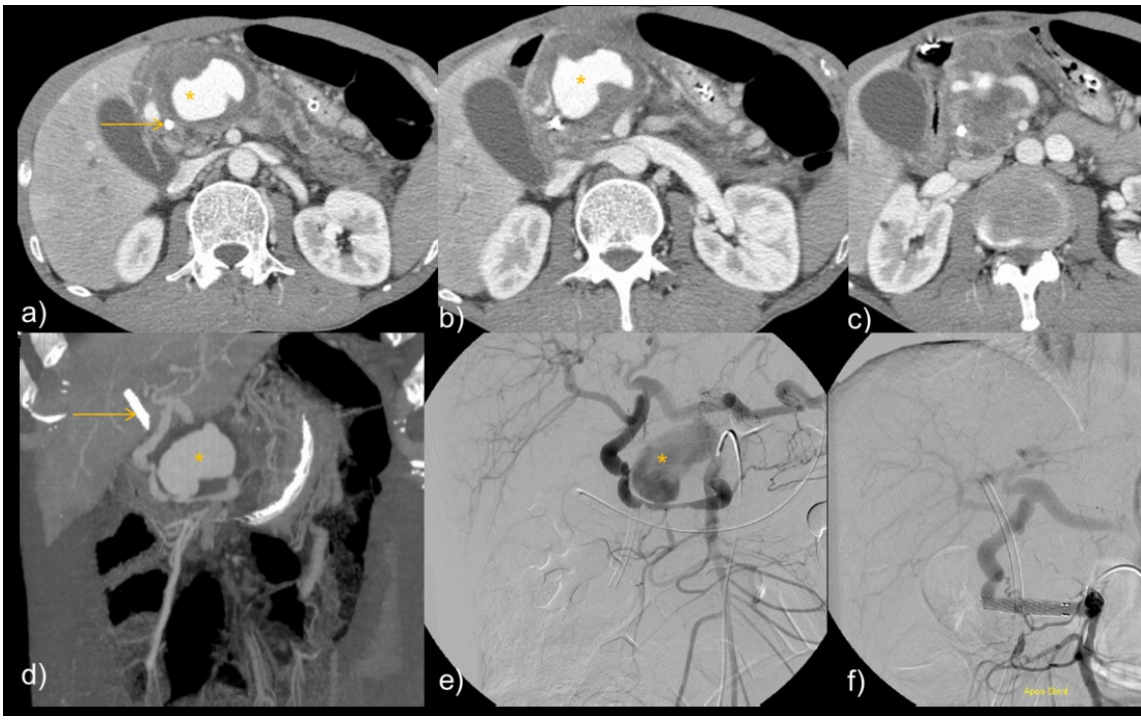


Fig. 16: Enhanced axial CT arterial phase images a), b) c) of a 53 year old male patient with severe chronic pancreatitis with a plastic biliary stent (arrows) and a large gastroduodenal pseudoaneurysm (*). Thick coronal MIP image d) demonstrated a narrow neck allowing pre-interventional planning, thus a covered stent was deployed via the pancreaticoduodenal inferior artery with successful exclusion of the aneurysm and bleeding (images e and f).
References: Medical Imaging Department and Faculty of Medicine, University Hospital of Coimbra, Portugal

- Acute pancreatitis Fig. 17 on page 43 Fig. 18 on page 44

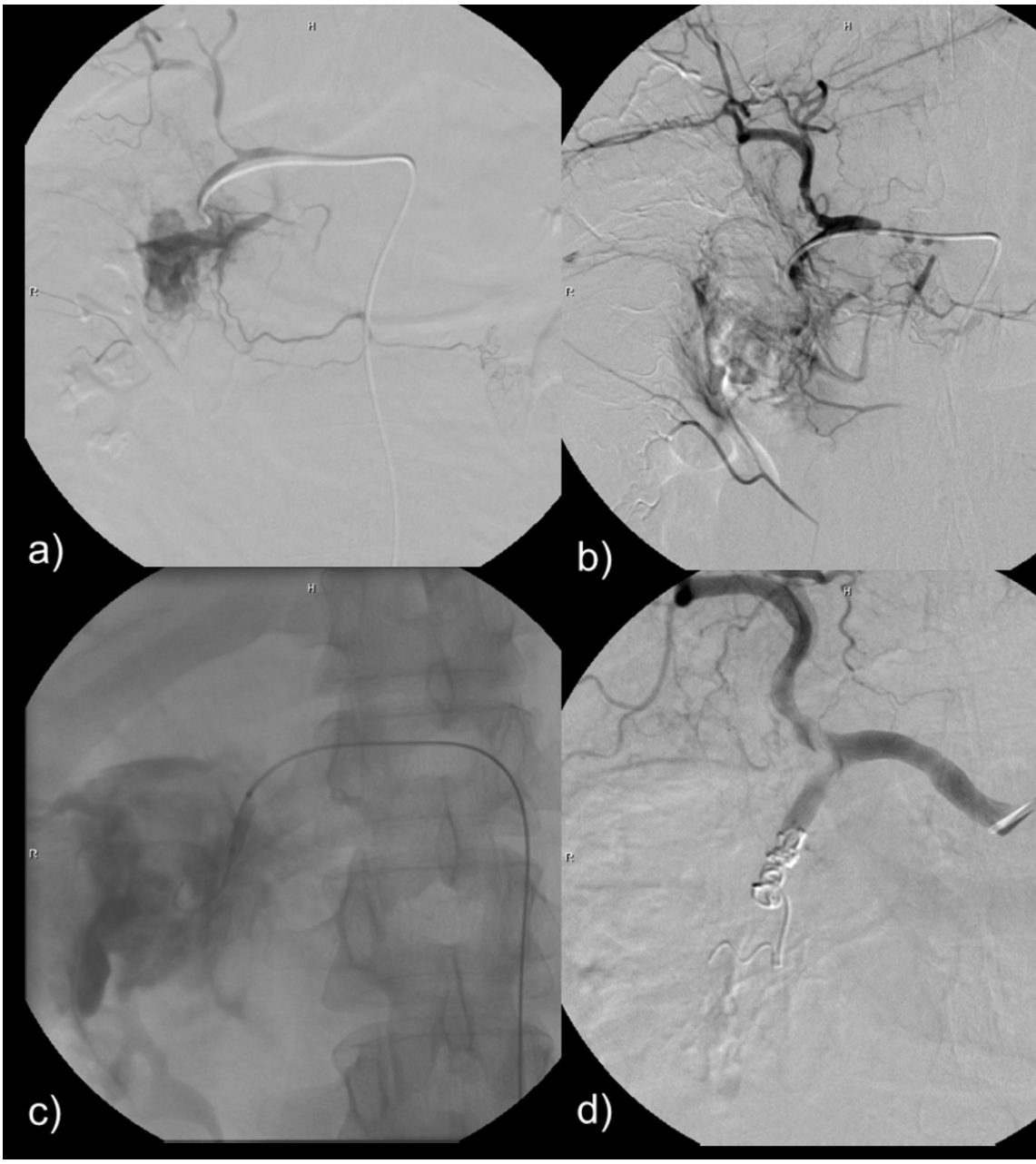


Fig. 17: Hemodynamically unstable patient referred to the angiography room, presenting with massive haemorrhage from the gastroduodenal artery (images a and b) . Before embolization a balloon was inflated (image c) due to the critical status in order to "gain" some time before coil embolization was performed together with gelfoam (image d). The superior mesenteric artery was studied (not shown) and no "backdoor" to the bleeding site was found.

References: Medical Imaging Department and Faculty of Medicine, University Hospital of Coimbra, Portugal

Fig. 18: Patient with acute pancreatitis presenting active bleeding from the inferior pancreaticoduodenal artery (images a and b). Bleeding site was successfully embolized with microcoils achieving stoppage of the bleeding (image c).
References: Medical Imaging Department and Faculty of Medicine, University Hospital of Coimbra, Portugal

- Duodenal ulcer Fig. 19 on page 44

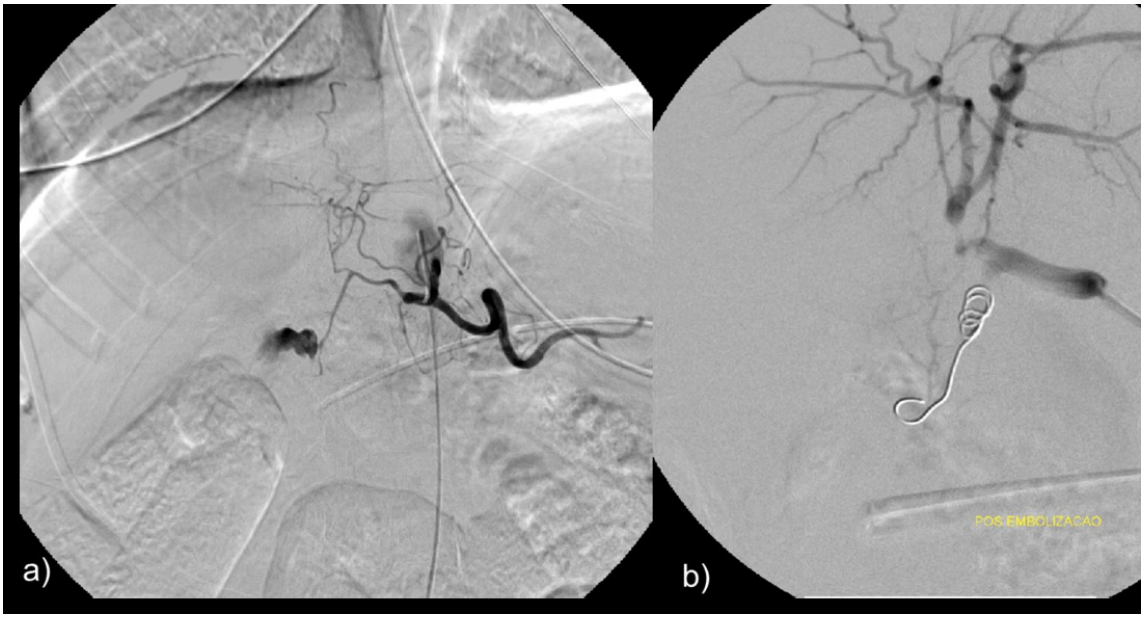


Fig. 19: 80 year old woman, hemodynamically unstable presenting with massive haemorrhage in the gastroduodenal artery (image a, previous shown in figure 8). This patient had already performed a endoscopy that detected fresh blood, but due to the massive haemorrhage the bleeding site could not be detected. Hemodynamically unstable patients such as this one should immediately undergo arteriography with team support of intensive care physician, conversely arteriography in hemodynamically stable patients with low volume haemorrhage is likely to be fruitless, and

is best reserved for cases in which all other standard workup has failed to localize or characterize the source of bleeding. The bleeding site once identified was embolized successfully with microcoils, and the patient recovered almost immediately, namely with stabilization of blood pressure.
References: Medical Imaging Department and Faculty of Medicine, University Hospital of Coimbra, Portugal

- Gastric neoplasm Fig. 20 on page 45

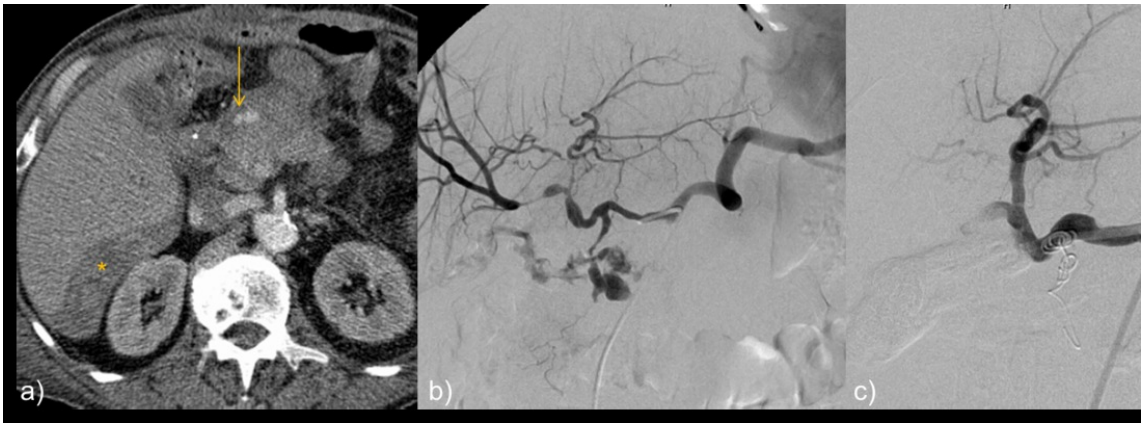


Fig. 20: 84 year old man with prepyloric antrum neoplasm invading the surrounding structures, with hemoperitoneum (*) and doubtful bleeding in the dependence of the gastroduodenal artery (arrow) at the computed tomography scan (image a). The patient went to the angiography room and the bleeding site was identified and embolized with coils (images b and c) as a palliative measure.
References: Medical Imaging Department and Faculty of Medicine, University Hospital of Coimbra, Portugal

- Pancreatic adenocarcinoma Fig. 21 on page 45

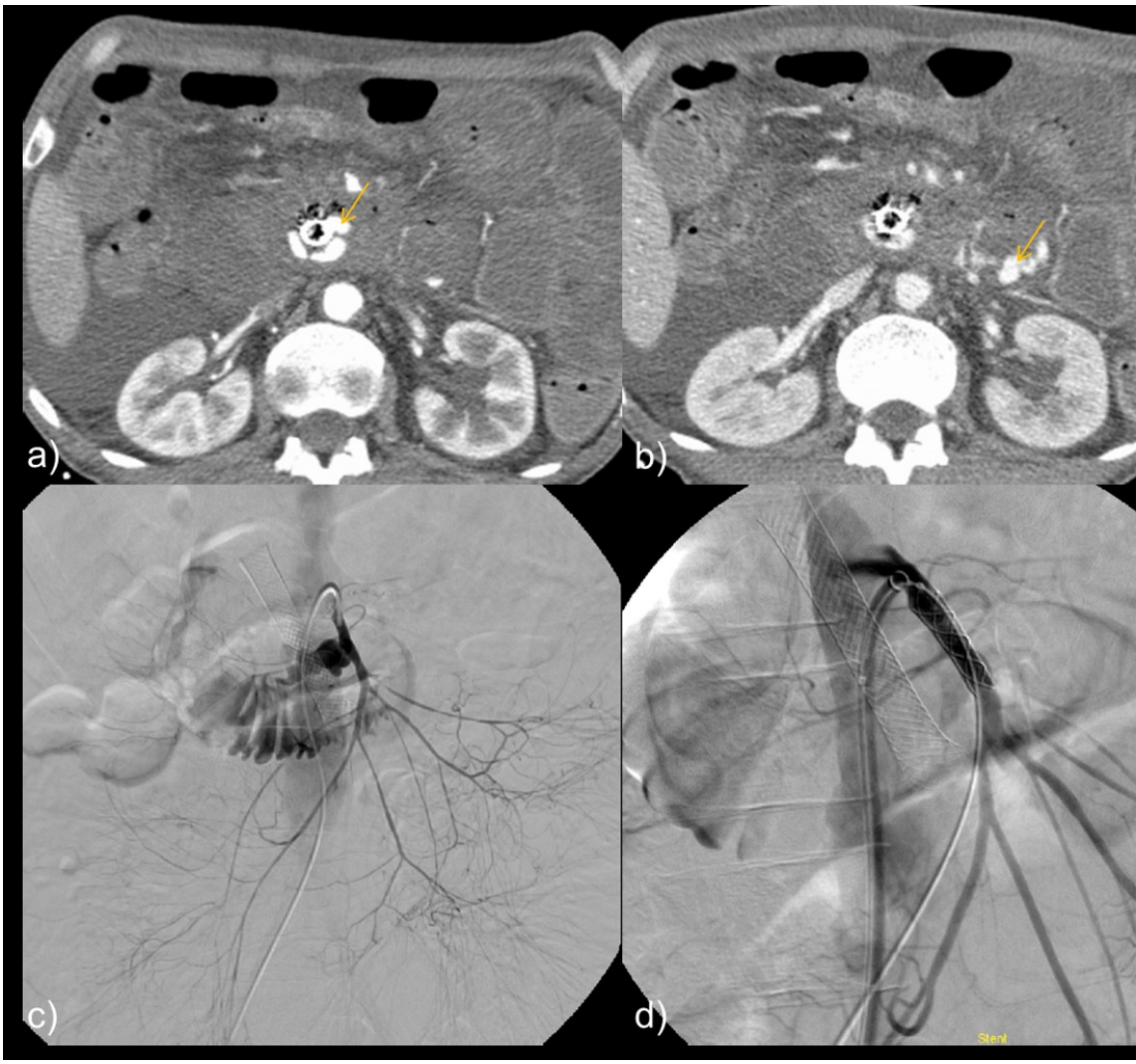


Fig. 21: 49 year old man with pancreatic head adenocarcinoma already palliated with biliary prosthesis, presenting with hypotension and hematemesis. Computed tomography (images a and b) disclosed hemorrhage around the biliary prosthesis with extravasation into the bowel lumen (arrows). The bleeding site was identified in the superior mesenteric artery and it was stopped by deploying a covered stent (images c and d).
References: Medical Imaging Department and Faculty of Medicine, University Hospital of Coimbra, Portugal

- Hemobilia Fig. 22 on page 46

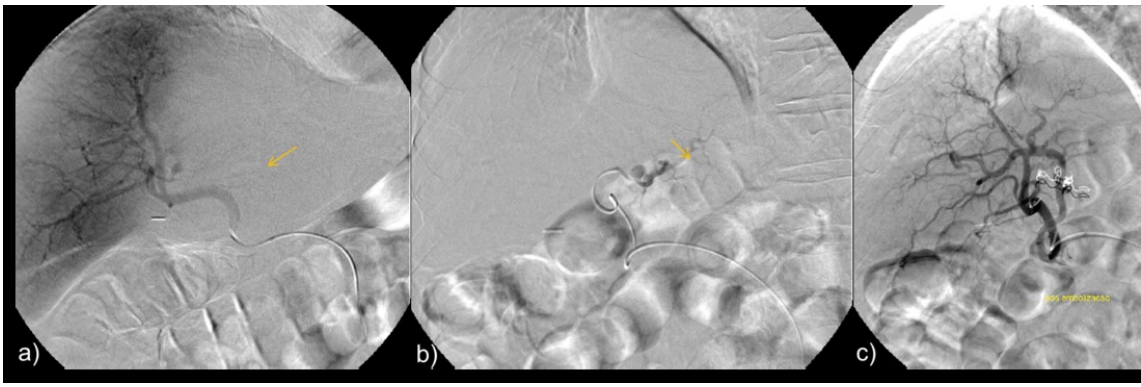


Fig. 22: 79 year old man referred for angiographic evaluation after upper endoscopy revealed bleeding from the duodenal papilla consistent with haemobilia, and cholecystectomy had been previously performed. After selective catheterization of the right hepatic artery a pseudoaneurysm is seen (arrows in images a and b), which was occluded by microcoil embolization (image c) and the haemobilia ceased following embolization.
References: Medical Imaging Department and Faculty of Medicine, University Hospital of Coimbra, Portugal

- Hemossucus pancreaticus Fig. 23 on page 47

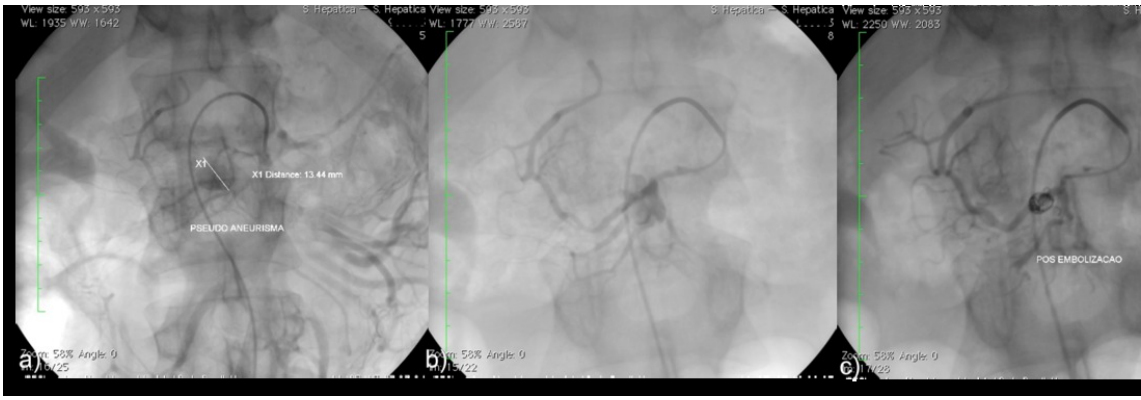


Fig. 23: 40 year old man referred to our institution for angiographic evaluation after endoscopy suggested hemossucus pancreaticus. This patient also had performed CT scans in the referring institution suggesting a gastroduodenal pseudoaneurysm. After selective catheterization of the celiac trunk (not shown) and superior mesenteric artery a pseudoaneurysm is seen in the dependence of the inferior pancreaticoduodenal artery (images a and b). Successful embolization was achieved wit microcoils occluding the bleeding (image c).
References: Medical Imaging Department and Faculty of Medicine, University Hospital of Coimbra, Portugal

Gastrointestinal bleeding of variceal origin

- Variceal sources of GI bleeding are distinct from arterial bleeding both in aetiology and endovascular treatment. It is important to distinguish between them.

- Variceal bleeding stops spontaneously in only #50% of patients. Following cessation of active haemorrhage, there is a high risk of recurrence specially within the first 48 to 72 hours. Each episode of bleeding carries a 30% mortality rate and the risk of rebleeding is high (60 to 70%) until the gastro-oesophageal varices are treated.

- Endoscopic therapy is currently the treatment of choice (sclerotherapy and variceal band ligation) for active variceal haemorrhage and can be performed at the time of diagnostic endoscopy. However urgent endoscopic and pharmacological treatments fail to control bleeding in about 10 to 20% of patients, and more definitive therapy such as transjugular portosystemic shunt (TIPS) creation should be performed Fig. 24 on page 47.

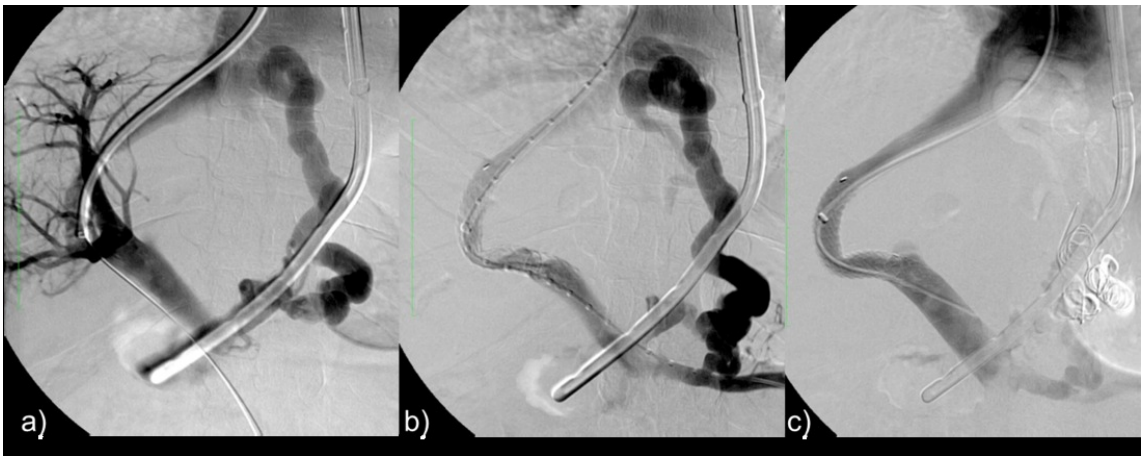


Fig. 24: 46 year old man with hepatic cirrhosis presenting with upper gastrointestinal bleeding refractory to both endoscopy and pharmacological treatment. Direct portography shows significant collateralization to the left gastric vein, opacifying above the diaphragm, the left portal vein was not seen (image a). After TIPS creation the collateral was still opacifying and above the diaphragm (image b), so the collateral was occluded with coils and amplatzer™ vascular plug (image c).
References: Medical Imaging Department and Faculty of Medicine, University Hospital of Coimbra, Portugal

- TIPS is effective in 95-100% of cases and is presently considered as a 2nd line treatment, being helpful in gastric varices or difficult access intestinal varices. Recently a group published that TIPS is more effective in preventing bleeding recurrence in high risk patients than endoscopy and pharmacological treatment, with similar complications rate, thus suggesting his early use in high risk patients.

- In patients with isolated gastric varices, balloon-occluded retrograde transvenous obliteration (BRTO) is a highly effective treatment, being widely accepted in Japan. It is useful in patients who are not suitable candidates for TIPS due to poor hepatic reserve.

Complications of embolotheraphy in gastrointestinal haemorrhage Fig. 25 on page 48 Fig. 26 on page 48

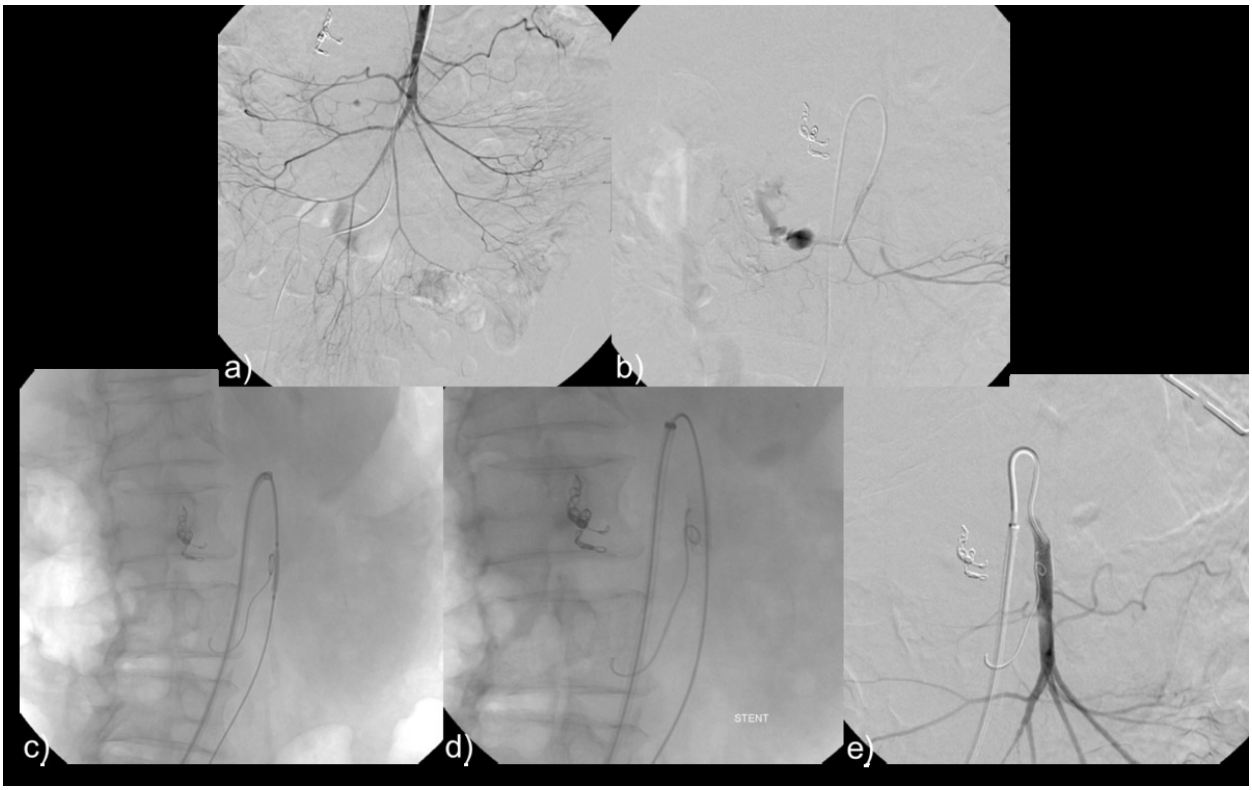


Fig. 25: 66 year old woman with severe acute lithiasic pancreatitis, submitted to previous embolization of a gastroduodenal artery pseudoaneurysm, referred for angiography due to a new bleeding jejunal branch of the superior mesenteric artery (images a and b). After catheterization of the bleeding artery the only coil available was oversized and partial migration into the superior mesenteric artery occurred (image c). This complication was resolved by placing the guidewire downstream the coil and deploying the stent(image d), thus compressing the coil and maintaining normal permeability of the superior mesenteric artery.
References: Medical Imaging Department and Faculty of Medicine, University Hospital of Coimbra, Portugal

- Minor complications are more frequent and include ileus, abdominal pain, hypotension, etc…

- Major complications are rare and include bowel ischemia or infarction Fig. 26 on page 48(reported in about 1 to 2% of cases), enteric fistulas, femoral arterial access thrombosis and sepsis.

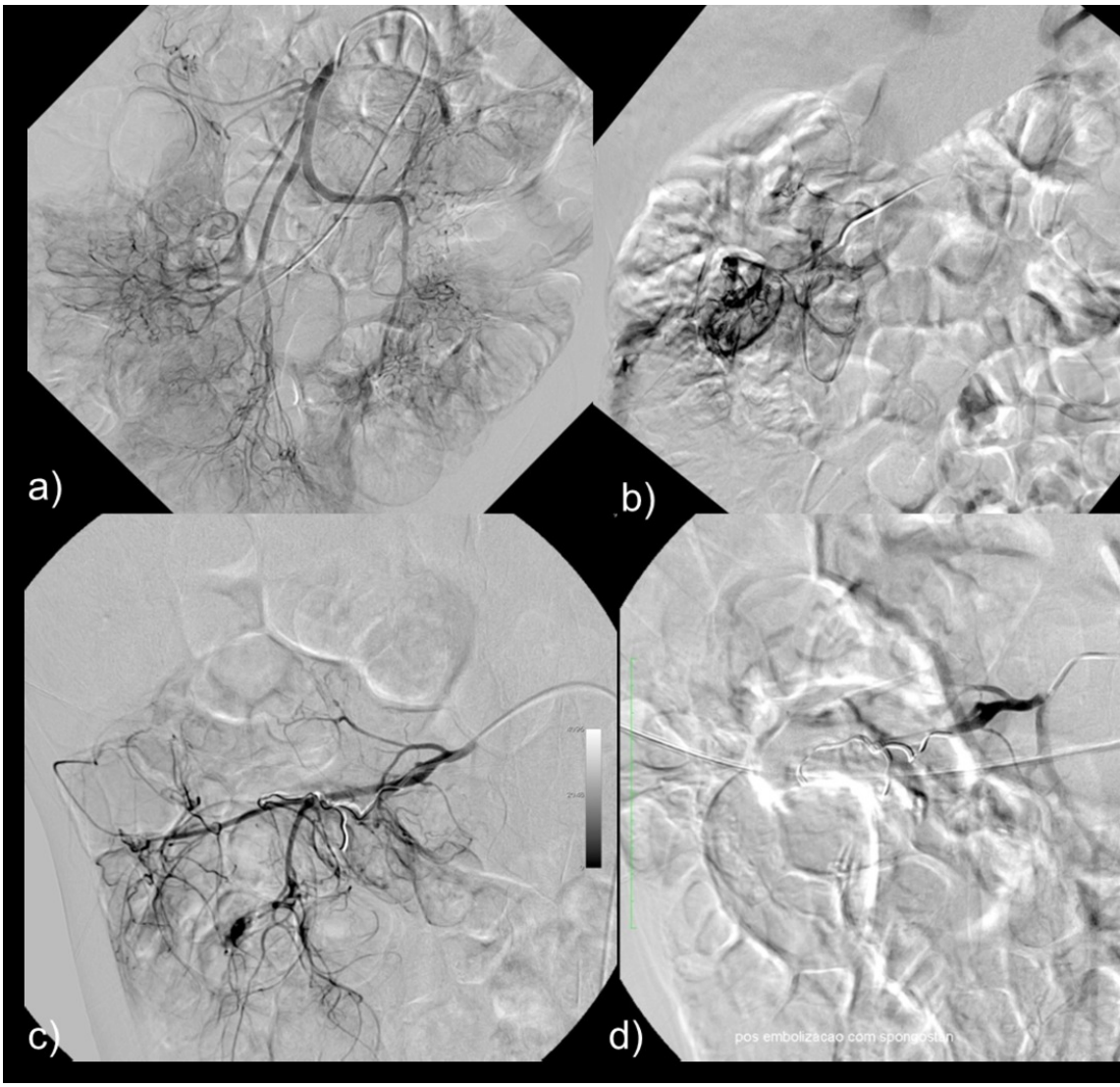


Fig. 26: 44 year old man referred for angiographic evaluation due to lower gastrointestinal haemorrhage, the patient had an history of previous unknown surgeries and previous gastrointestinal haemorrhages, no further data was given and the patient did not performed computed tomography scan. At the superior mesenteric artery angiogram a suspicious area at the topography of the right colic artery was seen (image a), and superselective catheterization confirmed the bleeding (image b). Coil embolization was performed, but was not sufficient to stop the bledding (image c), so gelfoam was also applied occluding the haemorrhage. This patient developed bowel ischemia afterwards confirmed at surgery. At the time of the embolization it wasn´t known that the patient had previous right hemicolectomy and he had a paraduodenal hernia, so the embolized vessels were in fact jejunal branches. This case is illustrative of the need and utility of computed tomography scans in patients with gastrointestinal haemorrhage and previous surgery.

References: Medical Imaging Department and Faculty of Medicine, University Hospital of Coimbra, Portugal

- In most instances small areas of infarction are well tolerated and do not require surgery being self-limited.

Embolotherapy results in gastrointestinal haemorrhage

- A success rate in about 80% of patients has been reported.
- In about 20% of patients recurrent hemorrhage within 30 days of treatment occurs. This rebleeding is more frequent with inflammatory lesions and arteriovenous malformations.

Causes of failure of embolotherapy

Initial phase

- Unable to catheterize main mesenteric artery due to overlying vascular disease.
- Unable to select branch vessel (spasm, tortuosity).
- Coagulopathy of difficult control or incorrigible.

Delayed phase

- Recanalization of previous embolized site and collateral flow.
- New bleeding focus.
- Maintained coagulopathy.
- Multiorgan failure.
- Sepsis.
- Steroid therapy.

Images for this section:

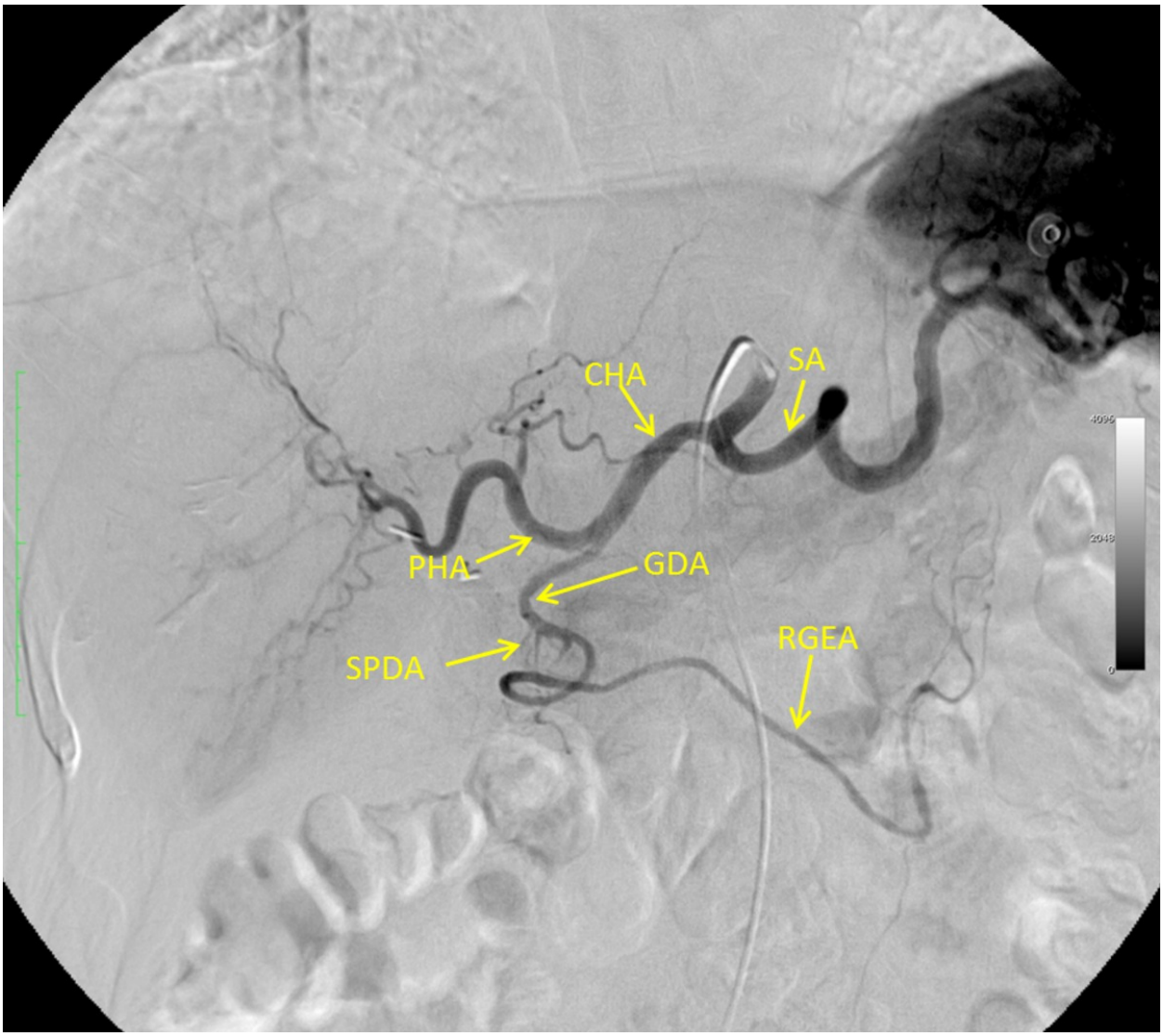


Fig. 9: Celiac trunk angiogram: CHA-Common hepatic artery; SA-Splenic artery PHA-Proper hepatic artery; GDA-Gastroduodenal artery; SPDA-Superior pancreaticoduodenal artery; RGEA-Right gastroepiploic artery.

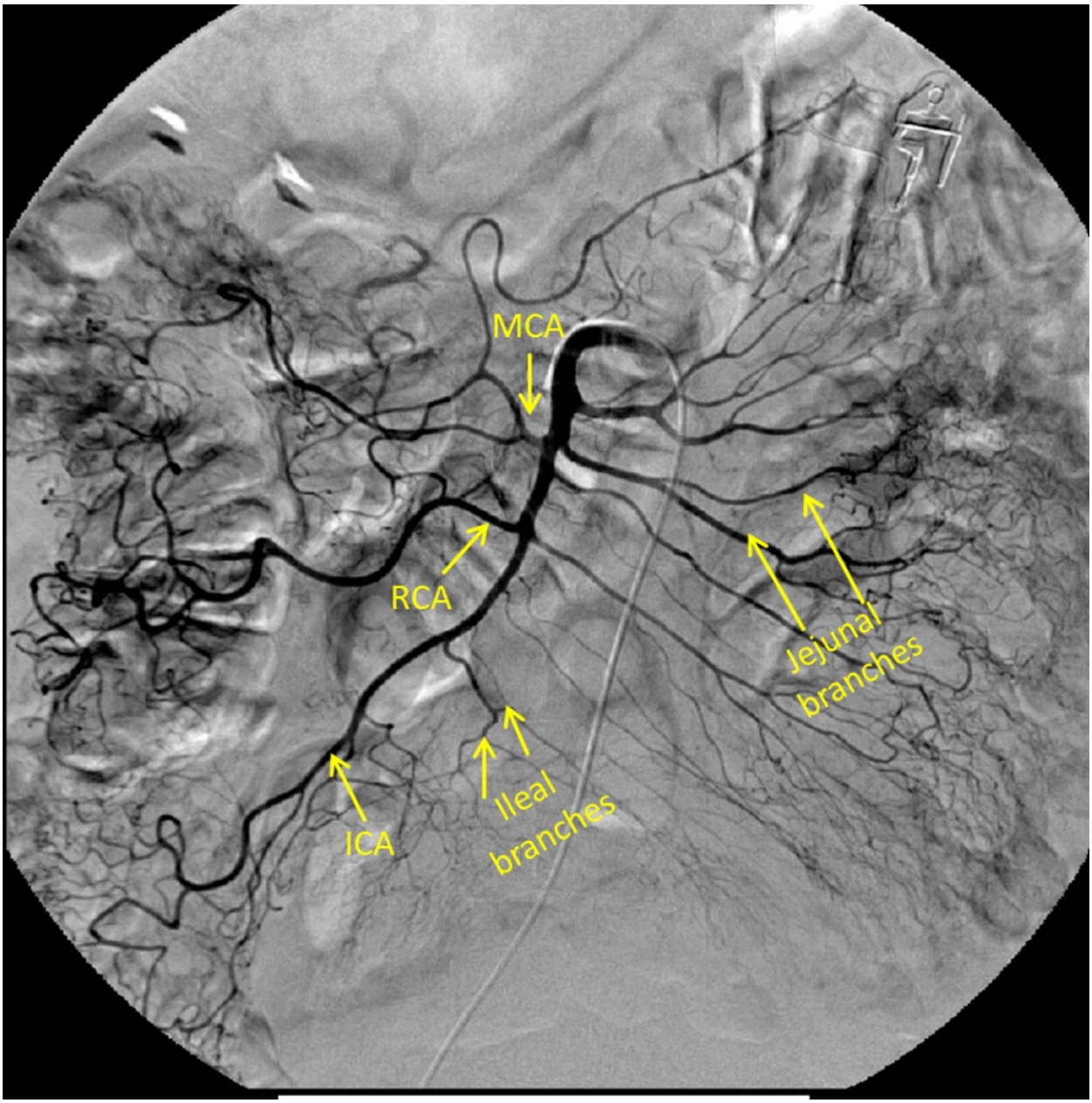


Fig. 10: - Superior mesenteric artery angiogram: MCA-Middle colic artery; RCA-Right colic artery; ICA-Ileocolic artery.

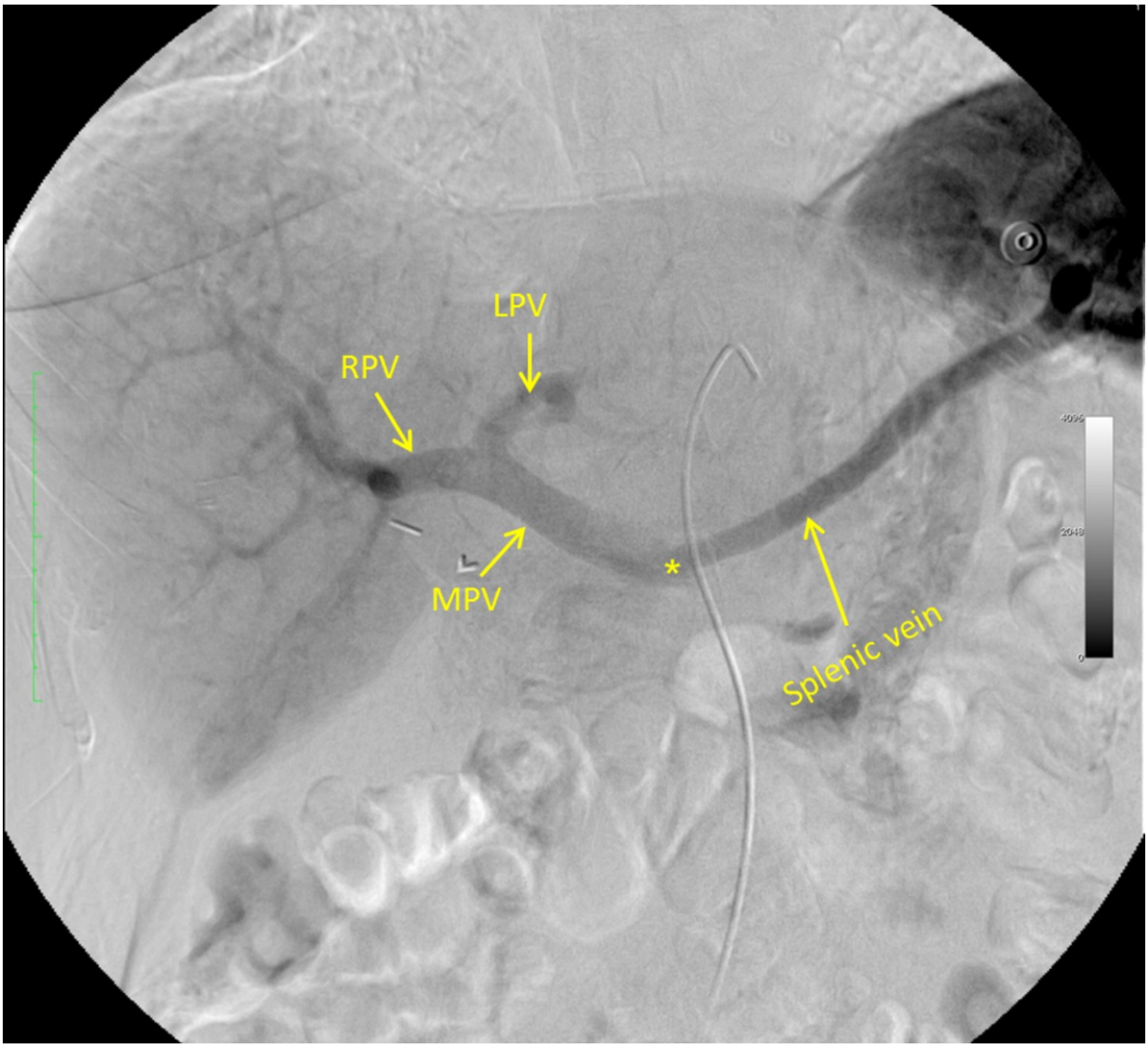


Fig. 11: Indirect portography after celiac trunk angiogram: MPV-Main portal vein; RPV-Right portal vein; LPV-Left portal vein; * - splenomesenteric confluence.

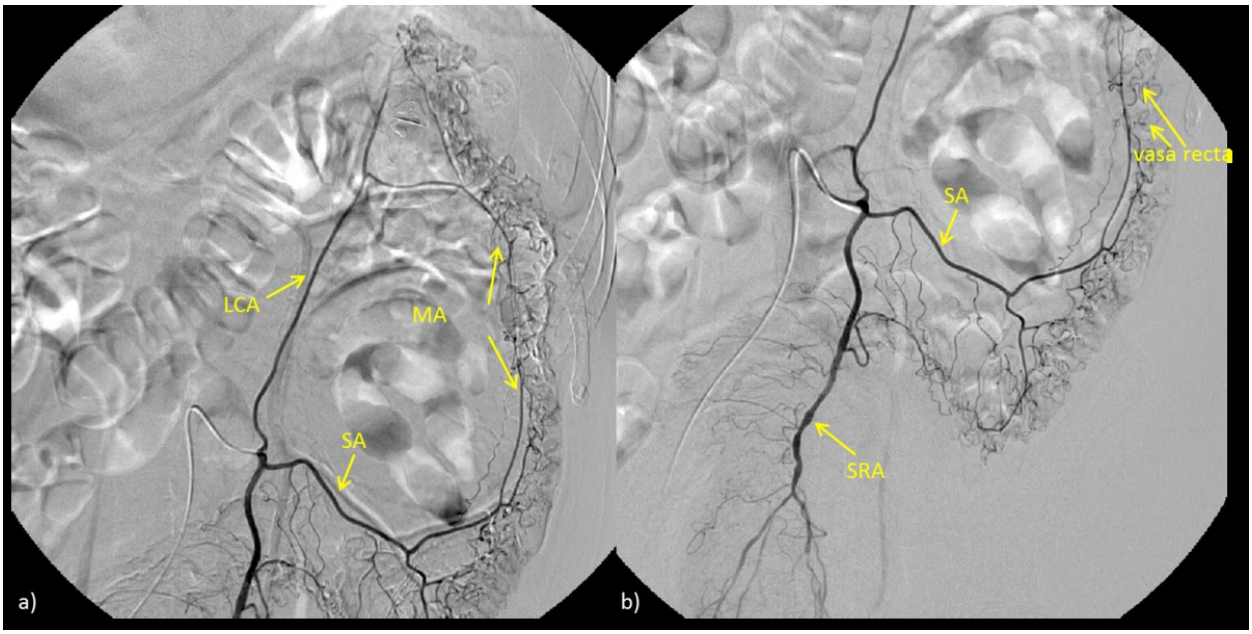


Fig. 12: Inferior mesenteric artery angiogram: LCA-Left colic artery; MA-Marginal artery; SA-Sigmoid artery; SRA-Superior rectal artery.

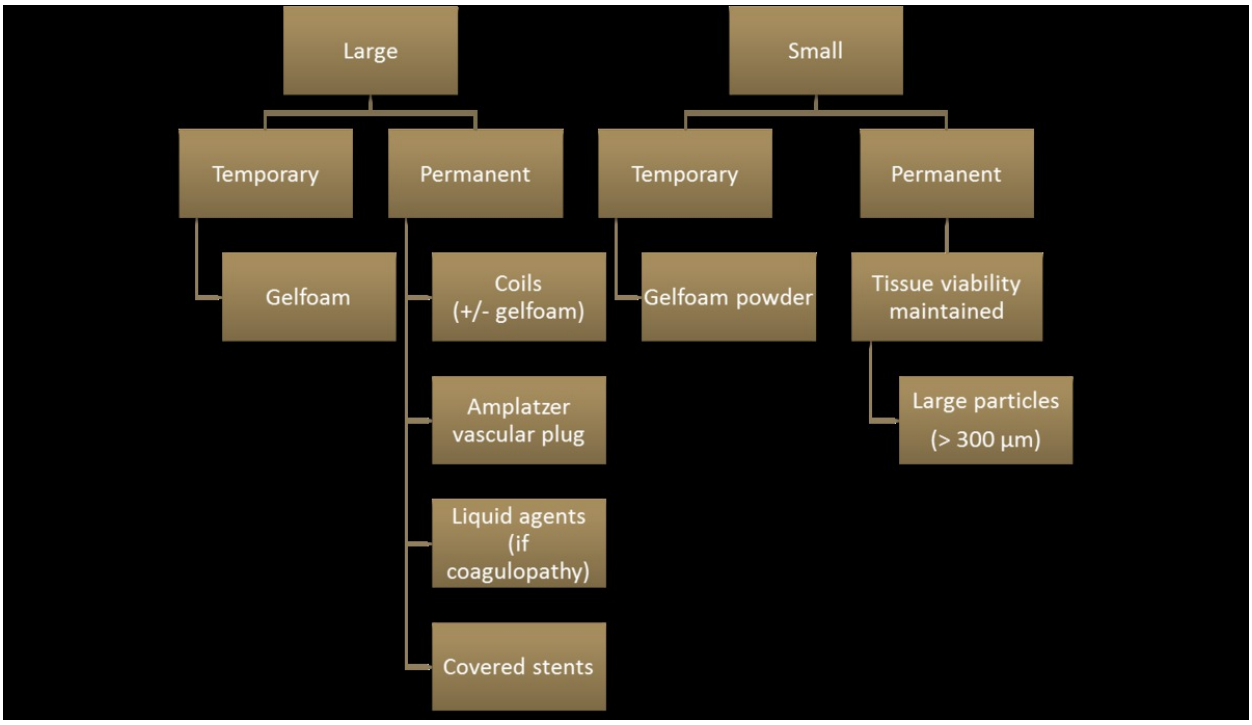


Fig. 13: Decision algorithm for embolic choice (adapted from Lubarsky M, Ray CE, Funaki B, 2009, Embolization agents-which one should be used when? Part 1: large-vessel embolization. Semin Intervent Radiol 26:352-357).

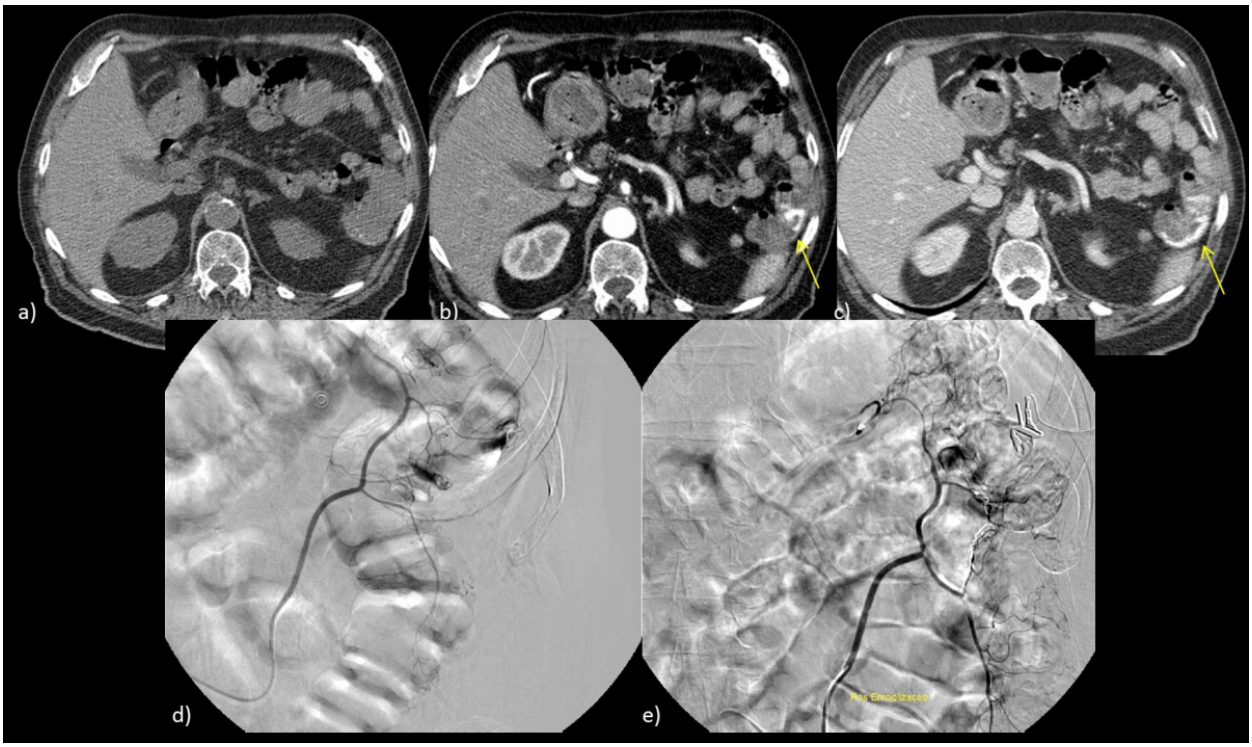


Fig. 14: Unenhanced a) arterial phase b) and portal venous phase c) axial CT images of a 86 year old man presenting with hematochezia and hypotension secondary to haemorrhagic diverticulosis, previous shown in figure 5. This patient went to the angiography room and the selective catheterization of the inferior mesenteric artery identified the bleeding site at the vasa recta of the marginal artery (image d). A microcatheter was coaxially introduced into the 5 Fr catheter and successful microcoil embolization of the bleeding vessel was achieved (image e). Pre-procedural knowledge of the haemorrhage allowed for initial catheterization of the inferior mesenteric artery resulting in less delay.

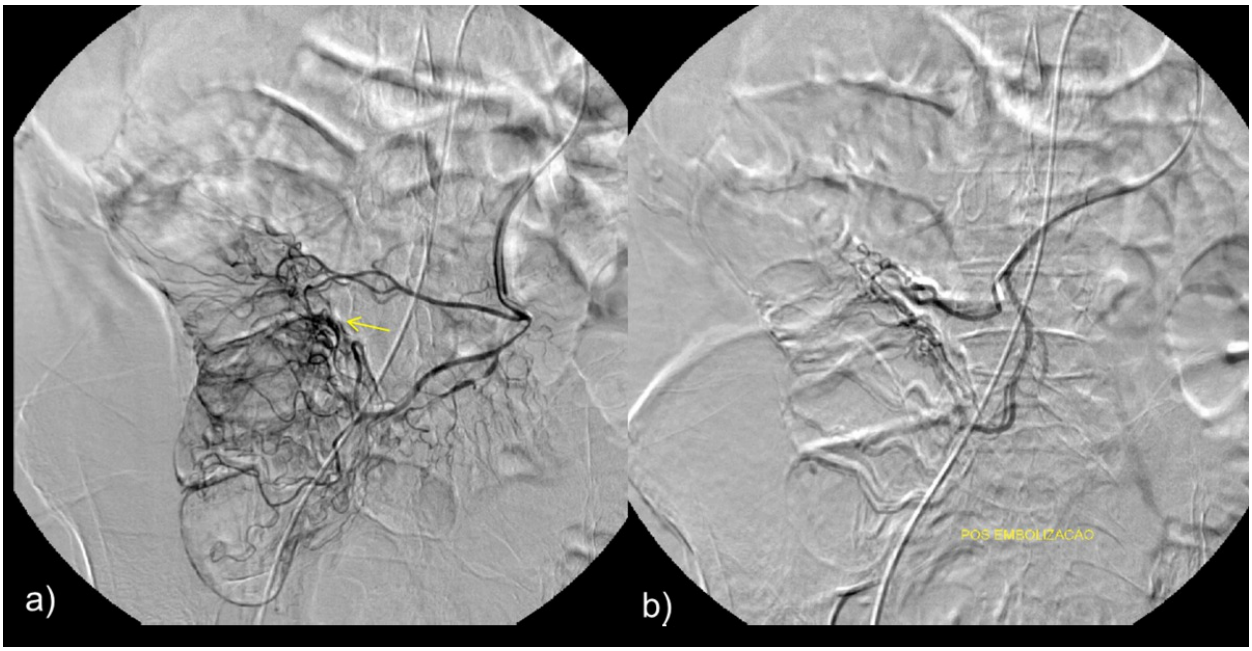


Fig. 15: 96 year old man who was referred by right colon bleeding, no other examinations were given. In fact this was the second angiography in 3 days, in the first one no active bleeding was detected. So in this case superselective catheterization of the superior mesenteric artery branches was performed and suggestion of bleeding was found in branches of the right colic artery were a small cluster of small arteries was found (arrow in image a). These findings were consistent with angiodysplasia and superselective microcoil embolization at the vasa recta was performed (image b), the patient underwent uneventful clinical and laboratorial recovery.

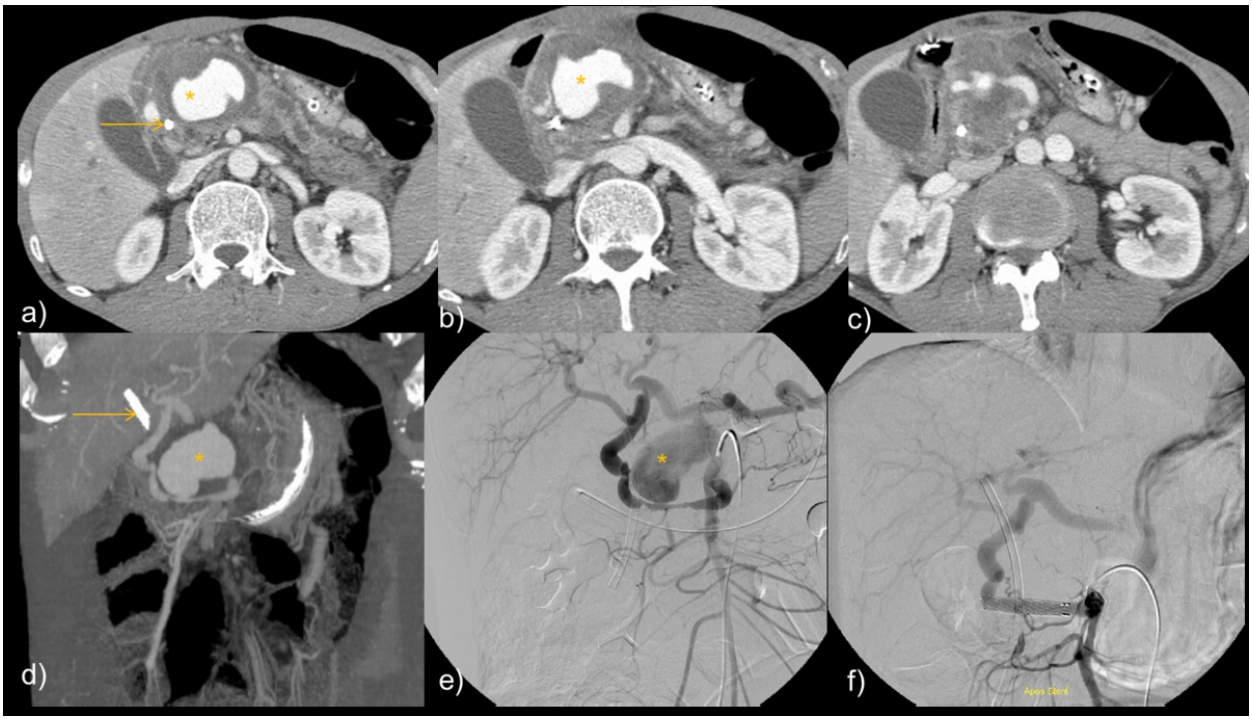


Fig. 16: Enhanced axial CT arterial phase images a), b) c) of a 53 year old male patient with severe chronic pancreatitis with a plastic biliary stent (arrows) and a large gastroduodenal pseudoaneurysm (*). Thick coronal MIP image d) demonstrated a narrow neck allowing pre-interventional planning, thus a covered stent was deployed via the pancreaticoduodenal inferior artery with successful exclusion of the aneurysm and bleeding (images e and f).

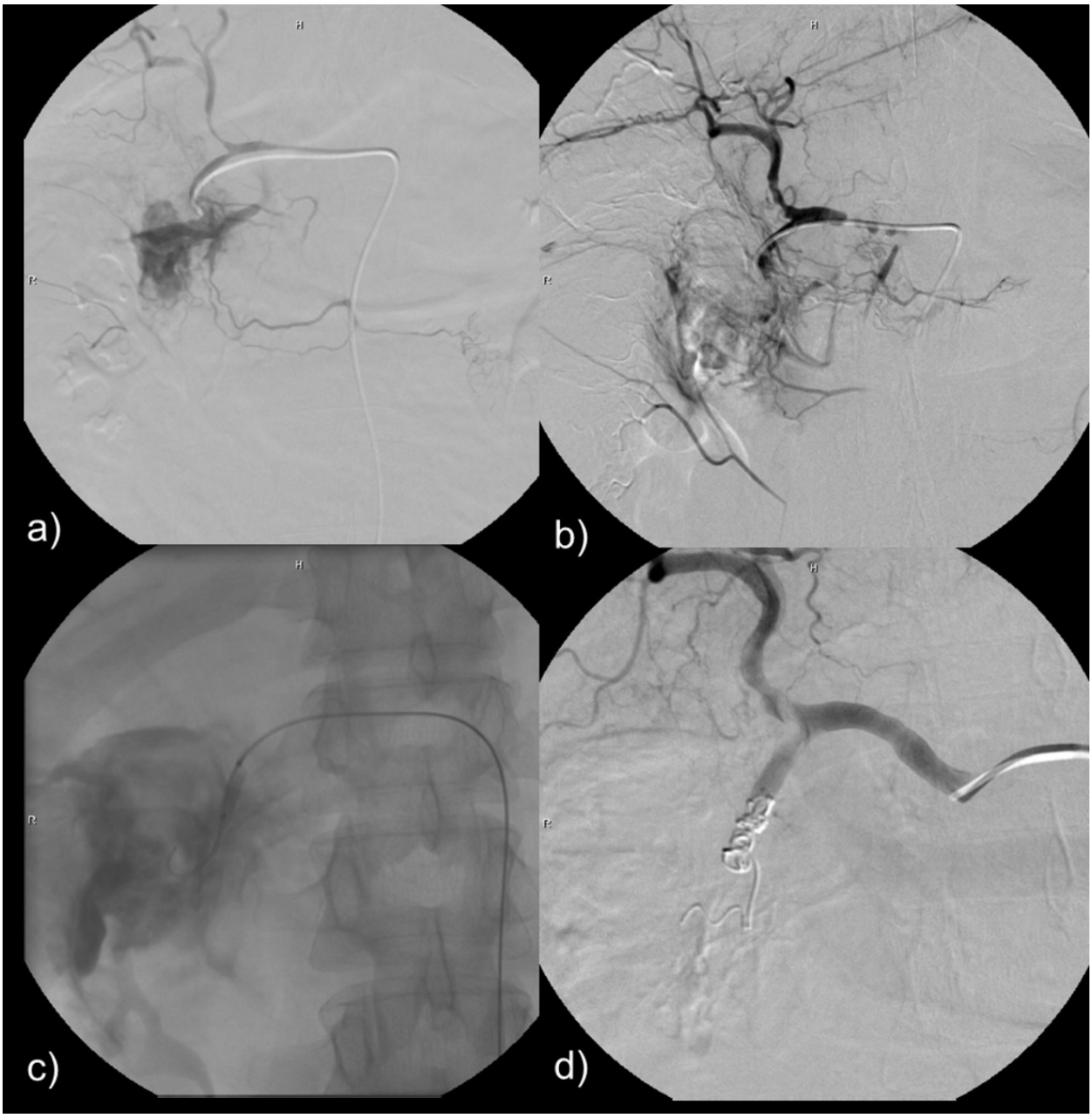


Fig. 17: Hemodynamically unstable patient referred to the angiography room, presenting with massive haemorrhage from the gastroduodenal artery (images a and b) . Before embolization a balloon was inflated (image c) due to the critical status in order to "gain" some time before coil embolization was performed together with gelfoam (image d). The

superior mesenteric artery was studied (not shown) and no "backdoor" to the bleeding site was found.

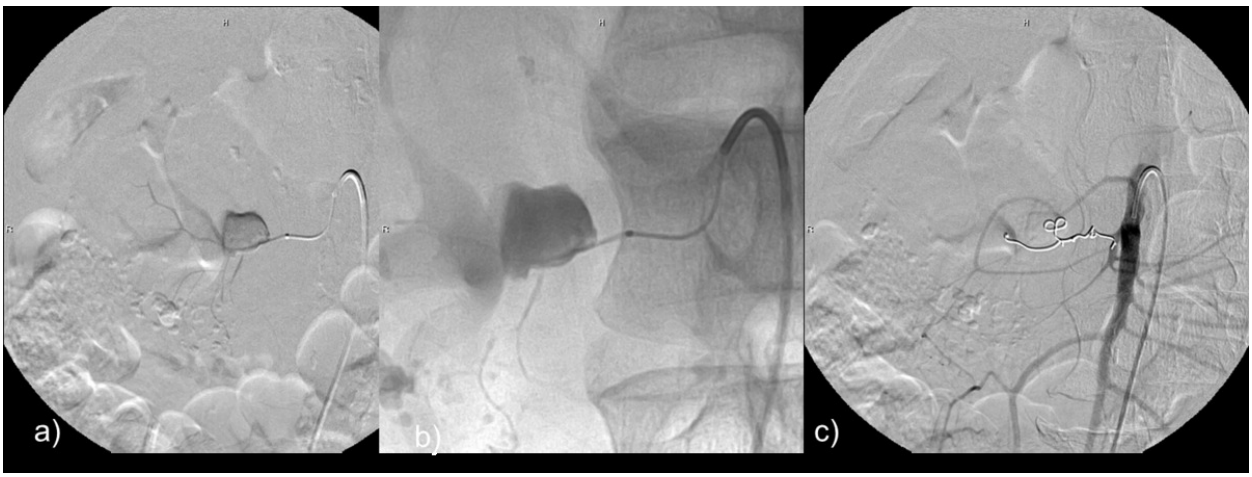


Fig. 18: Patient with acute pancreatitis presenting active bleeding from the inferior pancreaticoduodenal artery (images a and b). Bleeding site was successfully embolized with microcoils achieving stoppage of the bleeding (image c).

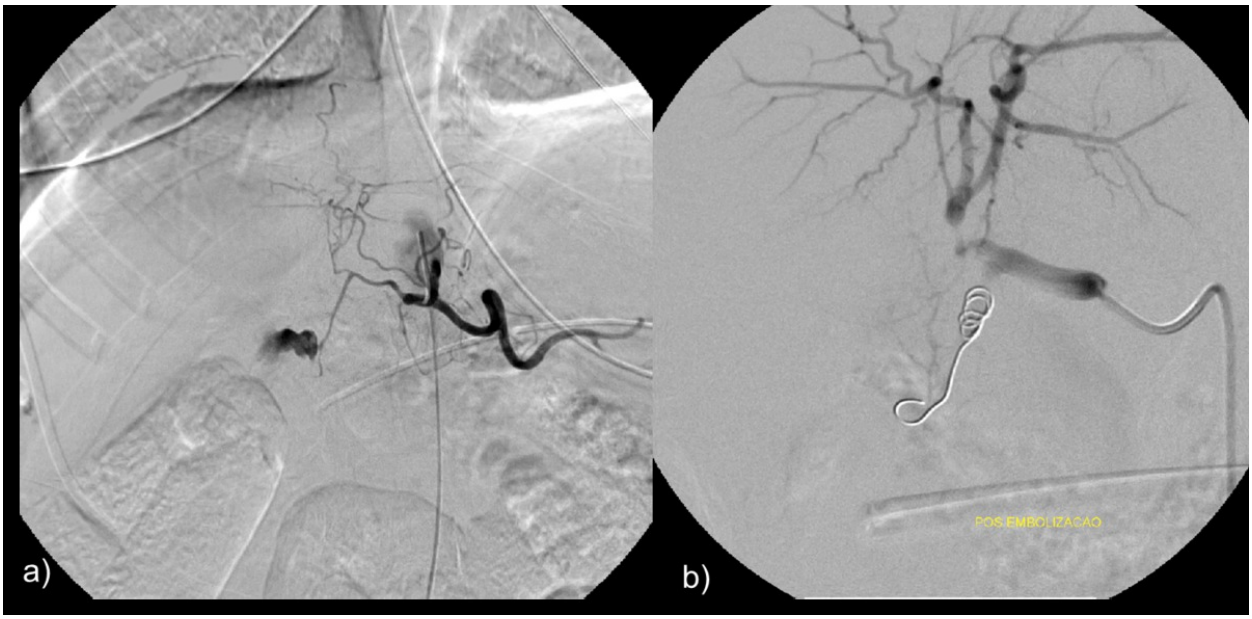


Fig. 19: 80 year old woman, hemodynamically unstable presenting with massive haemorrhage in the gastroduodenal artery (image a, previous shown in figure 8). This patient had already performed a endoscopy that detected fresh blood, but due to the massive haemorrhage the bleeding site could not be detected. Hemodynamically unstable patients such as this one should immediately undergo arteriography with team support of intensive care physician, conversely arteriography in hemodynamically stable patients with low volume haemorrhage is likely to be fruitless, and is best reserved for cases in which all other standard workup has failed to localize or characterize the

source of bleeding. The bleeding site once identified was embolized successfully with microcoils, and the patient recovered almost immediately, namely with stabilization of blood pressure.

Fig. 20: 84 year old man with prepyloric antrum neoplasm invading the surrounding structures, with hemoperitoneum (*) and doubtful bleeding in the dependence of the gastroduodenal artery (arrow) at the computed tomography scan (image a). The patient went to the angiography room and the bleeding site was identified and embolized with coils (images b and c) as a palliative measure.

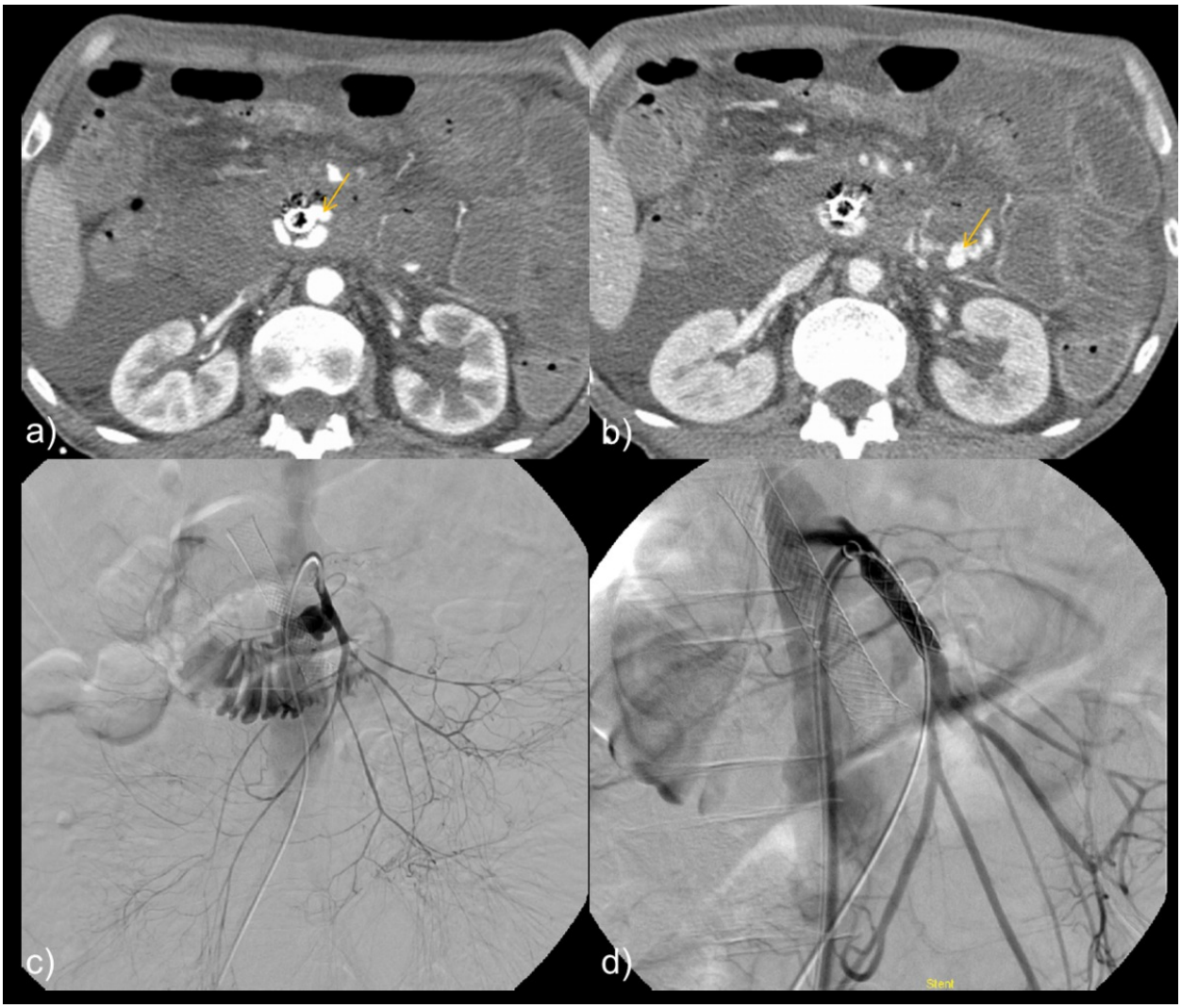


Fig. 21: 49 year old man with pancreatic head adenocarcinoma already palliated with biliary prosthesis, presenting with hypotension and hematemesis. Computed tomography (images a and b) disclosed hemorrhage around the biliary prosthesis with extravasation into the bowel lumen (arrows). The bleeding site was identified in the superior mesenteric artery and it was stopped by deploying a covered stent (images c and d).

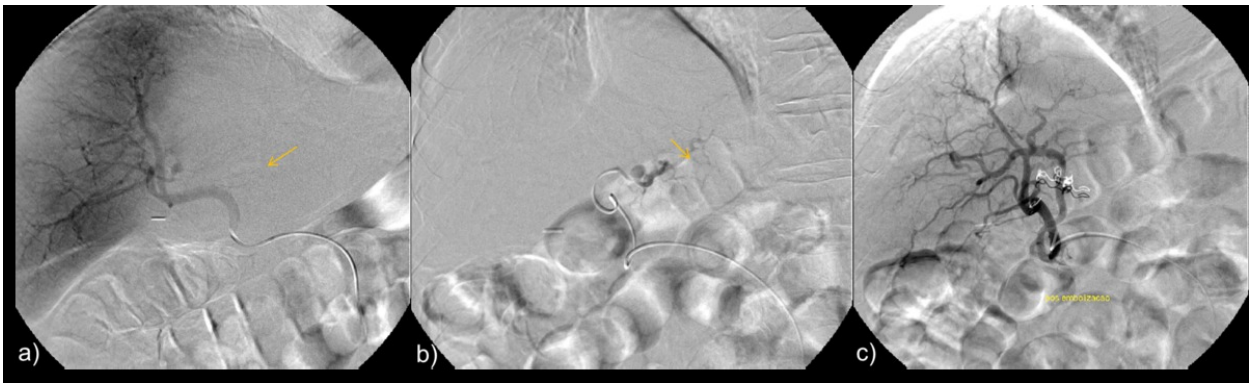


Fig. 22: 79 year old man referred for angiographic evaluation after upper endoscopy revealed bleeding from the duodenal papilla consistent with haemobilia, and cholecystectomy had been previously performed. After selective catheterization of the right hepatic artery a pseudoaneurysm is seen (arrows in images a and b), which was occluded by microcoil embolization (image c) and the haemobilia ceased following embolization.

Fig. 23: 40 year old man referred to our institution for angiographic evaluation after endoscopy suggested hemossucus pancreaticus. This patient also had performed CT scans in the referring institution suggesting a gastroduodenal pseudoaneurysm. After selective catheterization of the celiac trunk (not shown) and superior mesenteric artery a pseudoaneurysm is seen in the dependence of the inferior pancreaticoduodenal artery (images a and b). Successful embolization was achieved wit microcoils occluding the bleeding (image c).

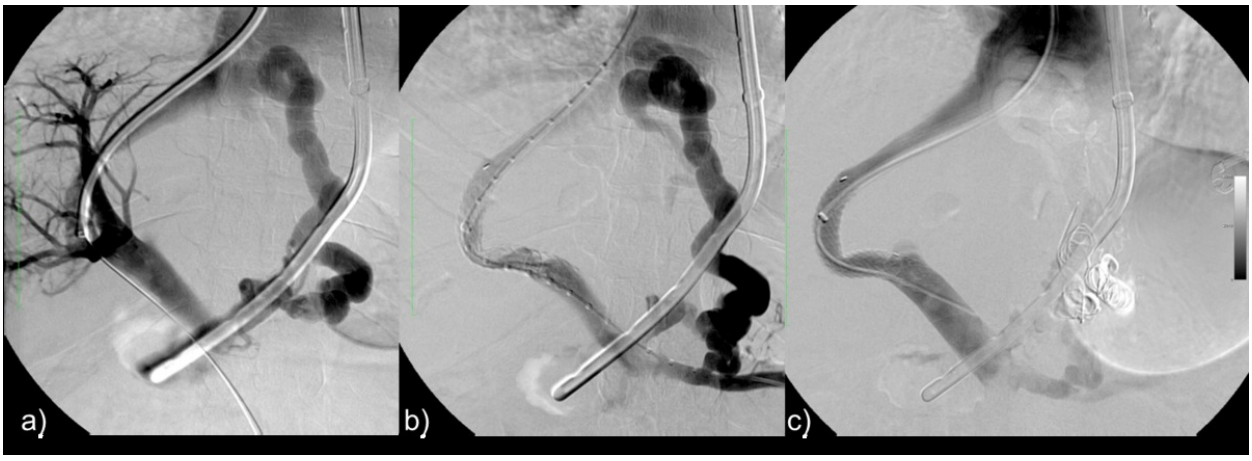
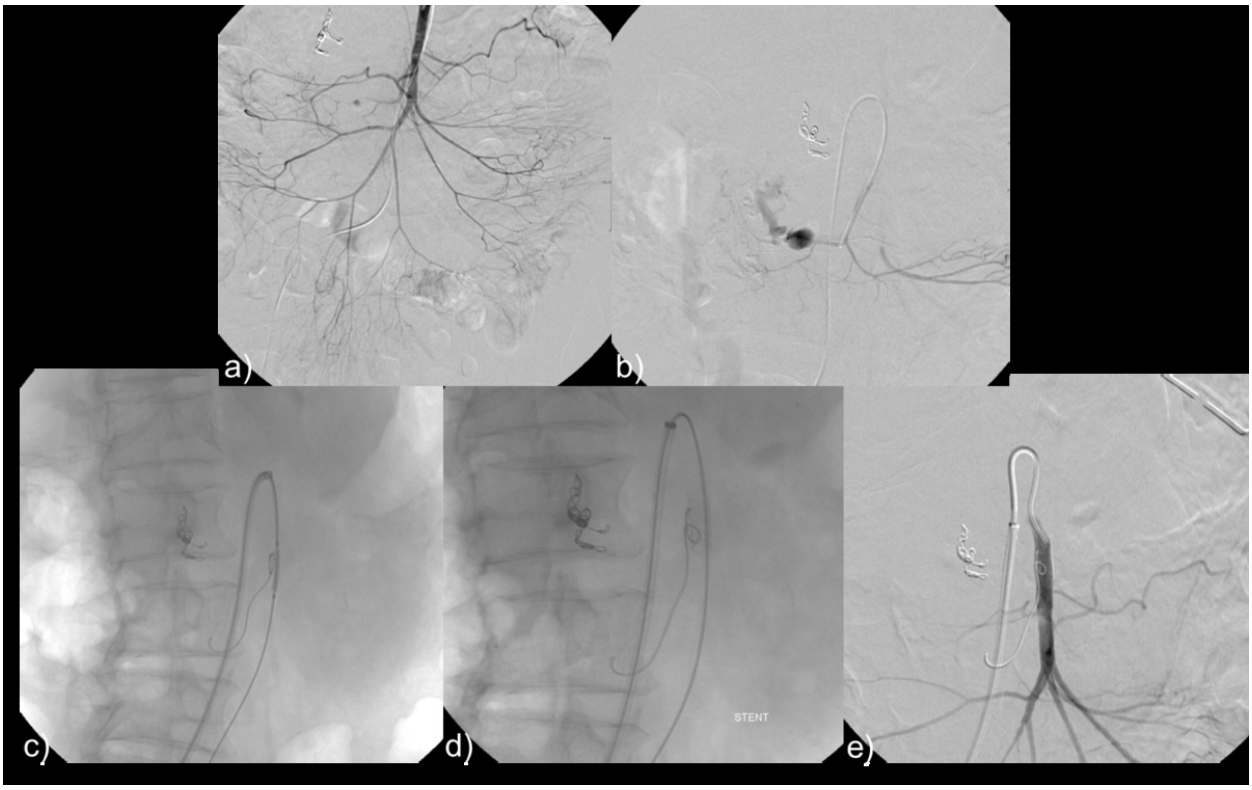


Fig. 24: 46 year old man with hepatic cirrhosis presenting with upper gastrointestinal bleeding refractory to both endoscopy and pharmacological treatment. Direct portography shows significant collateralization to the left gastric vein, opacifying above the diaphragm, the left portal vein was not seen (image a). After TIPS creation the collateral was still opacifying and above the diaphragm (image b), so the collateral was occluded with coils and amplatzer™ vascular plug (image c).



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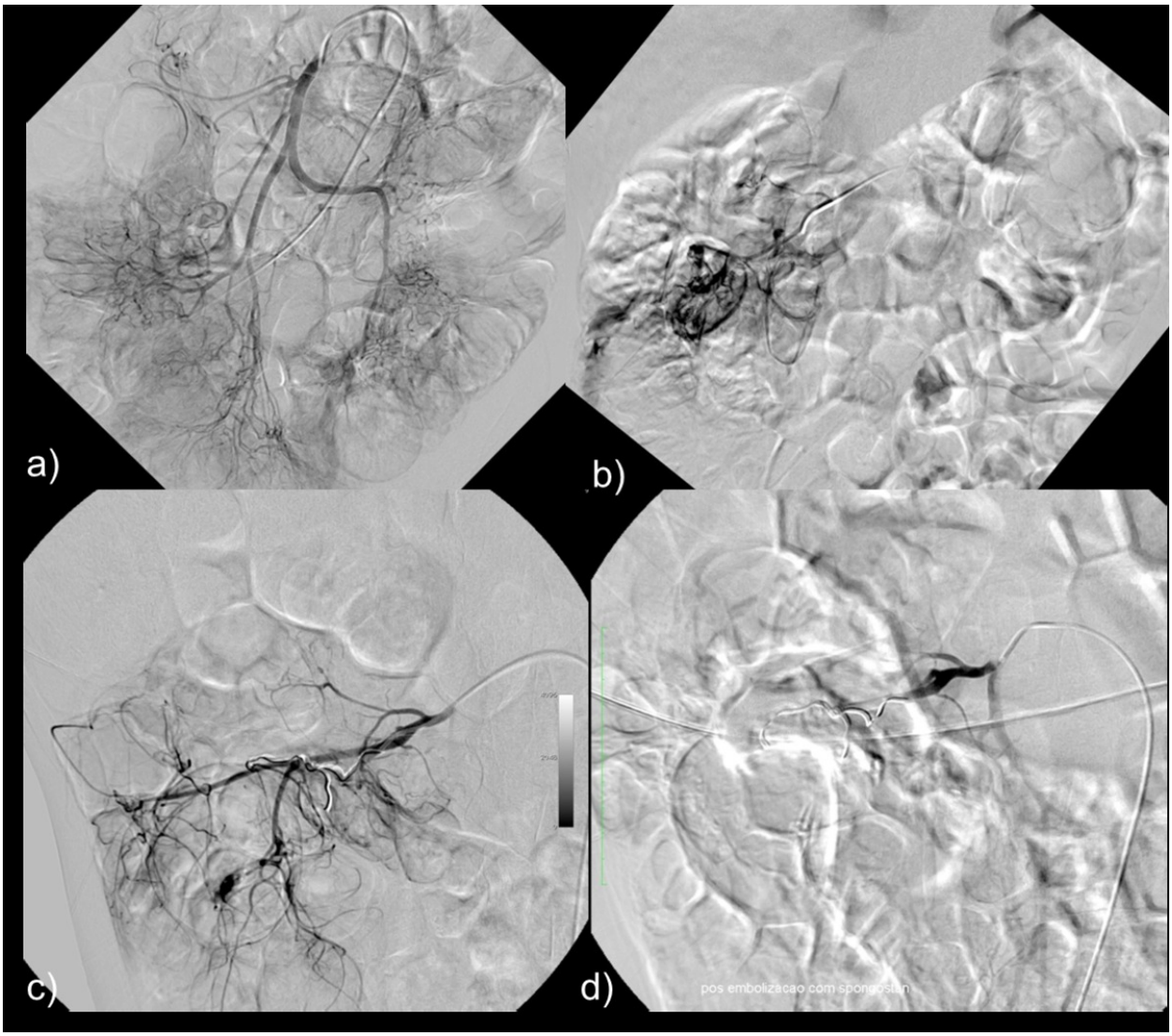

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Conclusion

- Percutaneous arterial embolization could be the initial treatment in any patient with bleeding severe enough to require angiography, namely in unstable patients, and in whom superselective catheterization is possible.
- Short and long term high success rate can be achieved.
- Most common complications are usually subclinical and success is conditioned by the experience of the interventional radiologist.
- In this context understanding the mechanisms and indications of different embolic agents is essential.

Personal information

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