Imaging abdominal vascular emergencies

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Abdominal vessels
Acute liver bleeding

- trauma
- anticoagulant therapy
- liver disease: HCC, adenoma, meta, FNH, Hemangioma

Diagnosis: CT angiography

Transcatheter arterial embolization
Surgical hemostasis
Visceral bleeding

- Spontaneous splenic rupture caused by lymphoma and leukemia results in severe bleeding.
Hyper vascular malignancies such as hepatocellular carcinoma, renal cell carcinoma, and melanoma are the most common culprits for spontaneous hemoperitoneum.

Meta from lung carcinoma, renal carcinoma and melanoma are the most frequent types that cause hepatic bleeding (Casillas et al. 2000).
GI TRACT

Intramural hemorrhage

- After FGSc, FCSc, TEE
- Anticoagulation treatment
CT is method of choice if:
- FCSc is not applicable
- FCSc does not find the bleeding source
- Angiodysplasia > 50 y
CT Locates bleeding
Identifies source of bleeding

- Intestinal tumor < 50 y
Intra-abdominal hemorrhage

- At unenhanced CT, acute hemoperitoneum appears as high-attenuation ascites (approximately 30–45 HU) because of the high protein content in unclotted extravascular blood.
- **Clotted blood** shows an attenuation of 45–70 HU
- **Active extravasation** of contrast material within the neoplasm and peritumoral region, after intravenous administration of the agent, indicates ongoing bleeding and the need for embolization or emergent surgical exploration
Rupture of abdominal aortic aneurysm
Can be symptomatic: impending rupture, contained leak, rupture.

A true aortic aneurysm is a localized dilatation of the aorta caused by weakening of its wall; it involves all three layers (intima, media, and adventitia) of the arterial wall.

Measure diameter on MPR, perpendicular to the blood flow! Axial slices can be misleading!!!

A pseudoaneurysm (false aneurysm) is not enclosed by the normal vessel wall - only by the adventitia or surrounding soft tissue.
Findings of Impending rupture

- Size > 6cm
- Thrombus / lumen ratio
- A focal discontinuity in circumferential wall calcifications - unstable aneurysms
- A peripheral increased attenuation within the thrombus
Rupture of abdominal aortic aneurysm

- A retroperitoneal hematoma adjacent to an abdominal aortic aneurysm is the most common imaging finding of abdominal aortic aneurysm rupture
• If acute bleeding is suspected unenhanced CT is mandatory!!!!!
Contrast enhanced CT

- size of the aneurysmal lumen,
- presence of active extravasation,
- relationship of the aneurysm to the celiac, superior mesenteric, renal, and inferior mesenteric arteries.
Rupture of visceral aneurysm

- splenic artery in 60%–80% of cases
- hepatic artery 20%

Rapid size increase in a known VA may be predictive
Abdominal aorta dissection

Complications:
- Rupture
- Visceral malperfusion
Malperfusion due to static compression

- Dissection continuing in the vessel
- No exit - thrombosis of the false lumen
Malperfusion due to dynamic compression

- True lumen compressed by the falls lumen
- Entry bigger than exit
Static and dynamic occlusion
Ischemia / infarct

- Different stages of an injury caused by interruption of the blood supply to the intestinal tissue.
- Ischemia could be a totally reversible event
- Infarction corresponds to a tissue death with no chance for the tissue to heal.

Fenoglio-Preiser et al. 2008
Three main conditions underlying an intestinal ischemic event

Impaired:
- Arterial blood supply - mainly related to embolism or thrombosis;
- Venous drainage;
- Decreased blood flow (cardiac failure, myocardial infarction, bleeding, and hypovolemia)

Paterno and Longo 2008
Bowel ischemia can present with nonspecific signs and symptoms!

Could be difficult to recognize ischemia or infarction of the bowel (Gore et al. 2008).

Acute mesenteric ischemia can be considered a real emergency because of the associated significant mortality rate - between 30 and 90%
Damage from ischemia

- increased capillary permeability
- epithelial cell injury
- coagulative necrosis
CT

- Collapsed small bowel with parietal enhancement - normal / higher
- In the following stage - air distension, thinner wall
pneumatosis intestinalis  

pneumatosis portalis:  

pneumoperitoneum: perforation of the bowel  

DD pneumobilia - more clustered at the hilum
After reperfusion

- extravasate through the disrupted vascular wall and mucosa,
- wall thickening, mural hemorrhage
- fluid filling of the lumen

Chou et al. 2004
Colonic Ischemia

- Griffith’s point
- Sudeck’s point

- most commonly involved by ischemic injuries

(Balthazar et al. 1999; Romano et al. 2006)
Ischemia of the colon

- Segmental or diffuse
- Mural thickening with hyper density of the mucosa from hemorrhage associated with submucosal edema
  - Romano et al. 2006, 2007
Acute pelvic vein and inferior vena cava occlusion

- postpartum period
- pelvic inflammatory disease
- tumor
- extension from the femoro-popliteal
Look at veins on venous phase
Conclusion

The CT affords a rapid, accurate, non invasive method of detecting vascular injury and appropriately triaging patients to receive the requisite intervention, when necessary.