

Acute complications of aortic aneurysms

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The complications of AAA include:

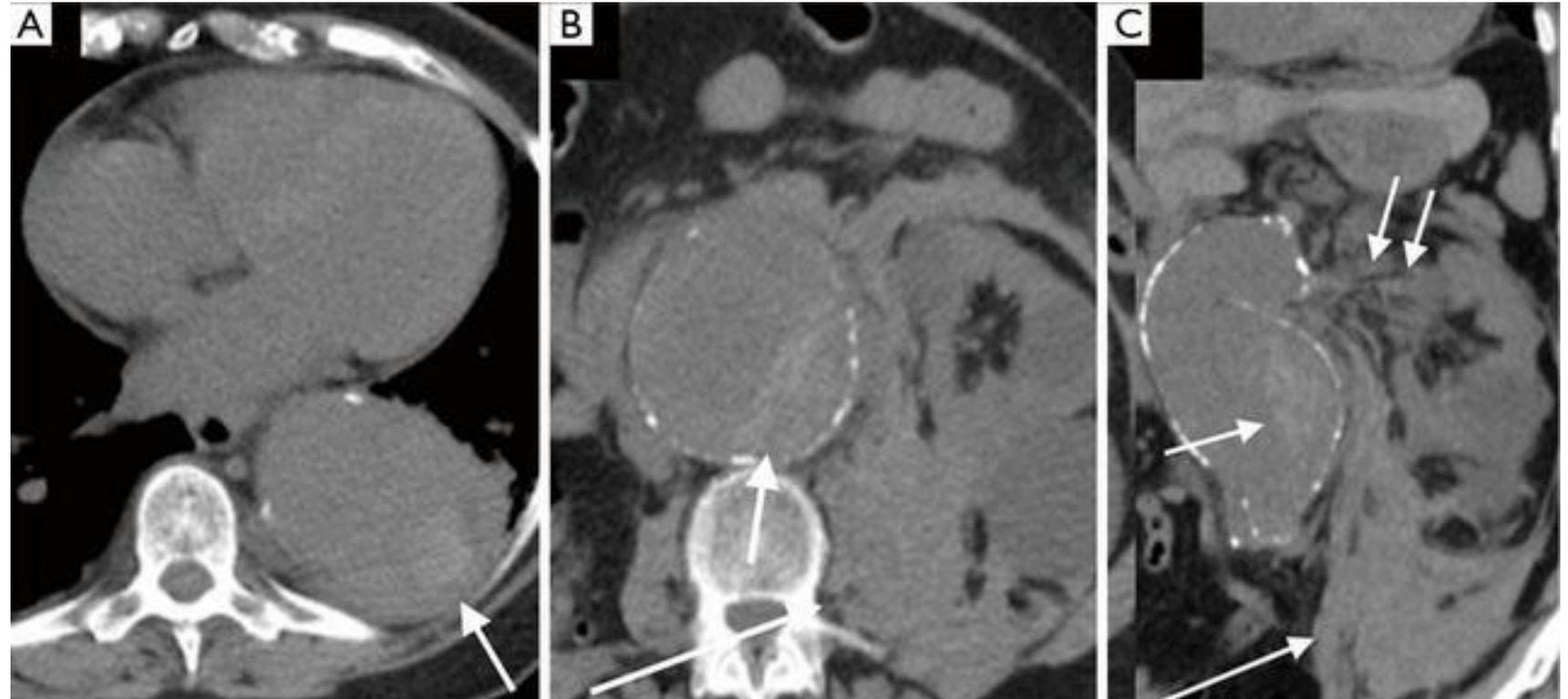
- ▶ Rupture
- ▶ Infection
- ▶ Aorto-enteric fistula
- ▶ Aorto-caval fistulas
- ▶ Pseudoaneurysm
- ▶ Thrombotic occlusion of branch vessel
- ▶ Compression of adjacent structures.

Rupture

- ▶ Acute rupture of AAA is a surgical emergency, and if left untreated, it has a mortality rate approaching 100%.
- ▶ The rupture most commonly involves the posterolateral aspect of the aortic wall, which results in hemorrhage into the retroperitoneal spaces including the perirenal space, pararenal spaces, and psoas muscles.
- ▶ Thus, the most common imaging feature of aneurysmal rupture is the presence of a retroperitoneal hematoma adjacent to AAA and peri-aortic stranding (Fig 1).

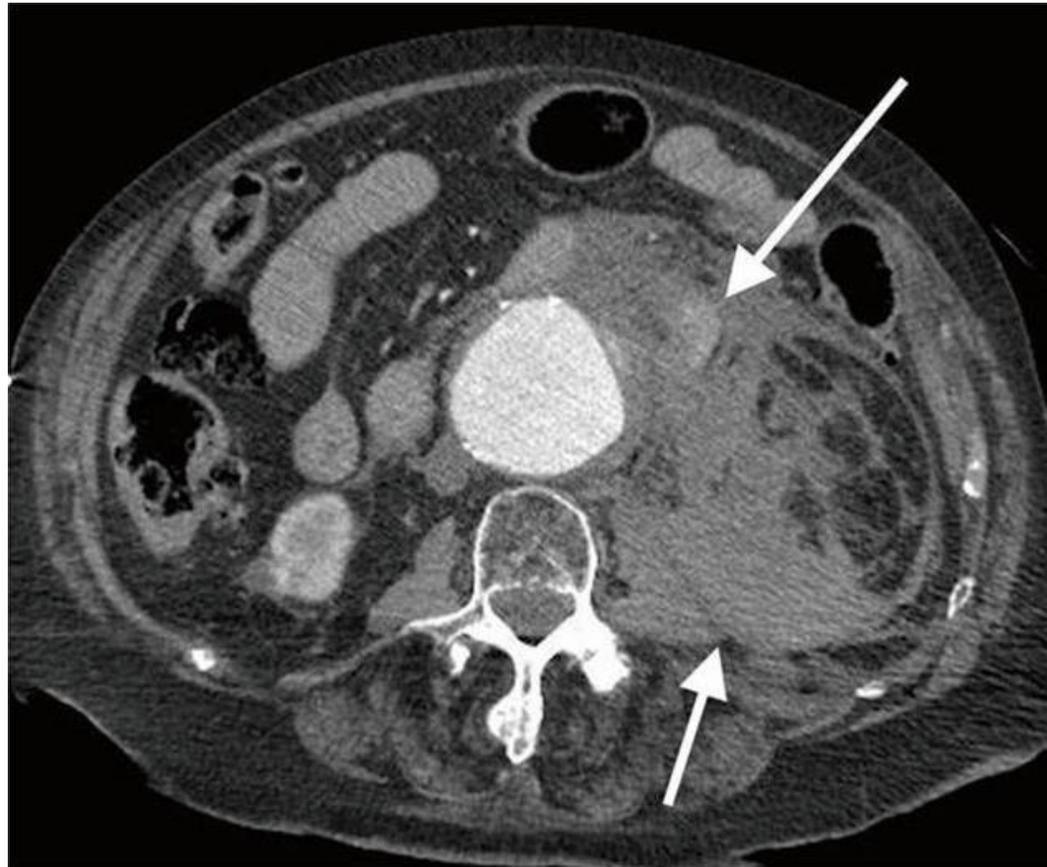
Figure 1: Non-contrast axial (A,B) and coronal (C) CT images of the abdomen demonstrate descending thoracic and abdominal aortic aneurysms with rupture.

- The large retroperitoneal hematoma (larger arrow), and periaortic stranding (double arrows).
- The patient also has a high attenuation crescent sign (smaller arrow)—a secondary sign of rupture.



- ▶ Extravasation of IV contrast reflects active bleeding (Fig 2).
- ▶ Secondary signs of rupture include high attenuation crescent (Fig 1), hematoma within either the mural thrombus or the aneurysmal wall, focal discontinuity of intimal calcification (Fig 1), tangential calcium sign, intimal calcification pointing away from the aneurysm, draped aorta sign, indistinct posterior aortic wall, posterior aorta following the contour of the spine on one or both sides.

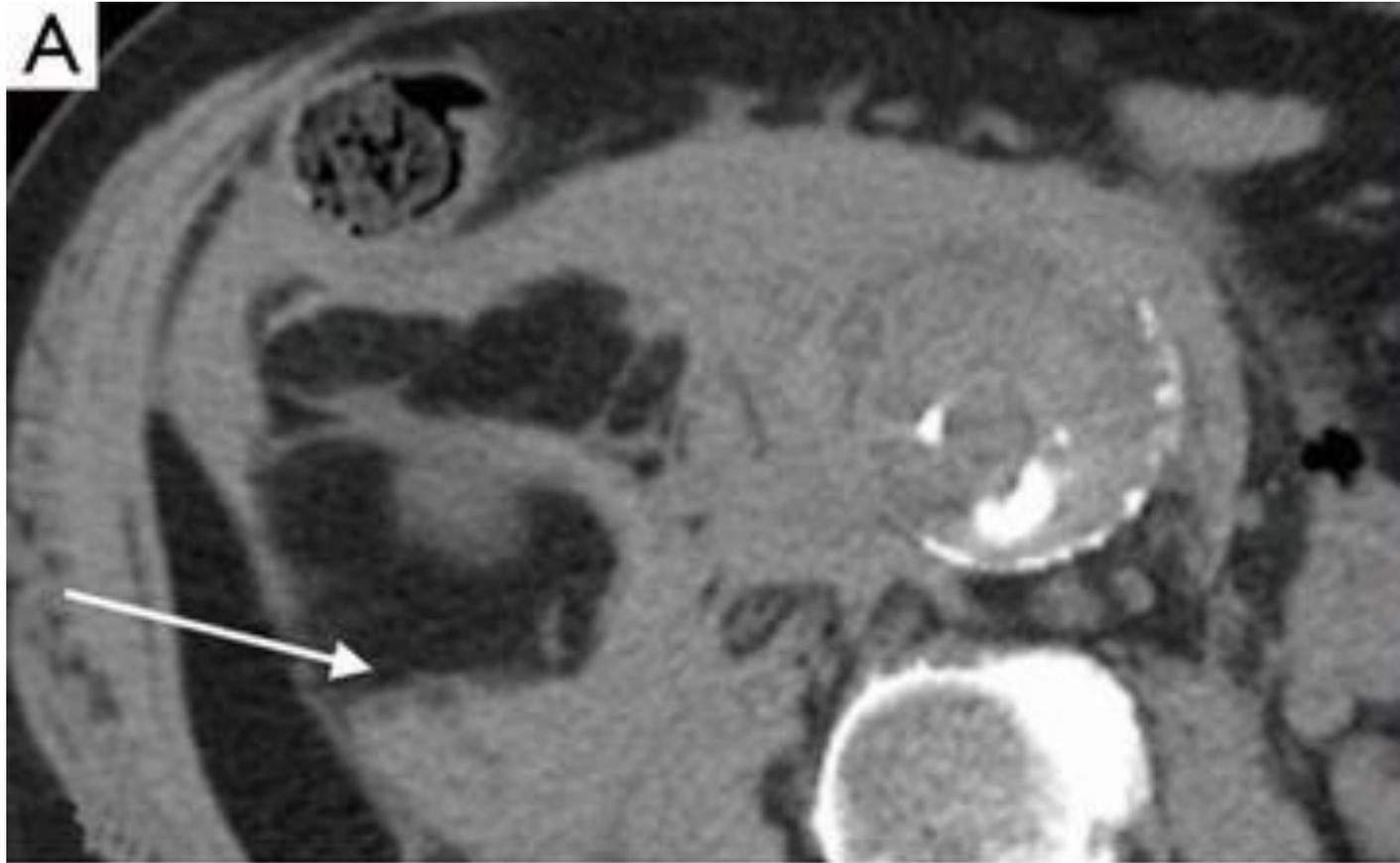
Figure 2: Axial CTA image demonstrates the presence of high attenuation contrast (larger arrow) in the retroperitoneal hematoma (smaller arrow) suggestive of active bleeding in a ruptured aortic aneurysm.



Contained Rupture

- ▶ The diagnostic criteria for contained rupture include:
known abdominal aortic aneurysm, previous pain symptoms that may have resolved, stable hemodynamic status with a normal hematocrit.
- ▶ CT imaging with show retroperitoneal hemorrhage, no evidence of active extravasation (Fig 3), with draping aorta sign.

Figure 2 Axial and coronal CTA images (A) of the abdomen in a patient with acute back pain demonstrate a contained rupture of AAA with periaortic retroperitoneal hematoma extending into the right side of the retroperitoneum (arrow).



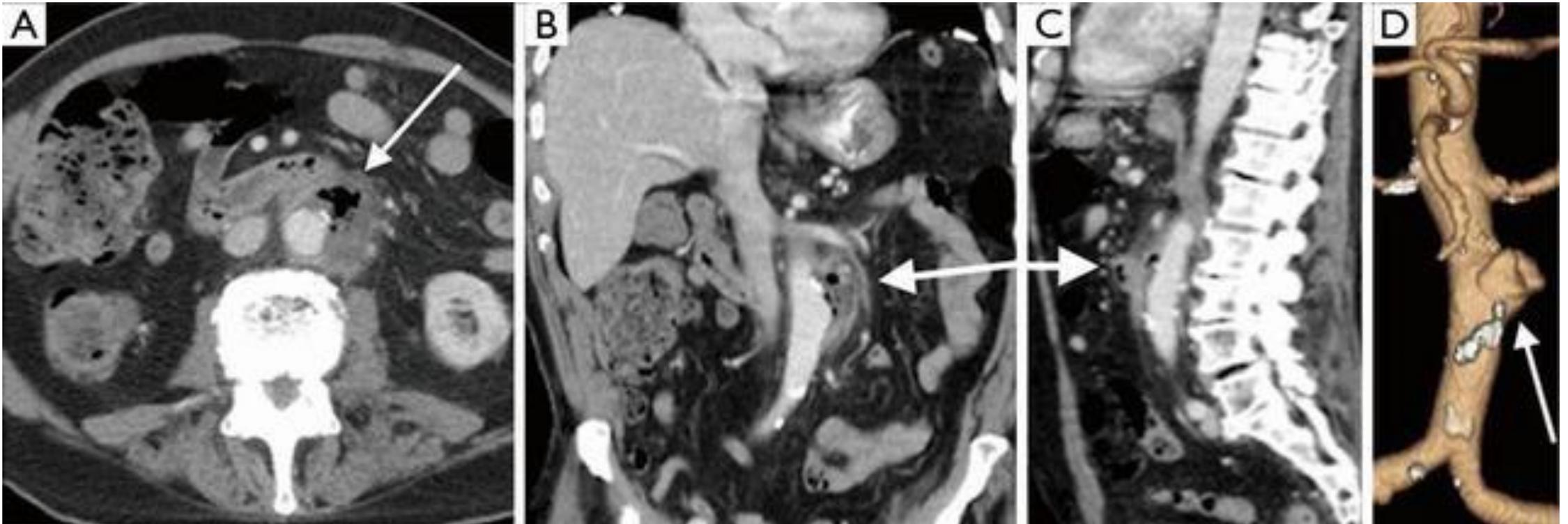
Infected (mycotic) aneurysms

- ▶ Mycotic aneurysms account for 0.7–2.6% of aortic aneurysms.
- ▶ They are very prone to rupture, with rupture rate of 53–75% at surgical repair.
- ▶ They can be caused by hematogenous seeding from septicemia or direct spread from vertebral osteomyelitis, renal and psoas abscesses.
- ▶ The majority are located in thoracic or suprarenal abdominal aorta.

- ▶ CT angiography (Fig 3) will show:
 - ▶ Saccular shape as opposed to fusiform shape in atherosclerotic aneurysms
 - ▶ Lobular contours
 - ▶ Periaortic inflammation
 - ▶ Abscess
 - ▶ Mass

- ▶ They have rapid expansion rate than that of atherosclerotic aneurysms.

Figure 3 Axial (A), coronal (B) and sagittal (C) images of the chest and abdomen from a CTA study in a patient with AAA demonstrate a saccular AAA with foci of air and hazy peri-aortic stranding (arrow) consistent with ruptured mycotic aneurysm. The 3D image (D) demonstrates the focal saccular aneurysm (arrow). CTA, computed tomography angiography; AAA, abdominal aortic aneurysm.

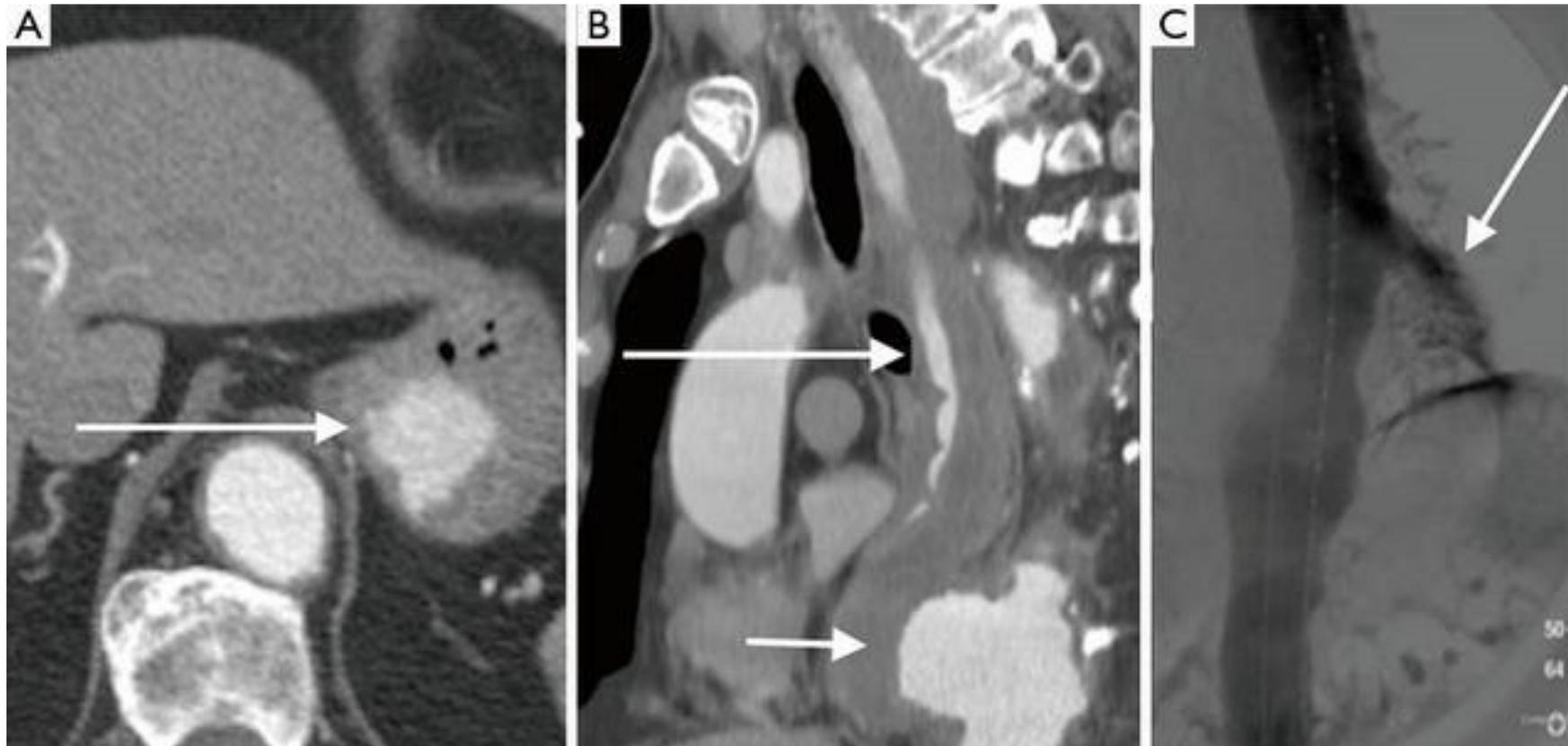


Aorto-enteric fistulas

- ▶ Aorto-enteric fistulas can be primary, caused by atherosclerotic aortic aneurysm or secondary related to from aortic reconstructive surgery.
- ▶ Secondary aorto-enteric fistulas are more common than primary fistulas.
- ▶ They usually occur between two weeks and eight years after surgery.
- ▶ The most commonly involved part of the gut 3rd & 4th portions the duodenum.

- ▶ Symptoms usually include abdominal pain, hematemesis, and melena.
- ▶ CT imaging will show rupture with gas within or outside the aneurysm sac.
- ▶ However, this finding can be seen in mycotic aneurysms as well.
- ▶ The contrast extravasation into the bowel (Fig 4) is diagnostic.

Figure 4 Axial (A) and sagittal (B) images from a CTA study in a patient with an acute chest pain demonstrate a saccular aneurysm in the descending thoracic aorta (smaller arrow) with rupture and fistulous communication into the distal esophagus. IV contrast is seen in the esophagus and fundus of stomach (longer arrow). A digital subtraction angiogram (C) demonstrates the fistulous communication (arrow) with contrast seen in the stomach.

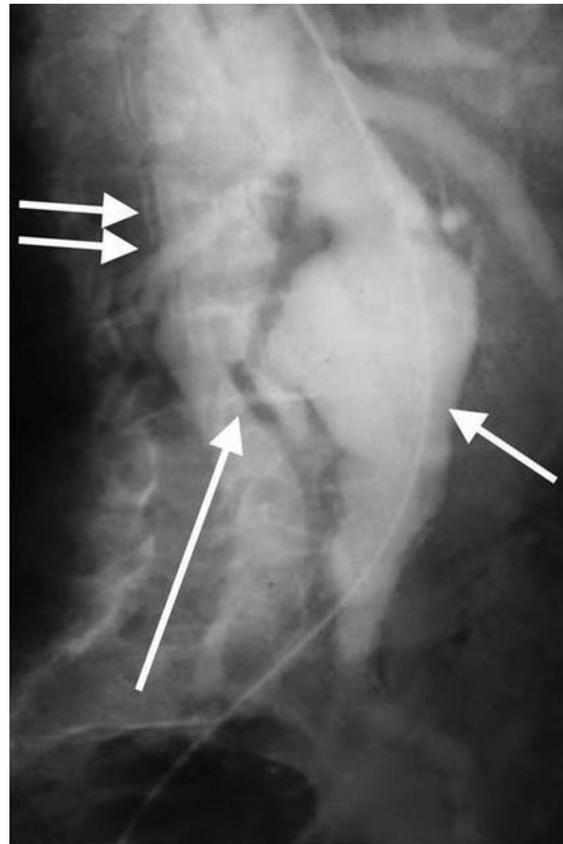


Aorto-caval fistulas

- ▶ Aorto-caval fistula is a rare and devastating complication in which aneurysm erodes into the IVC.
- ▶ It accounts for <1% of all aneurysms and in ~3% of ruptured aortic aneurysms.
- ▶ The features can be very atypical leading to a delay in diagnosis.
- ▶ The clinical features include faintness, syncope, hypotension, high output cardiac failure, bilateral pedal edema, renal insufficiency (reduced renal blood flow) and continuous bruit.

- ▶ Imaging studies will show opacification of the IVC in the arterial phase (*Fig 5*).
- ▶ These patients need urgent surgical exploration with 20–55% operative mortality.
- ▶ The increased mortality is predominantly due to misdiagnosis or delayed diagnosis.

Figure 5 Conventional catheter aortogram demonstrating a spontaneous aorto-caval fistula (larger arrow) between AAA (smaller arrow) and the IVC (double arrow). AAA, abdominal aortic aneurysm.



"Blue-toe" syndrome

- ▶ Severe extremity ischemia and the presence of the "blue-toe" syndrome are rarely the first complications of the present abdominal aortic aneurysm.
- ▶ Embolic phenomenon and peripheral embolic occlusion from the mural thrombus within the abdominal aortic aneurysm are relatively rare events, but associated with tissue loss.
- ▶ Thorough diagnostic examinations and prompt management are required regardless of the aneurysm size once these signs occurred.

Potential complications of AAAs treatment:

- ▶ Death (1.8-5% mortality for elective open repair, <1% for endovascular repair, and 50% if the AAA has ruptured, though studies are showing that this last figure is decreased with endovascular repair)
- ▶ Pneumonia (5%)
- ▶ Myocardial infarction (2-5%)
- ▶ Groin infection (<5%)
- ▶ Graft infection (<1%)
- ▶ Colon ischemia (<1% for elective repair, 15-20% if the AAA has ruptured)
- ▶ Renal failure related to preoperative creatinine level, intraoperative cholesterol embolization, and hypotension

- ▶ Incisional hernia (10-20%)
- ▶ Bowel obstruction
- ▶ Amputation from major arterial occlusion
- ▶ Blue toe syndrome and cholesterol embolization to feet
- ▶ Impotence in males - Erectile dysfunction and retrograde ejaculation (>30%)
- ▶ Paresthesias in thighs from femoral exposure (rare)
- ▶ Lymphocele in groin (~2%)
- ▶ Late graft enteric fistula

Thanks for your attention

