



Chapter 85 – Abdominal Aortic Aneurysm

Episode Overview:

1. List six presentations of an abdominal aortic aneurysm.
2. Compare Aneurysm and Pseudoaneurysm
3. List common misdiagnoses in patients with ruptured AAA
4. List three common early and delayed complications of AAA repair
5. List common delayed complications of Endovascular repair

Wisecracks

1. What to do about the intact, asymptomatic aneurysm?

Rosen's in Perspective

- AAA = is a TRUE aneurysm in that it involves a localised dilation and weakness to all three layers of an artery. IMA
- See the excellent Rosen's Figure 86-1
- Remember AAA ≠ an acute aortic dissection; these are different diseases!
 - And the term dissecting aortic aneurysm is also erroneous.
 - Aortic dissection = blood enters the media of the artery and splits the aortic wall
- An aneurysm can develop anywhere, but usually a AAA develops infra-renally.
 - Normal = 2 cm
 - AAA = > 3 cm

Pathophysiology:

- This is a disease of aging - rare before 50 yrs of age
- AAA seems to happen in people with biochemical disease leading to loss of elastin and collagen; not atherosclerotic disease!
- Infectious / traumatic / connective tissue disease related AAA are RARE
- Most risk factors are populational - not individual
 - The "presence or absence of risk factors should not strongly influence diagnostic considerations in any individual patient" (i.e. he's <50, his brother didn't have a AAA, he doesn't smoke, and he is healthy = therefore he doesn't have a AAA → wrong thinking!)
 - Up to half of AAA in the USA occur in non-smokers, women and ppl younger than 65 yrs!
 - Women often present with ruptured AAA!
- Key red flags to ask yourself if you're thinking of a AAA:
 - Age > 65, Men
 - Anyone with CAD or peripheral vascular disease
 - Brothers of patients with AAA (>30%!)



Diagnostics:

- U/S - 100% sensitive when a *technically adequate study* can be obtained
 - Does have operator and patient-induced limitations
- CT:
 - The test of choice for people with a suspected ruptured AAA
 - IV contrast helps determine the lumen / false lumens and any fistulae
 - But contrast isn't mandatory
 - Helps see retroperitoneal hemorrhage and peri-aortic hematoma

1) List 6 presentations of an abdominal aortic aneurysm.

The Natural Hx of AAA: enlarge → rupture → hemorrhagic cardiac arrest

- Risk increases with size, most ruptures are > 5 cm
- Most (any anyone can!) rupture retroperitoneally
 - But can rupture intraperitoneally, into the IVC, or into the GI tract
- Some can embolize clots and atheromatous material distally; others can erode through the duodenum and ureters.
- An acutely ruptured aneurysm vs. An expanding aneurysm may be clinically indistinguishable

Presentations:

- Incidental: ***most AAA are discovered incidentally!***
- Pain - in the abdomen / back / flank / chest / thigh / groin / scrotum /
 - Often vague, dull
 - This can be in the contexts of weeks/days of pain due to a contained, rupture aneurysm retroperitoneal
 - Throbbing, colicky
 - Acute / severe pain suggests impending rupture
- An awareness of an abdominal mass / fullness
- Back pain - due to vertebral body erosion
- Nausea, Vomiting, weight loss, bowel obstruction symptoms:
 - Due to compression of the duodenum
- Ureteral colic
 - Ureters being obstructed by the mass
- Syncope
- Upper or lower GI bleeding
 - Aorto-enteric fistula: when an unrepaired AAA erodes through - usually the duodenum. It may initially cause intra-abdominal infection/abscess and then progress to unexplained GI bleeding.
- High-output congestive heart failure:
 - Aortovenous/aortocaval fistula: the aorta erodes into the vena cava. Blood is shunted into the venous system causing dyspnea, JVD, abdominal bruits, pulmonary edema, peripheral edema. Lower extremity cyanosis, hematuria, rectal bleeding.
 - Usually develop renal failure

- Physical findings:
 - A pulsatile, expansile, palpable abdominal mass (most are non-tender, unless they have ruptured)
 - In non-obese patients 50-70% of aneurysms 4-5 cm can be palpated.
 - Any reasonable clinical suspicion of AAA warrants further imaging
 - Triad of: pain-mass-hypotension
 - Distended, large, tender, guarded abdomen (due to blood-induced ileus)

A few other points when it comes to presentation

- Bruits = are insensitive and nonspecific for AAA
- Most people have normal femoral pulses
- Thromboembolic complications can occur: blue toe syndrome, acute distal lower extremity occlusions,

2) Compare Aneurysm and Pseudoaneurysm

Aneurysm	Pseudoaneurysm
<ul style="list-style-type: none"> ● Occur due to trans-mural weakening: loss of collagen/elastin/arterial muscle integrity 	<ul style="list-style-type: none"> ● Arise from a defect in the arterial wall ● Arise from a leaking anastomosis after AAA repair <p>Think of the femoral pseudoA. That develops post femoral access</p>
<ul style="list-style-type: none"> ● A localized dilatation of the aorta, involving all three layers of the artery (IMA). 	<ul style="list-style-type: none"> ● A collection of flowing blood that communicates with the true lumen, but is enclosed with (contained by) just the adventitia or surrounding soft tissue

3) List common misdiagnoses in patients with ruptured AAA

From Box 86-1

“Common misdiagnoses in patients with ruptured AAA”

Acute abdomen: pancreatitis, diverticulitis, cholecystitis, appendicitis, bowel obstruction	Renal colic
Intestinal ischemia	MSK back pain
perforated viscus	Acute MI

4) List three common complications of traditional AAA repair

How are AAA repaired?

- Traditional
 - Open laparotomy
 - Longitudinal cut, and graft is anastomosed in place
 - Occasionally a bifurcation graft is used.



- Endovascular
 - Becoming the increasingly popular option
 - Stent graft is placed through the femoral artery to the correct position based on fluoroscopy

Complications - can occur at anytime post-op

- Infection - difficult to diagnose!
 - Graft contamination
 - Adjacent infectious spread
 - Hematogenous seeding
- Aortoenteric fistula (AEF)
 - Think about this in anyone with GI bleeding and a history of AAA surgery
 - Usually another GI source is found, but if not, think AEF!
- Pseudoaneurysm (anastomotic aneurysm)
 - Arise from the leaking anastomosis site

5) List common delayed complications of Endovascular repair

- Depends on the graft type (single vs. bifurcation grafts) but in general (beefed up from Uptodate):
 1. Infection
 2. Ischemic complications
 - a. Spinal cord ischemia
 - b. CVA
 - c. Extremity ischemia
 - d. Visceral ischemia (Celiac/SMA/Renal)
 - e. Post implantation syndrome (fever, leukocytosis and reactive inflammation, can get uni or bilateral reactive pleural effusions - SIRS to the max)
 3. Aortoenteric fistula
 4. Pseudoaneurysm (anastomotic aneurysm)
 5. Chylous Ascites / Chylothorax
 6. Endo Leak (blood flow outside the graft lumen - BUT contained within the aneurysm sac - and it grows) - in as many as 20% of patients who have had repair!
 - a. Type I - separation of proximal / distal end of graft from aortic wall (incompetent seal)
 - b. Type II - retrograde bleeding from branch vessels into aneurysm sac (eg lumbar arteries feeding)
 - c. Type III - leaking between components of the graft (in a bifurcation graft)
 - d. Type IV - leakage through the graft fabric itself (gore tex popped a hole!)

Many of these endoleaks can resolve spontaneously; we'll need to order CT-with contrast in the ER to diagnose them! See Figure 86-7 in Rosen's.



Wisecracks

1) What to do about the intact, asymptomatic aneurysm?

So, you're working in the ER, you get a CT scan for renal colic, and you find an AAA that's 5.3 cm....

- According to Rosen's clinical trials have been done comparing early surgery vs. close follow-up with serial ultrasounds / symptom onset / or size greater than 5.5cm.
- Found that watchful waiting has similar mortality to early elective repair
- Depends on features of aneurysm (location, complications, localised aneurysm etc), but these patients generally need close f/u in the community. Consult Vascular in the department and arrange o/p management.

Important to give good discharge teaching re: flank/back/abdominal pain as a red flag for possible AAA rupture

Management of a ruptured AAA:

- Anyone with a confirmed ruptured AAA should be taken to the OR urgently, regardless of hemodynamic stability
- MOVIE
 - Ask for at least 6 units of blood to be immediately available
 - Send for cross match
- Get that bedside US done ASAP
- Hypotensive patients → should go to the OR, not the CT scanner!
- Don't attempt to fully resuscitate these patients in the ER; they need a surgeon
 - Target resuscitation to mental status
 - A good aim is systolic BP 90-100
- Resuscitate with BLOOD (MTP!!!)
 - 1:1:1 = RBC, FFP, Platelets (most come as a five pack of pooled platelets)
- CAREFUL in reducing BP in the patient with hypertensive AAA rupture - because they will crash HARD
- Mortality for ruptured AAA = 30-40%
 - Patients in cardiac arrest or very frail are usually not considered for repair