

## Vesalius SCALpel™ : Aorta and Branches (see also: vascular folios)

### Thoracic aneurysm

ascending aneurysm: Marfan's/connective tissue  
Marfan's 50% mortality by 50  
cause of mortality: aortic insufficiency causing CHF, or tamponade  
Dissection: most dissections start in ascending aorta  
I full length (multiple entry and reentry)  
II ascending only (Marfan's)  
IIIA > subclavian/thoracic  
IIIB > subclavian/thoracic/abdominal  
unless visceral compromise, wait for 30% enlargement before OR  
thoracoabdominal aneurysm  
complications: paraplegia, renal failure  
transverse arch aneurysm: highest mortality with repair, hypothermic bypass  
90% of blunt thoracic aortic ruptures die at scene

### Congenital

bovine arch:  
origin of left common carotid from brachiocephalic artery (two vessel arch)  
most common aortic branching variation  
double aortic arch most common ring anomaly  
aberrant left subclavian as 4<sup>th</sup> arch branch  
esophageal compression: dysphagia lusoria  
reason for non-recurrent r laryngeal nerve

### AAA

#### management

5% of men > 60; 4M:1F, 95% infrarenal  
women 4X as likely to rupture as men  
most asymptomatic until rupture  
ruptured aneurysm 90% mortality  
if reach hospital 50% mortality  
factors: age, race, distance from hospital, complexity, surgeon's experience  
(>10 cases lower mortality)  
60% ultimately need repair  
no advantage of early repair for asymptomatic 4-5.5cm aneurysm  
reassess Q6mo, > 0.7cm increase between exams, operate  
repair symptomatic  
rupture risk based on size and site: 5cm = 5% risk/year  
size most important factor in rupture  
> 5.5cm aneurysm becomes most likely cause of death, repair  
10-20% of patients w AAA have iliac aneurysms as well

(isolated iliac aneurysm [2%] > 3cm, repair: high incidence of rupture and mortality)  
endovascular aortic aneurysm repair (EVAR)

> 50% are candidates

colon ischemia open = endo

endograft: lower morbidity and mortality, more secondary procedures

need adequate neck below renals, not for suprarenal

small size vessels difficult, calcified iliacs

distal end/landing zone problem if there are iliac aneurysms

pelvic ischemia risk if internal iliacs occluded

interruption of one tolerated

25% temporary ipsilateral butt claudication (10-15% persistent)

complications: endoleak (main), migration, limb occlusion, infection, failure (stent fracture, fabric fatigue/perforation)

endoleak

I contact zone, most serious, at end, repair endo or open

dilation of neck may result in graft migration

current proximal seal zone maximum is 34mm

good results if seal zone is cylindrical or conical and has less than 33%

circumferential thrombus

II collateral backbleed (IMA, lumbar): lo pressure, treat only if aneurysm

enlarging, may close spontaneously within 12mo

III component separation/graft defect: repair endo or open

IV fabric degeneration/perforation, now rare

V endotension

complications of all aneurysm repairs

infection: increased incidence with groin incision 1-6%

gold standard: graft excision and extra-anatomic bypass

in situ reconstruction in selected pts.

CT diagnosis

< 4 mo PO more virulent

s. epi most common

aorto-femoral higher incidence than aorto-iliac

most > 1y post op

infected/mycotic aneurysm: salmonella most common

aortoenteric fistula, < 1%

sentinel bleed

endoscopy in OR 47% false negative

graft excision, extraanatomic bypass

30% post-op mortality

pseudoaneurysm 2-4% (usually host artery degeneration)

lymph leak/lymphocele 2-4%, groin

bleeding

occlusion

graft thrombosis 5-10% @5y

embolism < 1%

colon ischemia 1-2%

need for reimplanting IMA: open aneurysm, look at orifice for good backbleeding

IMA pressure > 30-40, test occlude

Doppler sigmoid mesenteric border

bowel ischemia

if large meandering mesenteric artery, means IMA or SMA obstruction

look for calcification at origins of visceral vessels on pre-op studies

preserve IMA in case of SMA obstruction or may devascularize whole small bowel

spinal cord ischemia < 0.1%

20% ventral hernia after open aneurysm repair

highest renal failure rate after bypass, vascular procedures

## Visceral aneurysm

visceral aneurysm: male celiac, hepatic more common, female splenic

repair splenic in women of childbearing age, symptomatic in others

spleen 60%, hepatic 20%, mesenteric 5%, other 15%

spleen

4F:1M

calcification not protective

repair > 2cm, symptomatic, childbearing age (increased risk of rupture during pregnancy)

renal a. aneurysm

F>M, multiparous

tissue relaxants late in pregnancy affect elastin, especially at bifurcations

most asymptomatic, ~1.5cm, average number 1.5

repair results in 60% reduction of hypertension

all > 2cm operate

repair for hypertension, not size

mesenteric aneurysm

most SMA, celiac or branches including pancreaticoduodenal

etiology: infection (mycotic), atherosclerotic, digestive (pancreatitis), fibromuscular dysplasia

## Mesenteric ischemia

50% arterial, 20% venous, 20% non-occlusive mesenteric ischemia (NOMI)

acute: embolus (arrhythmia, MI)(25%), thrombosis (superimposed on narrowing)(65%)

sudden severe unrelenting pain

benign exam delays diagnosis

angio, CT, prompt OR

peritonitis high mortality

arterial 50-75% mort

non-occlusive mesenteric ischemia

most lethal form of mesenteric ischemia  
lo flow  
pruning of smaller branches  
Papaverine vasodilation except in shock  
second look after resuscitation if extensive  
73% mortality  
digitalis causes mesenteric vasoconstriction, worsens  
mesenteric venous thrombosis  
< 10% of mesenteric ischemia  
shorter segments, usually non-operative  
variable onset, symptoms of intestinal ischemia  
causes: (90% hypercoagulable)  
    prothrombotic: ATIII deficiency, V-Leiden, birth control pills  
    hematologic: polycythemia, thrombocytosis  
    inflammatory: pancreatitis, abdominal sepsis, IBD  
    other: post op, portal hypertension/cirrhosis, trauma  
    pneumatosis, portal v air = infarction  
    contrast CT 90% accurate  
treat cause, anticoagulate (lifelong)  
30% mortality

chronic: atherosclerosis

post prandial (30-45m) pain, weight loss (food fear), bloating, flatulence, diarrhea,  
constipation, chronic volume depletion, hypoglycemia, tremulous  
hydrate well to do angio: AP & lateral aortogram  
90% 2 vessel stenosis, 50% 3 vessel  
PTA/stent  
emergency surgery 33% mortality  
antegrade bypass better long term patency than retrograde (longer, kink)  
transaortic endarterectomy

## Renal artery stenosis

atherosclerotic, fibromuscular dysplasia (most common)  
    fibromuscular dysplasia associated with intracranial aneurysm  
80% from atherosclerotic narrowing near origin, 1/3 bilat  
    hypovolemic, rehydrate  
management remains controversial  
    intervention best reserved for bilateral disease in patients who have failed best  
    medical management (i.e. worsening Cr or uncontrolled HTN despite 3 meds)  
almost all done endovascularly now  
    atherosclerotic least amenable to endovascular, requires stent  
    renal artery stenosis in renal transplant: PTA, rigid stent  
PTA/stent: 90% success  
treat hypertension, preserve renal function  
surgical: endarterectomy, bypass (aortorenal, hepato-, spleno-)  
results:

young do better than old  
shorter duration of hypertension better than long  
FMD better than ASCVD  
2/3 with renovascular hypertension cured or improved

### **Paget-vonSchrotter**

subclavian/axillary venous thrombosis  
high recurrence with thrombolytic/anticoag Rx  
treat thoracic outlet problem  
vascular and/or neurologic manifestations of thoracic outlet syndrome  
first rib resection most common therapeutic requirement  
ulnar N pain/paresthesia most common manifestation of thoracic outlet syndrome

### **SVC syndrome**

mediastinal invasion by bronchogenic main cause  
obstruction below azygous better tolerated (alternate route to IVC)

### **Reynaud's**

Ca channel blocker

### **References:**

The UK Small Aneurysm Trial Participants. Mortality results for randomised controlled trial of early elective surgery or ultrasonographic surveillance for small abdominal aortic aneurysms. *Lancet* 1998; 352: 1649-1655.

Immediate repair compared with surveillance of small abdominal aortic aneurysms. *NEJM* 2002; 346:1437-1444.