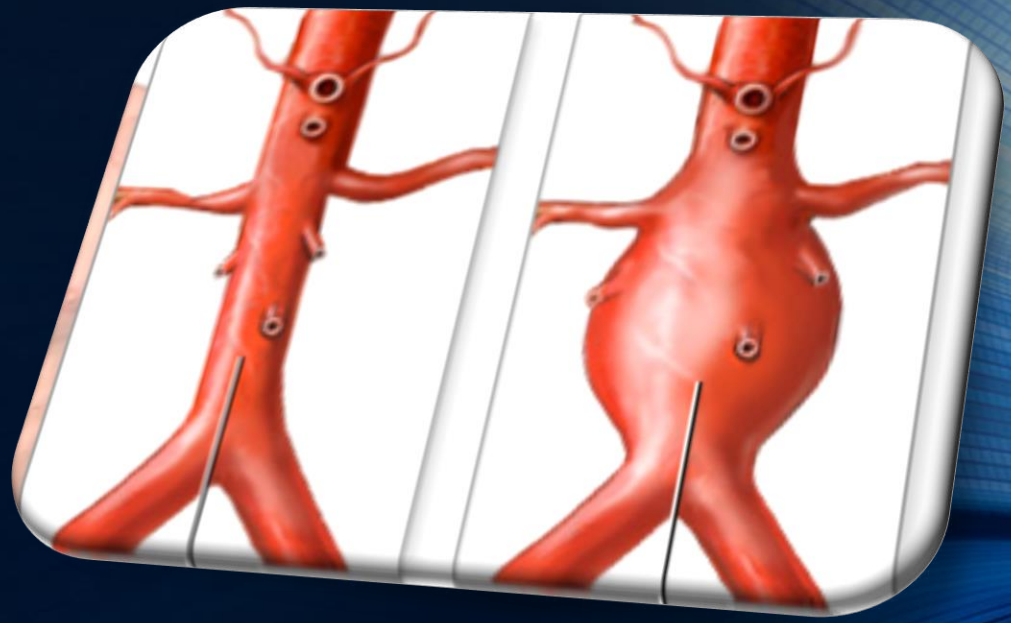
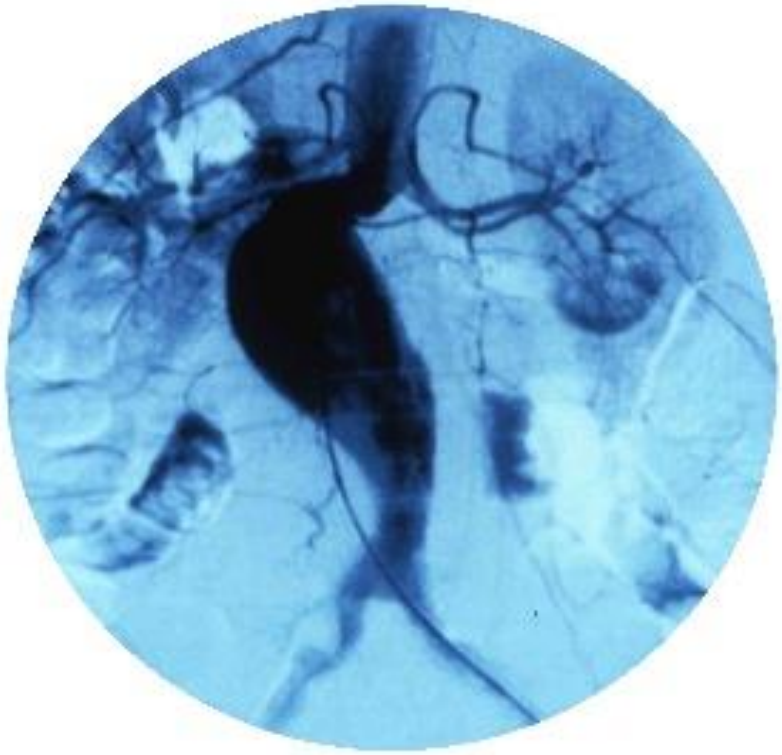


Aortic aneurysm

MOHAMED SHOKRY
LECTURER OF VASCULAR SURGERY

Albert Einstein died from an abdominal aortic aneurysm, a type of vascular disease that affects more than 700,000 people in Europe.



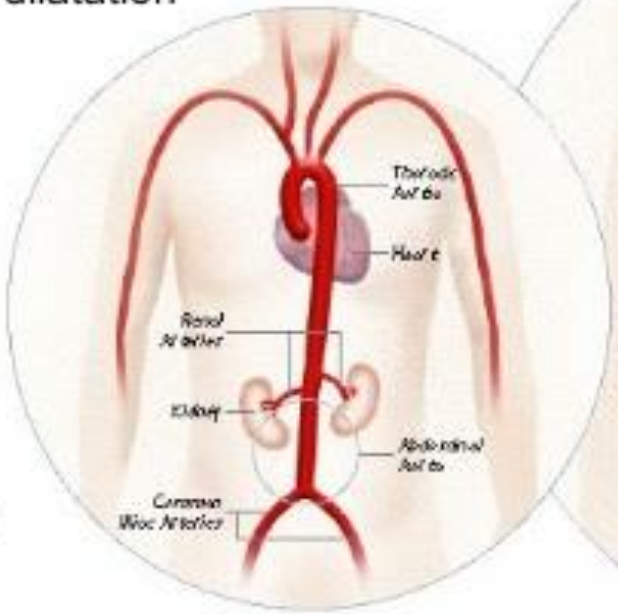
Abdominal Aortic Aneurysm

Definitions

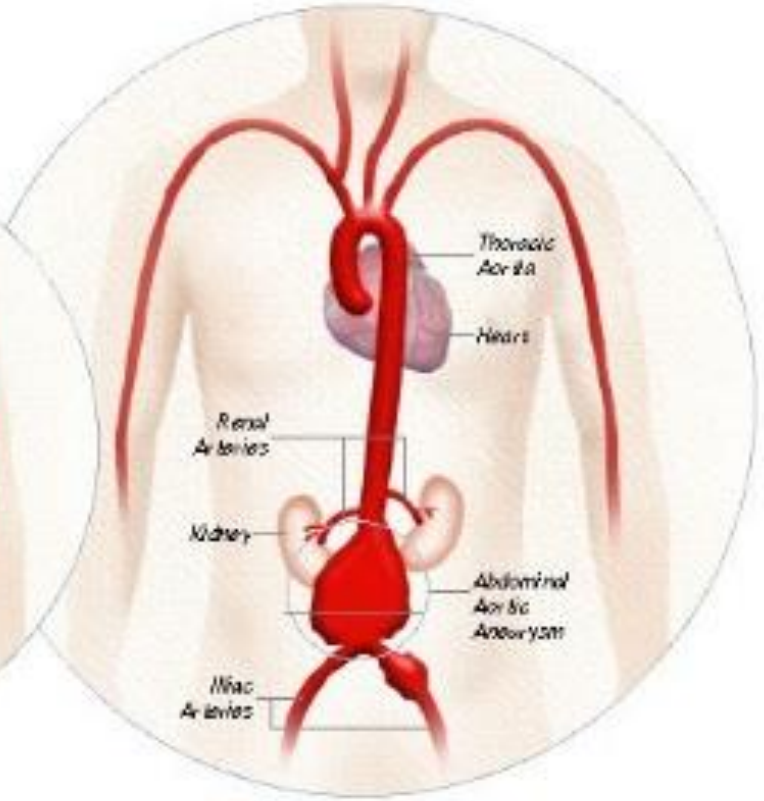
- **Aneurysm:** An aneurysm is a focal permanent dilatation of an artery greater than 1.5 times the normal diameter for that particular artery.
- **Ectasia:** Refers to a focal dilatation of an artery greater than the normal diameter for that artery but less than 1.5 times the normal diameter.
- **Arteriomegaly:** Is similar to ectasia but the entire arterial segment is diffusely dilated.
- **Aneurysmosis:** Multiple aneurysms may occur with intervening normal arterial segments.

What is an Abdominal Aortic Aneurysm (or AAA)?

- An Abdominal Aortic Aneurysm (AAA) is a permanentlocalized dilatation of the abdominal aorta.
- The disorder is conventionally diagnosed if the aortic diameter is 30 mm or more.
- Or increase in size of Vessel 1 and half times normal diameter



Normal aorta



Aorta with an abdominal aneurysm

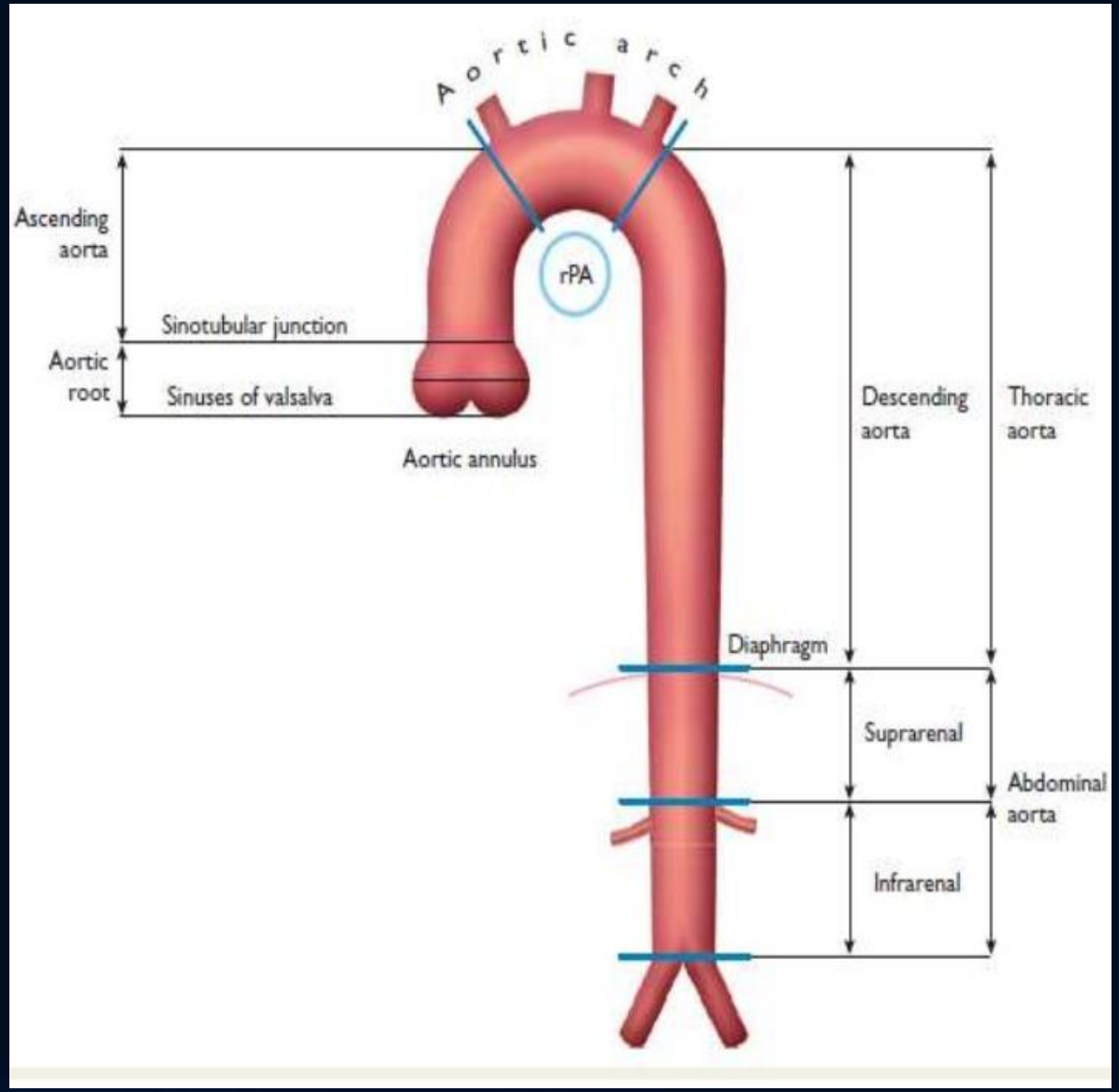
- Enlargement of the aorta greater than 1.5 times its normal diameter if **fusiform**

- **Saccular** aneurysm involves a localized protrusion of one of an area of the vessel wall

- **Male to female ratio** is **6 : 1**

Classification

- Abdominal aortic aneurysm (AAA)
  - Infra-renal
  - Supra-renal
- Thoraco-abdominal aortic aneurysm (TAAA)
- Thoracic aortic aneurysm (TAA)

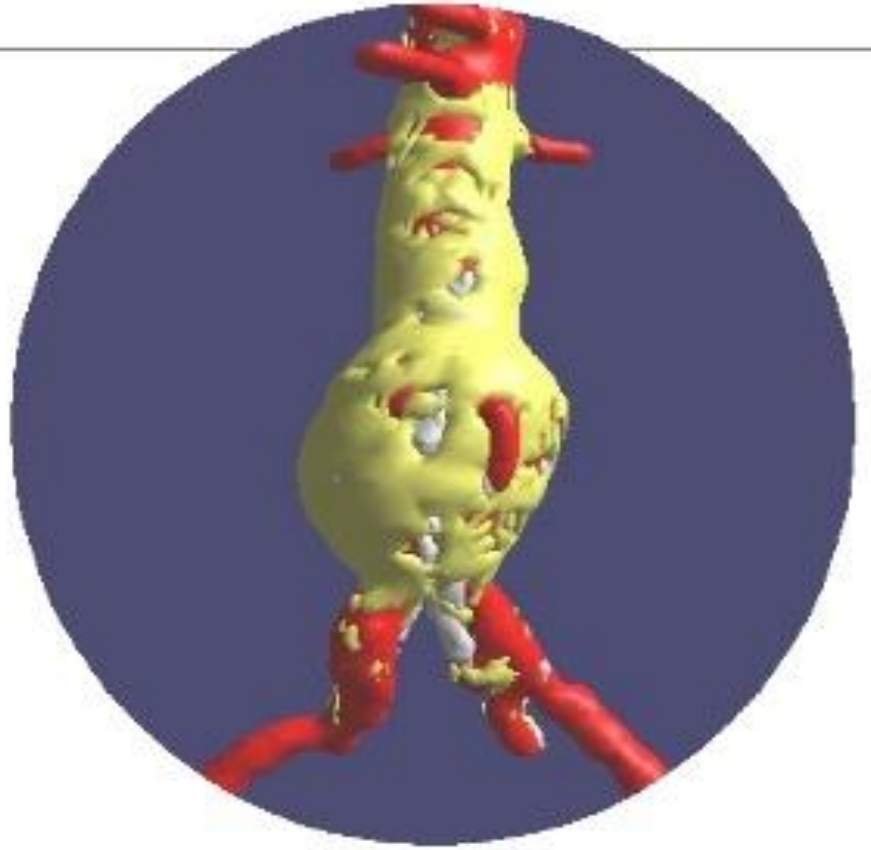


Aetiology

- Degenerative (atherosclerotic)
- Infective (Mycotic)
- Inflammatory
- Connective tissue disorders (Marfan`s syndrome)
- Post-dissection
- Trauma

Pathophysiology of a AAA – risk factors

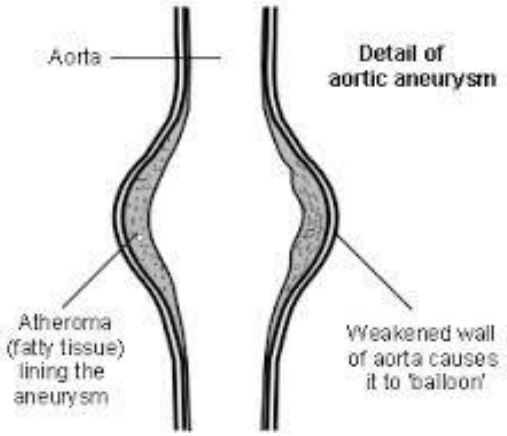
- Main risk factors are
  - Male
  - Smoking history
  - Hypertension
  - Family history
  - Increasing age
  - Atherosclerosis
  - COPD
  - Infection/inflammation

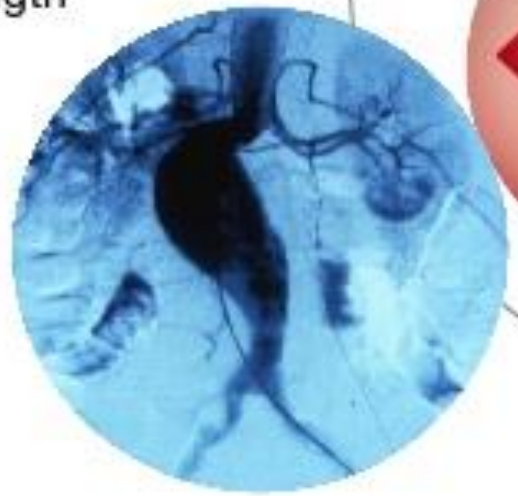


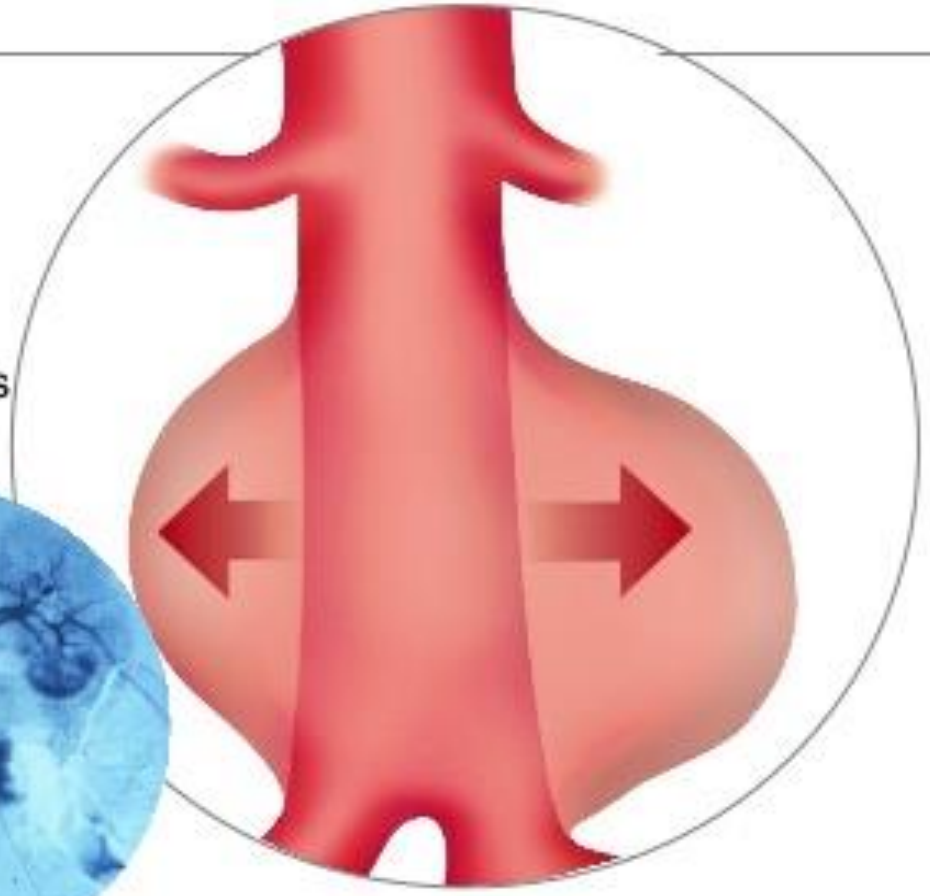
Abdominal Aortic Aneurysm

Pathophysiology of a AAA

- Pathological changes in the aortic wall:
  - Inflammatory process
  - Causing breakdown of elastic elements
  - Decrease tensile strength
  - Leading to expansion







Abdominal Aortic Aneurysm

Pathophysiology of a AAA – aneurysm growth

- AAA growth:
  - Expansion tends to be highly variable
  - AAA growth accelerates with the diameter of the AAA
  - Aneurysm growth is influenced by risk factors

Why is early diagnosis of AAA so important?

- The operative mortality of treating a ruptured aneurysm is **80%**
- For elective AAA cases, the operative mortality rate is drastically reduced, approximately only **2-7%** of cases result in death
- AAA ruptures can be avoided by identifying the population at risk and conducting simple and inexpensive ultrasound examinations.

Clinical features of AAA

- **Asymptomatic (75%)**
  - Incidentally discovered during clinical exam.or radiographic investigation
- **Pain**
  - Central abdominal radiating to the back
  - Chronic due to stretching the vessel wall or compression/erosion of surrounding structures
  - Acute pain due to rupture
- **Complications**

Complications

- **Rupture**

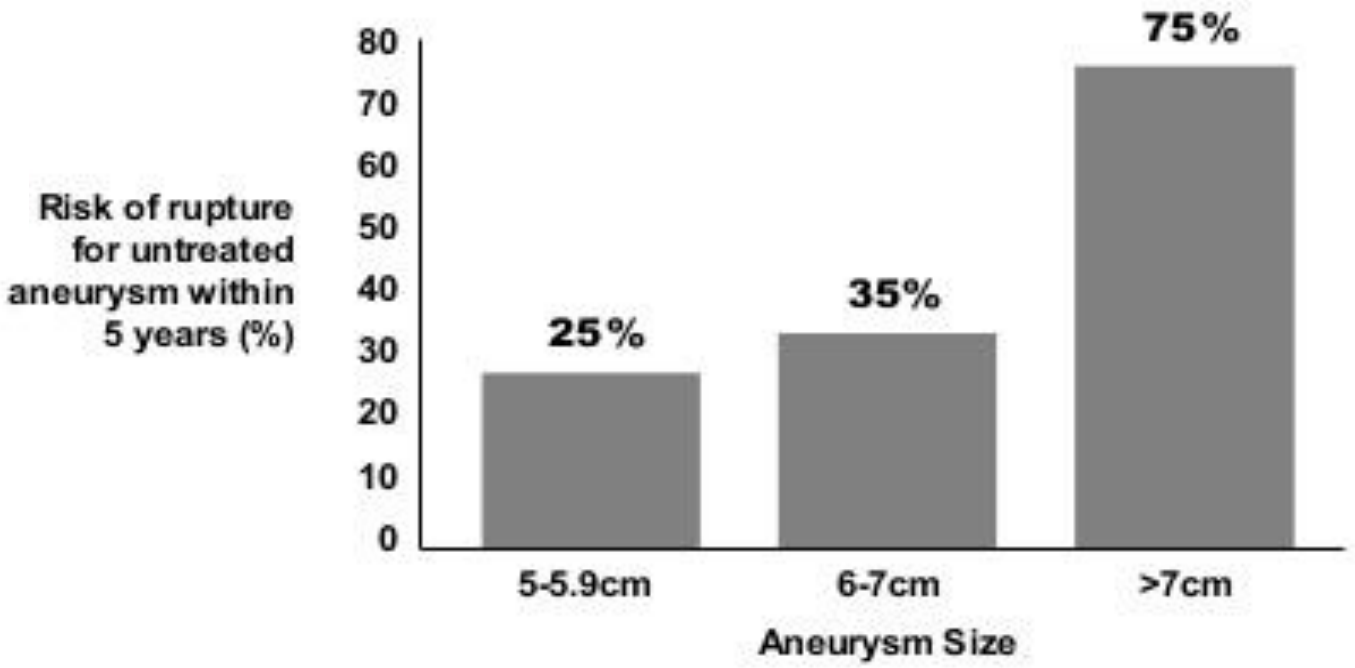
classic triad (Sudden onset severe backache, Shock and Pulsatile abdominal mass)

  - Free intra-peritoneal rupture
  - Contained retro peritoneal rupture
  - Chronic contained leak
  - Risk of rupture correlate with aneurysm size

- **Acute lower extremity limb ischaemia** (macro-embolism)
- **Blue toe syndrome** (micro-embolism): These patients have bluish digits and dermal staining but bounding foot pulses

- **Aorto-enteric fistula** – seen with "inflammatory" non-specific AAAs
- **Aorto-caval fistula** – seen with "inflammatory" non-specific AAAs

If untreated, the AAA may rupture



When the aneurysm diameter reaches 5cm, the risk of rupture is generally considered to be higher than the operative risk.

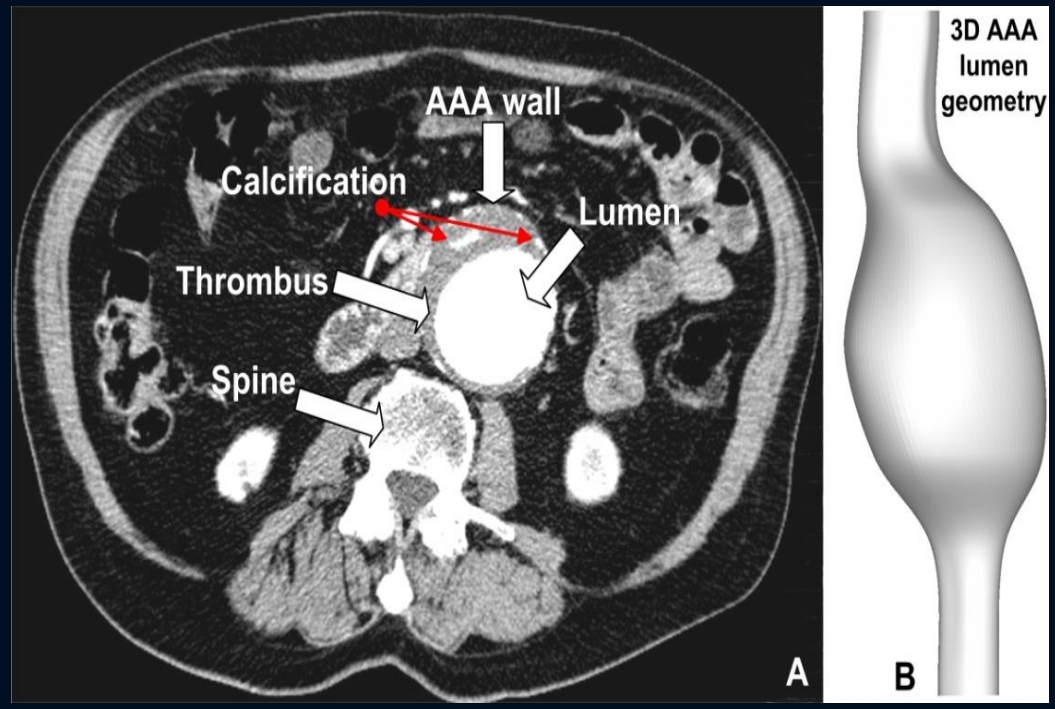
Investigations

- **Abdominal duplex ultrasound (DUS).** This is a first line investigation for AAA detection. It is cheap and readily available.The results are operator- dependent and imaging may be affected by obesity and bowel gas.
- **Computed Tomography Angiography (CTA).** Multi- detector CTA is requested when ultrasound findings are equivocal or ultrasound imaging is inadequate. Multi-detector CTA is the imaging tool of choice in treatment planning for AAA when indicated.

Investigations

- **Magnetic Resonance Angiography (MRA).** This is an alternative to CTA but it`s availability and cost remains an issue.

- **Conventional Digital Subtraction Angiography (DSA).** This imaging modality is rarely used for diagnostic considerations currently. It`s use is limited to interventional treatment of AAAs



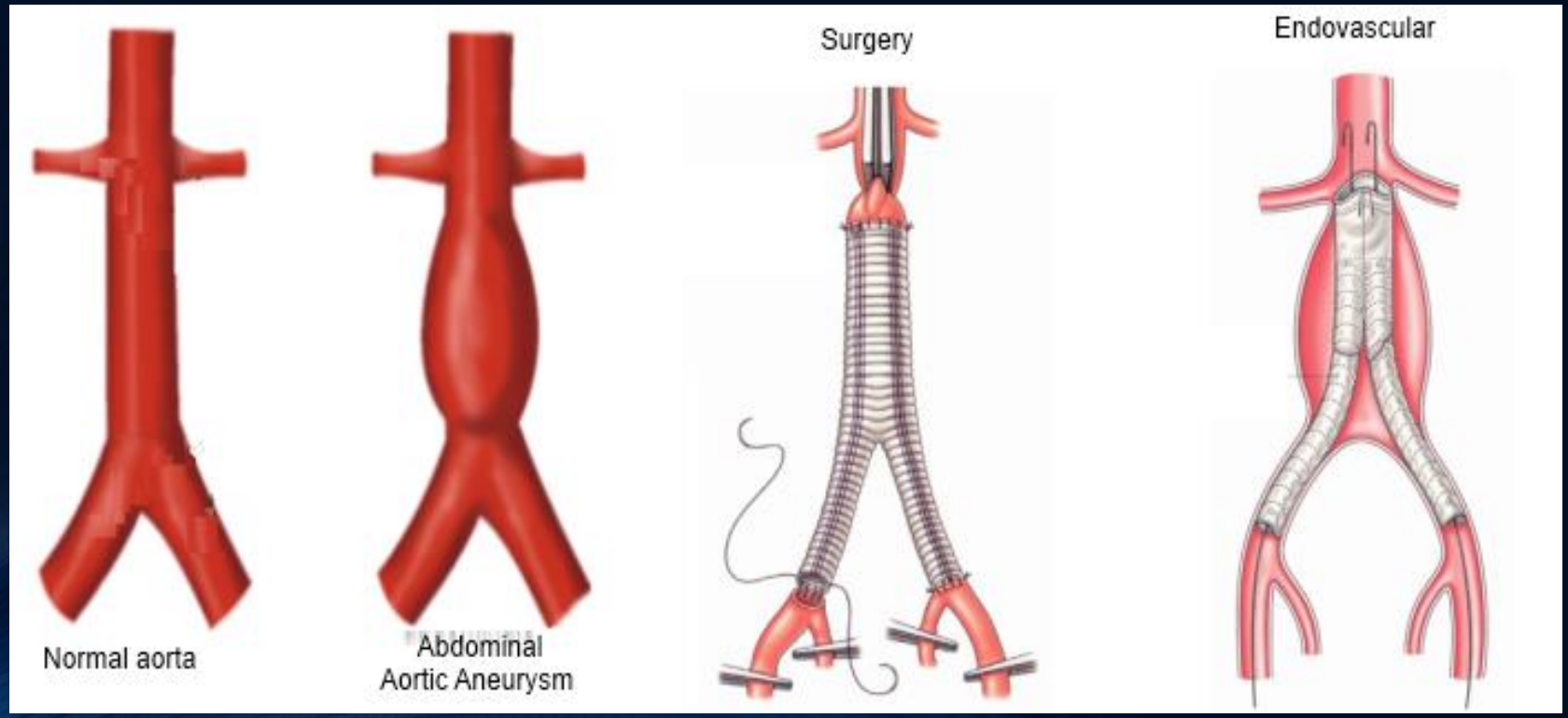
What if a AAA is diagnosed?

- Clinical practice suggests that:

Aneurysm diameter	Follow-up action
Less than 4cm	Recall annually
More than 4cm and less than 5cm	Recall every 6 months
More than 5cm or symptomatic or growing by more than 1cm per year	Endovascular or surgical management

Treatment

- Open surgical repair
- Endovascular (EVAR,TEVAR)

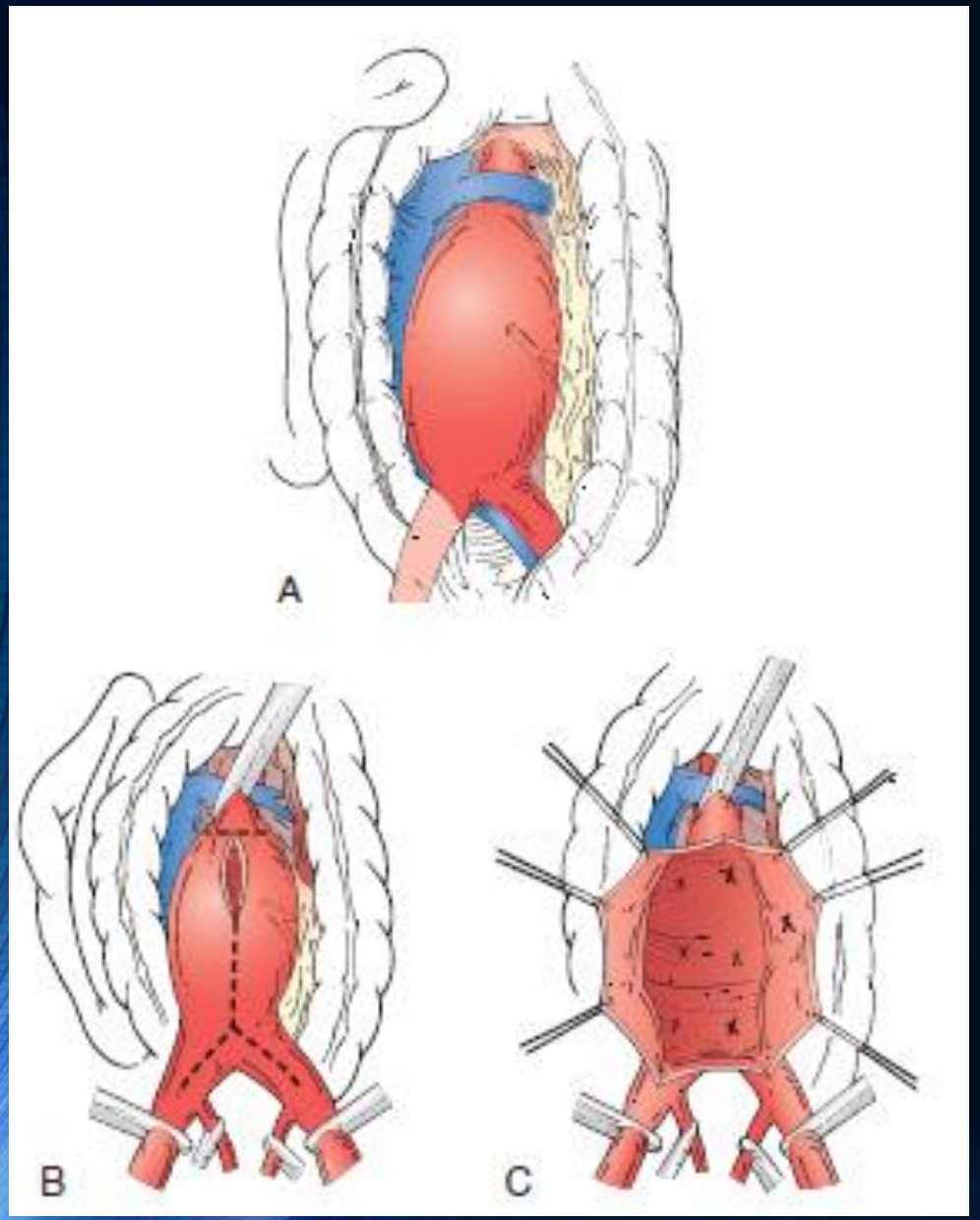


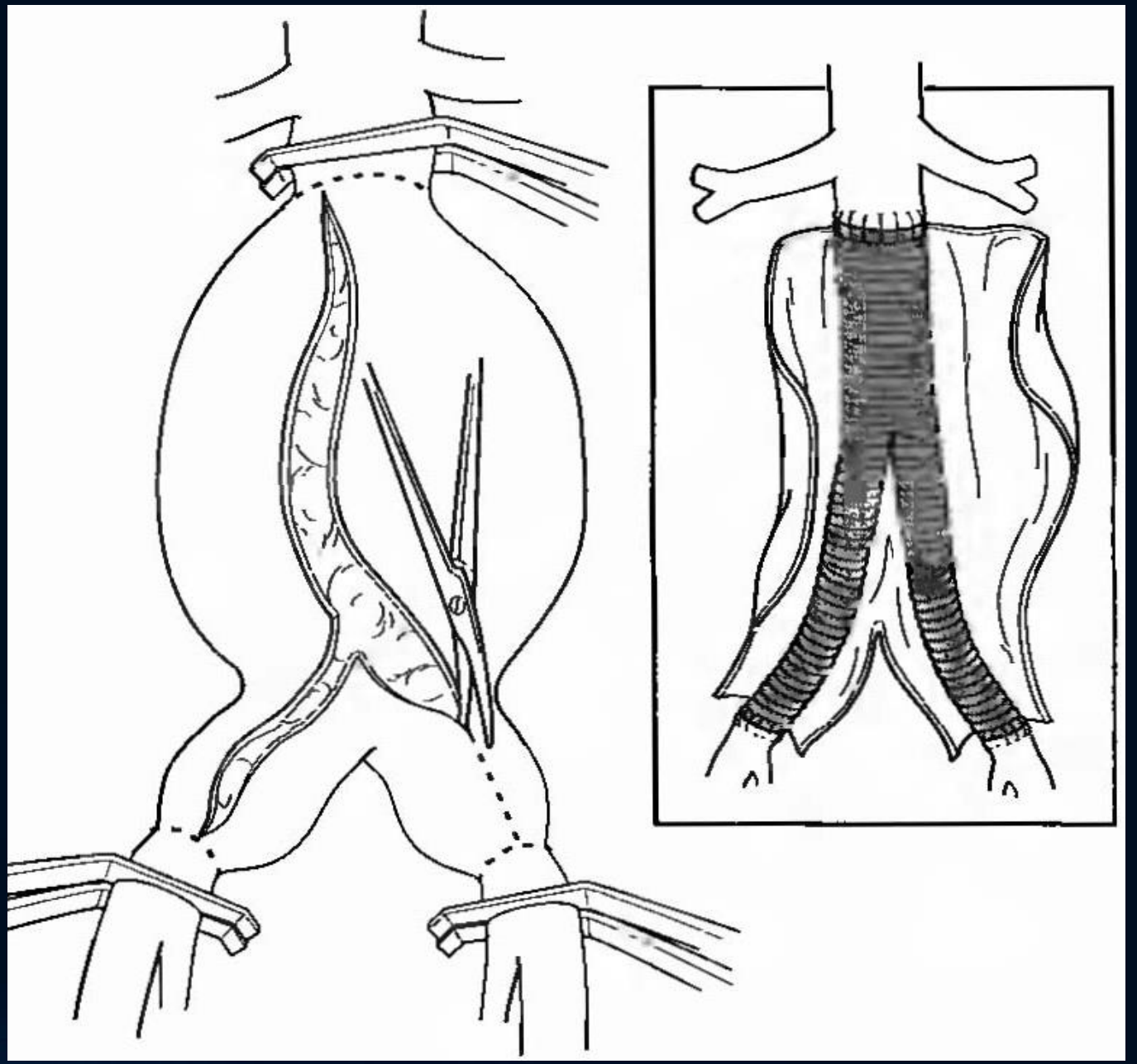
Treatment

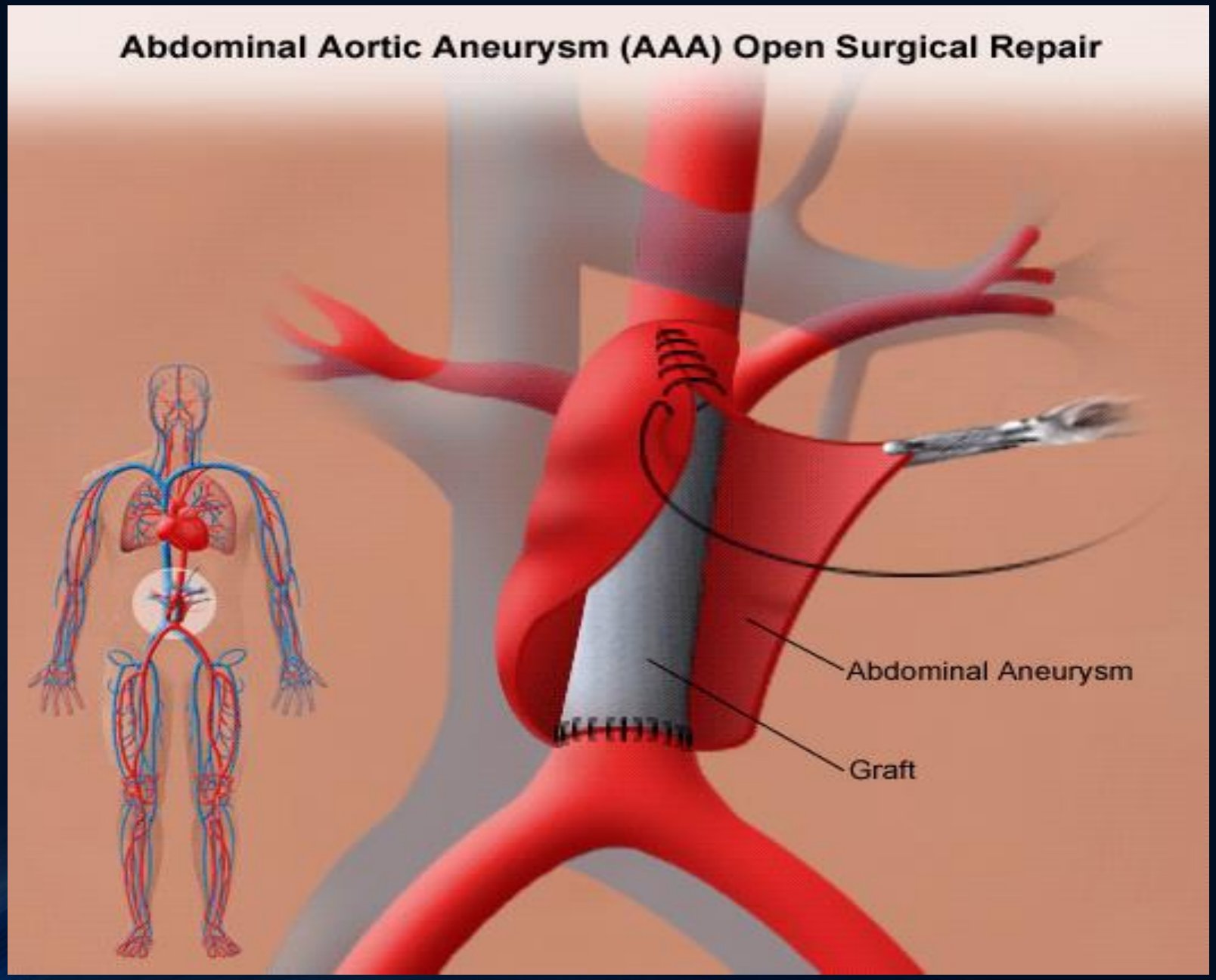
- **Indications for intervention (only in patients fit for treatment)**
  - All symptomatic AAAs.
  - All complicated AAAs.
  - Asymptomatic AAA > 5.5 cm in males
  - Asymptomatic AAAs > 5 cm in females
  - Small AAAs on surveillance with rapid enlargement (> 1 cm after 1 year on repeat scan)
  - Asymptomatic AAA with a large iliac aneurysm > 3cm
  - Asymptomatic saccular AAA > 3 cm (these tend to rupture at smaller diameters)

Open repair for AAA

- The standard of care for patients who are young, fit.
- Open repair involves a laparotomy with repair of the aneurysm using a tube or bifurcated prosthetic vascular graft.
- The peri-operative mortality is 3 – 5% but the morbidity may be up to 30%.
- Extremely durable and generally does not need post-operative surveillence imaging.
- Associated with better longterm survival and decreased re-intervention rates compared to the endovascular procedure.

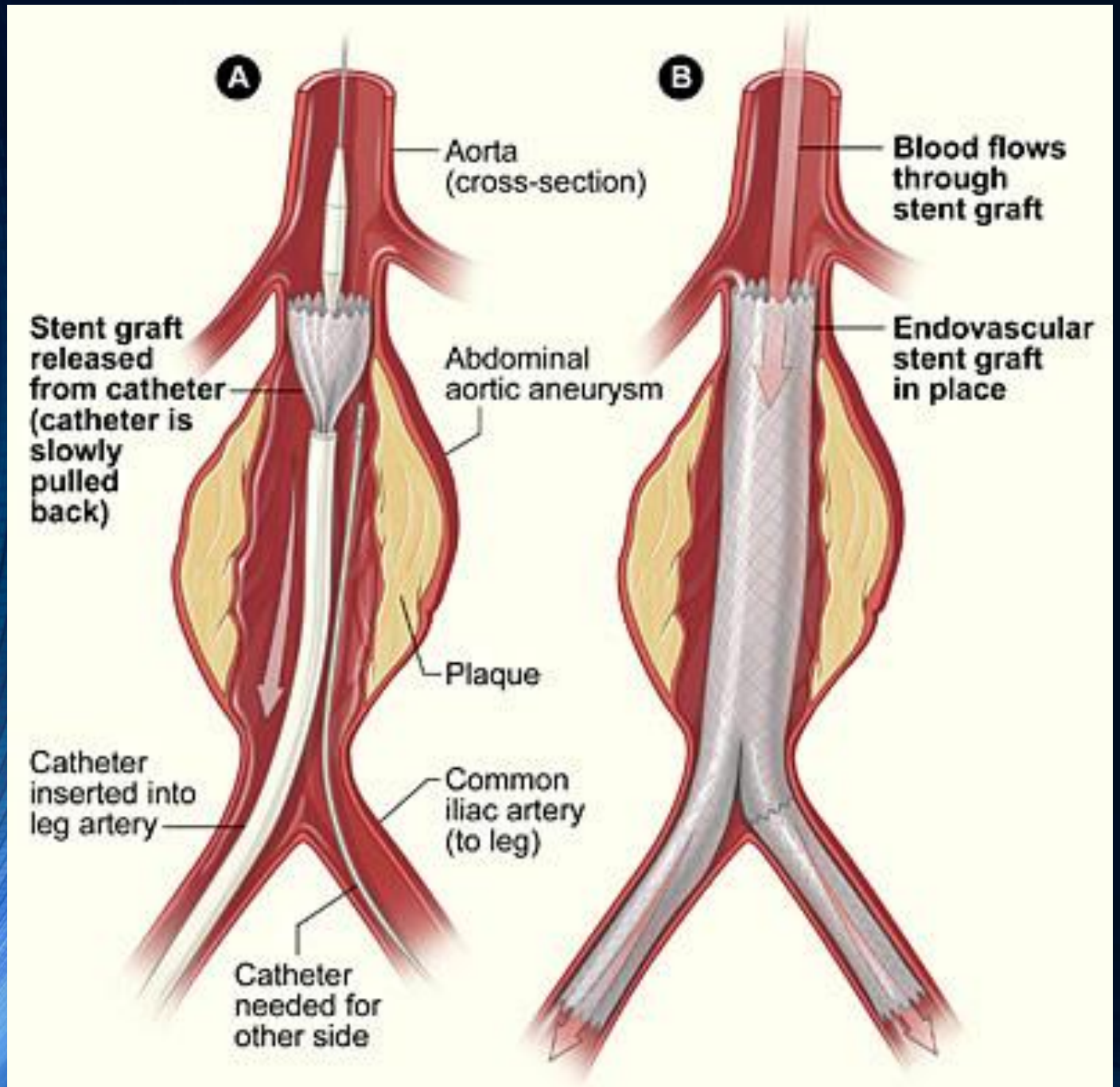

A
B
C

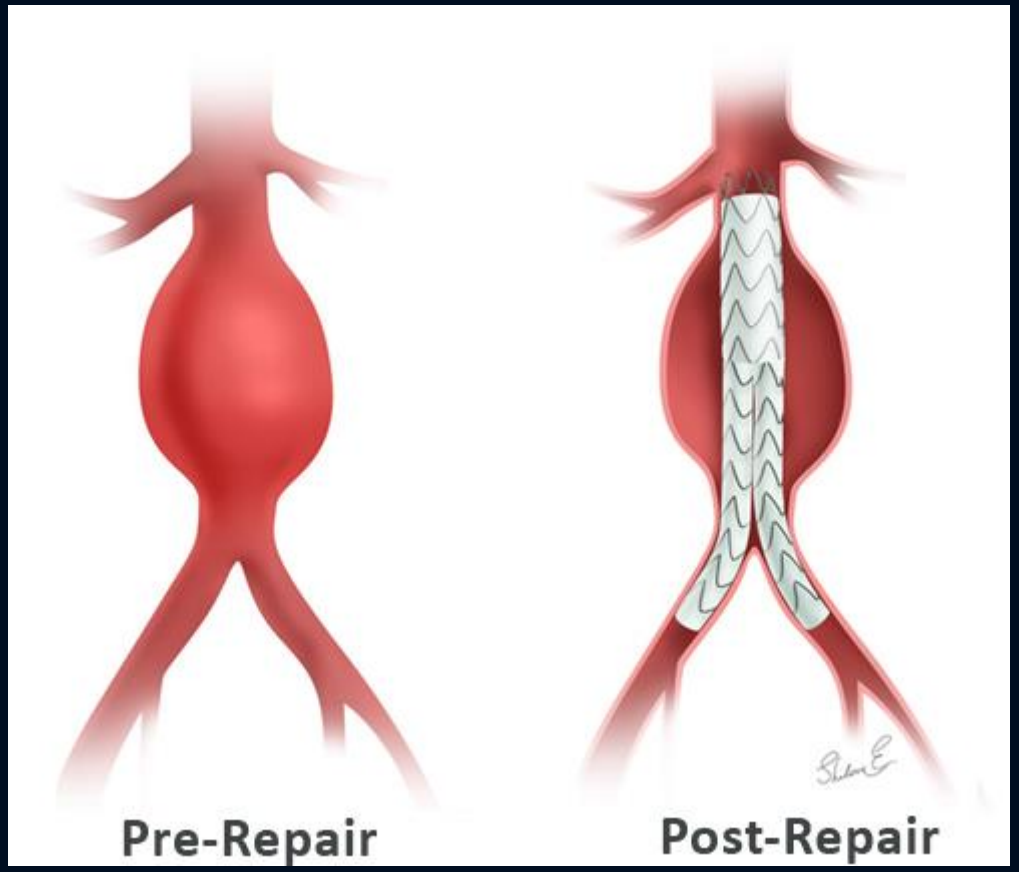


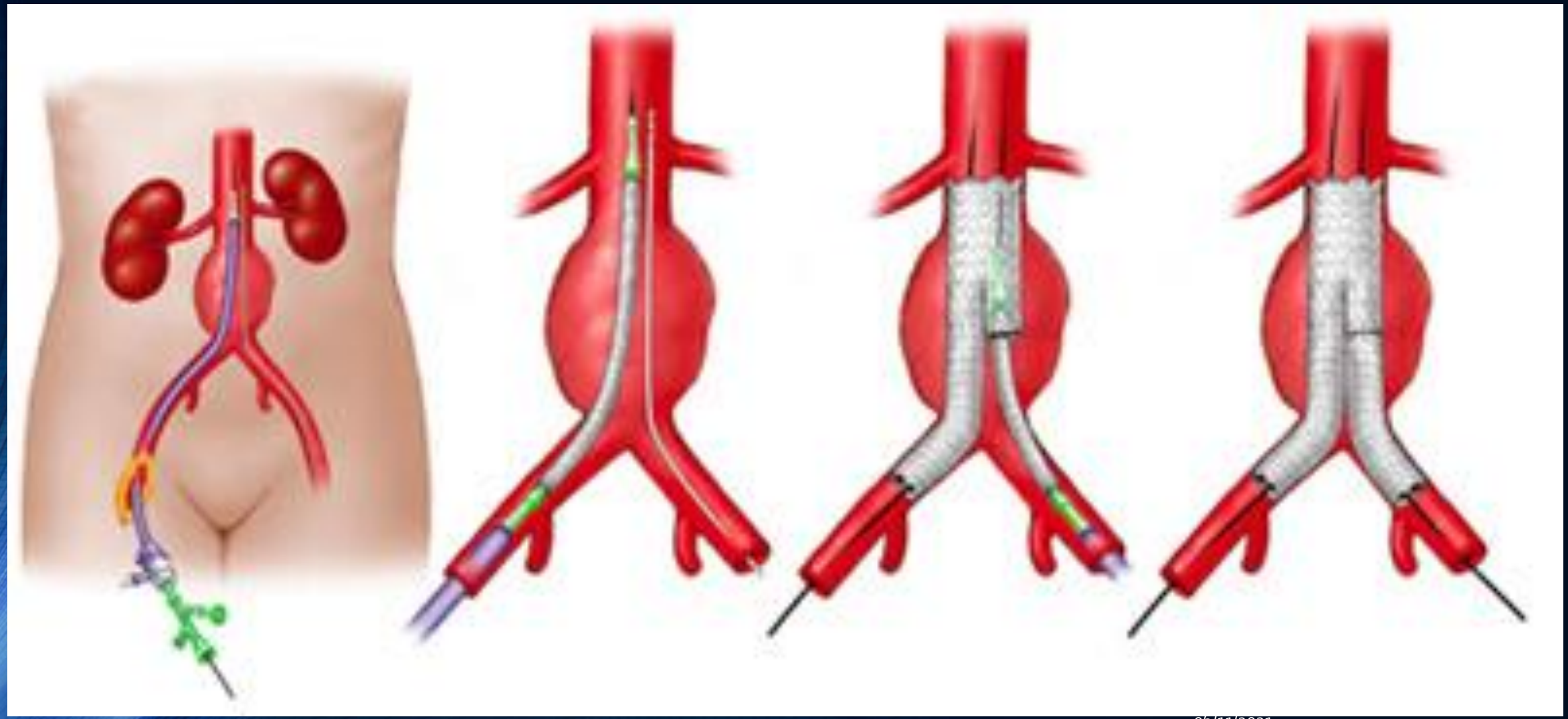

Abdominal Aortic Aneurysm (AAA) Open Surgical Repair
Abdominal Aneurysm
Graft

Endovascular aneurysm repair (EVAR)

- Endovascular aneurysm repair (EVAR) a suitable alternative or complimentary treatment strategy to open repair.
- AAA is excluded internally using a large aortic covered stent (aortic stentgraft / endografts).
- The device is deployed using endovascular techniques.
- It avoids a laparotomy as the device is deployed via the groin vessels using a small groin incision and/or percutaneous access.
- The peri-operative mortality is low (< 1%).
- Patient recovery is quicker &The length of hospital stay is shorter.


A
B
Aorta
(cross-section)
Stent graft
released
from catheter
(catheter is
slowly
pulled
back)
Abdominal
aortic aneurysm
Plaque
Catheter
inserted into
leg artery
Common
iliac artery
(to leg)
Catheter
needed for
other side
Blood flows
through
stent graft
Endovascular
stent graft
in place


Pre-Repair
Post-Repair



Complications

OPEN REPAIR

- Iatrogenic injuries (bowel, veins, ureter, etc)
- Haemorrhagic complications
- Wound healing complications (sepsis, dehiscence, hernias, etc)
- Acute renal dysfunction / failure
- Pulmonary complications (atelectasis/ pneumonias)
- Cardiac complications (myocardial infarction, cardiac failure, cardiac arrhythmias)

EVAR

- **Endoleaks :**
- Type 1 endoleak.(inadequate seal)
- Type 2 endoleak. Lumbar arteries.
- Type 3 endoleak. The components is separated
- Type 4 endoleak. Stentgraft porosity
- Type 5 endoleak. Endotension

Complications

OPEN REPAIR

- Ischaemic colitis
- Erectile dysfunction
- Buttock / perineal ischaemia / necrosis
- Acute limb ischaemia (macro-embolism)
- Thrash foot (micro-embolism)
- Graft occlusion
- Graft sepsis

EVAR

- Stentgraft limb kinking occlusion
- Stentgraft migration
- Late rupture
- Stentgraft sepsis
- Access vessel related complications (pseudo- aneurysms, etc)

Thank you