

# **Aorta Intervention: Technical Tip and Trick**

**Han Cheol Lee MD. PhD.**

**Department of Cardiology**

**Pusan National University Hospital**

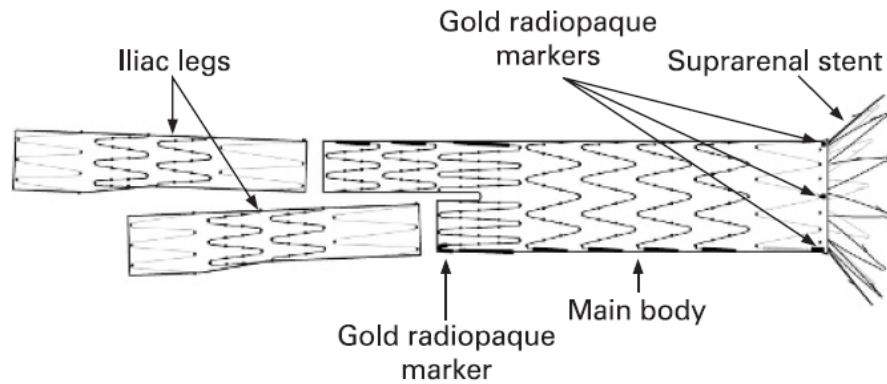
# Cook Zenith Endograft



Three components

.Aortic part & two iliac limbs

.greater flexibility in choosing the correct diameter for each component



# Medtronic



Talent



AneuRx (Medtronic)



# AneuRx (Endurant)



# Gore Excluder Stent--Graft



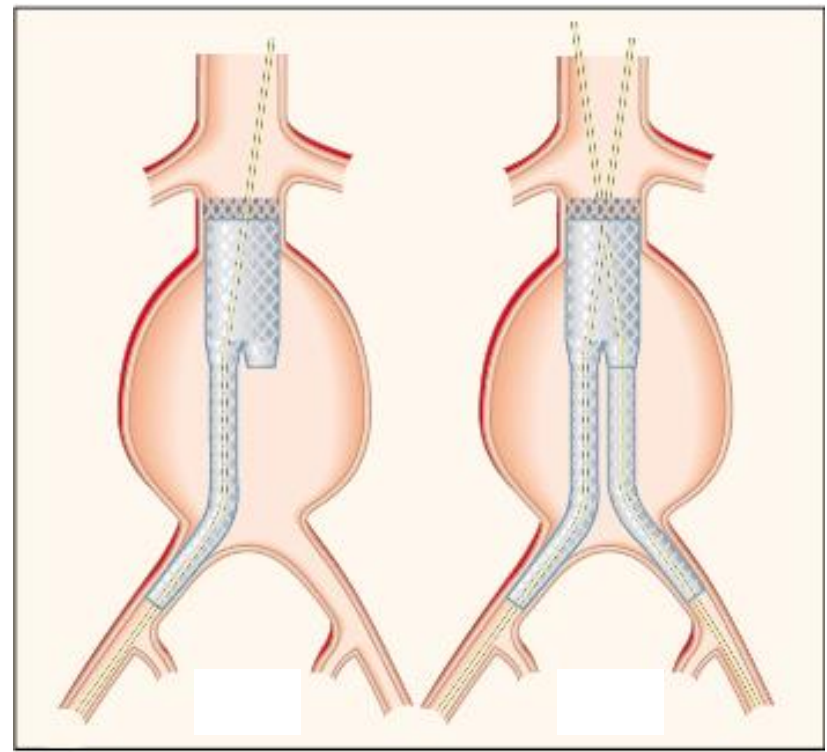
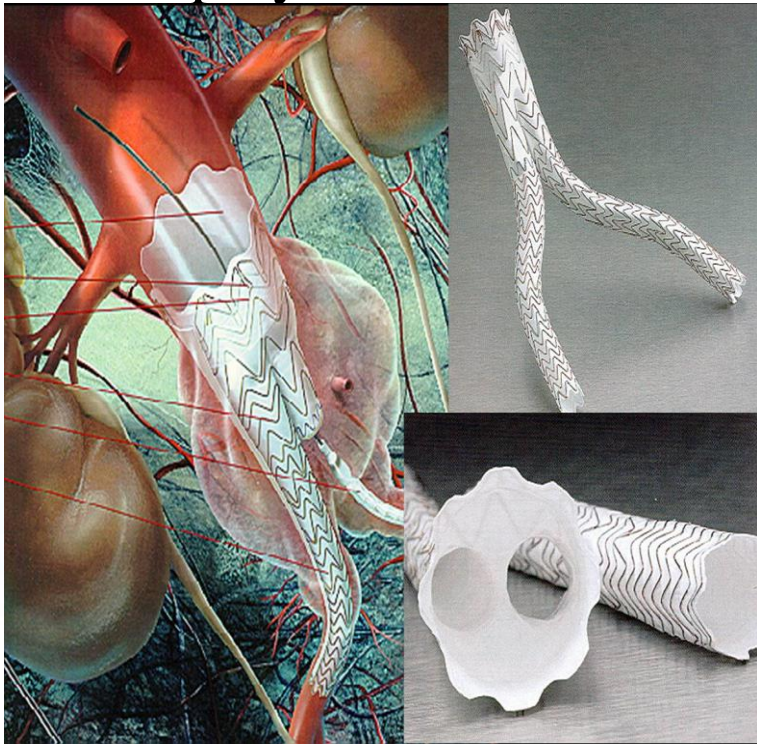
. Two pieces

. Aortic component :

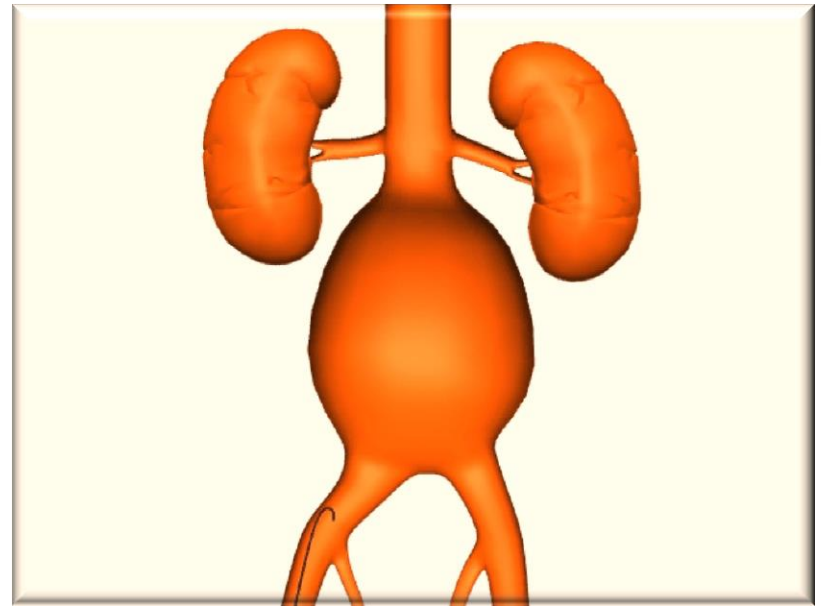
. extends down into the ipsilateral CIA & provides good stability

. Contralateral (shorter) limb :

. deployed into a secure docking zone above the aortic bifurcation



# S & G Seal Graft



# AAA Mortality

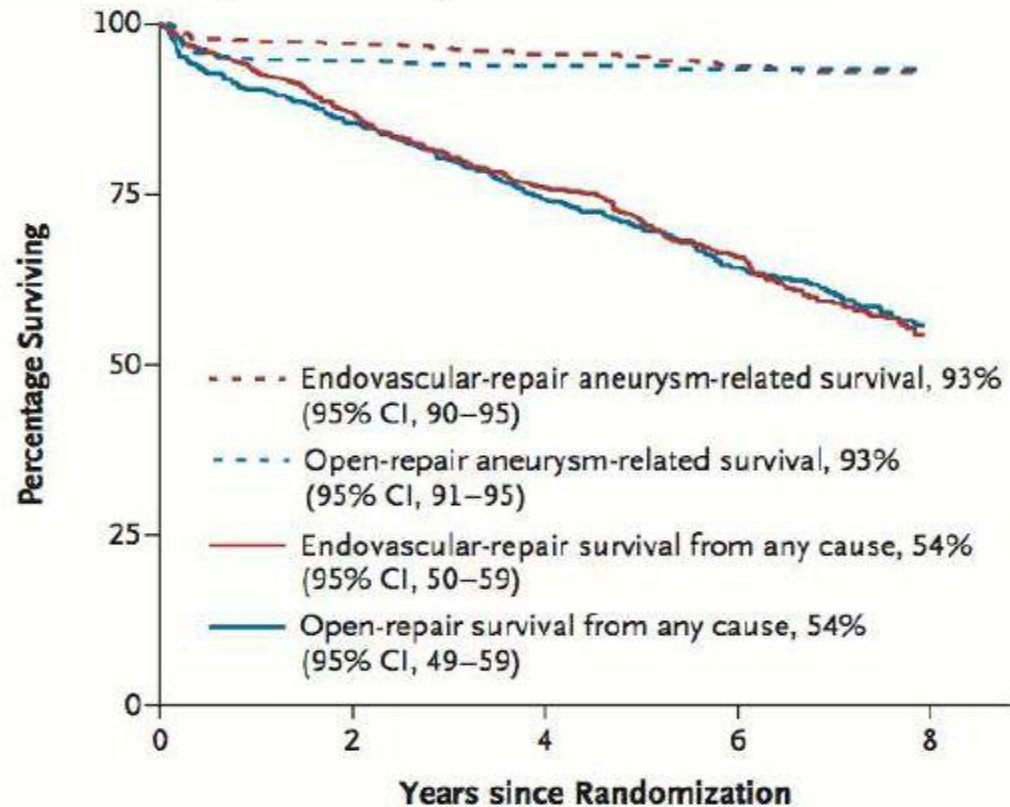


- Rupture at home: **99 %**
- Rupture treated surgically: **40-80 %**
- Rupture treated endovascularly: **?? (<40 %)**
- Elective standard surgery: **2-8 %**
- Elective endovascular: **0-3 %**



## Endovascular versus Open Repair of Abdominal Aortic Aneurysm

The United Kingdom EVAR Trial Investigators\*



### No. at Risk

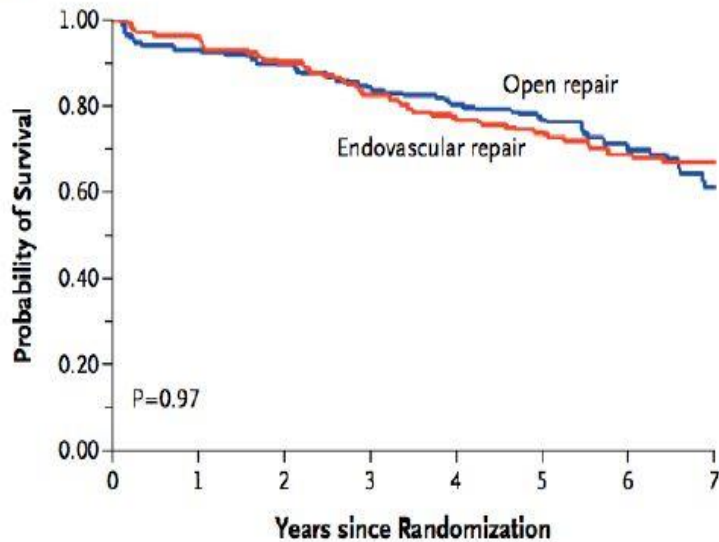
Endovascular repair	626	543	472	312	101
Open repair	626	534	461	301	109



# Open Repair vs. EVAR



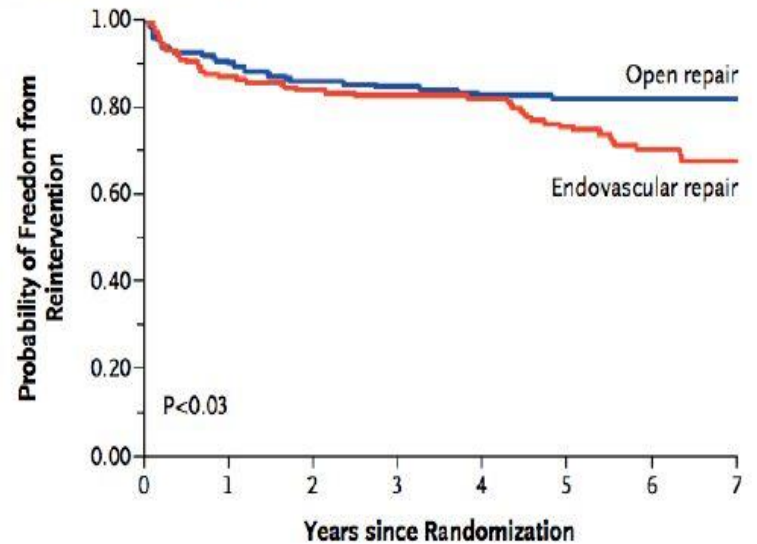
**A Survival**



**No. at Risk**

Open repair	178	166	159	150	143	137	88	36
Endovascular repair	173	166	156	143	133	128	83	39

**B Freedom from Reintervention**



**No. at Risk**

Open repair	178	152	139	128	118	111	73	29
Endovascular repair	173	147	134	123	115	102	66	31

# Open Repair vs. EVAR

9/1999 – 12/2003

AAA > 5.5 cm

34 Centers in UK

Mean Age: 74

91% Men

Median AAA size 6.2 cm

Devices:

51% Zenith (Cook)

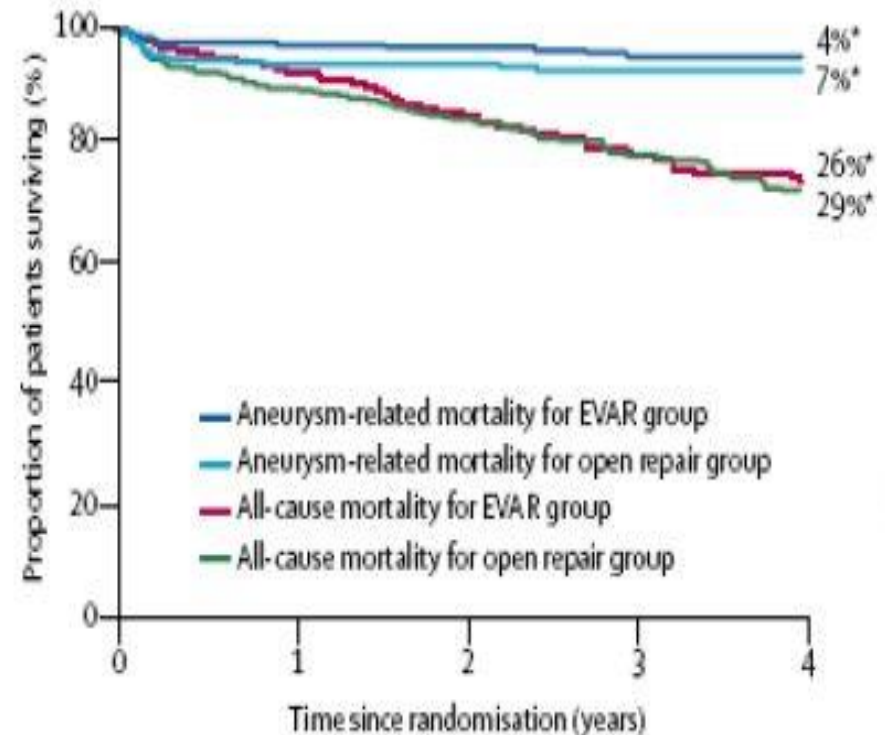
33% Talent (Medtronic)

7% Excluder (Gore)

4% AneuRx (Medtronic)

3% Quantum/Teramed (Cordis)

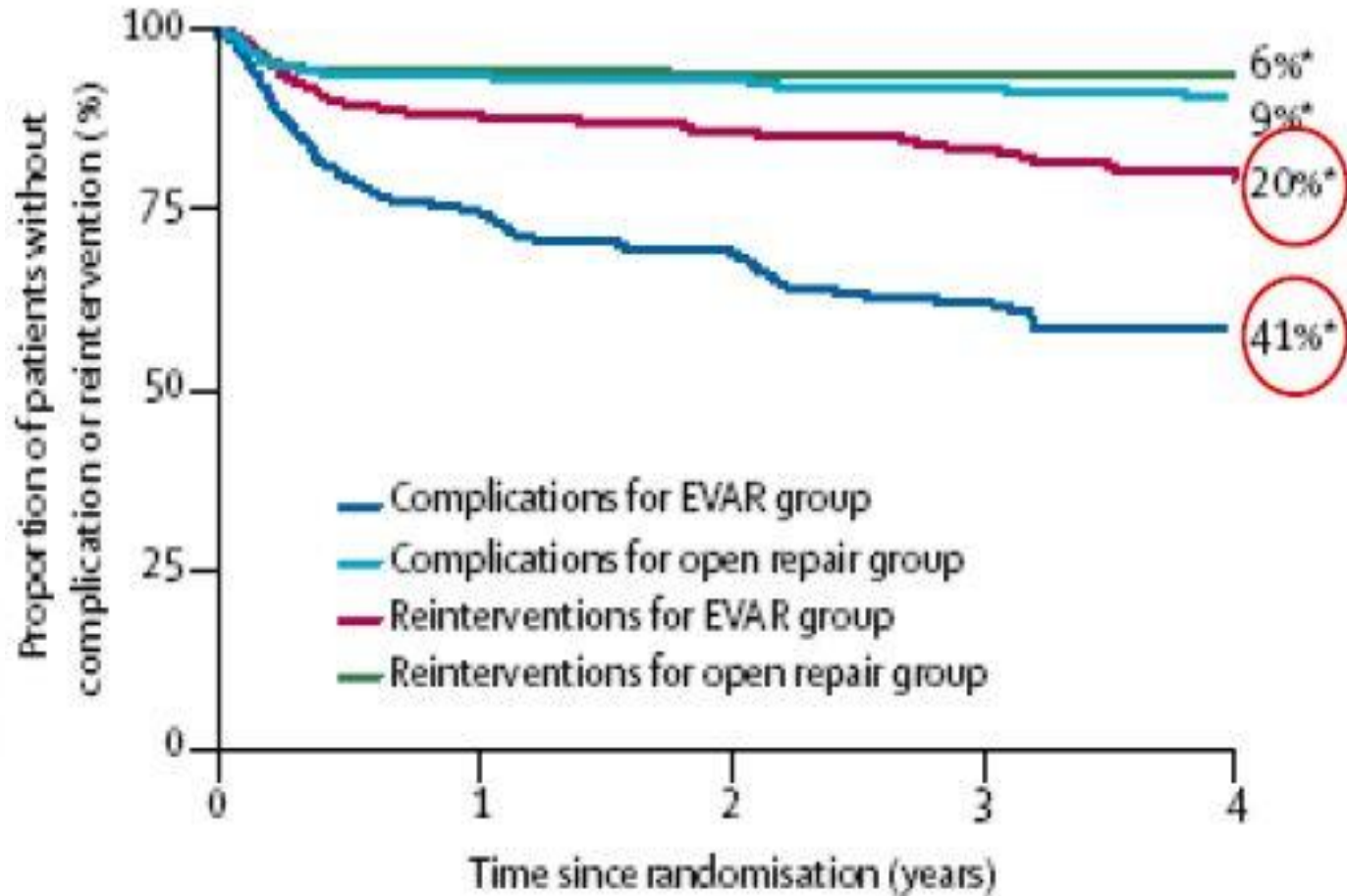
EVAR trial participants. Lancet 2005; 365: 2179-2186



Number at risk

Open repair	539	484	314	195	88
EVAR	543	503	316	187	94

# Open Repair vs. EVAR



# Benefits of EVAR



- avoidance of major abdominal surgery
- no cross-clamping of aorta
- avoidance of surgery-specific complications (i.e. sexual dysfunction)
- short LOS (1-3 days), no need for ICU
- ‘simple’ and speedy recovery
- **Rx of surgical high-risk patients**

# Weak Points of EVAR

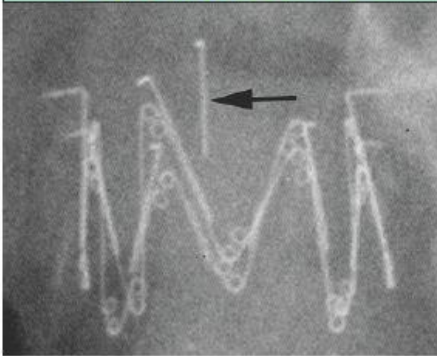


- Limited by anatomy
- Device costs
- Need for life-long surveillance
- Endoleaks
- Secondary interventions
- Long-term risk of AAA rupture?

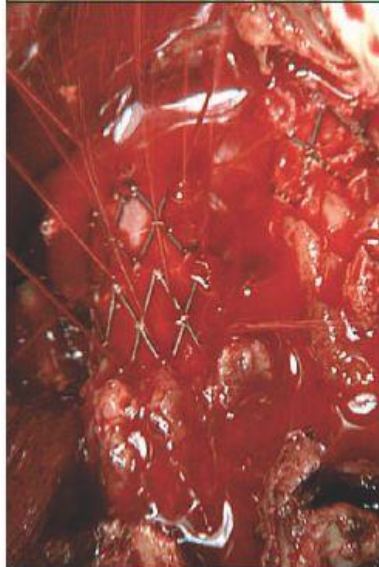
# Problems of Stent Graft



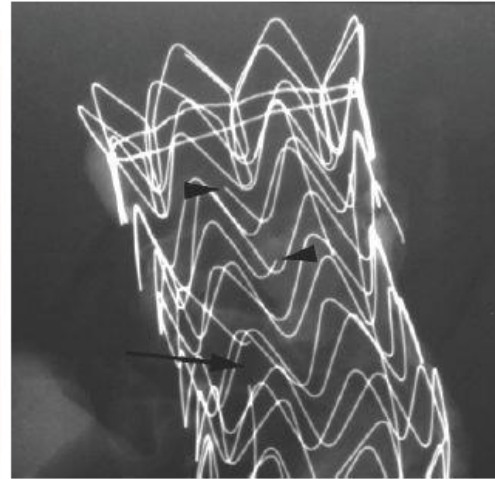
Hook Fractures



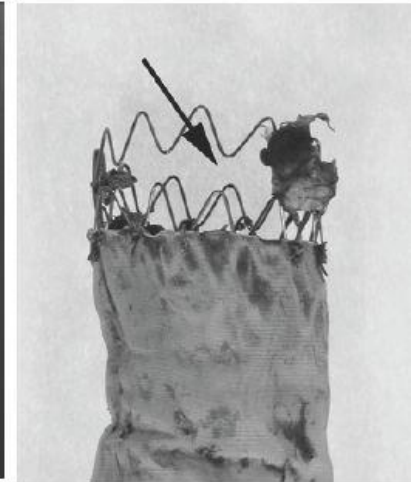
Permeability



Strut Fractures



Suture Breaks



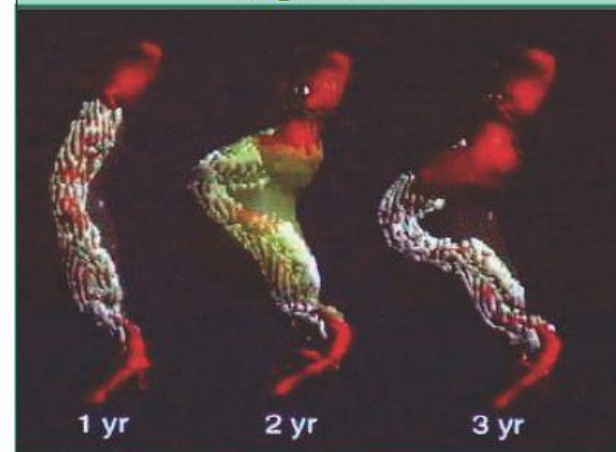
Strut and Suture



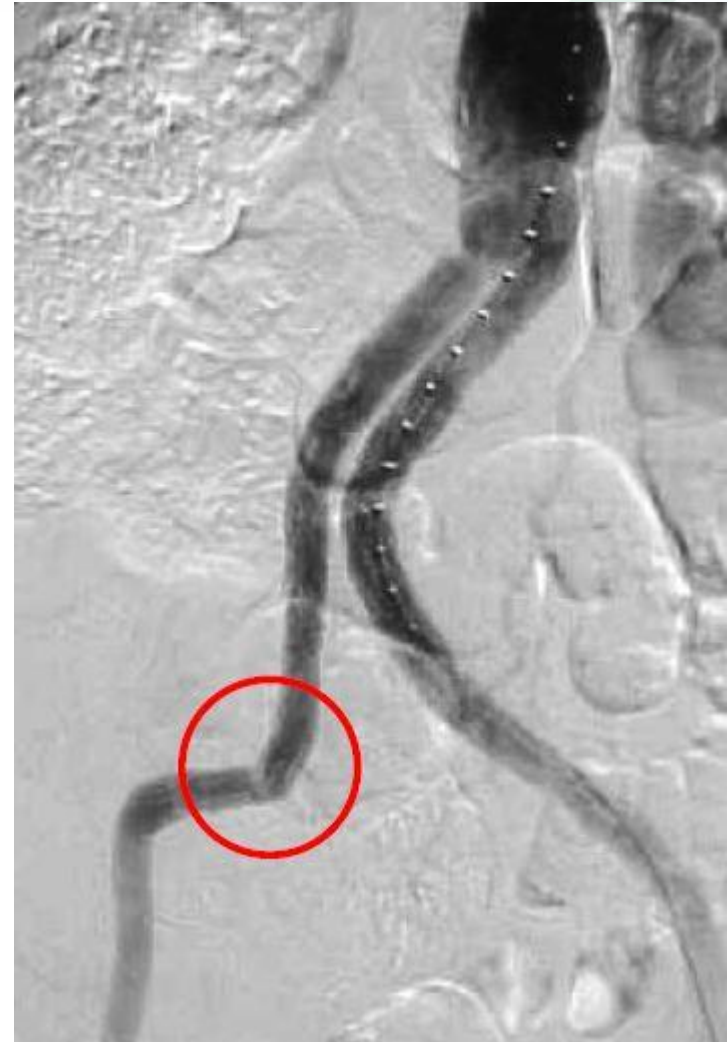
Graft Wear+Tear



Migration



# Problems of Stent Graft



# Case by Case : Angle and High Risk Patient



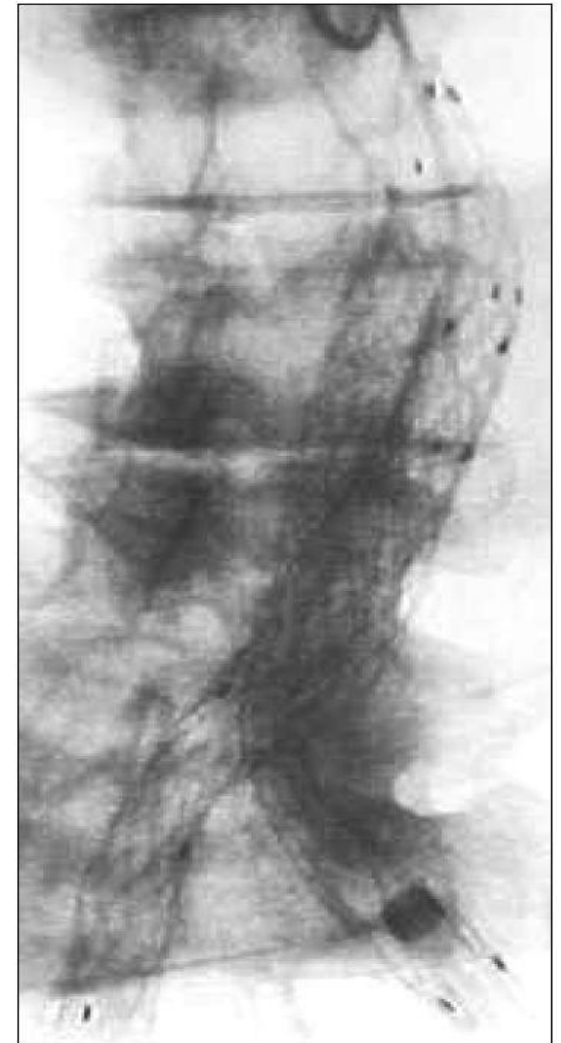
- reality: 9.5 cm AAA on an 82 year-old lady at high risk for standard AAA surgery (LVEF 20%)



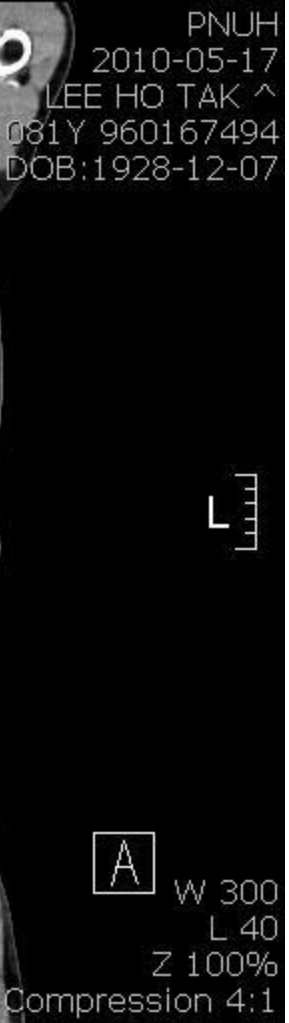
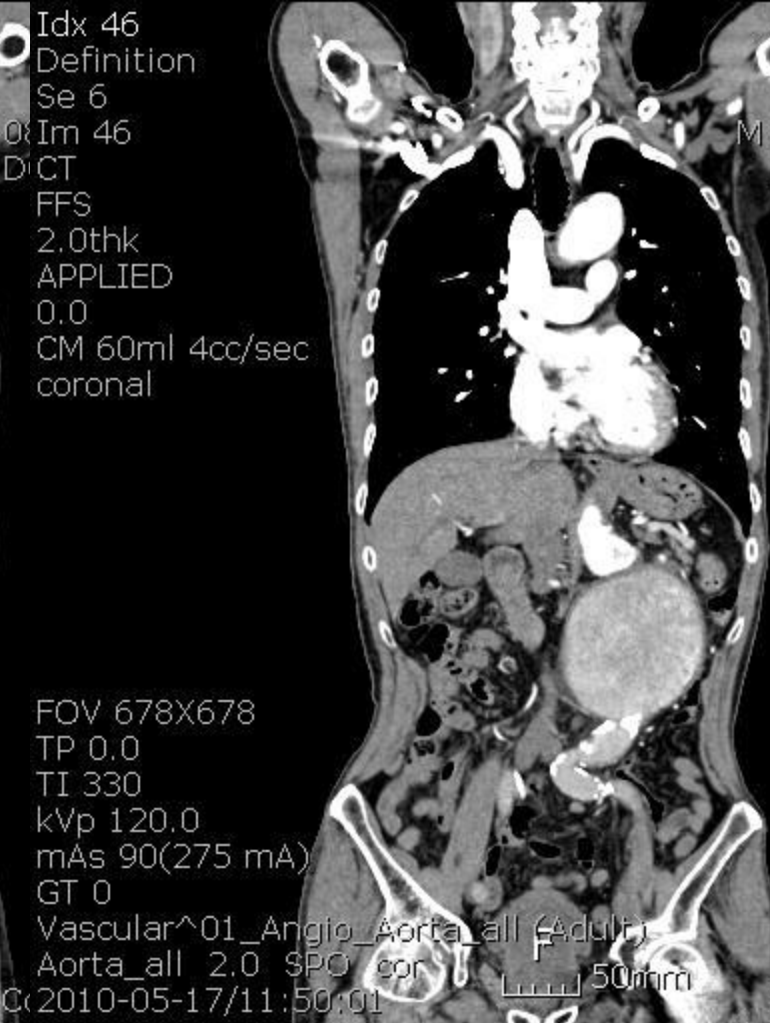
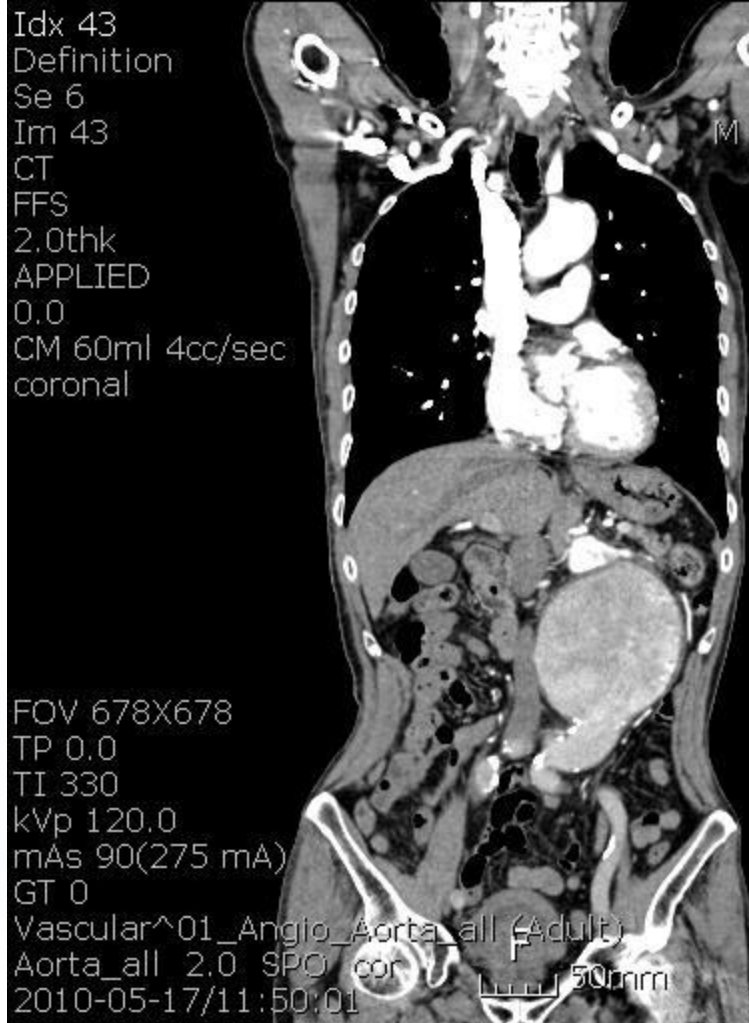
- very large AAA with “angulated anatomy”, ‘empty sac’ ... likely to ‘morph’ dramatically after endoluminal exclusion increasing risk of late failure...



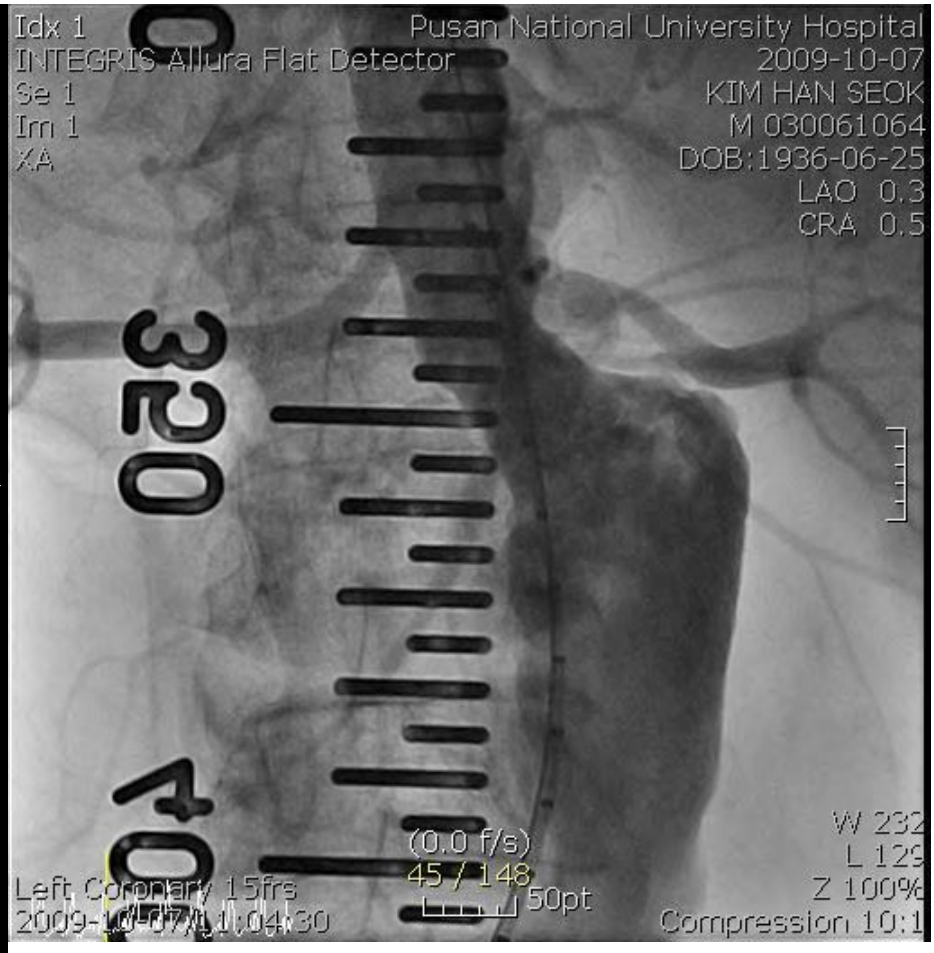
# Case by Case



# Case by Case : 84/M



# Case by Case : 68/M Short Neck



# Requirements of stent Grafting



- Suitable anatomy

  - Vascular access

  - Aortic neck

  - Angulation

  - Calcification

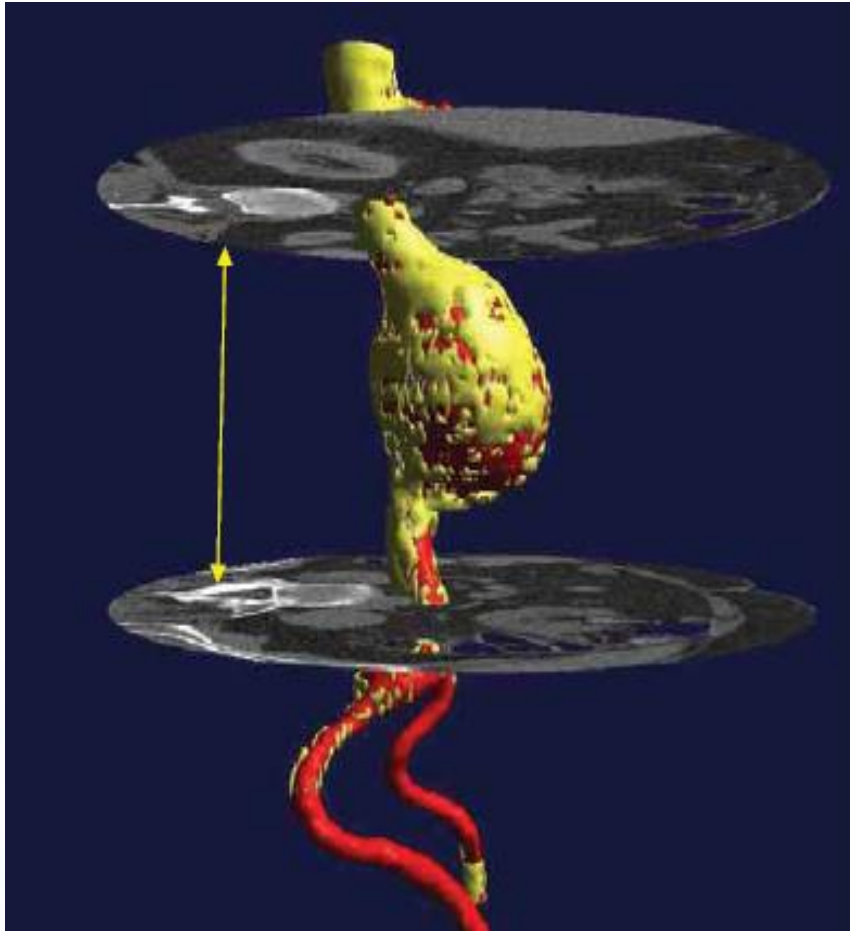
- Precise sizing

  - <3mm CT scan slices

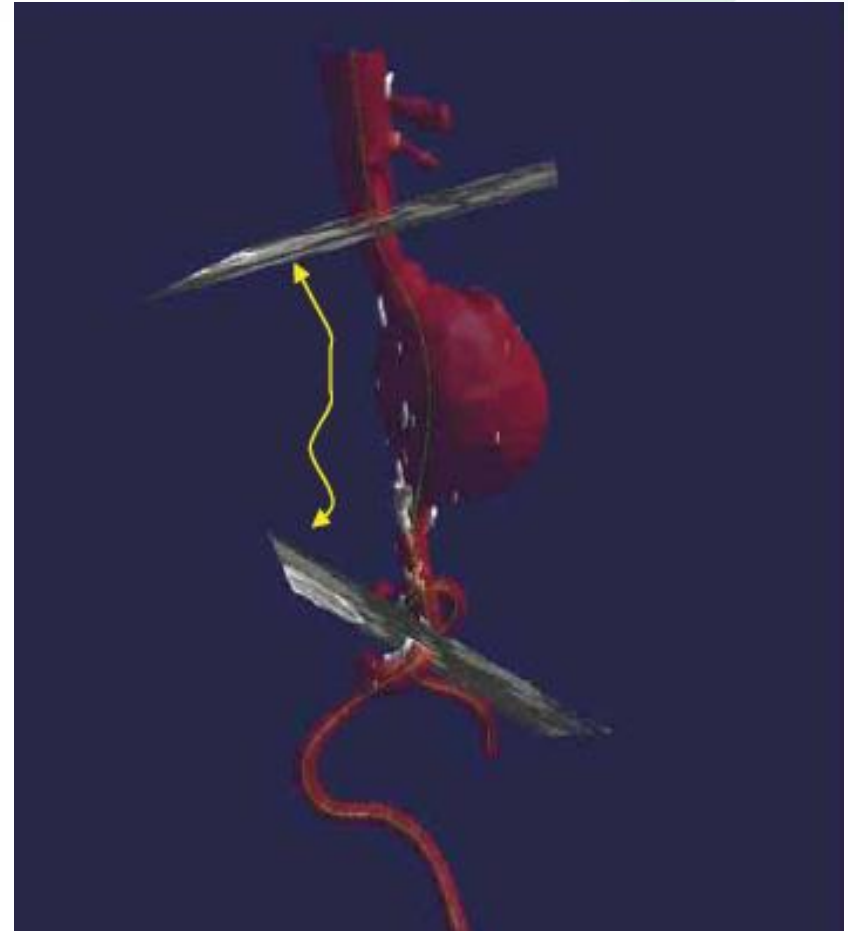
- Good imaging equipment mandatory

- Patient annual follow-up exam strongly advised

# Length measurements

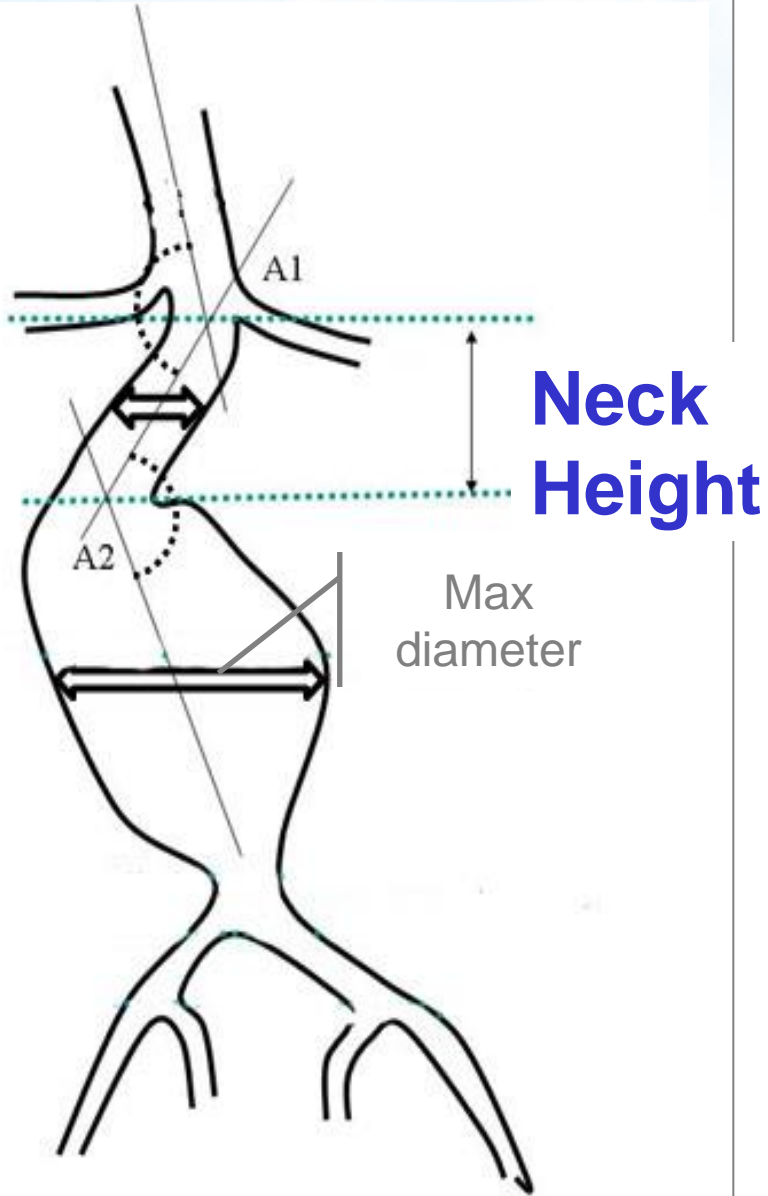


**Standard length measurements**

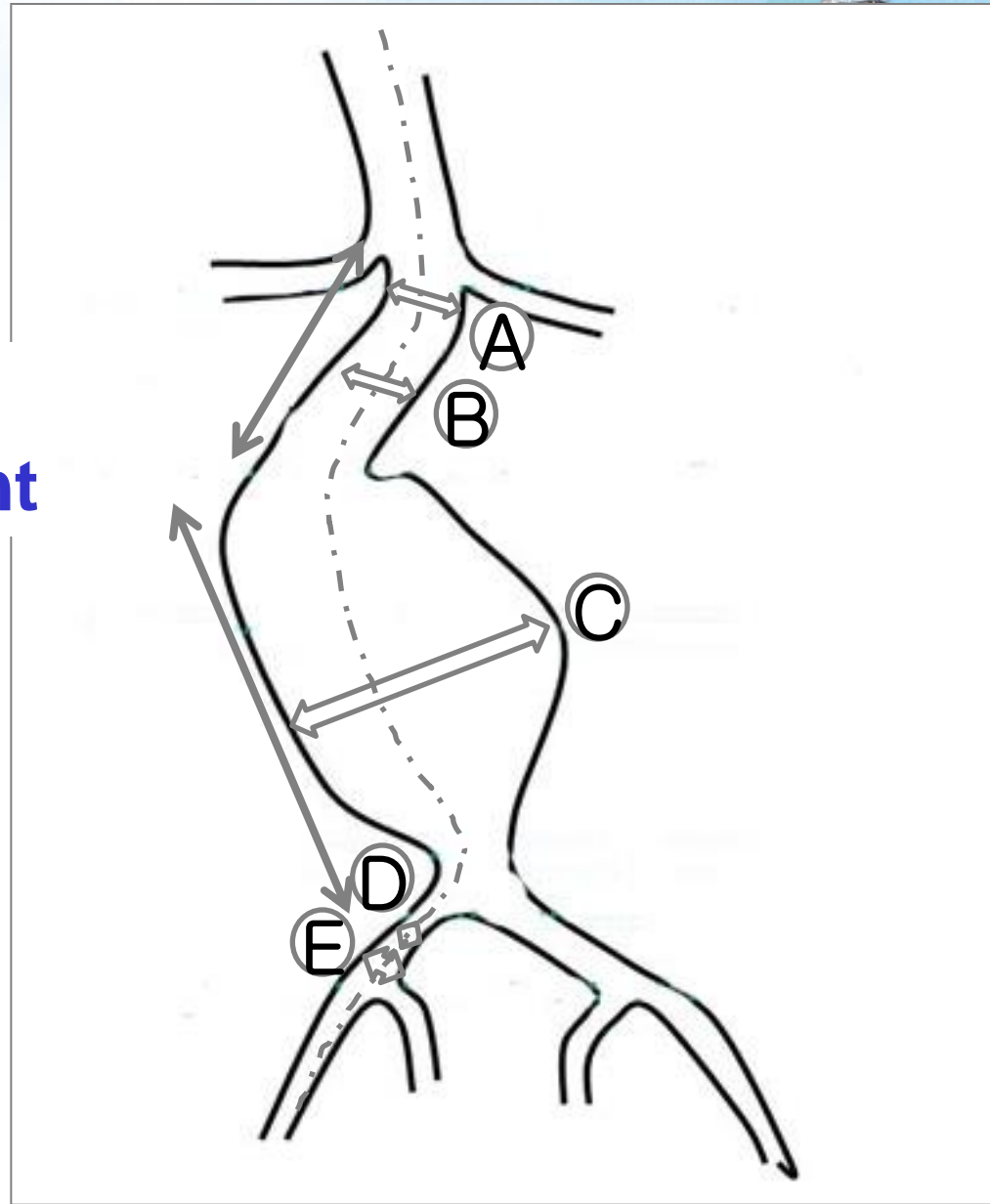


**Centerline length measurements**

# Standard length measurements



# Centerline length measurements

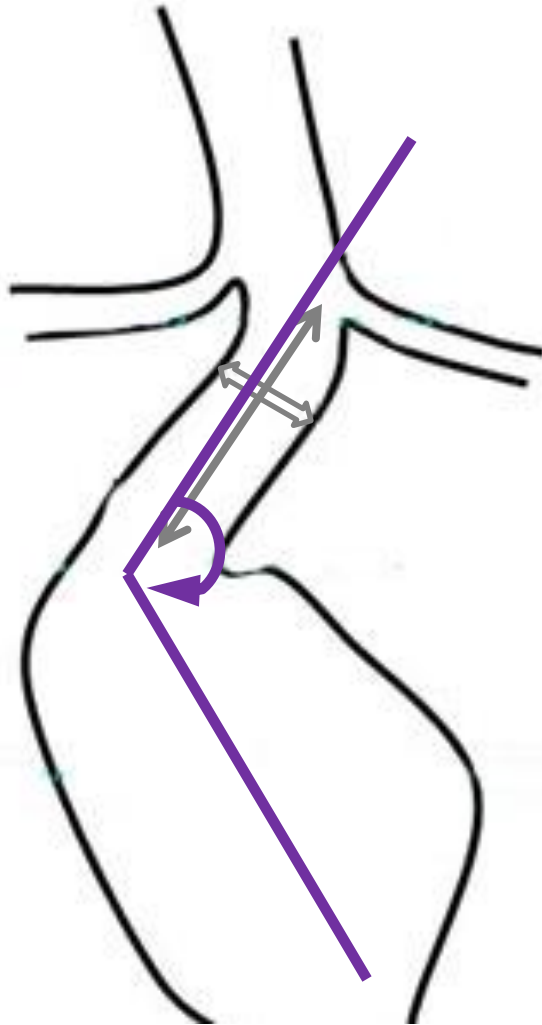


# Anatomic Criteria



- Proximal neck length
  - >15mm
  - diameter <28mm
- Tube graft
  - distal cuff length >10mm
  - diameter <28mm
- Iliac artery diameter
  - >7mm and < 15mm
  - Minimal to moderate tortuosity
- No mural thrombus at attachment sites
  - Minimal calcification
- No associated mesenteric occlusive disease

# Anatomical criteria



- **Infra-renal neck**

Choose 10-20% bigger diameter device

Maximum diameter: < 28-29mm

(Currently 36mm is maximum device diameter)

Angle < 60

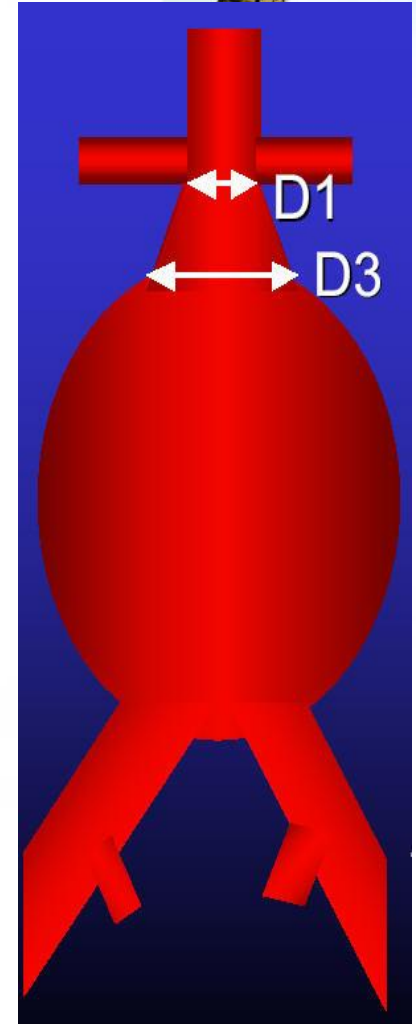
: Technically hard



# Conical neck

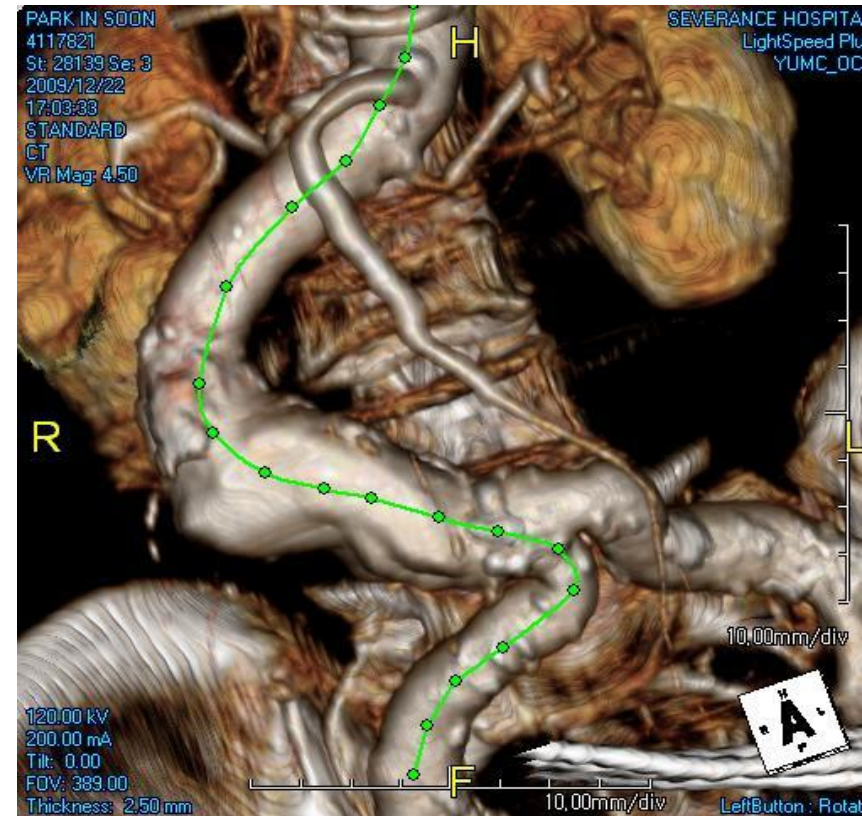


- Potential Solutions
  - Rejection
  - Oversizing
  - Supra-renal Fixation
  - Balloon-expandable Stent
  - Fenestrated or Branched Endograft



# Anatomic **Unsuitability** for EVAR

- Proximal Neck
  - Length; < 15 mm
  - Angulation; > 60 Degrees
  - Cornical shape
  - Filling Defect: Atheroma or Thrombus
    - More risk of endo-leak: calcification or thrombus > 1/3~ 1/4 aorta

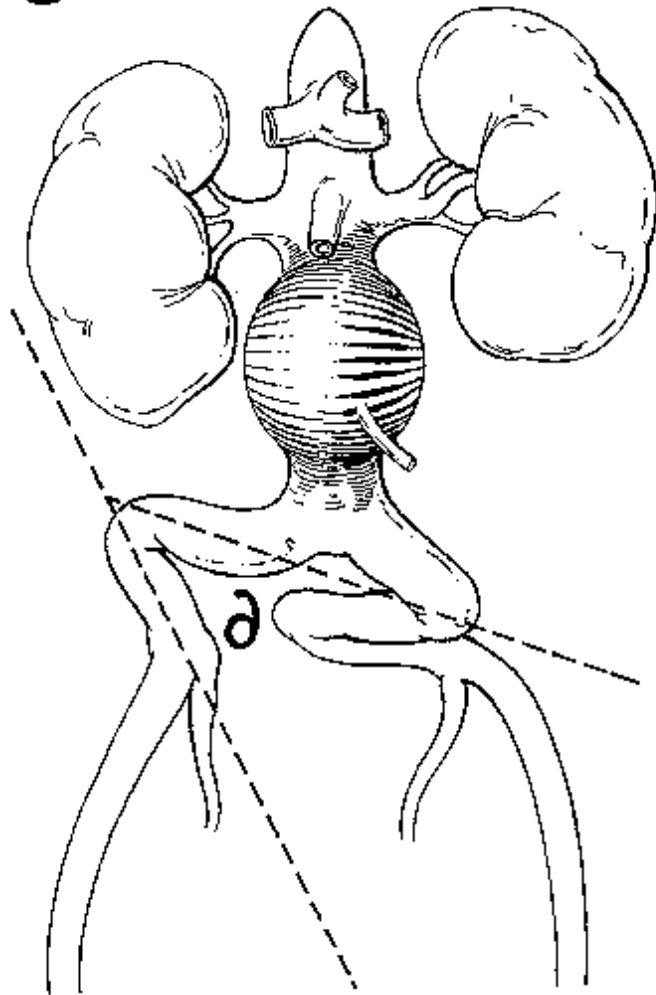


# Anatomic **Unsuitability** for EVAR

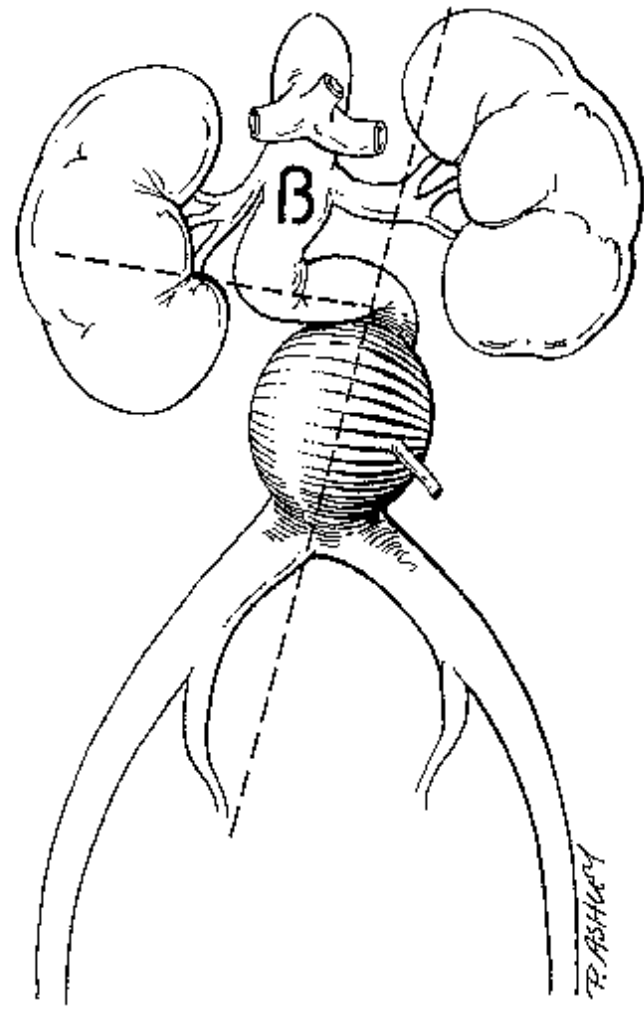
- Iliac Arteries
  - CIA Aneurysm (20% of AAA pts)
  - Stenosis / Obstruction
  - Small size
  - Tortuosity
    - Need low profile flexible delivery device
    - ↑Risk of malposition
      - » graft kinking
      - » dislocation



# Anatomic Unsuitability for EVAR

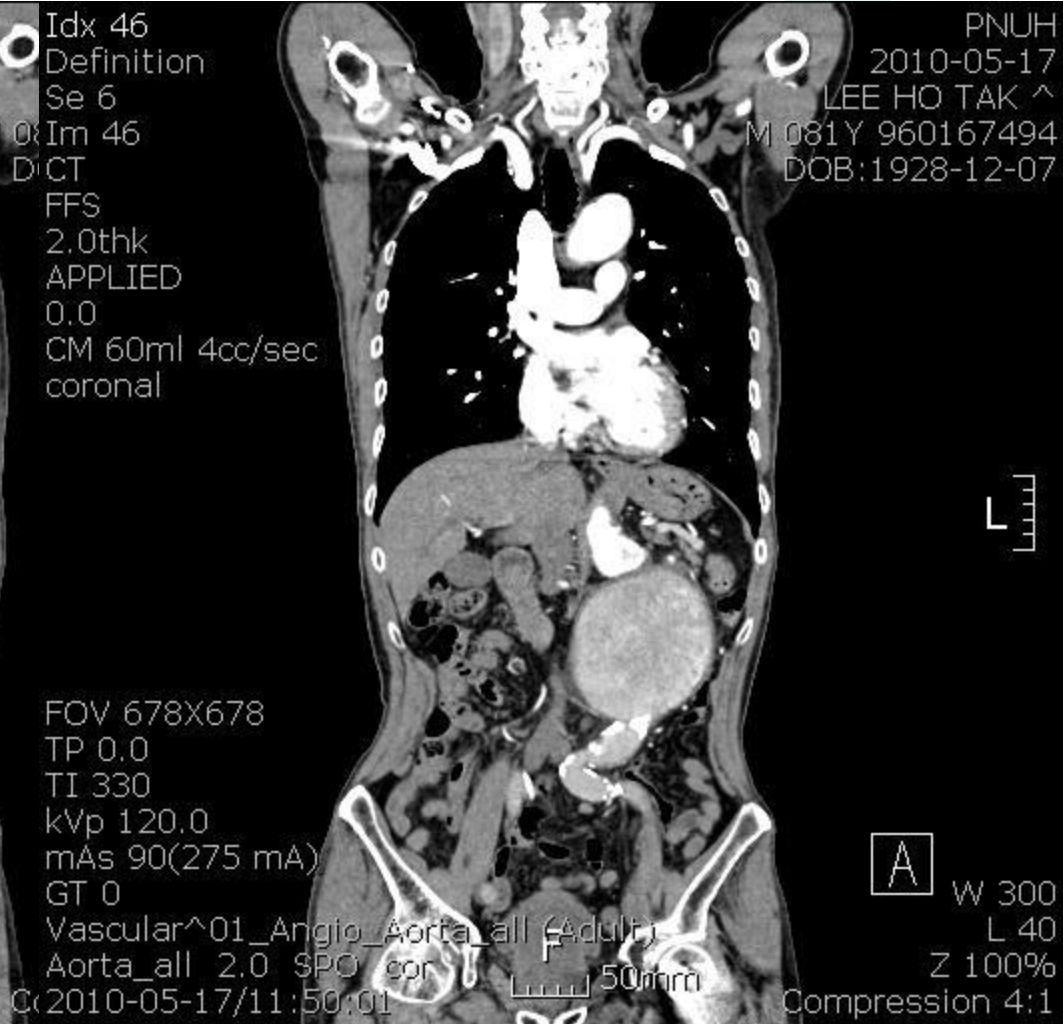
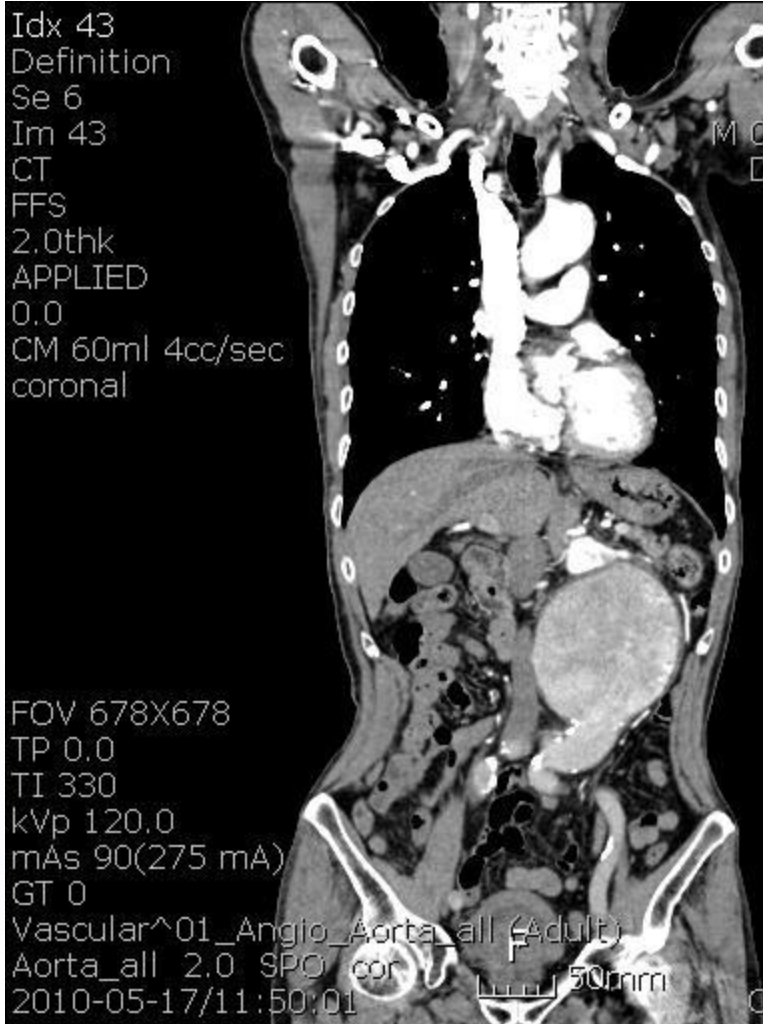


Ilio-iliac Axis  $\delta < 90^\circ$

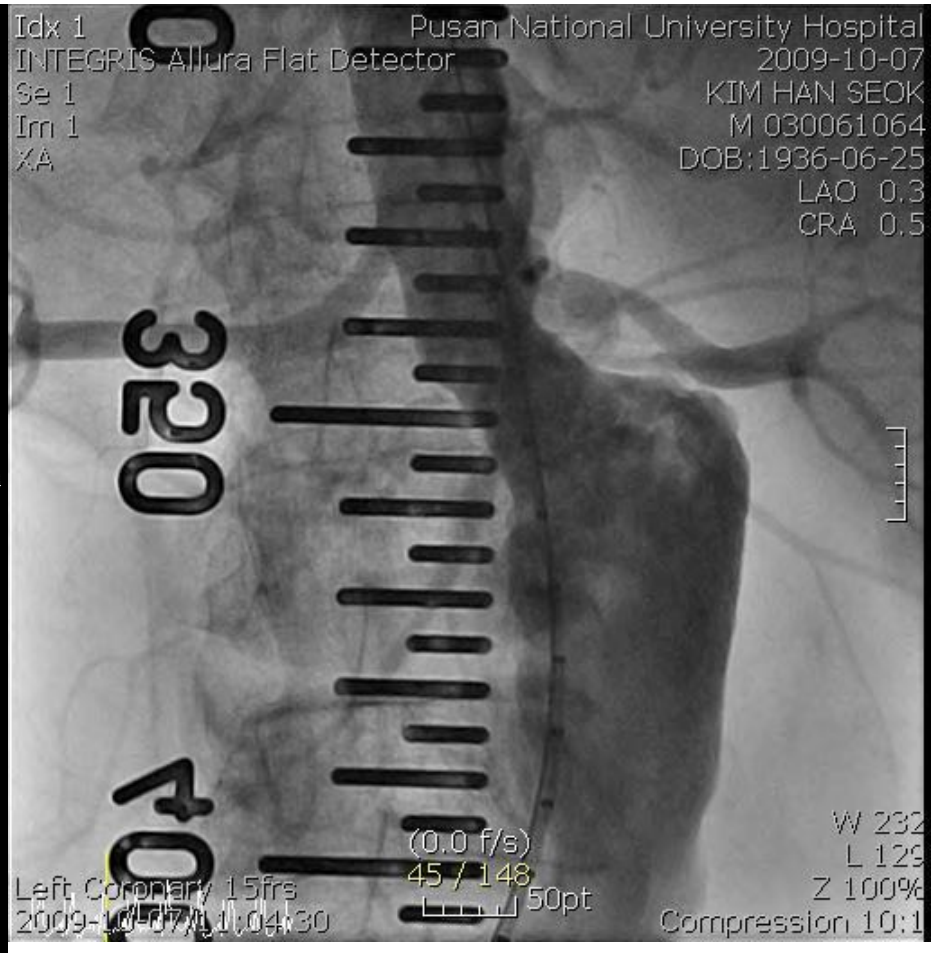


Angulation Proximal Neck  $B > 60^\circ$

# Anatomic Unsuitability for EVAR



# Short Neck



# Complications of EAAA repair



- Systemic
  - MI, CHF, arrhythmias, respiratory failure, renal failure
- Procedure related
  - Dissection, malpositioning, renal infarction, thromboembolization, ischemic colitis
  - Groin hematoma, wound infection
- **Device related**
  - **Migration, detachment, rupture, stenosis, kinking, endoleak**

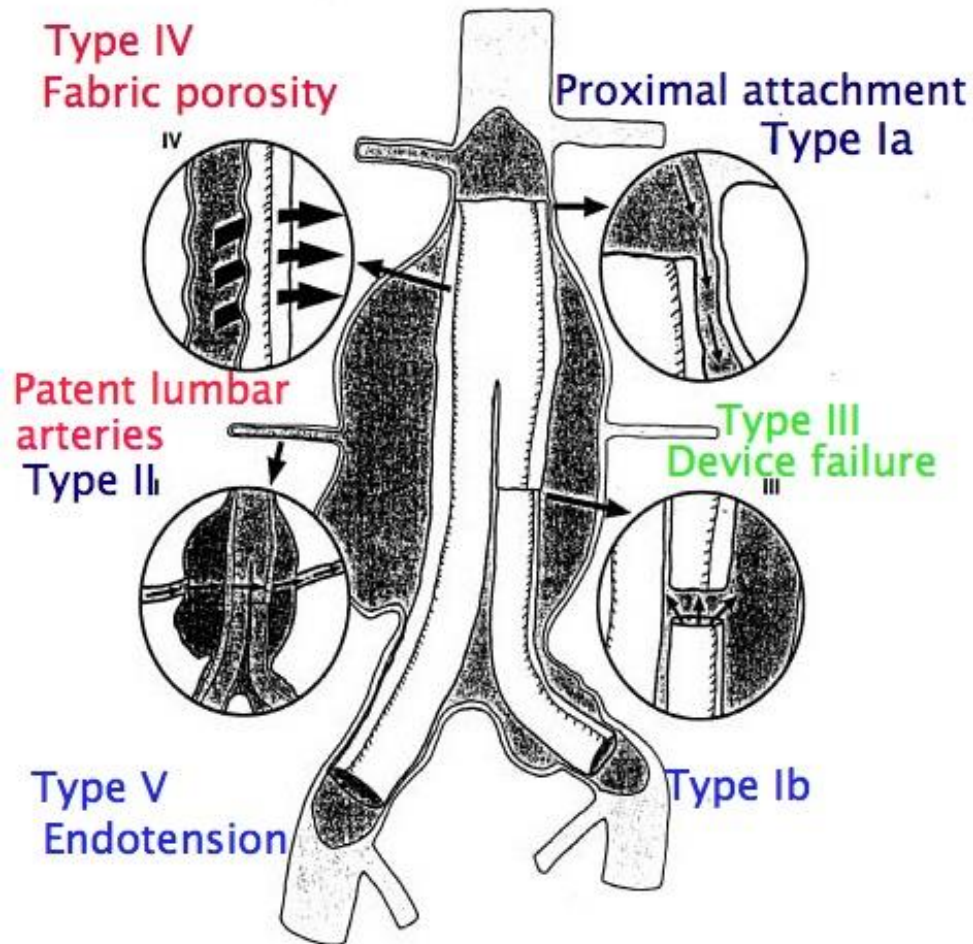
# Endoleaks



- Coined by White, et al, 1996
  - Leak around proximal or distal attachment sites
    - Persistent flow in aneurysm sac
    - Incomplete exclusion
- Rates
  - 0 to 44%
- Risks
  - Expansion
  - Rupture



# Endoleak Classification



- Type I—perigraft
  - Persistent flow at proximal(a) or distal(b) attachment sites
- Type II—retrograde flow from side branches
  - Inferior mesenteric or lumbar arteries
  - Subgroup A: inflow only; B: in and outflow
- Type III—graft defect
- Type IV—graft porosity
- Primary or secondary

# Summary



- Open Repair : young patients, Comorbidity(-)
- EVAR : old patients, Suitable anatomy



**Thank you from my heart**

