

Decision-making in aortic aneurysm



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Definition..!!!!



- **Aneurysm**

Diameter > 50%, all 3 layers (intima, media, adventitia)

- **Pseudoaneurysm**

Disruption of arterial wall with extravasation
Blood contained by periarterial connective tissue
(not by the arterial wall)

- **Ectasia**

Arterial dilatation < 150%

- **Aortic dissection**

Disruption of the media layer
Bleeding within and along the wall of the aorta

- **Acute aortic dissection**

< 2wks

- **Chronic aortic dissection**

> 2wks (or 2mos.)

- **Subacute aortic dissection**

2wks ~ 2 mos.

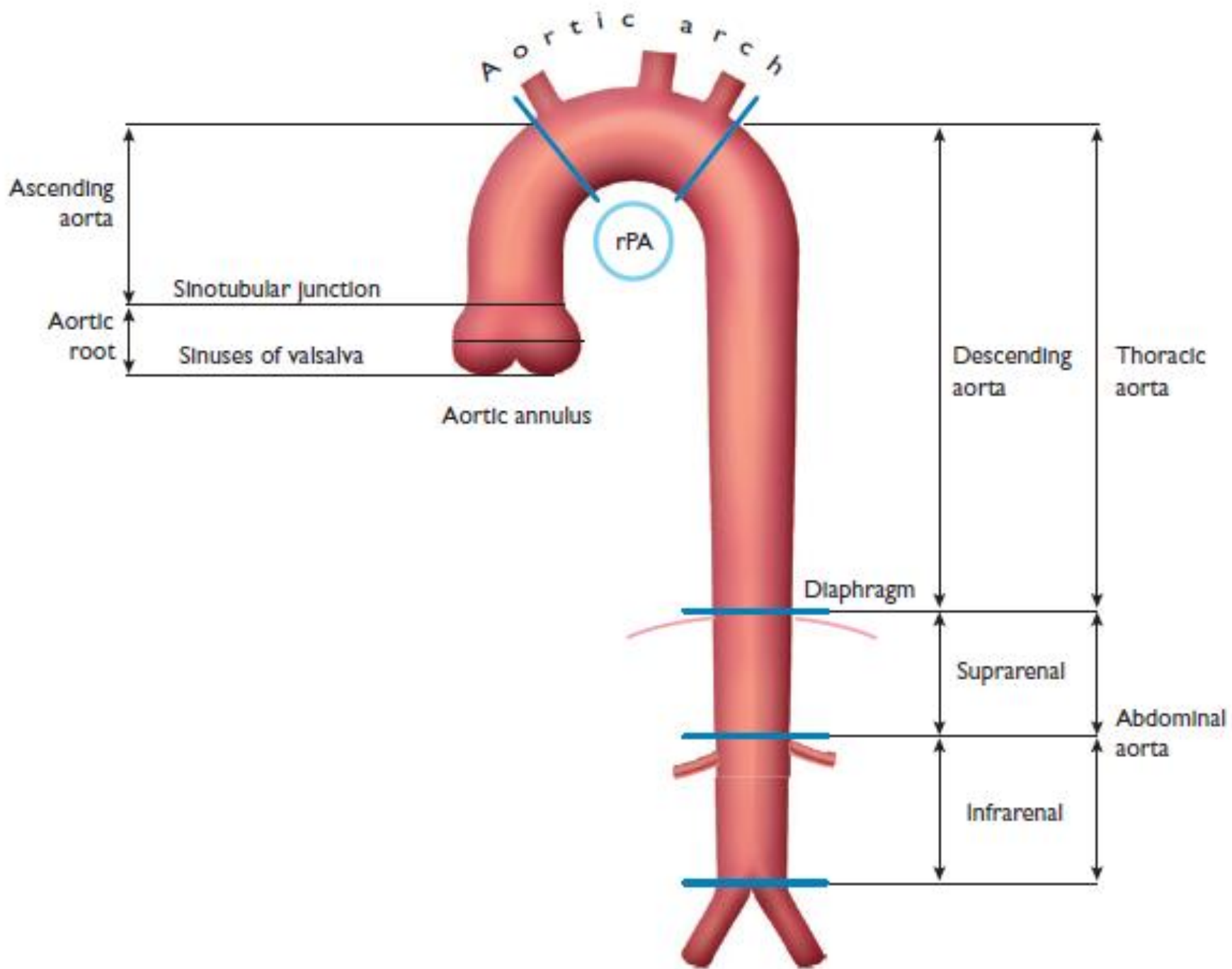
Aortic aneurysm



Aneurysm

- **Diameter > x1.5**
- **Ascending aortic aneurysm**
- **Aortic arch aneurysm**
- **Descending thoracic aortic aneurysm**
- **Thoracoabdominal aortic aneurysm**





Cause



- **HTN & atherosclerosis**
- **Aortic dissection**
- **Genetic disorder (ex. Marfan syndrome)**
- **aortitis (ex. Syphilis, Tbc)**
- **Trauma (mostly pseudoaneurysm)**

Symptom



- **Asymptomatic !!!!!**
 - **Pain (not common)**
 - Neck & jaw pain ← arch aneurysm
 - Back, interscapular +/- left shoulder pain ← DTA aneurysm
- **SVC syndrome (← ascending aortic aneurysm)**
- **Hoarseness (← recurrent laryngeal n. ,d/t arch aneurysm)**
- **Stridor (← tracheal or bronchial compression)**
- **Dyspnea / Dysphasia (← lung / esophageal compression)**
- **Abdominal palpable mass (← abdominal aortic aneurysm)**

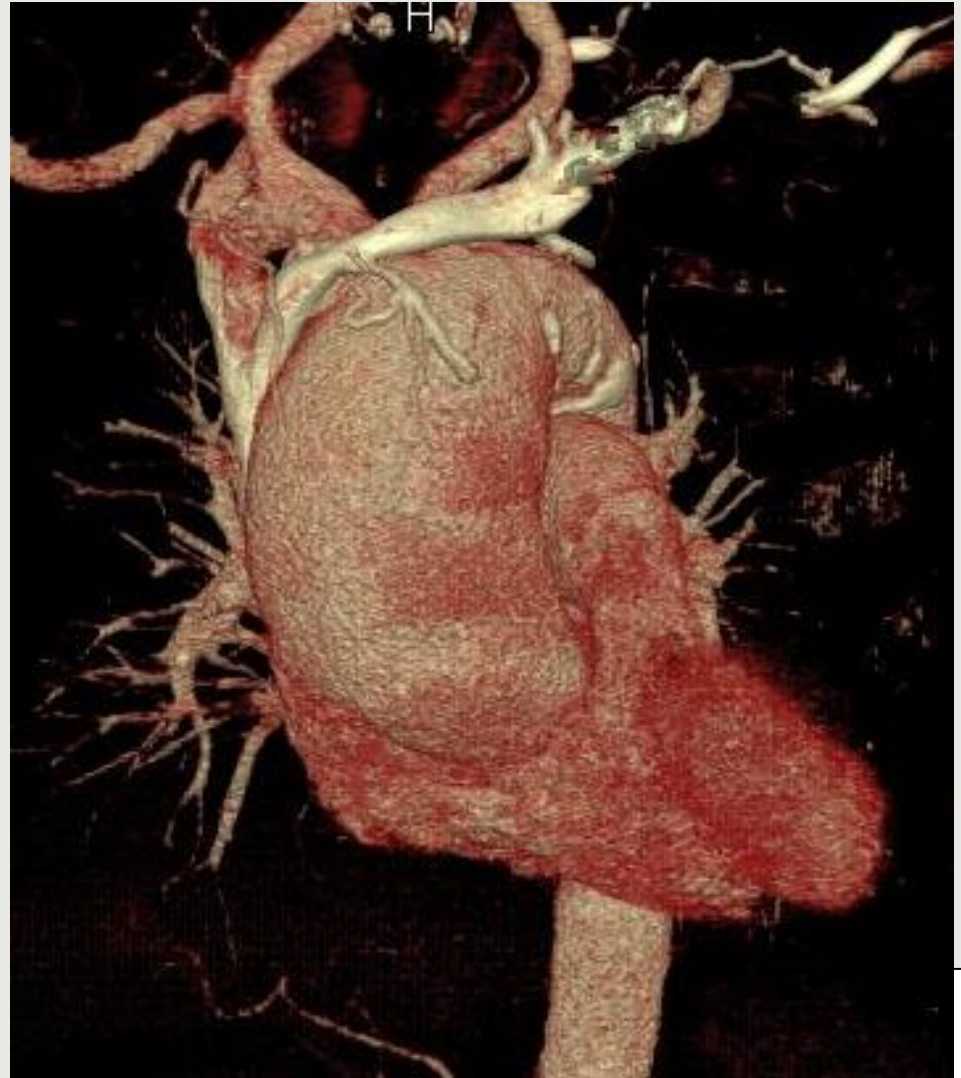
Case Based Learning



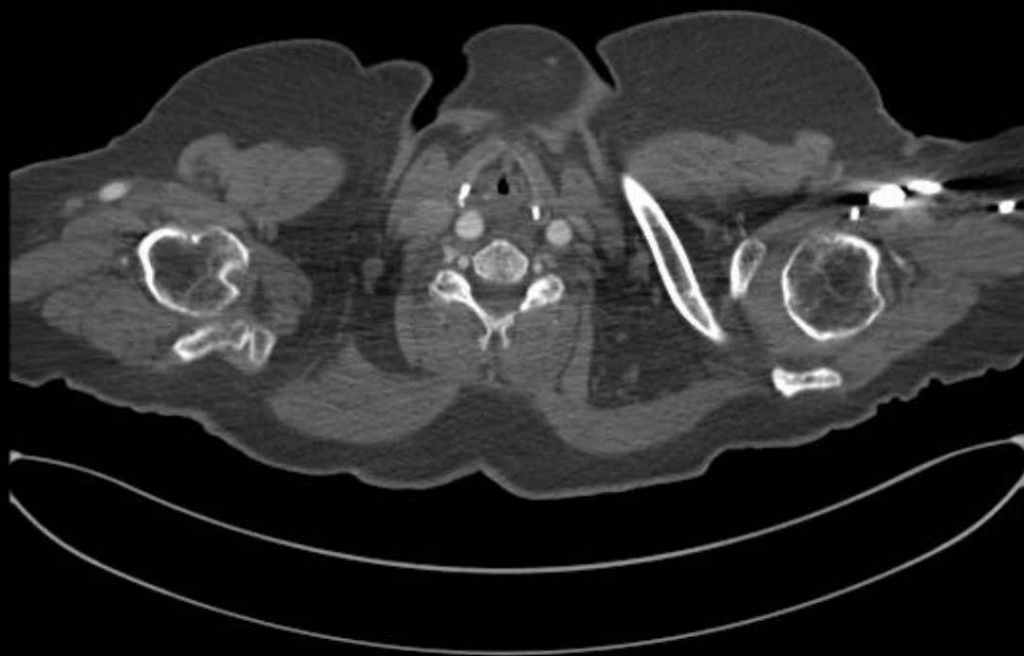
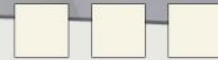
Case 1.



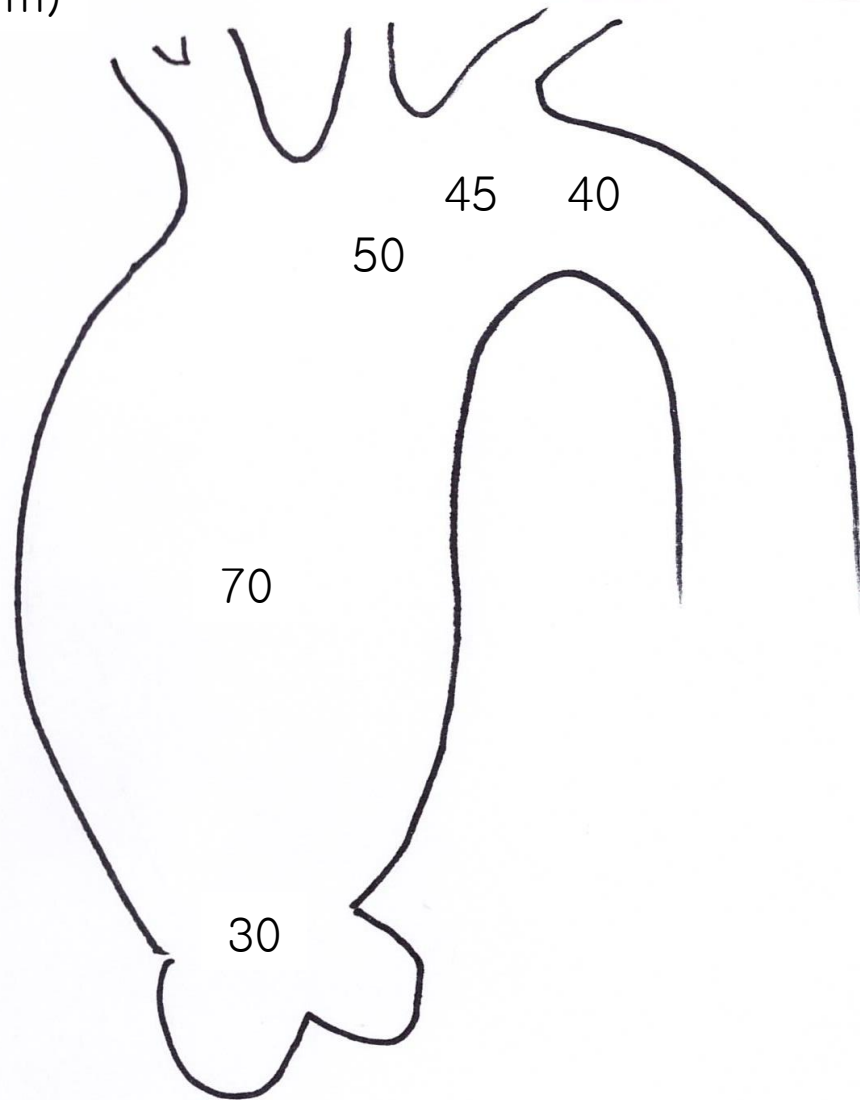
- **F/ 75**
- **No Sx**



Case 1.



(mm)



Treatment ..???



- **Ascending aorta replacement**
- **Ascending & total arch replacement**
- **TEVAR**
- **Hybrid TEVAR**
- **Observation**

Treatment ..???



- Ascending aorta replacement
- **Ascending & total arch replacement**
- TEVAR
- Hybrid TEVAR
- Observation

Ascending & total arch replacement (1)



- **Cerebral protection strategy?**
 - **DHCA (deep hypothermic circulatory arrest)**
 - **RCP (retrograde cerebral perfusion)**
 - **ACP (antegrade cerebral perfusion)**

- **Surgical technique?**
 - **Kazui's technique (distal anastomosis first)**
 - **Spielvogel technique (trifurcated graft technique)**

Cerebral protection – ascending or arch surgery



- **Deep hypothermic circulatory arrest (DHCA)**
 - **Clean & bloodless surgical field**
 - **Limitation of safe duration : 30-40min (under 18°C)**
 - **Increase CPB time, coagulopathy**

Cerebral protection – arch surgery

- **ACP**

- **Unilateral ACP via Rt. Axillary cannulation**

- **Circle of Willis does not guarantee**

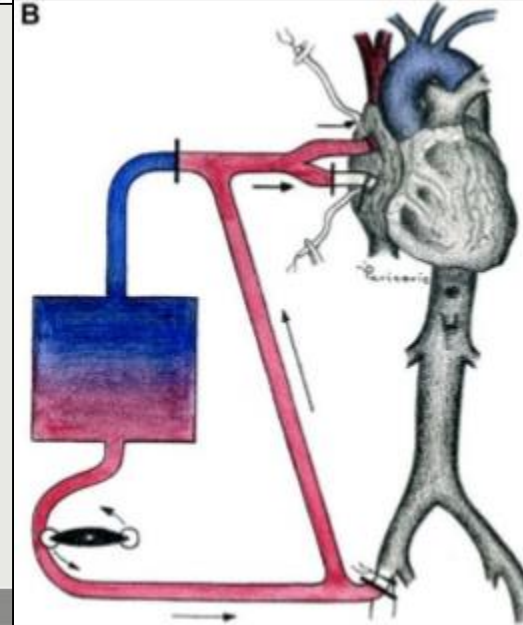
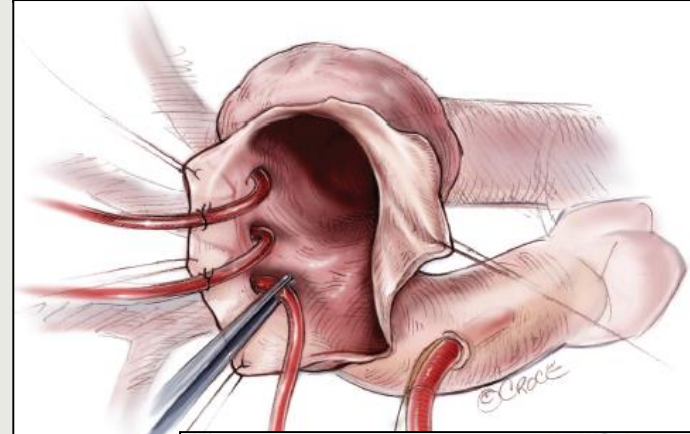
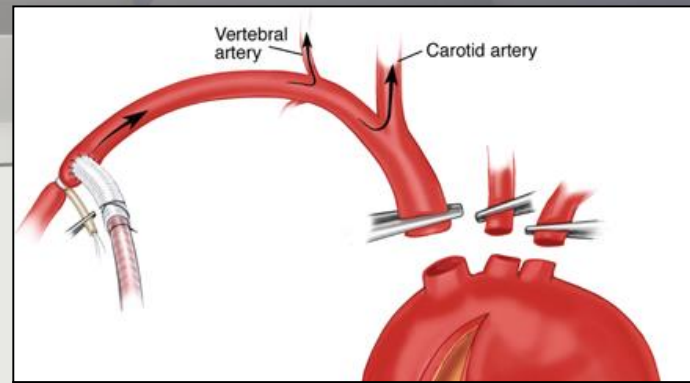
- **More physiologic**

- **RCP**

- **Cerebral embolic washout**

- **Maintenance of cerebral hypothermia**

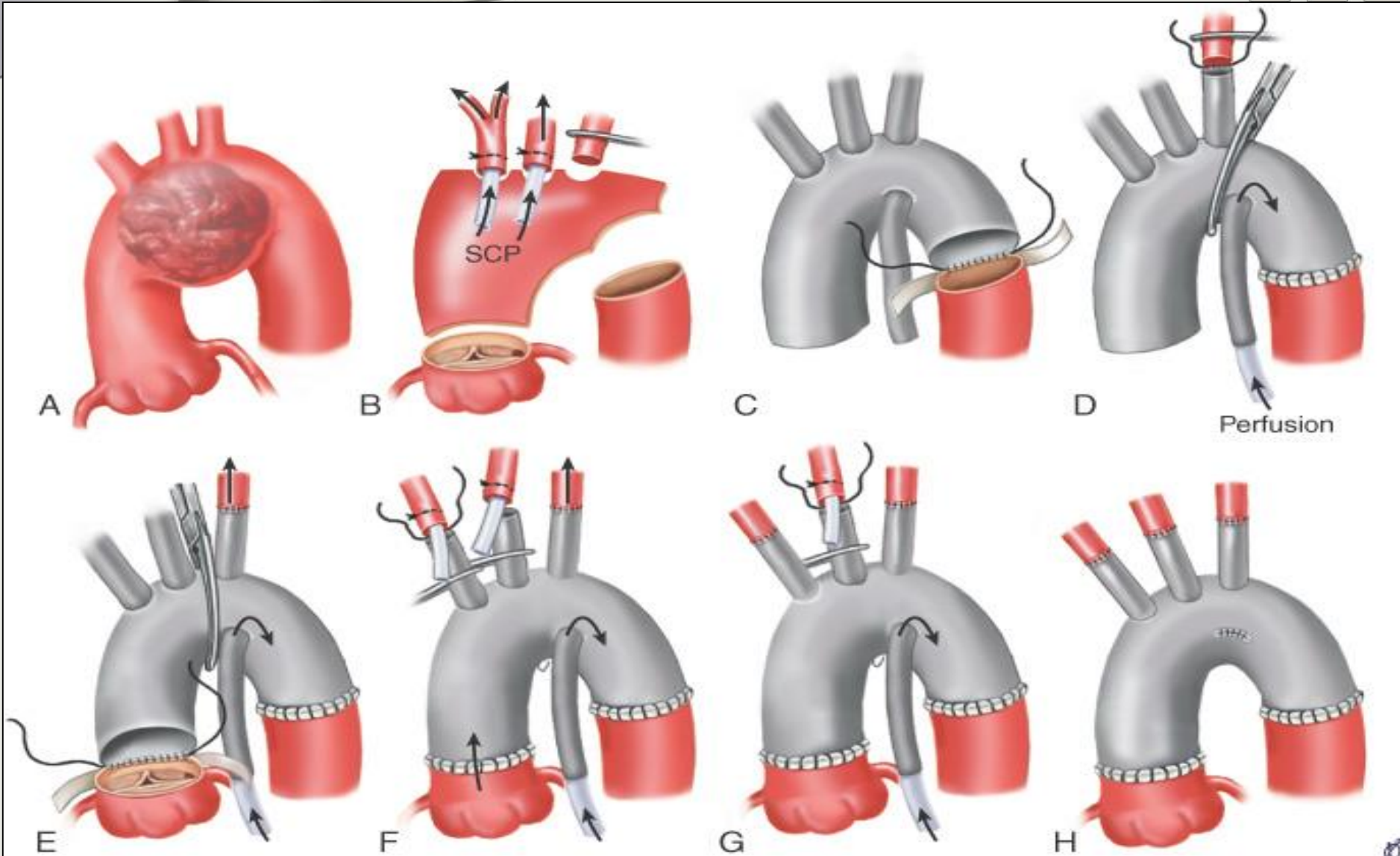
- **Cerebral edema (CVP < 25mmHg)**



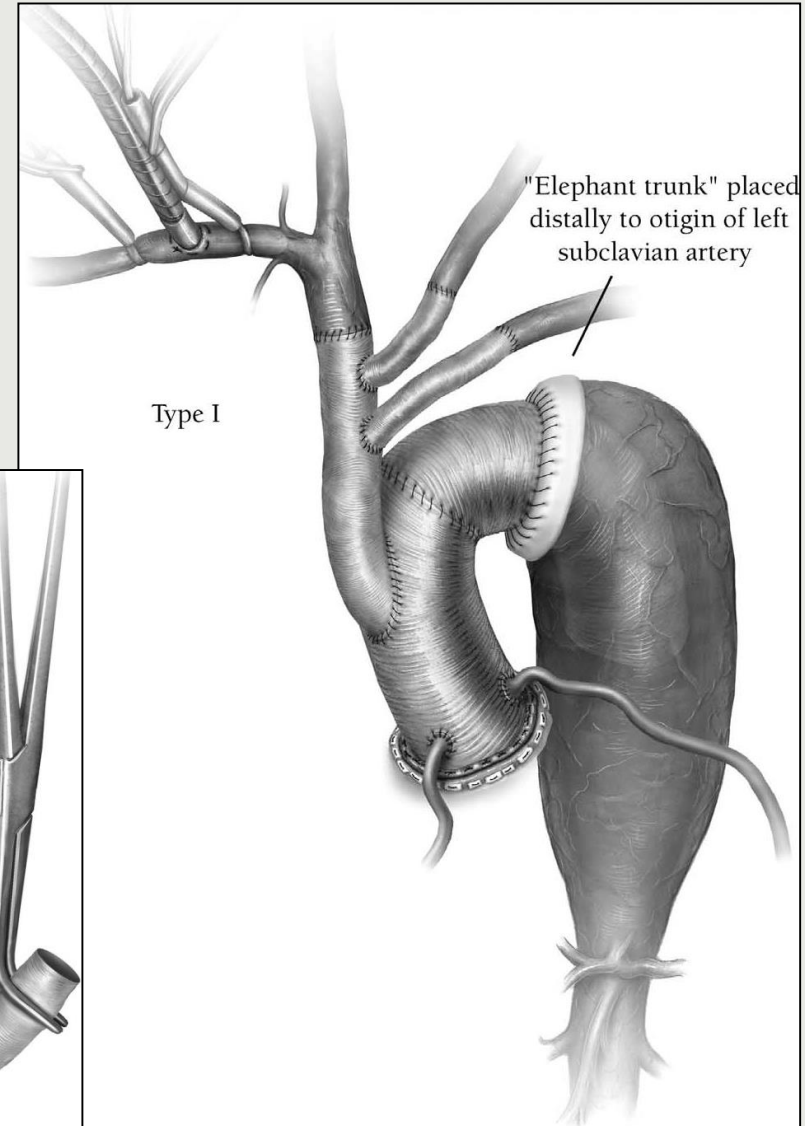
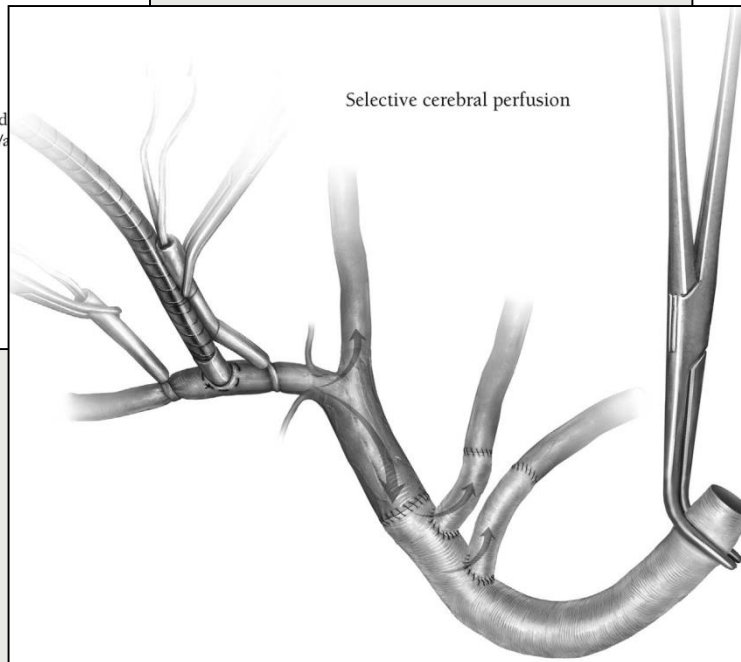
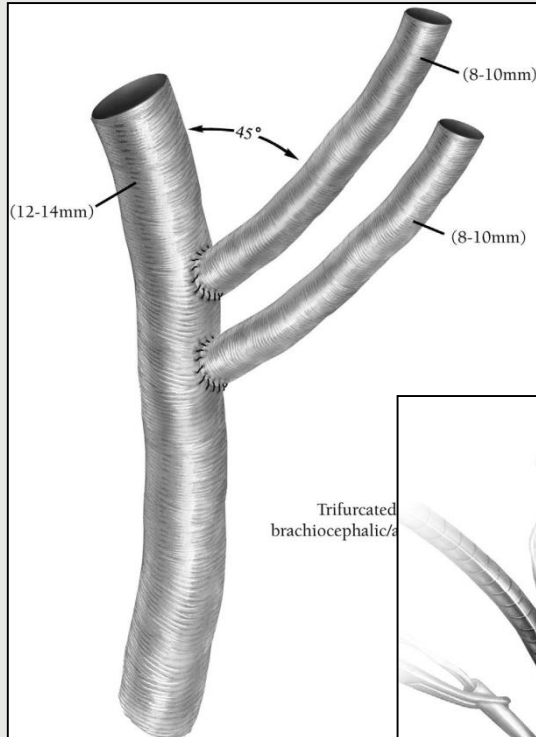
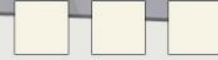


- **Surgical technique?**
 - **Kazui's technique (distal anastomosis first)**
 - **Spielvogel technique (trifurcated graft technique)**

Kazui's technique (distal anastomosis first)



Spielvogel technique (trifurcated graft technique)

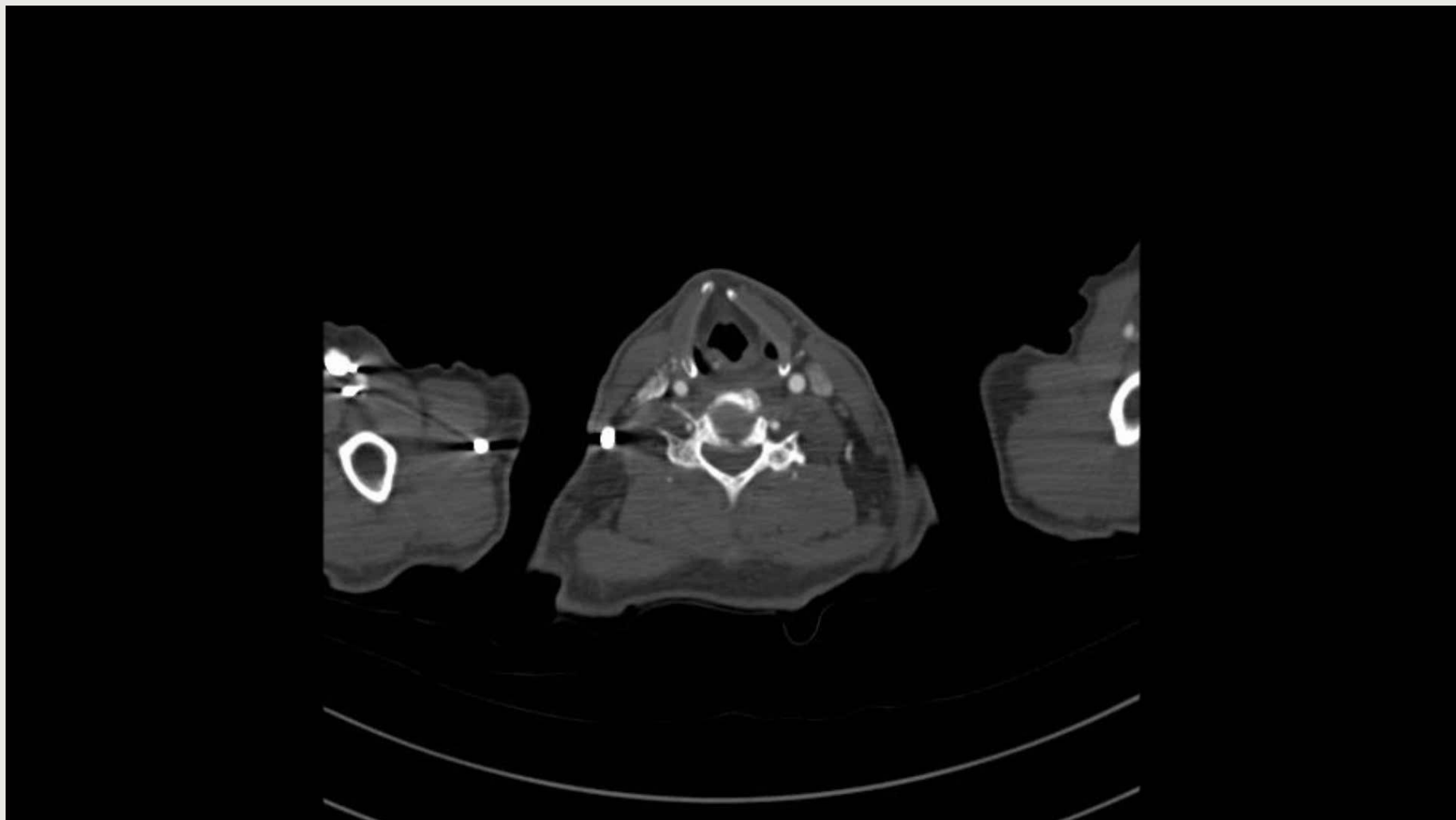
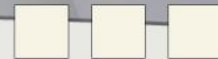


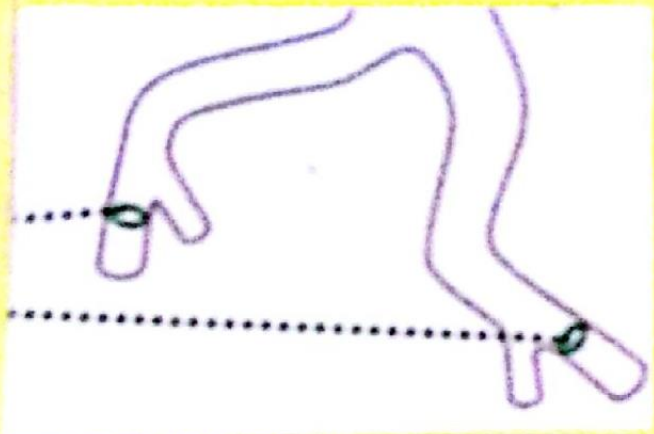
Case 2

- M/78
- Hoarseness



Case 2





Treatment ..???



- **Ascending & total arch replacement**
- **TEVAR**
- **Hybrid TEVAR**
- **Observation**

Treatment ..???

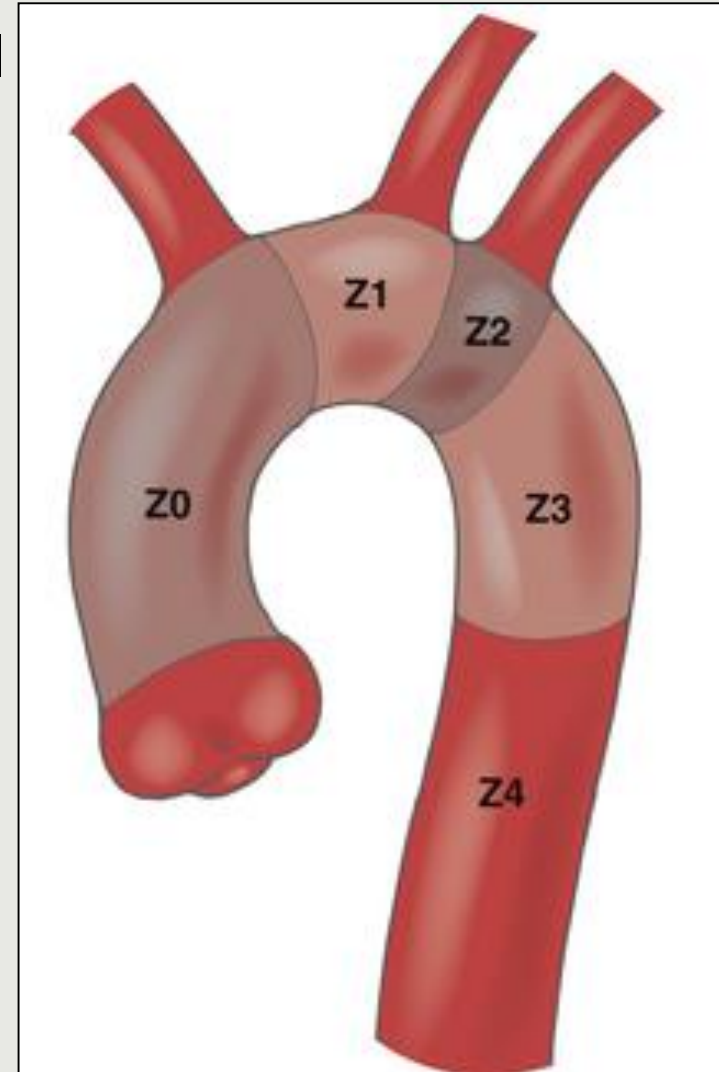


- Ascending & total arch replacement
- TEVAR
- **Hybrid TEVAR (zone 0)**
- Observation

TEVAR – aortic arch



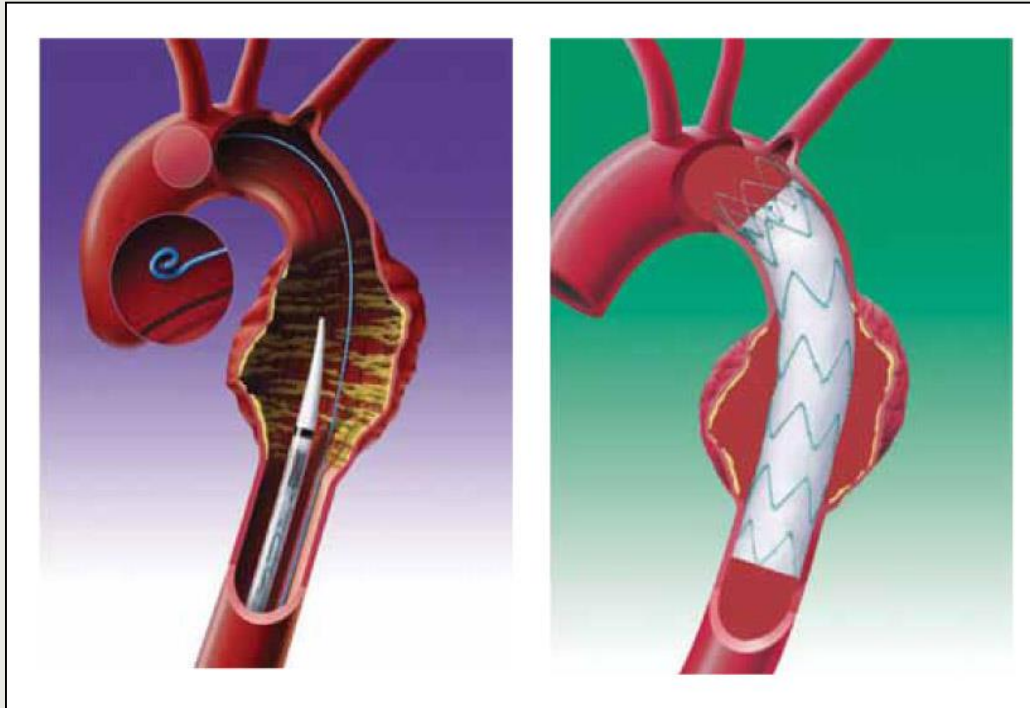
- **Zone 0:** ascending aorta and proximal arch to innominate artery
- **Zone 1:** segment between innominate artery and left common carotid artery
- **Zone 2:** segment between left common carotid and left subclavian arteries
- **Zone 3:** segment beyond left subclavian along curved portion of distal arch
- **Zone 4:** straight portion of descending thoracic aorta starting at level of the 4th thoracic vertebra



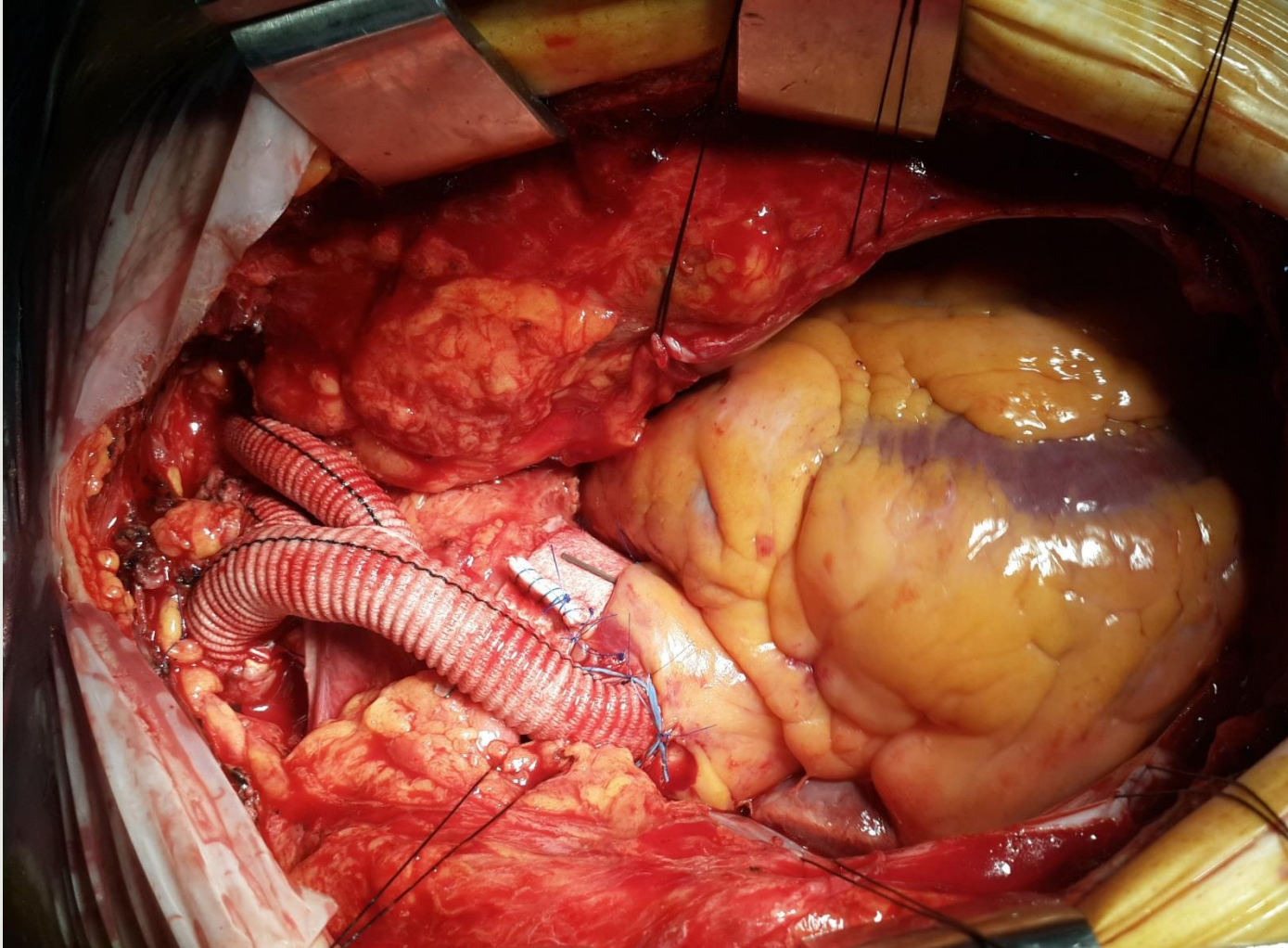
Anatomical indication for TEVAR



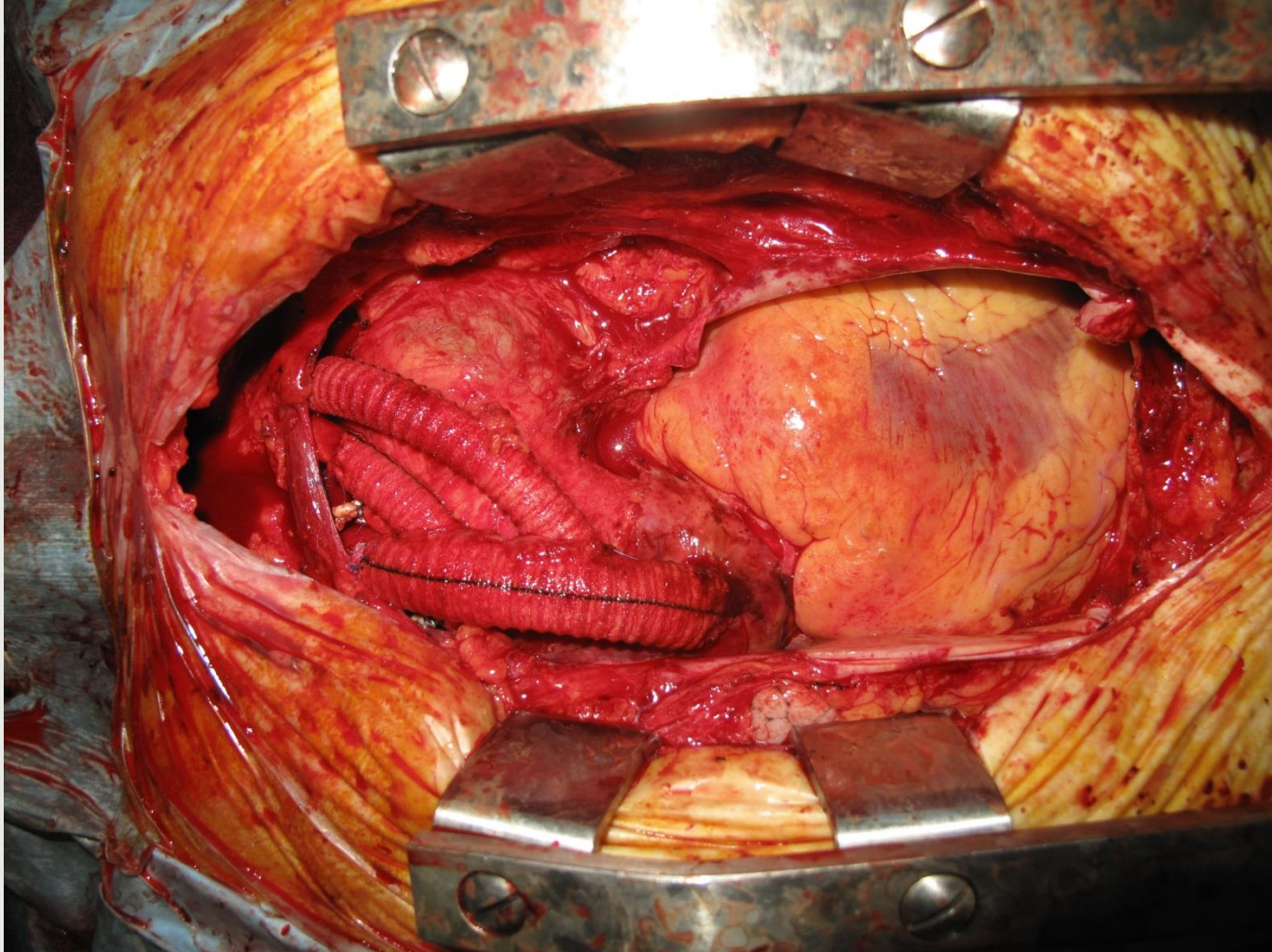
- **Iliac/femoral access vessel morphology that is compatible with vascular access techniques, devices, and/or accessories**
- **Non-aneurysmal aortic diameter in the range of 18 - 42 mm**
- **Non-aneurysmal aortic proximal and distal neck lengths \geq 15 - 20 mm**



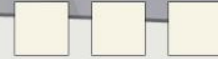
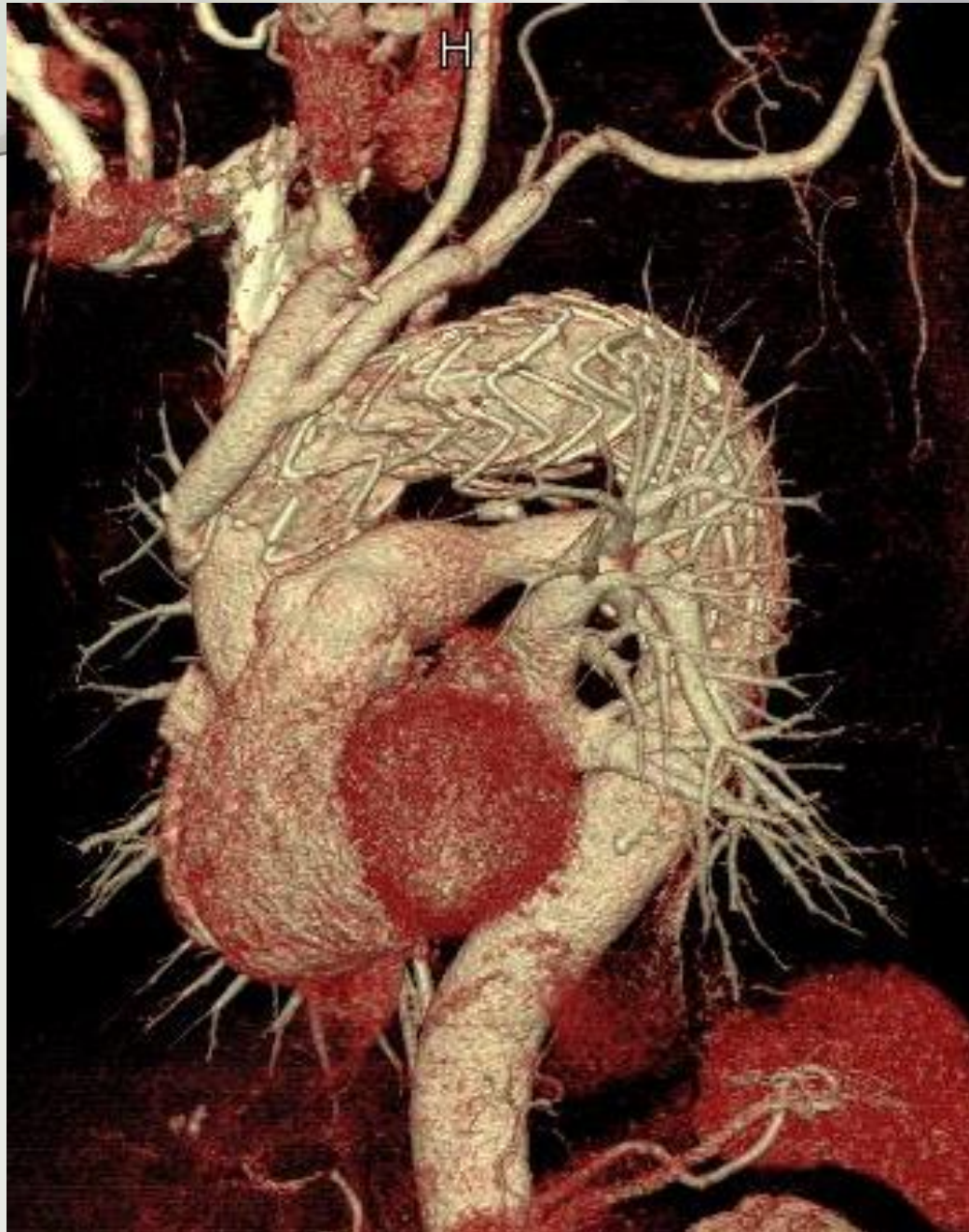
Zone 0 hybrid TEVAR - debranching



Zone 0 hybrid TEVAR - debranching

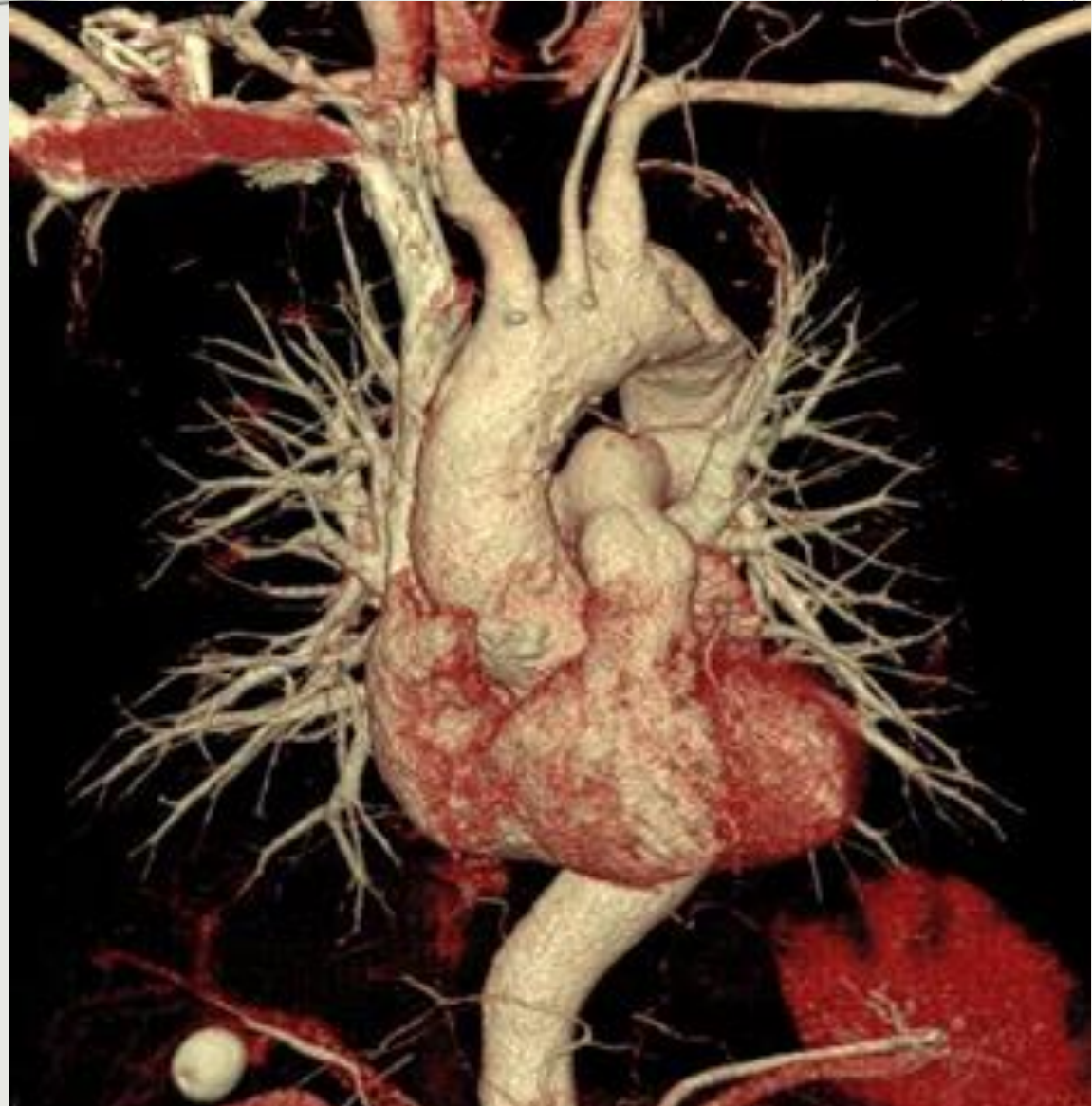




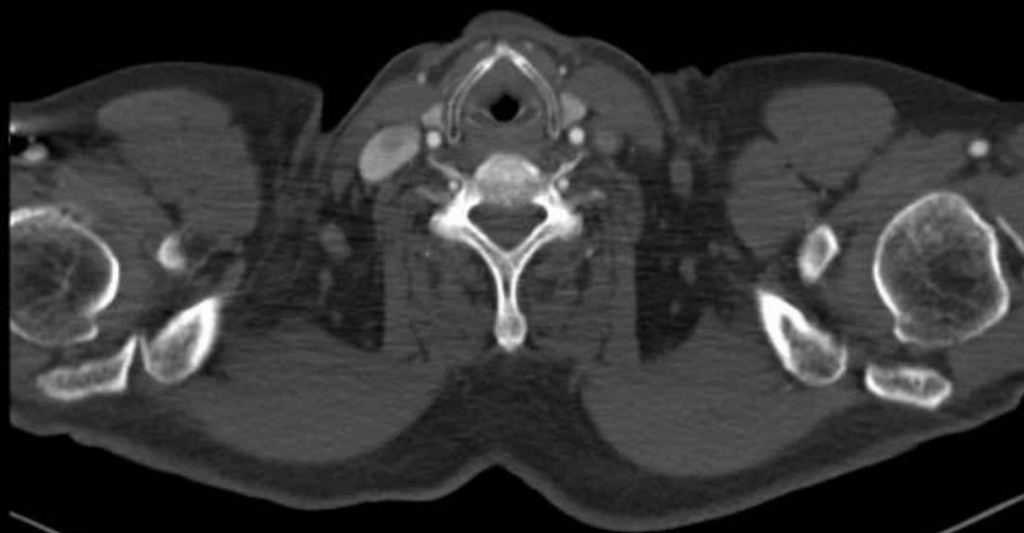
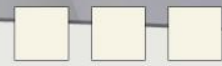


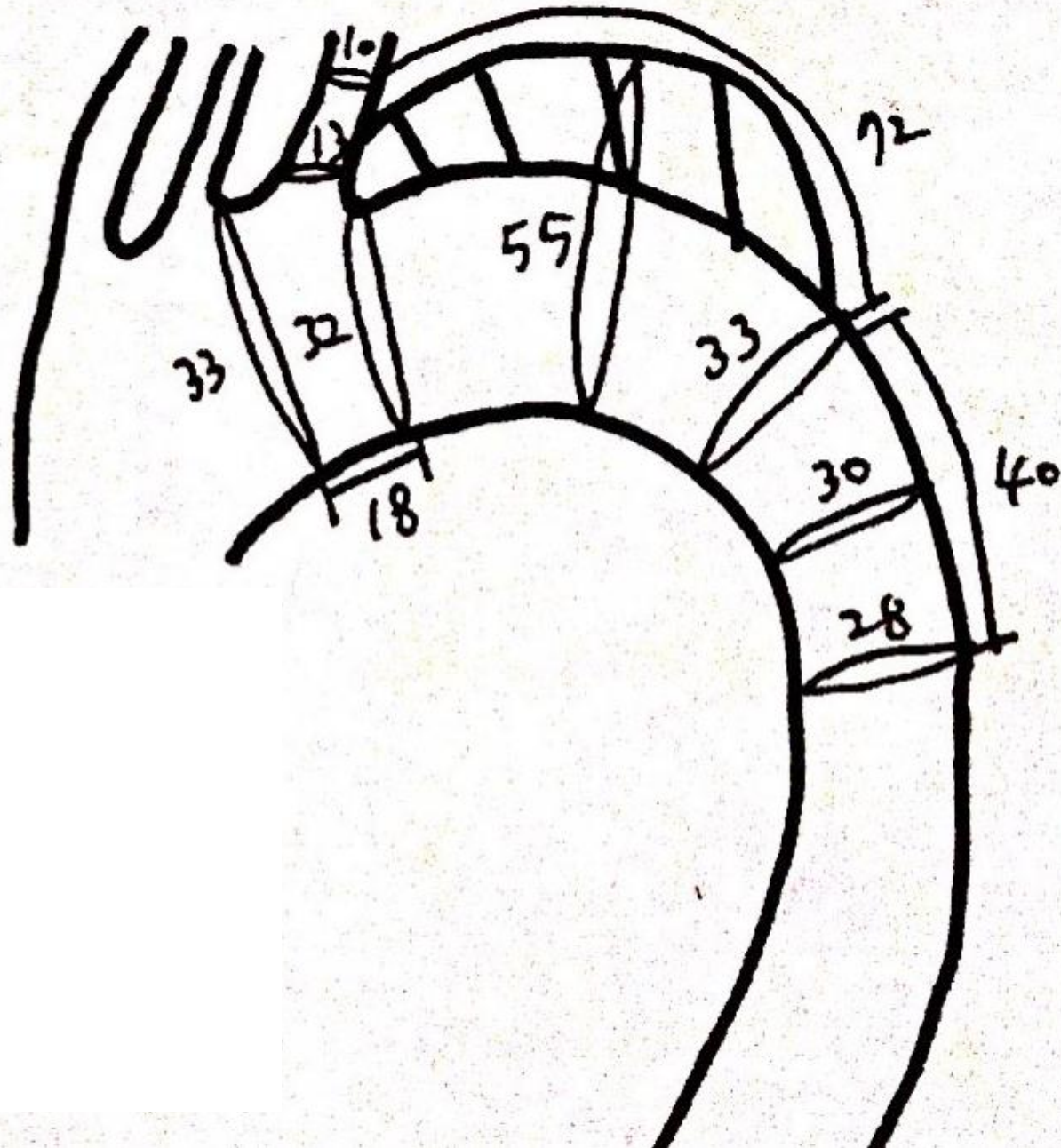
Case 3

- M/82
- Hoarseness



Case 3





Treatment ..???



- **Ascending & total arch replacement**
- **TEVAR**
- **Hybrid TEVAR**
- **Observation**

Treatment ..???

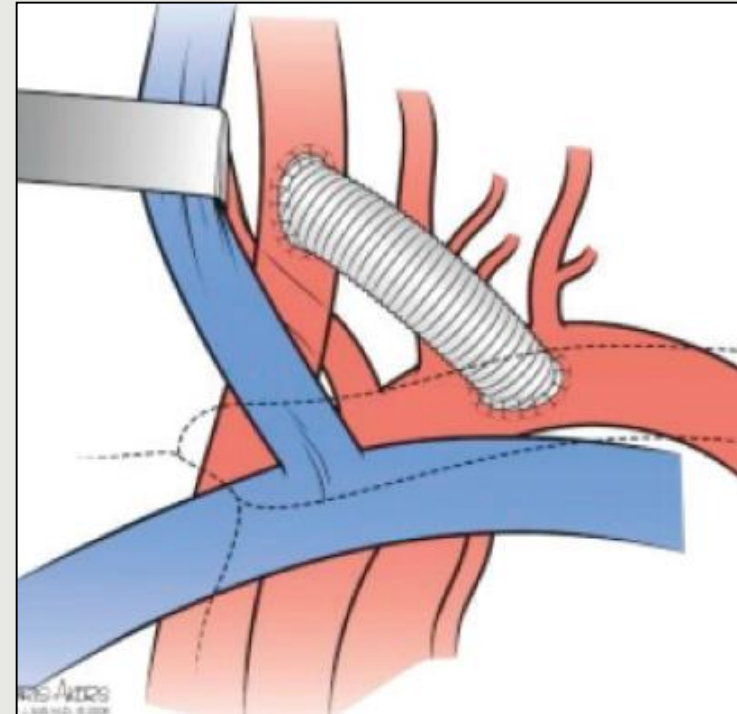


- Ascending & total arch replacement
- TEVAR
- **Hybrid TEVAR (zone 2)**
- Observation

Consideration for zone 2 TEVAR

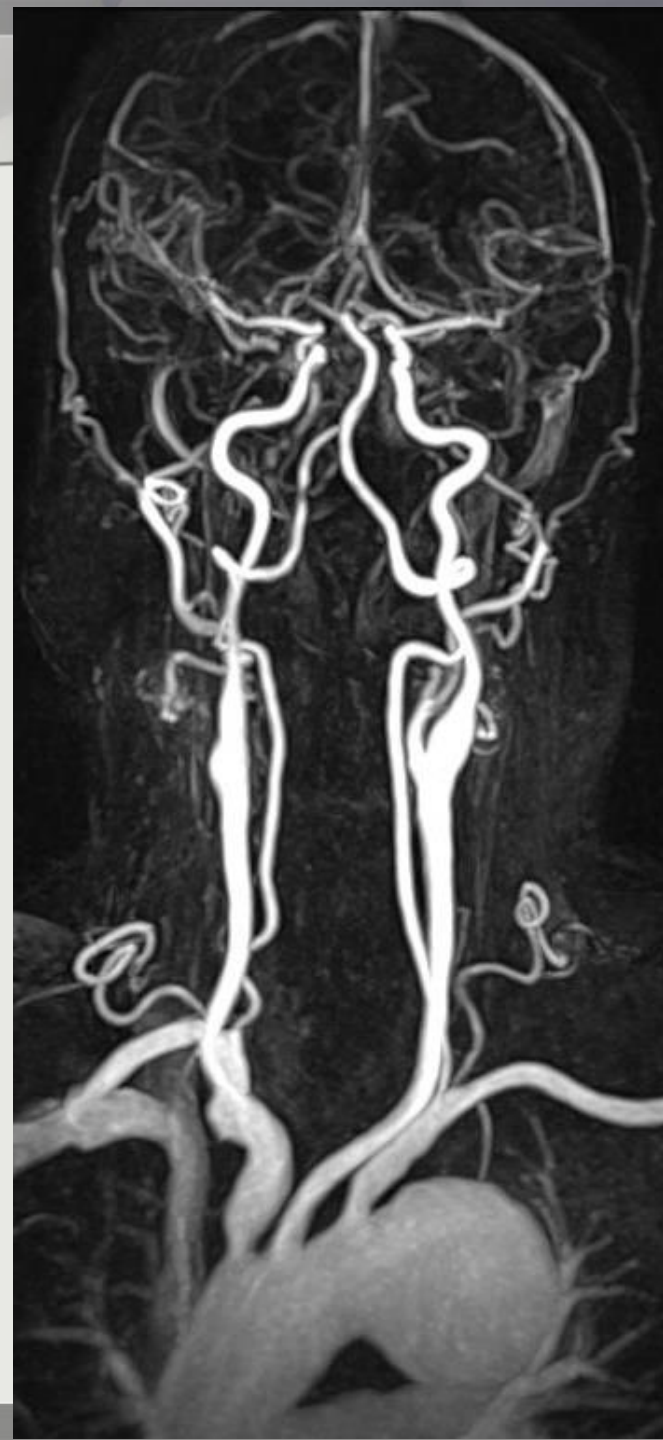
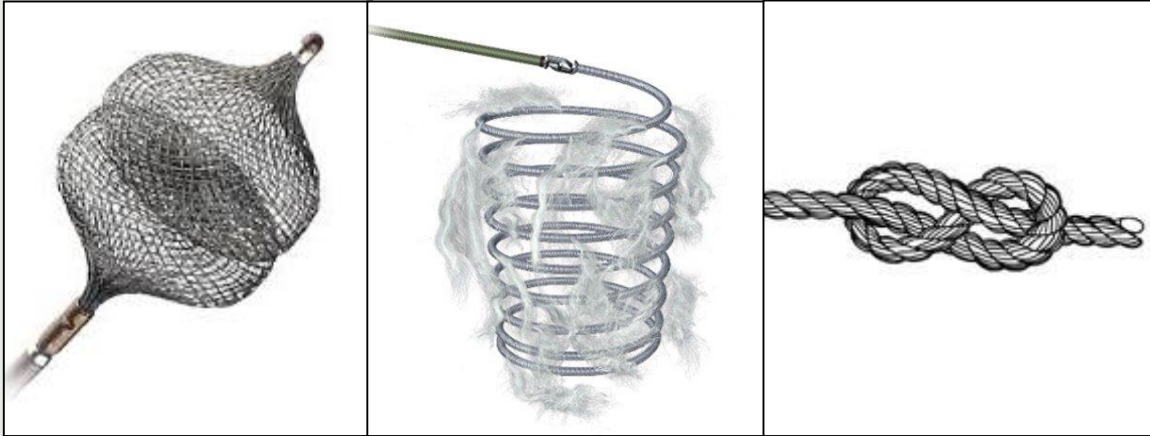


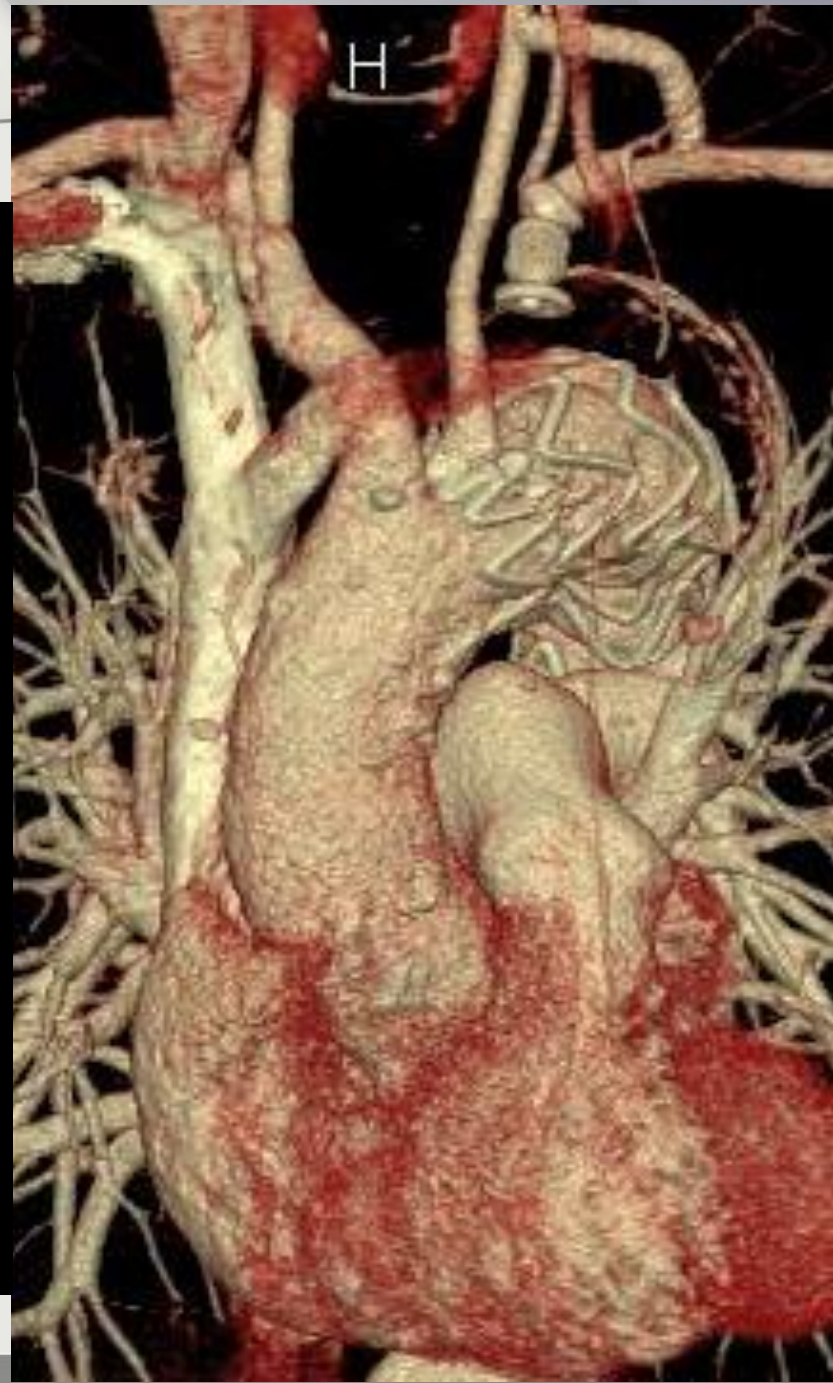
- **LSCA bypass or not..??**
 - **Absolute indication of LCCA-LSCA bypass**
 - LIMA bypass
 - left vertebral dominance
 - isolated left brain hemisphere
 - Previous AAA repair
 - left upper extremity dialysis access
 - **LCCA-LSCA bypass : not difficult..!!!!**



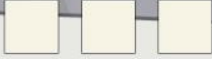
Consideration for zone 2 TEVAR

- **Vertebral artery dominance**
- **Proximal LSCA**
 - **Plugging vs coiling vs ligation**





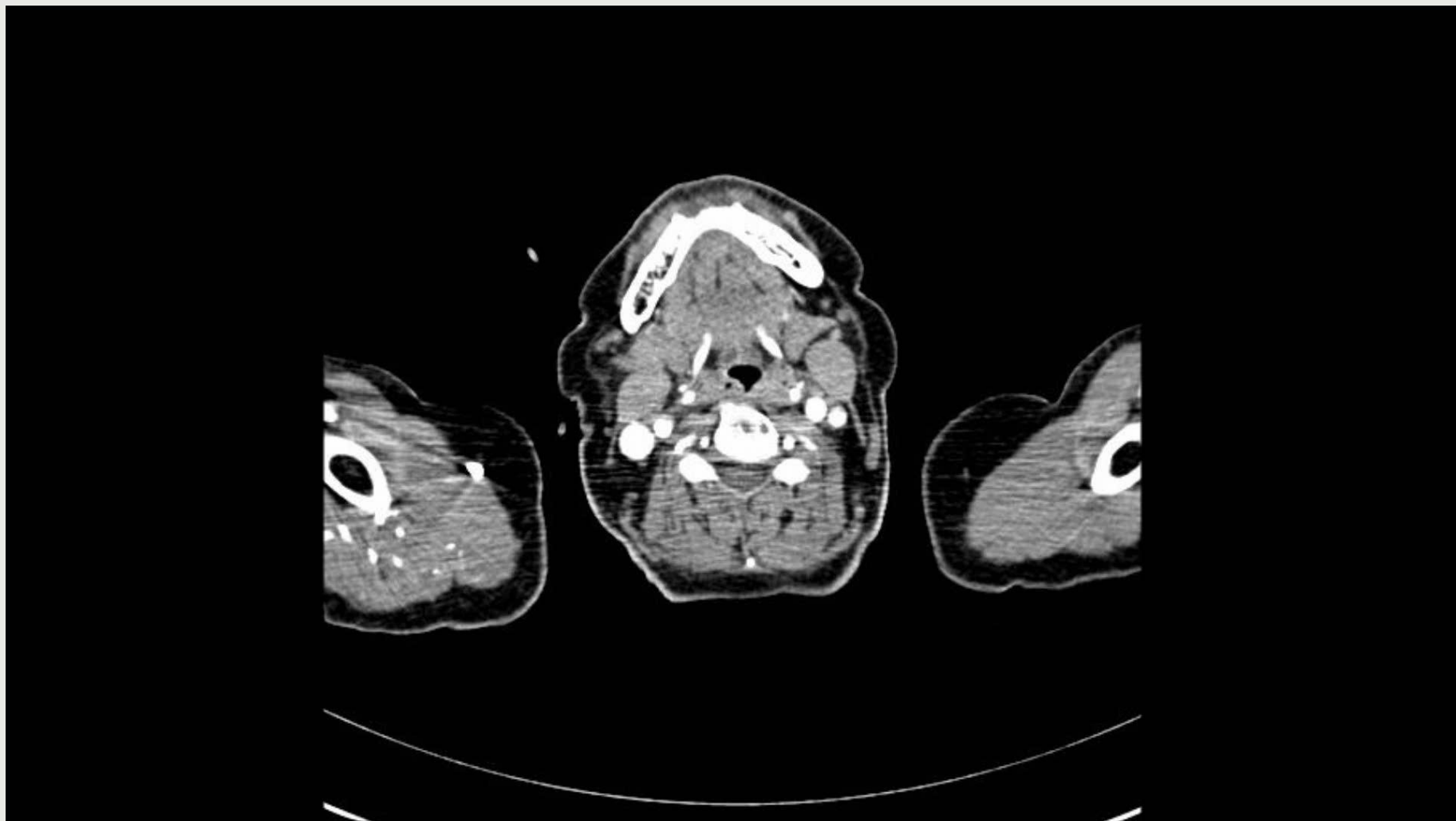
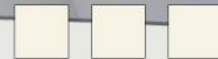
Case 4



- **F/74**
- **Back pain**



Case 4



Treatment ..???



- **DTA or TAA replacement**
- **TEVAR**
- **Hybrid TEVAR**
- **Observation**

Treatment ..???

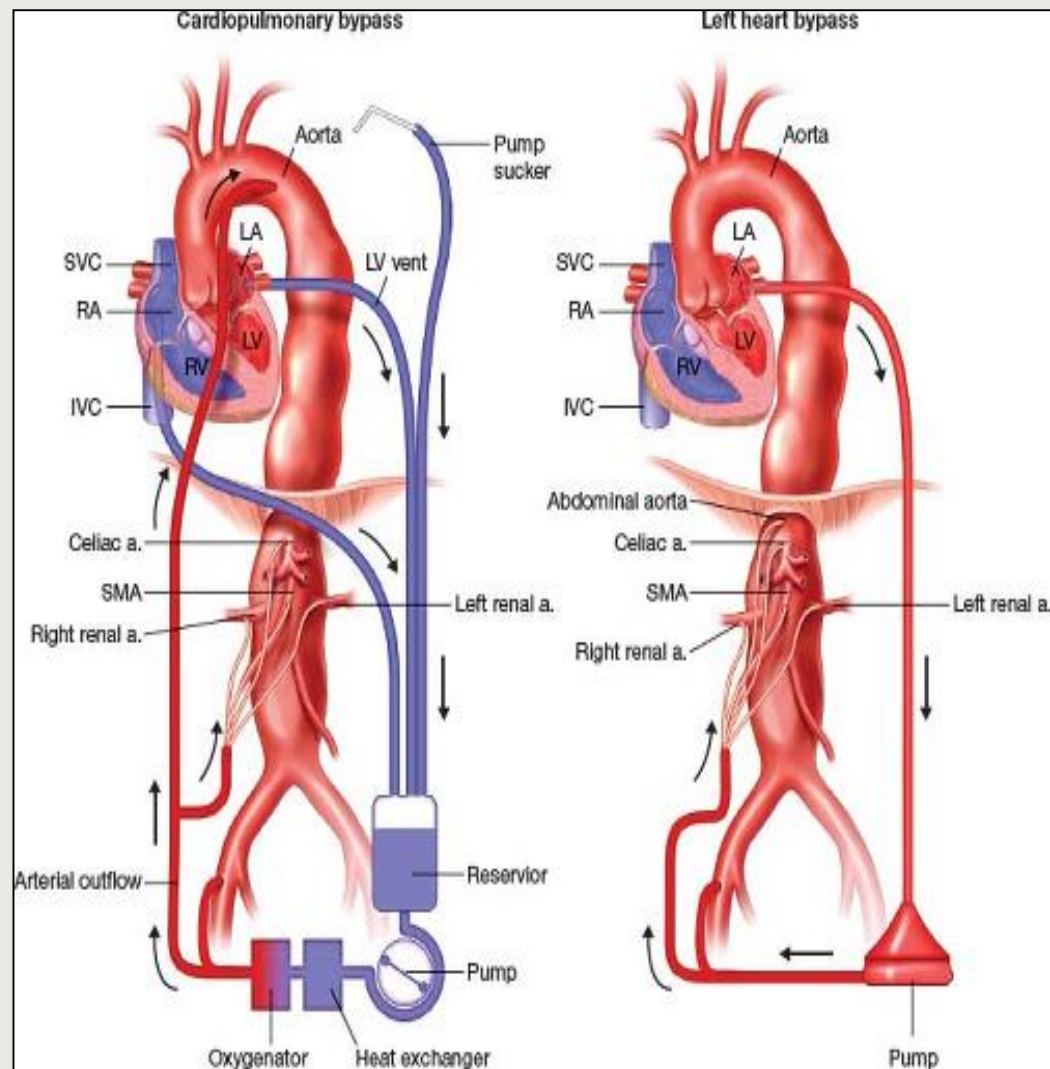


- **DTA or TAA replacement**
- **TEVAR**
- **Hybrid TEVAR**
- **Observation**

Consideration for TAAA or DTAA



- **Perfusion strategy**
 - **Left heart bypass**
(LA - fem bypass)
 - **Cardiopulmonary bypass**
(Fem - fem bypass)



Consideration for TAAA or DTAA



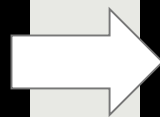
- **Left heart bypass (LA-fem bypass)**
 - *Without oxygenator..!!!*
 - Lower ACT
 - Unload left ventricle
 - Avoidance of a systemic inflammatory response
- **Cardiopulmonary bypass (fem-fem bypass)**
 - *Use of oxygenator..!!!*
 - Allows DHCA
 - Use of cardiotomy suction
 - Allows reliable oxygenation

Consideration for TAAA or DTAA

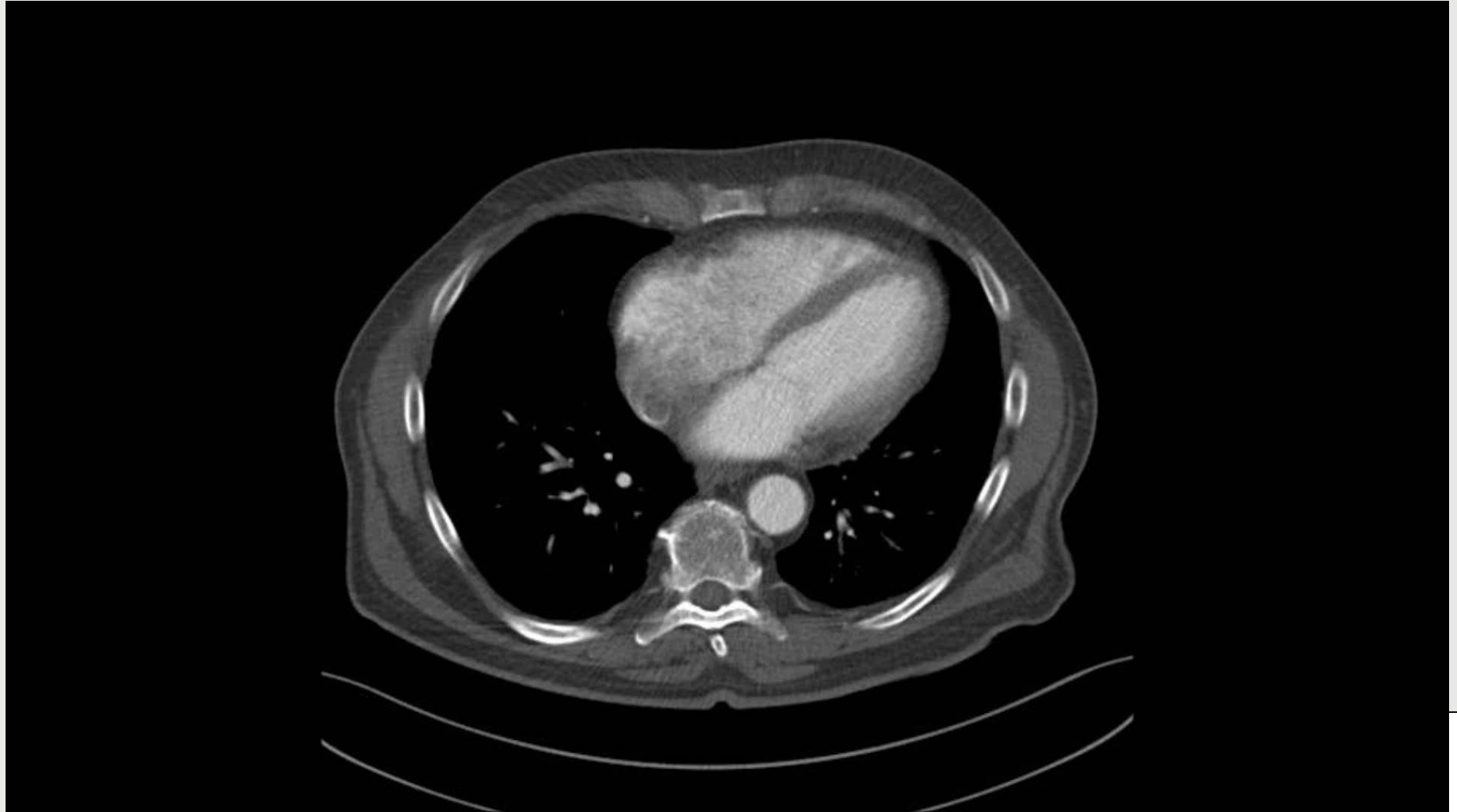


- **Spinal cord protection**
 - **Reduction of the duration of ischemia**
 - **Reduction of the severity of ischemia**
 - **CSF drainage**
 - **Hypothermia**
 - **Reestablishment of spinal cord blood flow**
 - **Reattachment of segmental arteries between T6~L2**
 - **Revascularization of the left subclavian artery**
 - **Preservation of blood flow in at least one internal iliac artery**

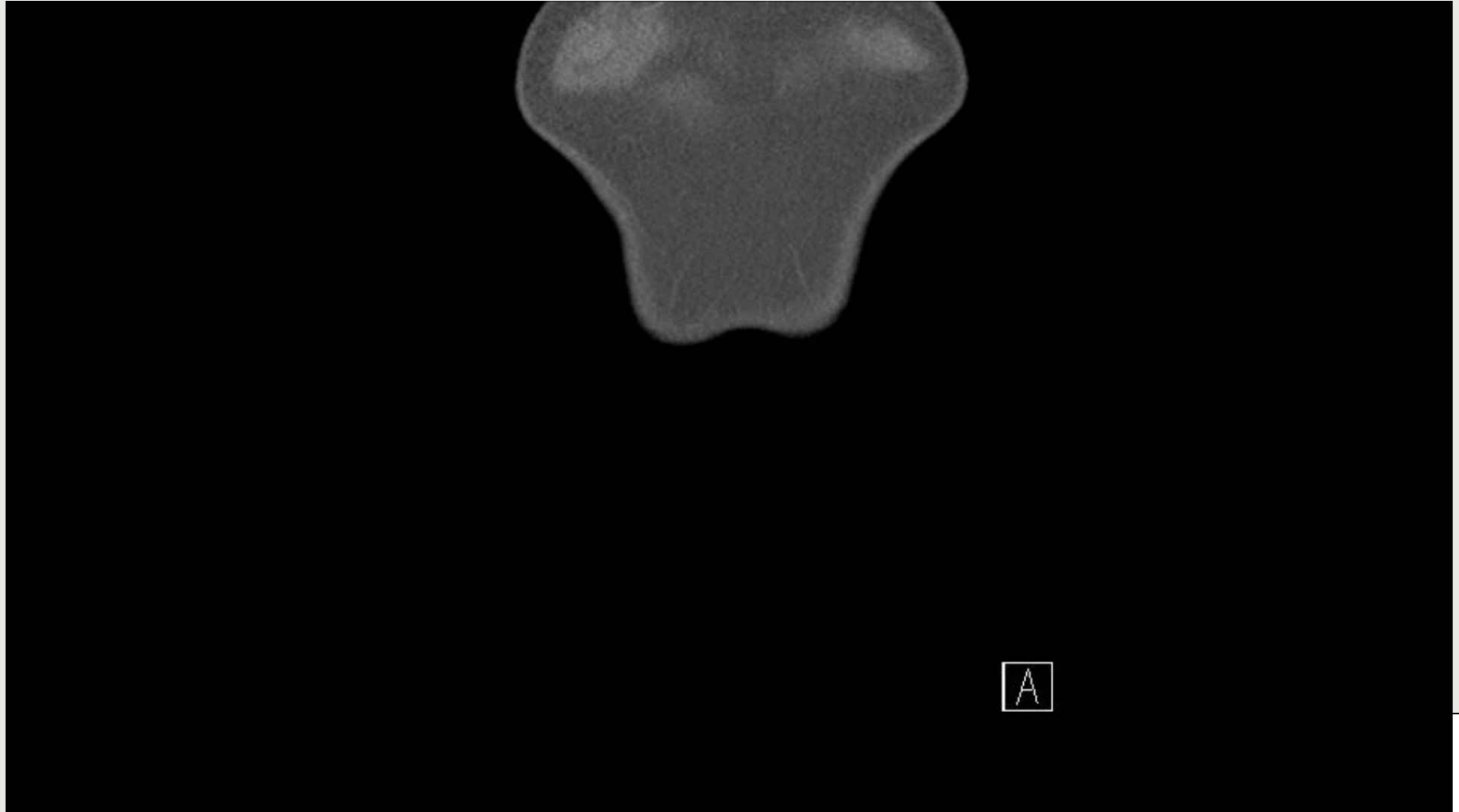
Operative procedure



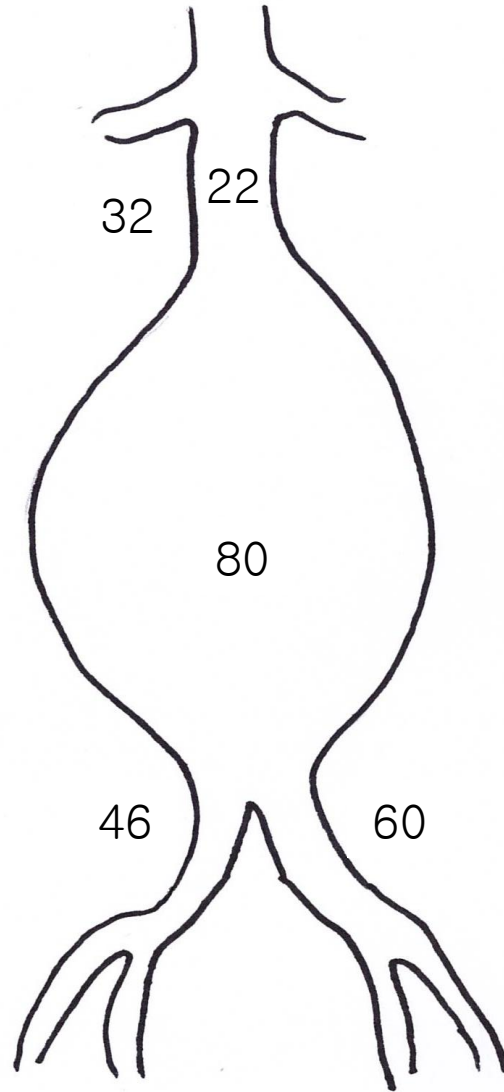
Case 5 (M/75)



Case 5 (M/75)



(mm)



Treatment ..???



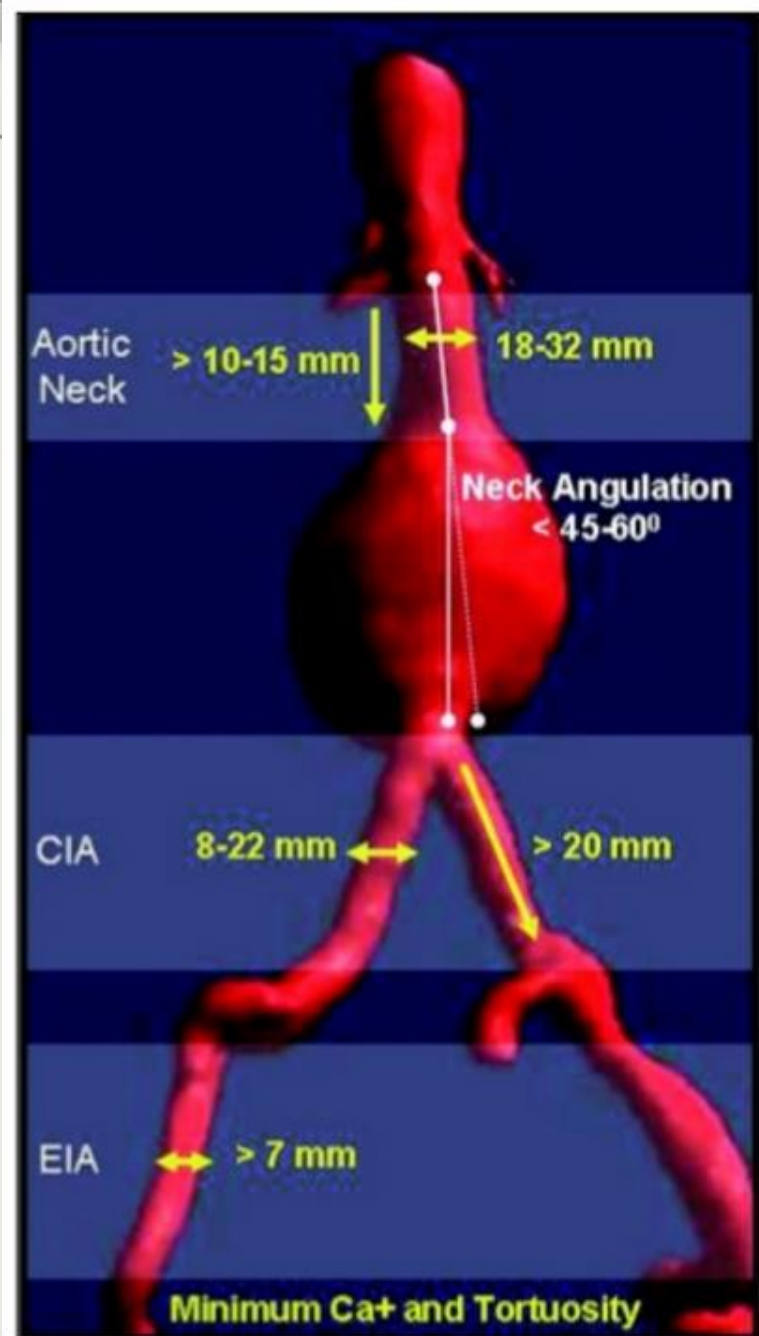
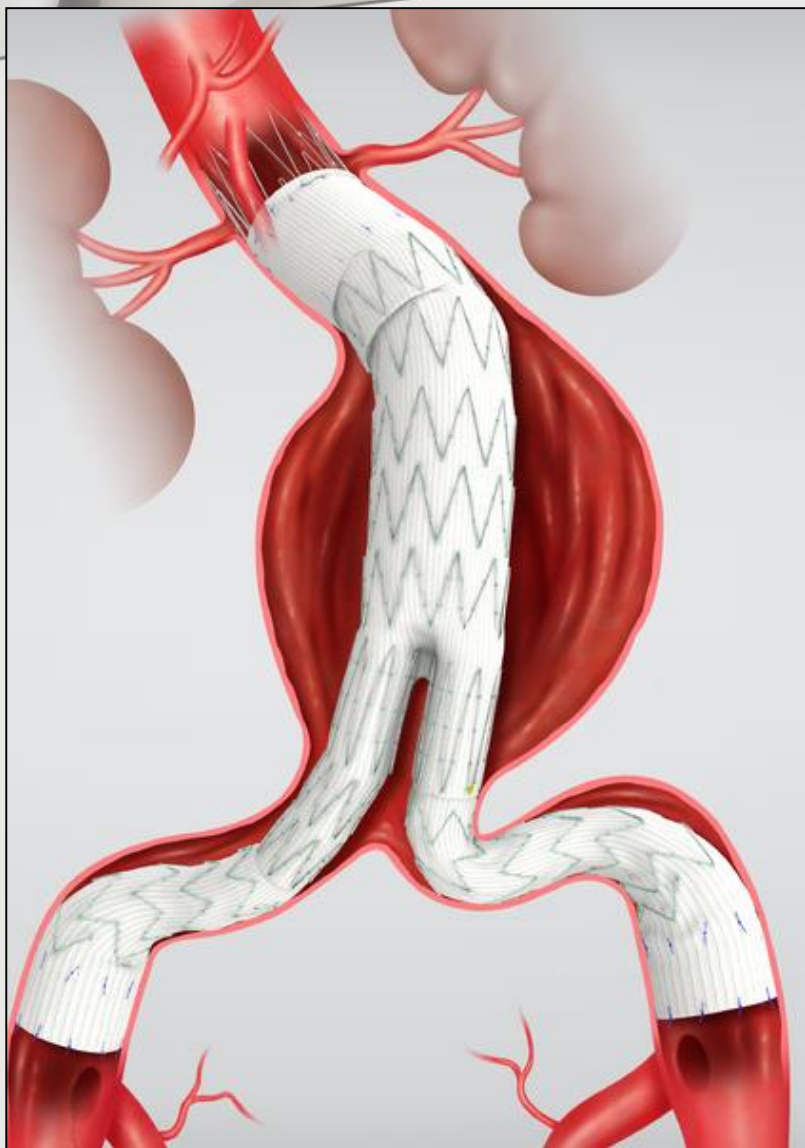
- **Aortobiiliac replacement**
- **EVAR**
- **Observation**

Treatment ..???



- **Aortobiiliac replacement**
- **EVAR**
- **Observation**

Anatomical indication for EVAR



	Gore Excluder	Cook Zenith	Gore Excluder Low Permeability	Endologix Powerlink	Cook Zenith Enlarged Neck	Medtronic Talent	Endologix Enlarged Neck	Gore Excluder Enlarged Neck	Summary
Year of Release	2002	2003	2004	2004	2006	2008	2009	2009	2002-2009
Neck Diameter (mm)	19-26	18-28	19-26	18-26	18-32	18-32	18-32	19-29	18-32
Neck Length (mm)	≥15	≥15	≥15	≥15	≥15	≥10	≥15	≥15	≥10-15

	Nellix Endovascular Aneurysm Sealing System [†]	Ovation iX Abdominal Stent Graft System [†]	Zenith Fenestrated AAA Endovascular Graft [†]	Zenith p-Branch Standard Fenestrated Endovascular Graft [‡]	Aorfix AAA Endovascular Stent Graft [†]
Proximal neck diameter	18–32 mm	16–30 mm	19–31 mm	18–32 mm	19–29 mm
Proximal neck length	Infrarenal ≥ 10 mm	Not specified; seal ring is 13 mm below lowest renal	Infrarenal ≥ 4 mm	Infra-SMA sealing zone length ≥ 4 mm	Infrarenal ≥ 15 mm
Proximal neck angulation	≤ 60°	≤ 60° if neck length ≥ 10 mm; ≤ 45° if neck length < 10 mm	≤ 45°	≤ 45°	≤ 90°

- Diameter ≤ 20-25 mm
- Length ≥ 1.0 cm in length
- Access vessels



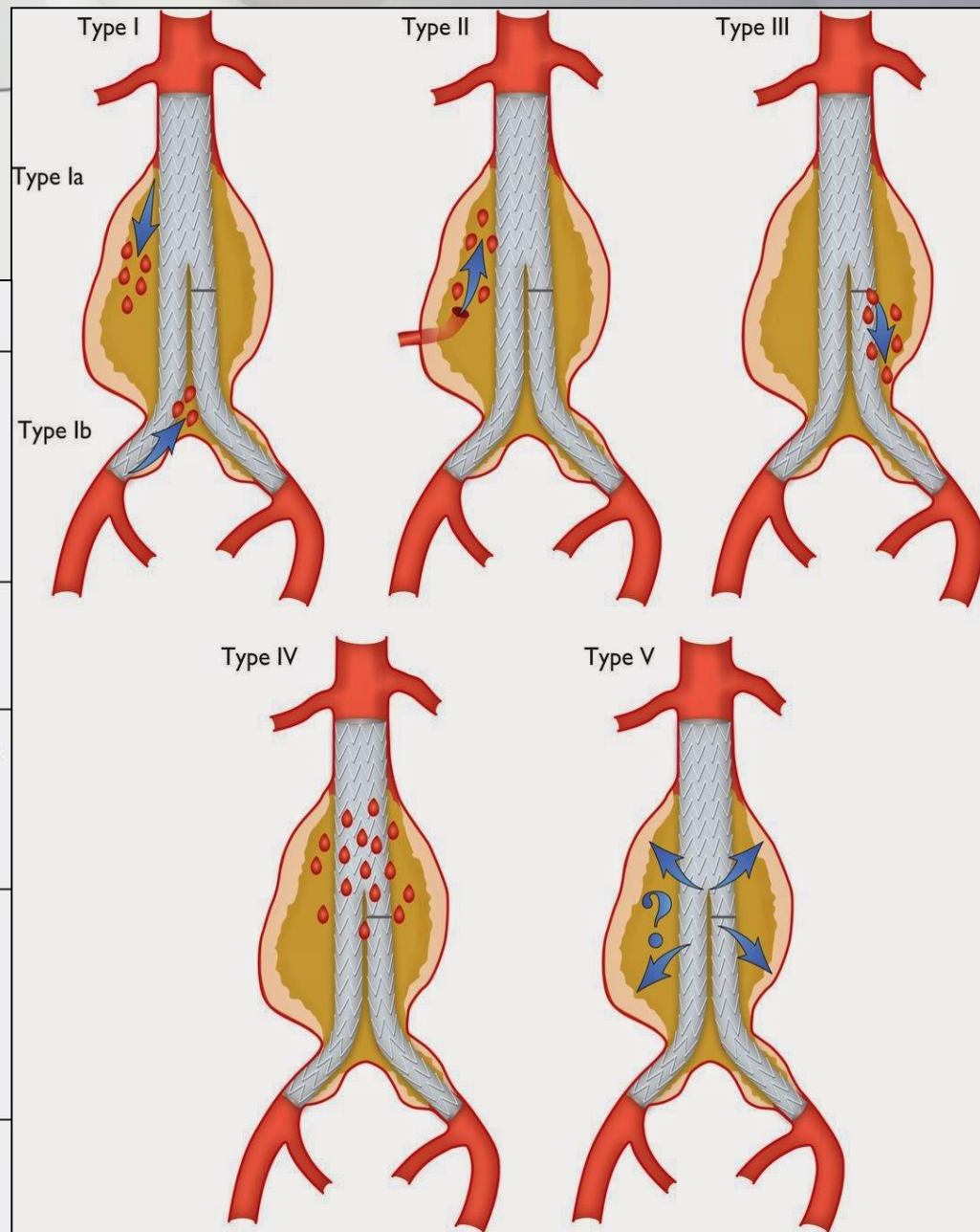
Complications of EVAR



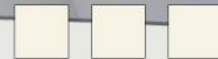
- **Device related**
 - **Graft migration, kinking, endoleak**
- **Procedure related**
 - **Dissection, malpositioning,**
 - **renal failure, thromboembolism, ischemic colitis**
 - **Groin hematoma, wound infection**
- **Systemic complications**
 - **Contrast induced nephropathy (CIN)**

Endoleak

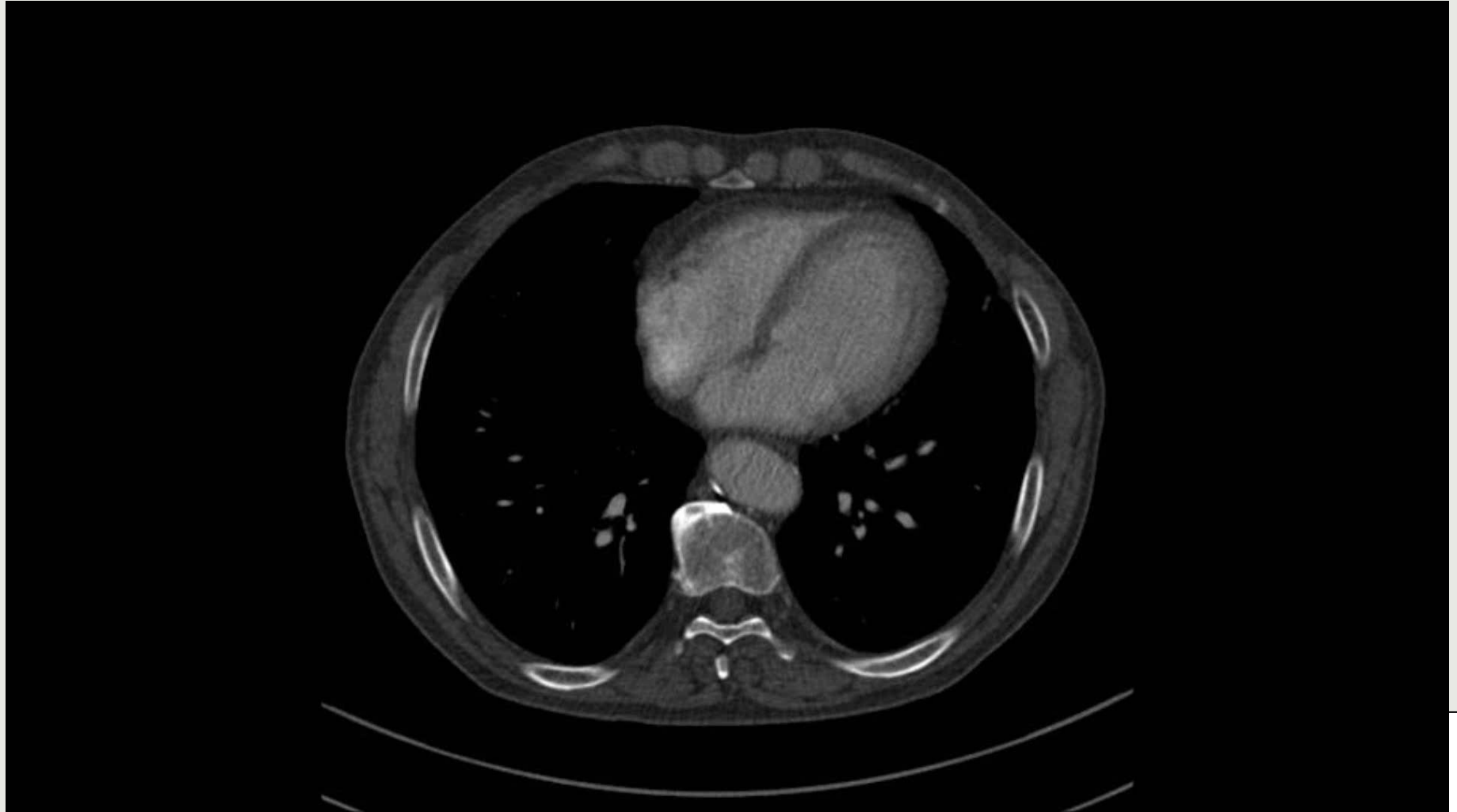
Type	Definition
Type I	Persistent filling of the aneurysm sac due to incomplete seal or ineffective seal at the proximal (type IA) or distal (type IB) end of the stent graft
Type II	Persistent filling of the aneurysm sac due to retrograde branch flow from collateral vessels
Type III	Blood flow into the aneurysm sac due to inadequate or ineffective sealing of overlapping graft joints or rupture of the graft fabric
Type IV	Blood flow into the aneurysm sac due to the porosity of the graft fabric, causing blood to pass through from the graft and into the aneurysm sac
Type V	Aneurysm sac expansion without clear evidence of endoleak origin



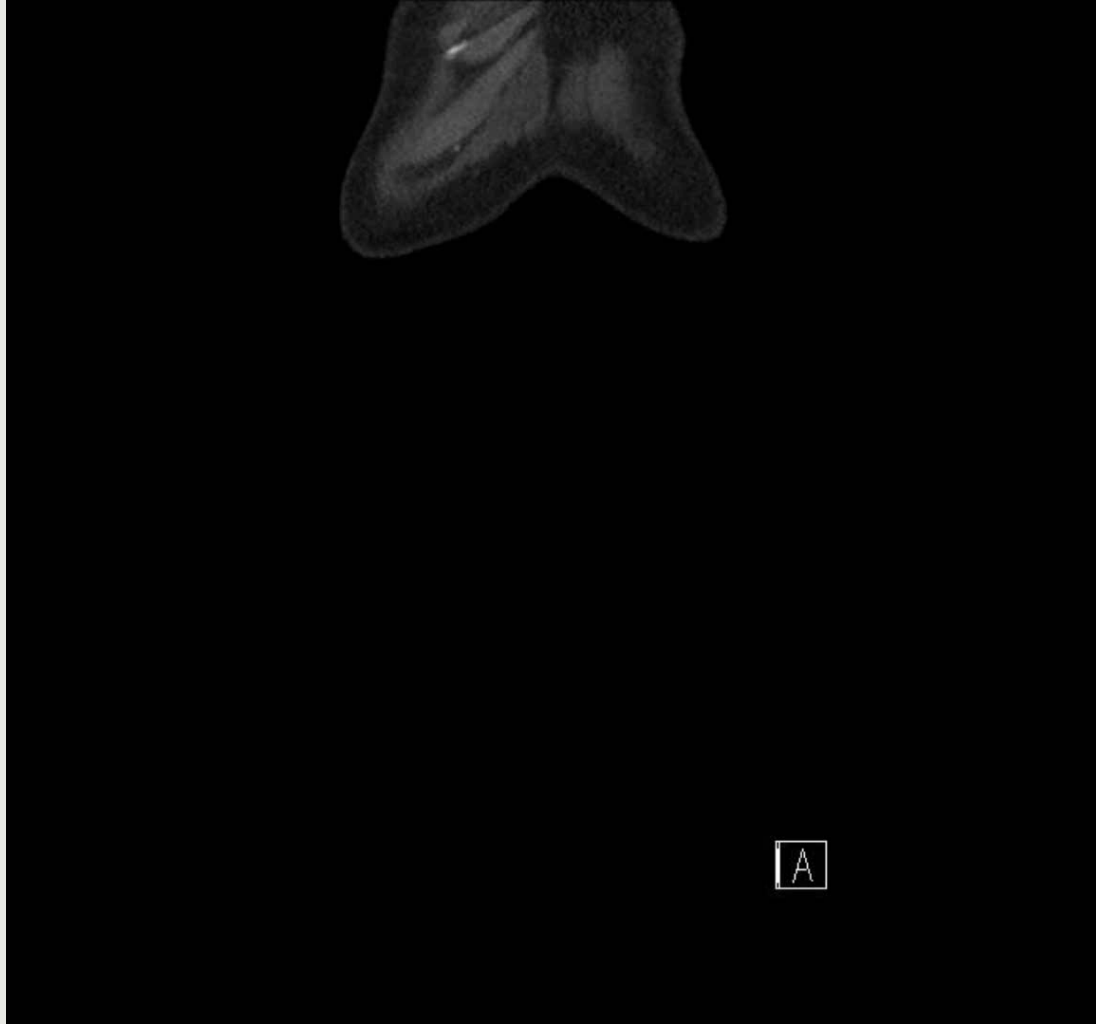
Postop CTangiography



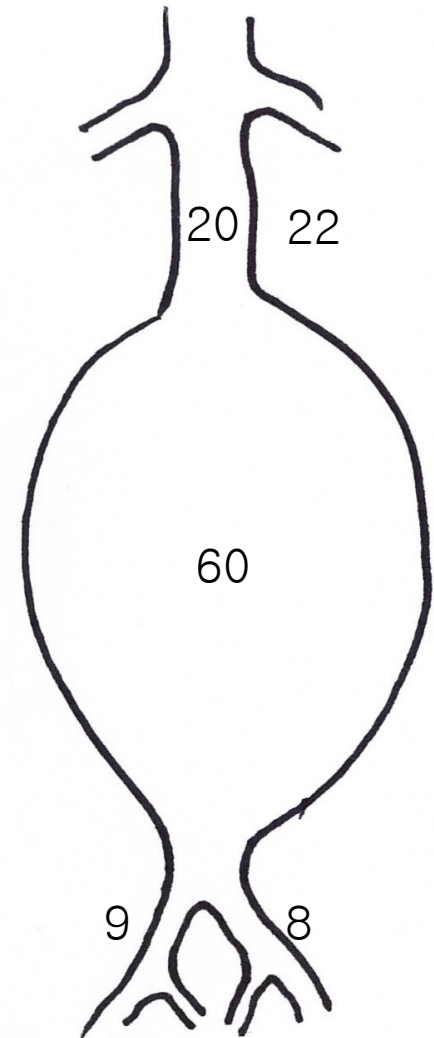
Case 6. (M/62)



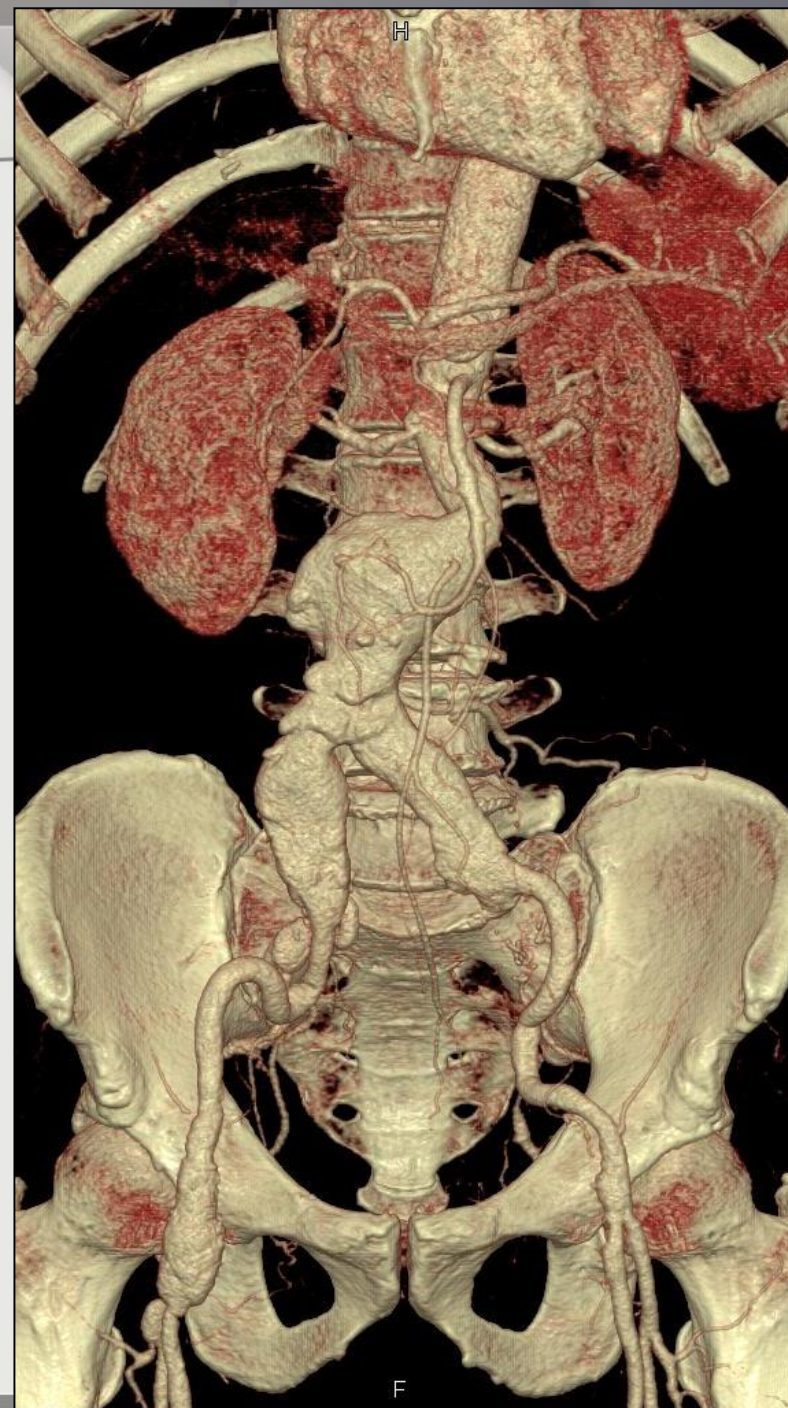
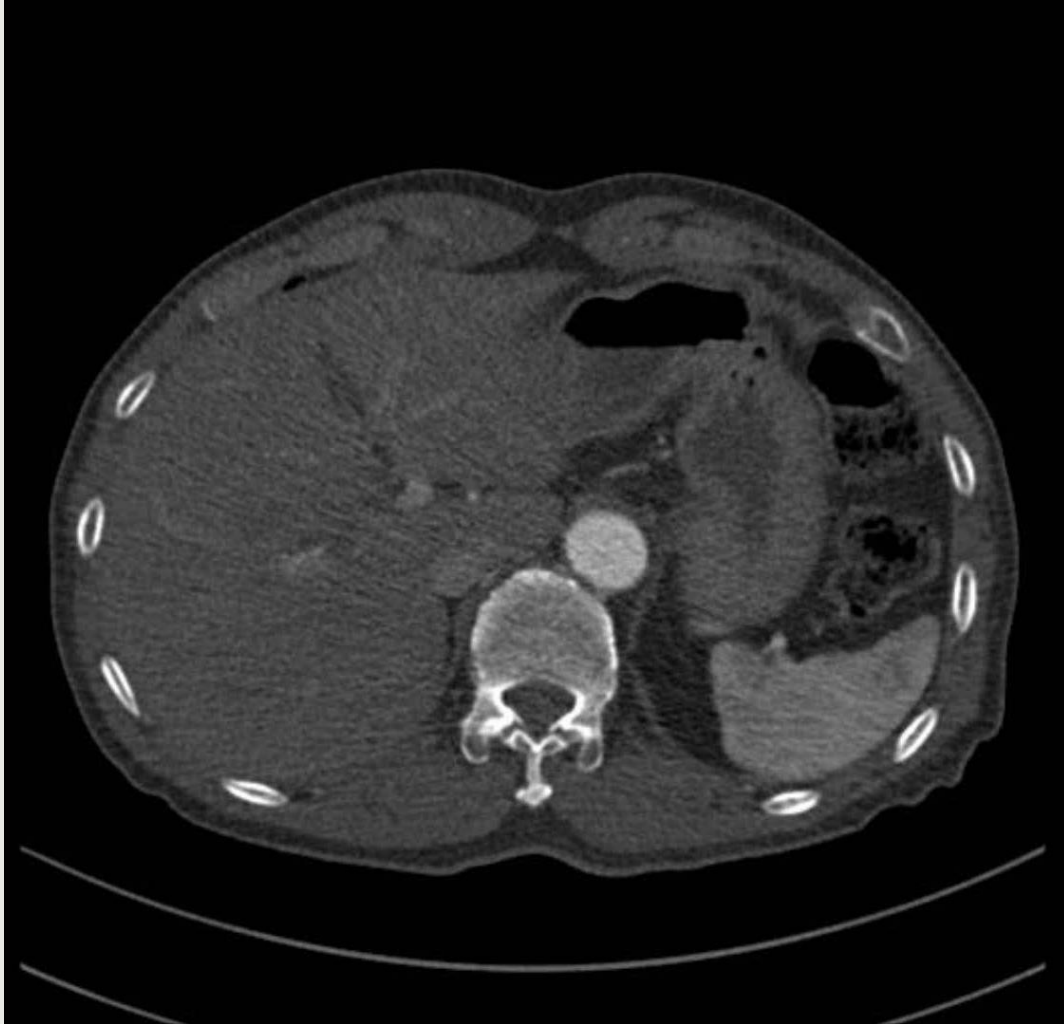
Case 6. (M/62)



(mm)

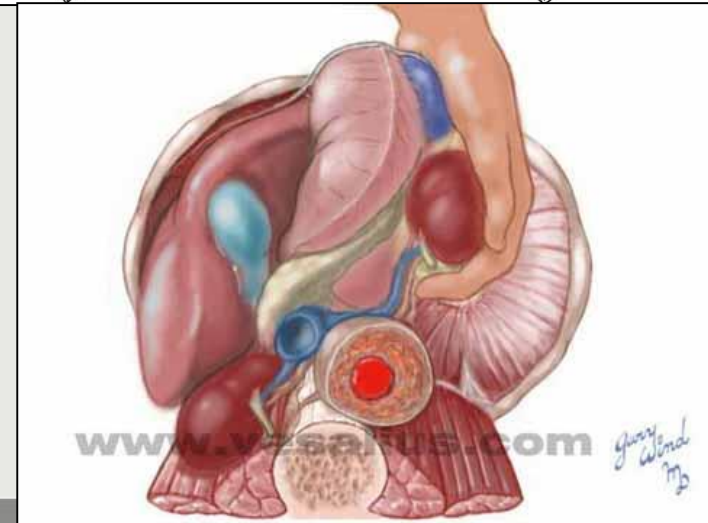
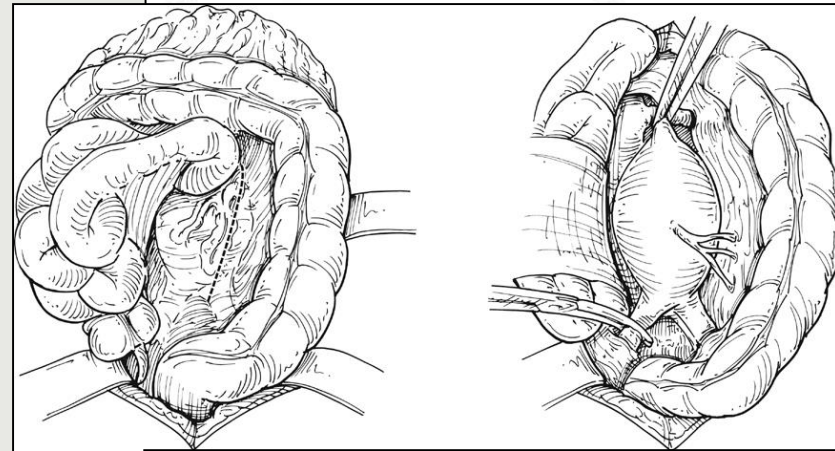
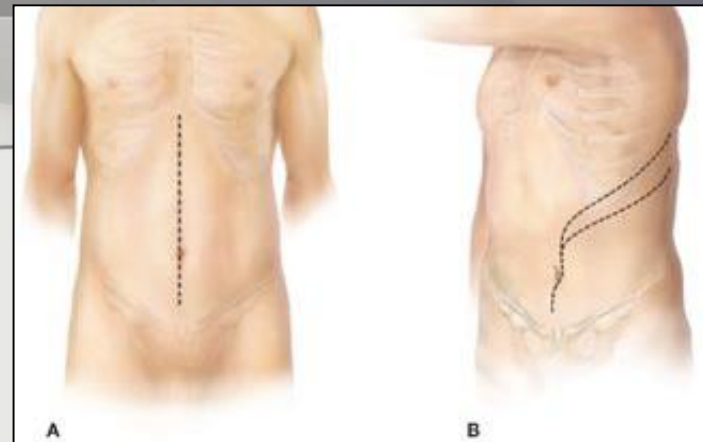


Case 7. (M/70)



Surgical approach

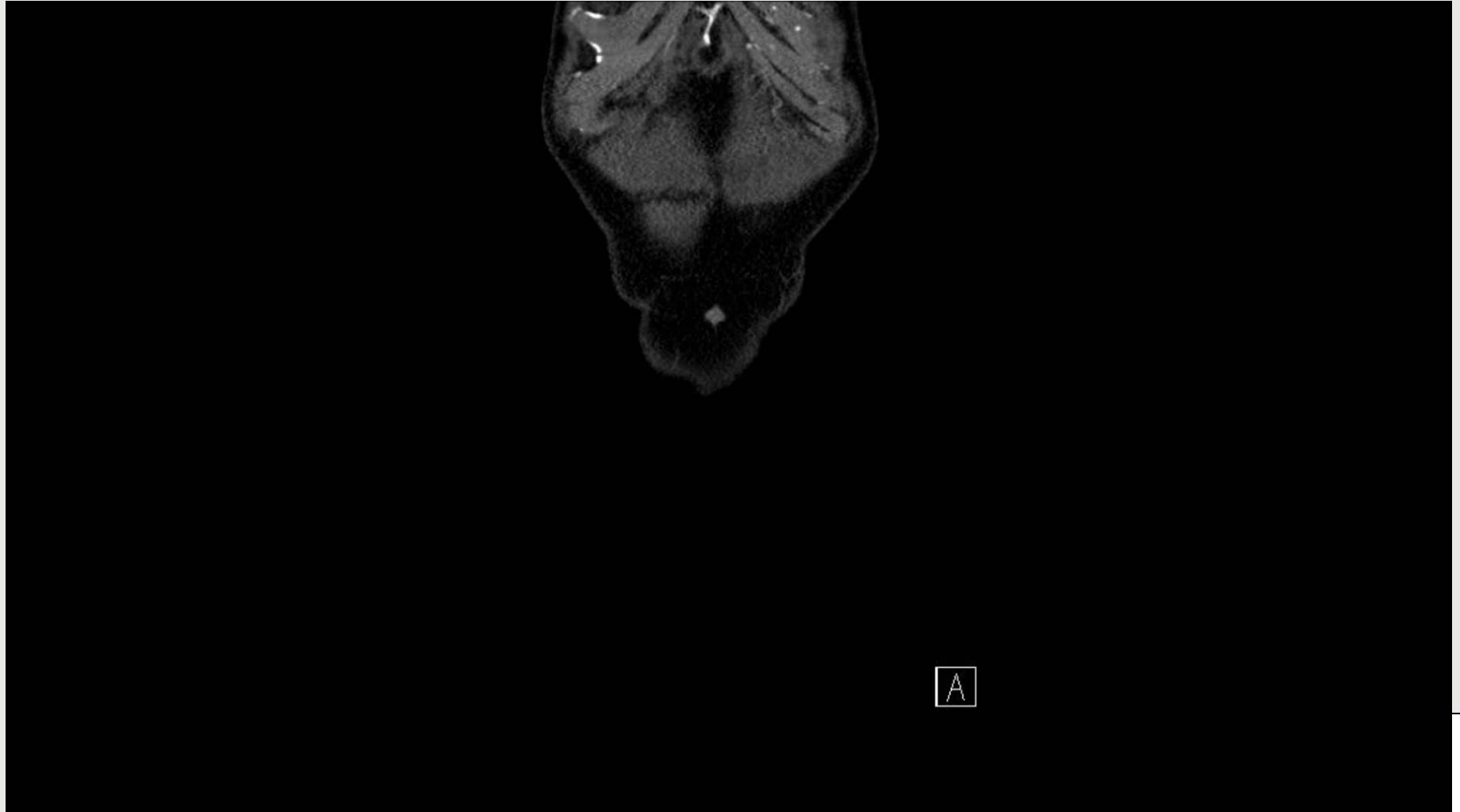
- **Transperitoneal exposure**
 - Exposure of right renal artery
 - Access to intra-abdominal organ
 - Access to right iliac system
- **Retroperitoneal**
 - Extensive peritoneal adhesions
 - Need for suprarenal exposure
 - Short duration of ileus / ICU stay
 - Less pulmonary complications



Case 8. (M/78)



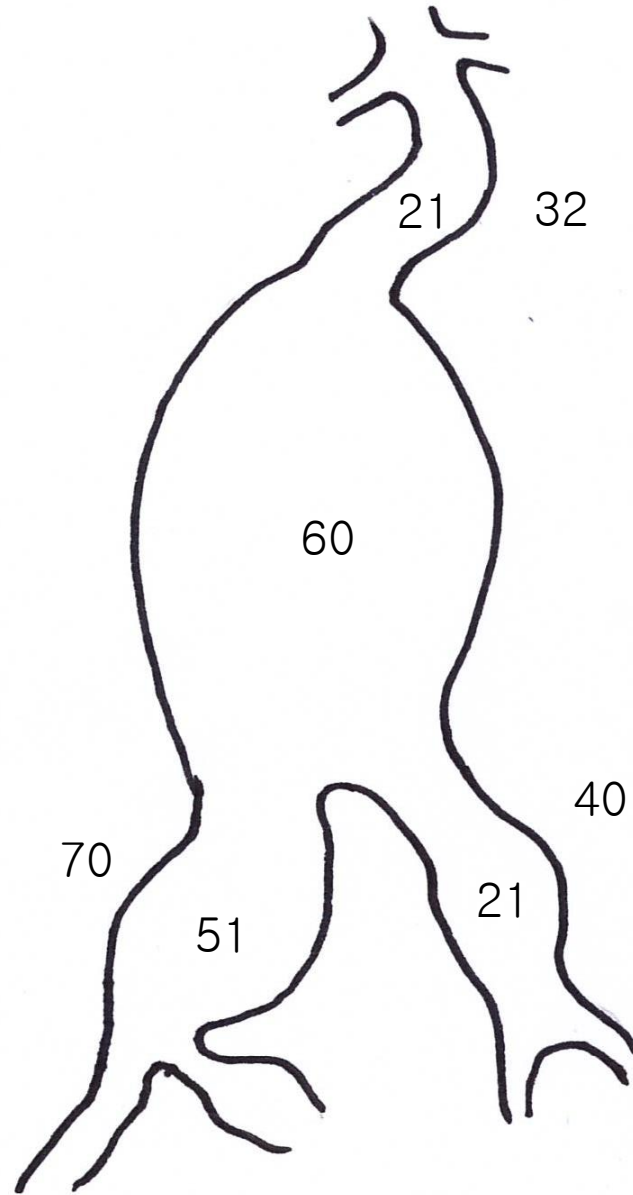
Case 8. (M/78)

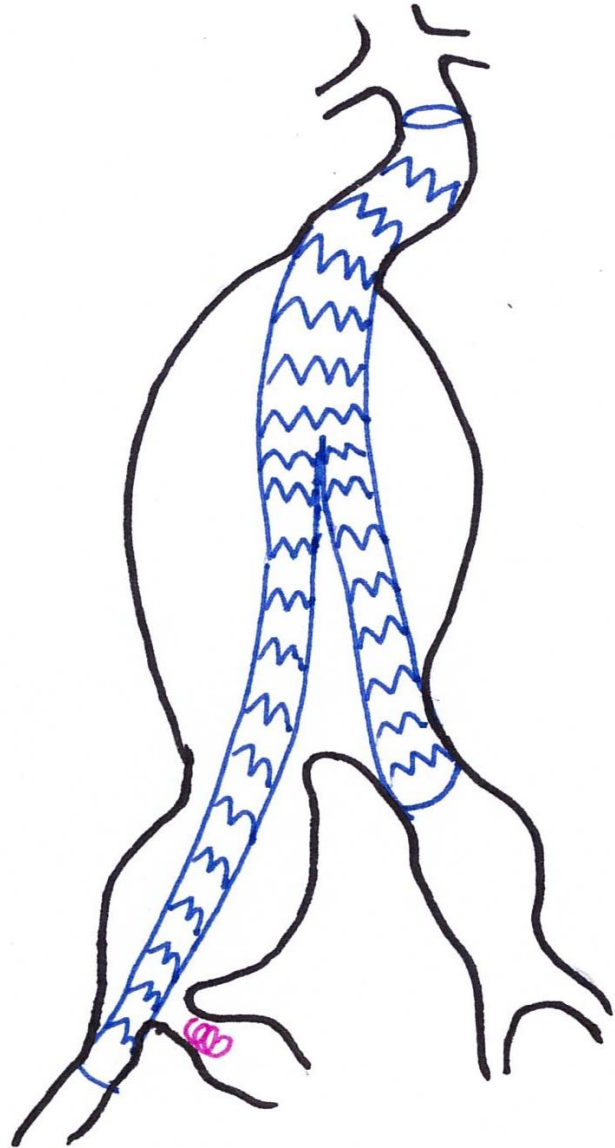
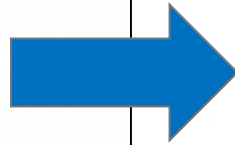
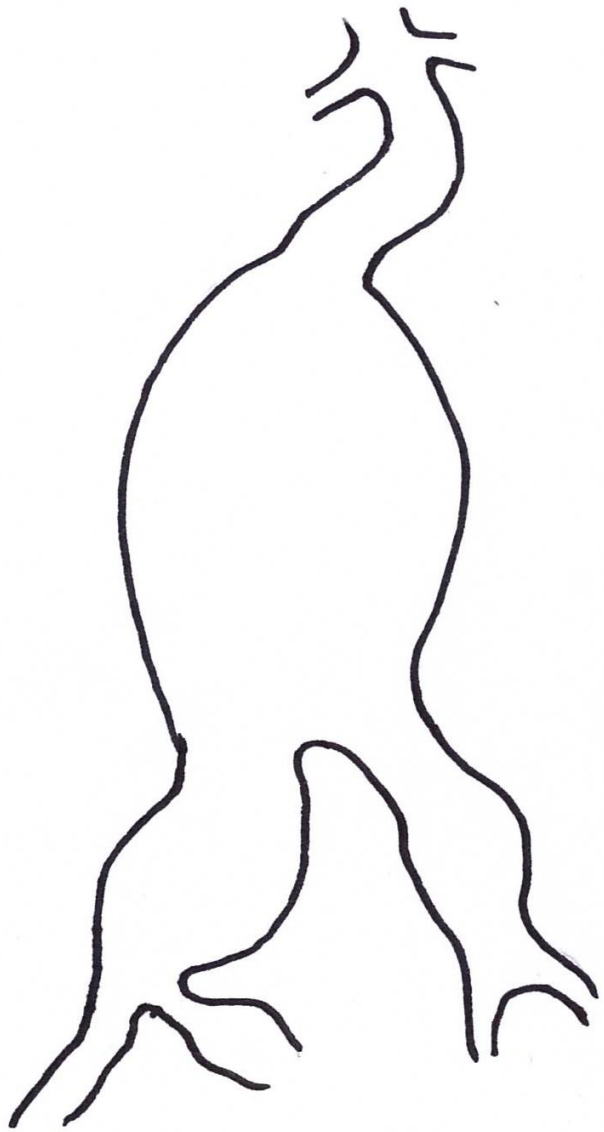


A



(mm)

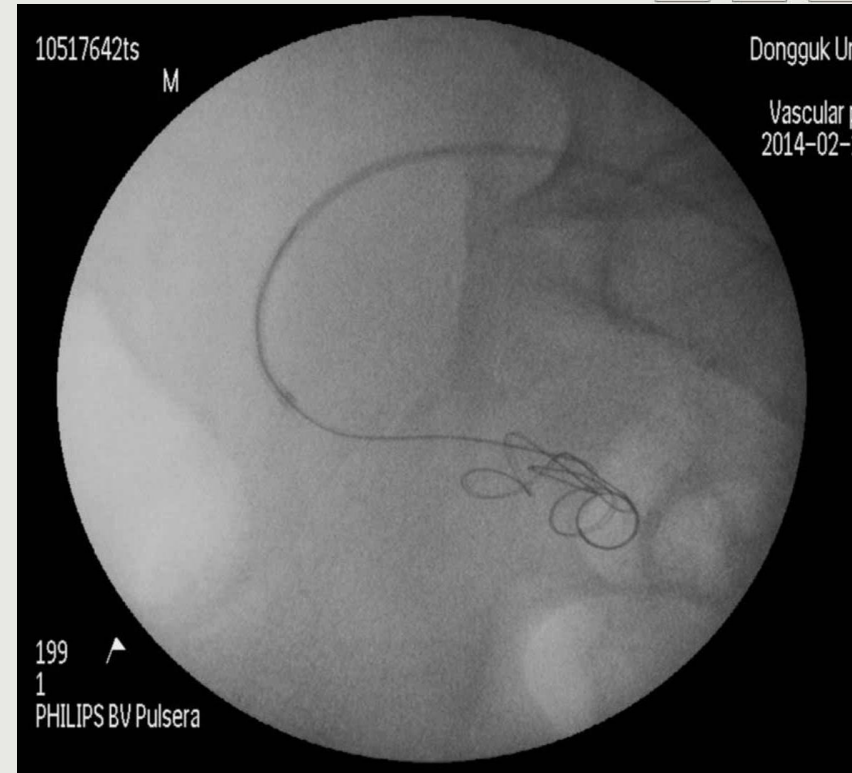




Internal iliac artery embolization

- **Coil vs. plug**
- **Buttock or thigh claudication**
- **Sexual dysfunction (impotence)**
- **Bowel ischemia**
- **Spinal cord ischemia**

- **Avoid bilateral internal iliac artery..!**



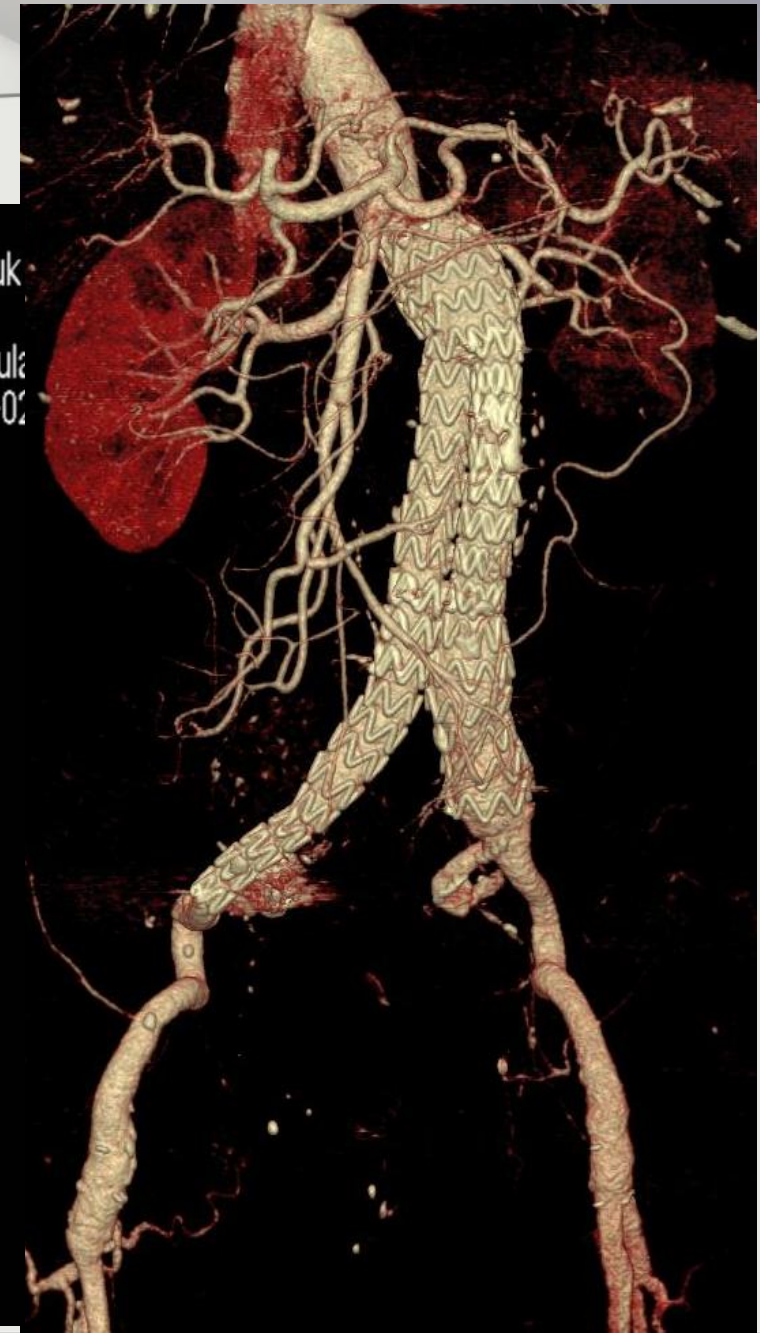
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Vascular
2014-01



What approach..?



- **(T)EVAR**
 - Minimal incision
 - No aortic cross clamping
 - No extracorporeal circulation
 - Lower operative mortality rate
 - Lower morbidity rate
 - Lower hospital stay
 - Good choice for patients with important comorbidities
 - *.. But not for everyone..*
 - *.. Long term results..??*
- **Open surgery**
 - No suitable proximal and distal landing zones
 - No suitable stent-grafts
 - Lack of vascular access
 - Connective tissue disorders

Summary



~~V/S.~~

with

