Complications after TEVAR requiring open surgical treatment

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Disclosures

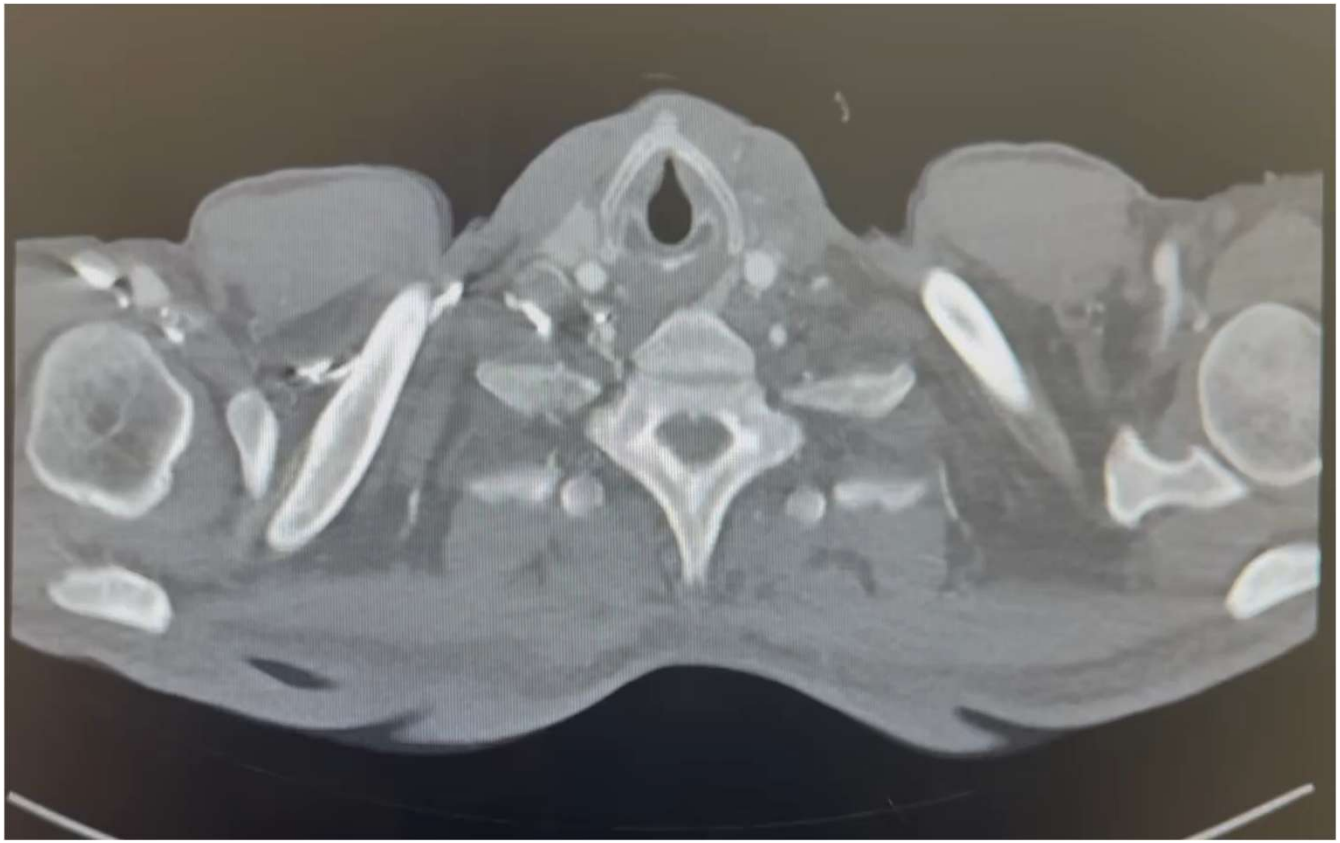
None

Case 1

- 77M with enlarging aortic arch after TEVAR

- PMHx/PSHx:
  - L CS-SCA bypass, TEVAR, Amplatzer plug to LSCA 2020
  - Proximal TEVAR extension with partial coverage of LCCA with endostaples for endoleak 2021
  - Distal TEVAR extension 10/2024 for new type B
  - Periop CVA and AKI after TEVAR, now CKD Cr 1.8

Case 1: s/p TEVAR with Endoleak - preop CT



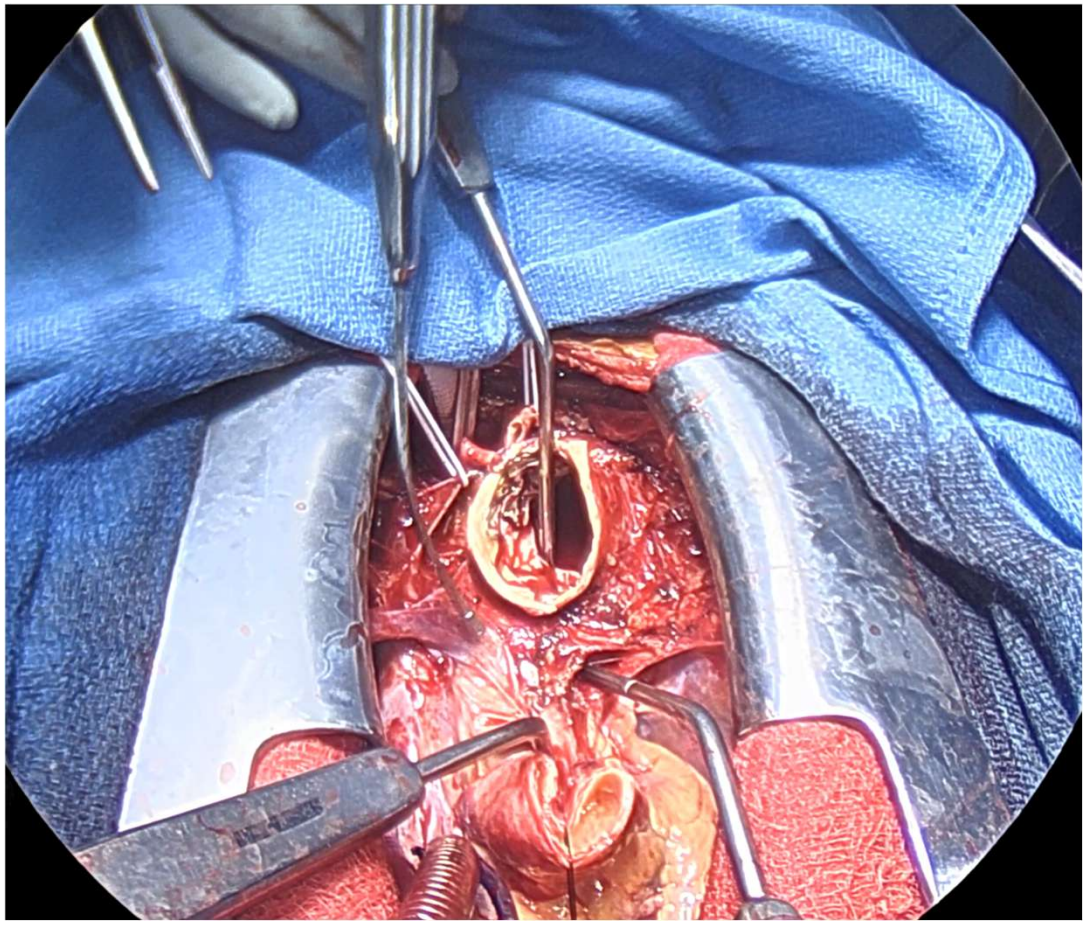
Type 1A/Type 3 Endoleak

Case 1: OR

What are the options:

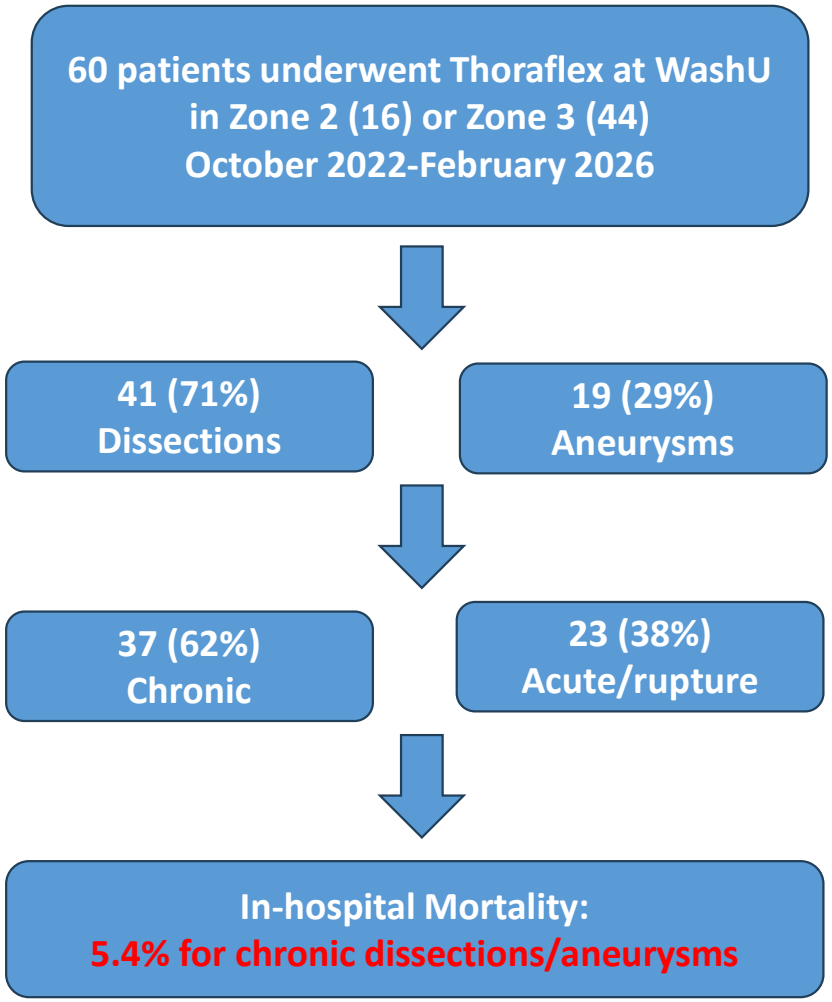
- More proximal TEVAR with cervical debranching?
- Open arch/TAA replacement via thoracotomy – circ arrest?
- Open aortic arch replacement?
- Other?

Case 1: Open arch with Thoraflex



Case 1: s/p Zone 2 Thoraflex - postop CT

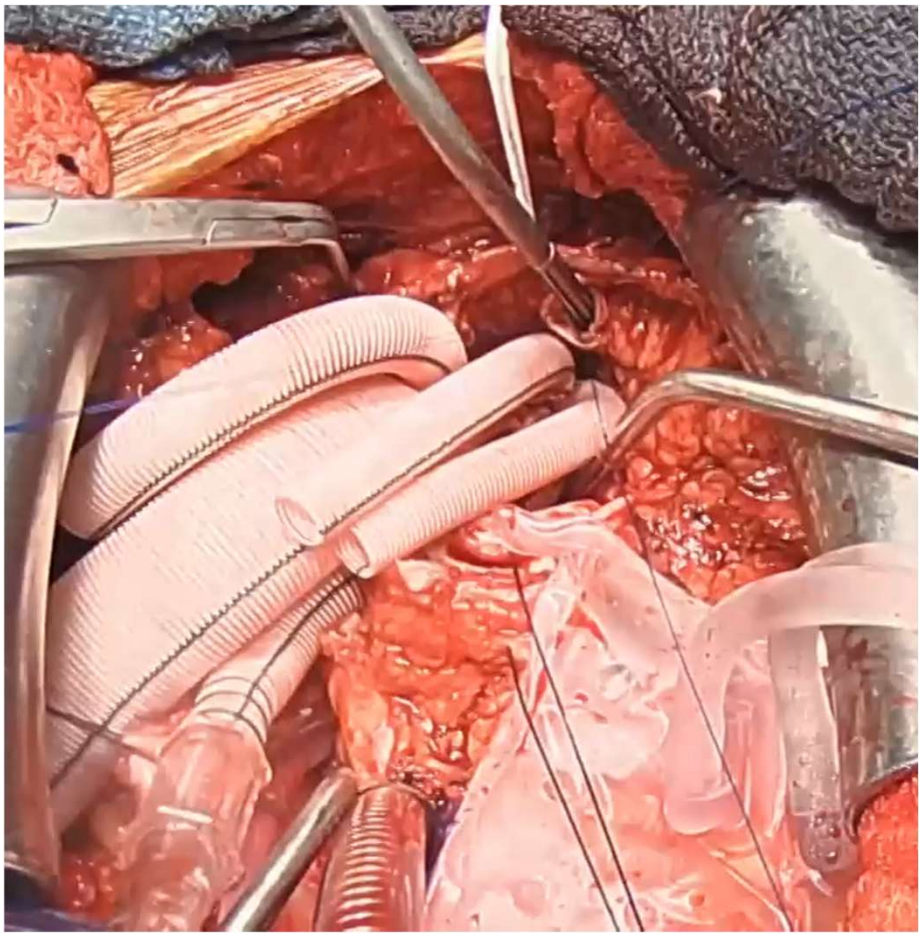
Thoraflex



Mean age: 61 yrs [38-80 yrs]
39 Males, 21 Females

55% redo surgery
45% concomitant surgery
Mean circulatory arrest: 45 min
73% Zone 3 arch

RapidLink Clinical trial– 1st case Dec 2025



(Terumo Aortic)

Case 2

- 79F with rapidly enlarging PAU of aortic arch

- PMHx:
  - Prior 3ppd smoker, HTN, HLD, CVA-no deficits, DM, severe OA of knees
  - Surveillance imaging of aortic root (known 5cm)
  - During workup, found to have chronic systolic HF
  - s/p PCI to LAD, started on GDMT with EF recovery

Case 2: Preop CT scan

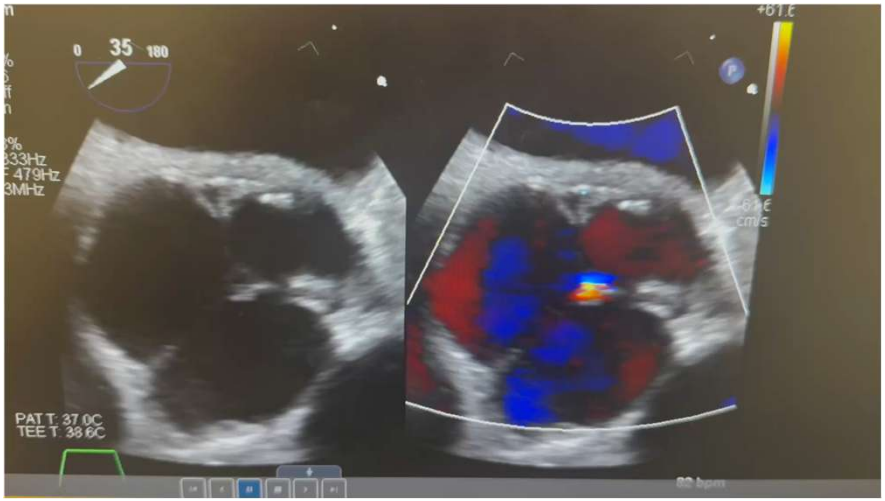
Sinus of Valsalva 5cm; STJ 4cm; Max ascending 4.5cm;
Aortic arch 5cm at level of PAU, ulcer depth 2cm

Case 2: OR for endovascular repair

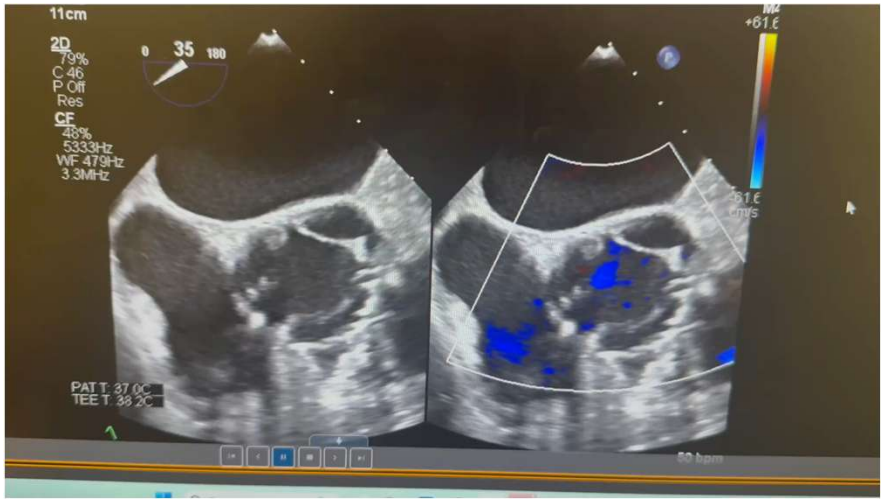
- Bilateral femoral artery access - 24Fr sheath, right radial access
- Zone 0 Gore TBE (37x150mm), 20mm x 6cm side branch
- 45x80mm ascending graft
- Tried to advance 49x100mm graft more proximally but first graft migrated forward
- Coda to balloon ascending graft to pull back, still small 1a endoleak
- Re-advanced 49x100mm ascending graft
- After deployment, some hypotension and bradycardia
- ?Entrapped AV leaflet, tried to move with Coda and Trilobe balloons
- Residual small 1a but elected to leave alone given AV injury

Case 2: Intraop TEE images of aortic valve

Mild central AI to start

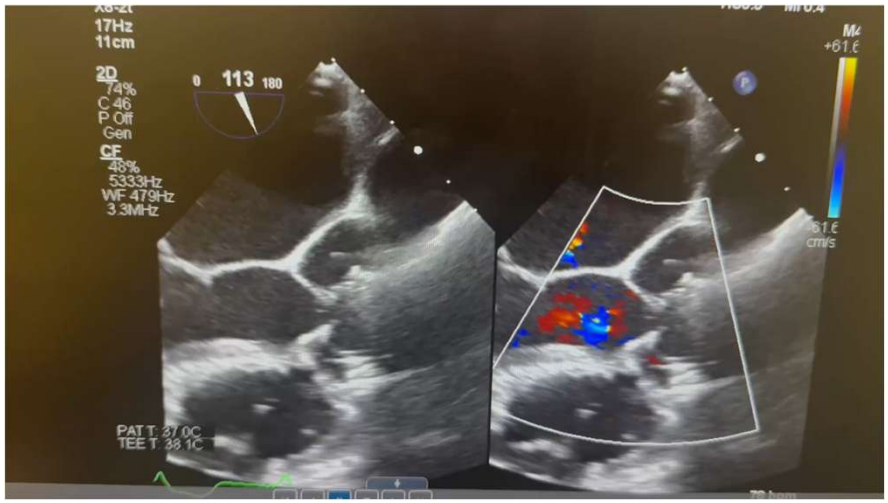


Before ascending graft deployment

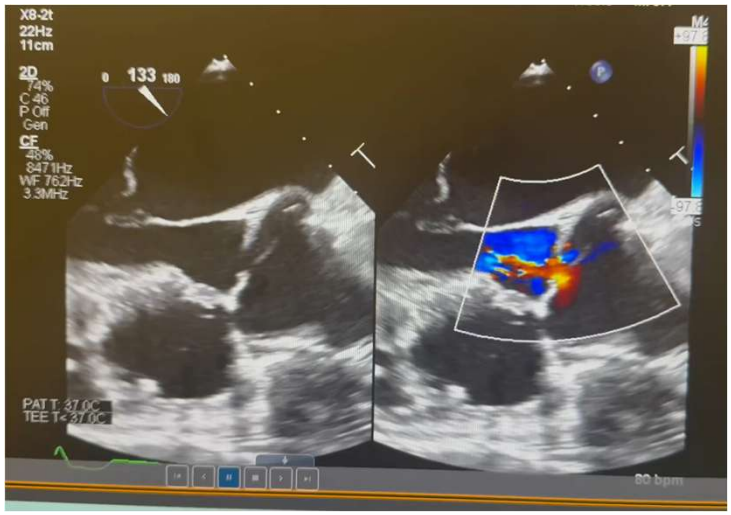


Case 2: Intraop TEE images of aortic valve

Immediately after 100% ascending graft deployment



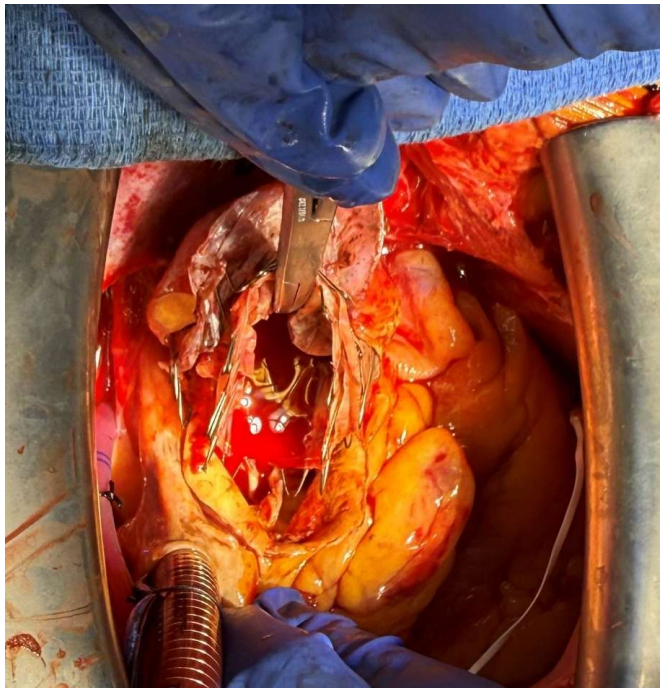
Severe AI at end of procedure



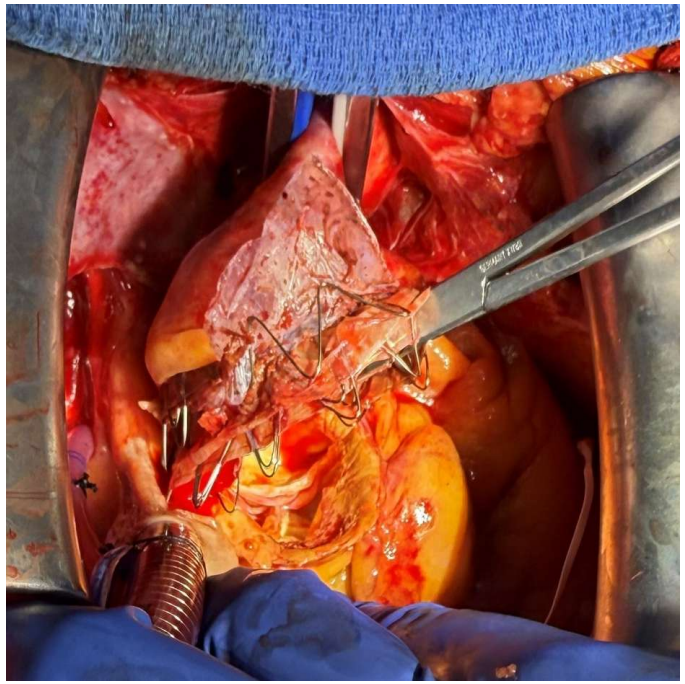
Case 2: CT s/p endovascular repair

Case 2: OR for AVR/ascending repair 9/15/2025

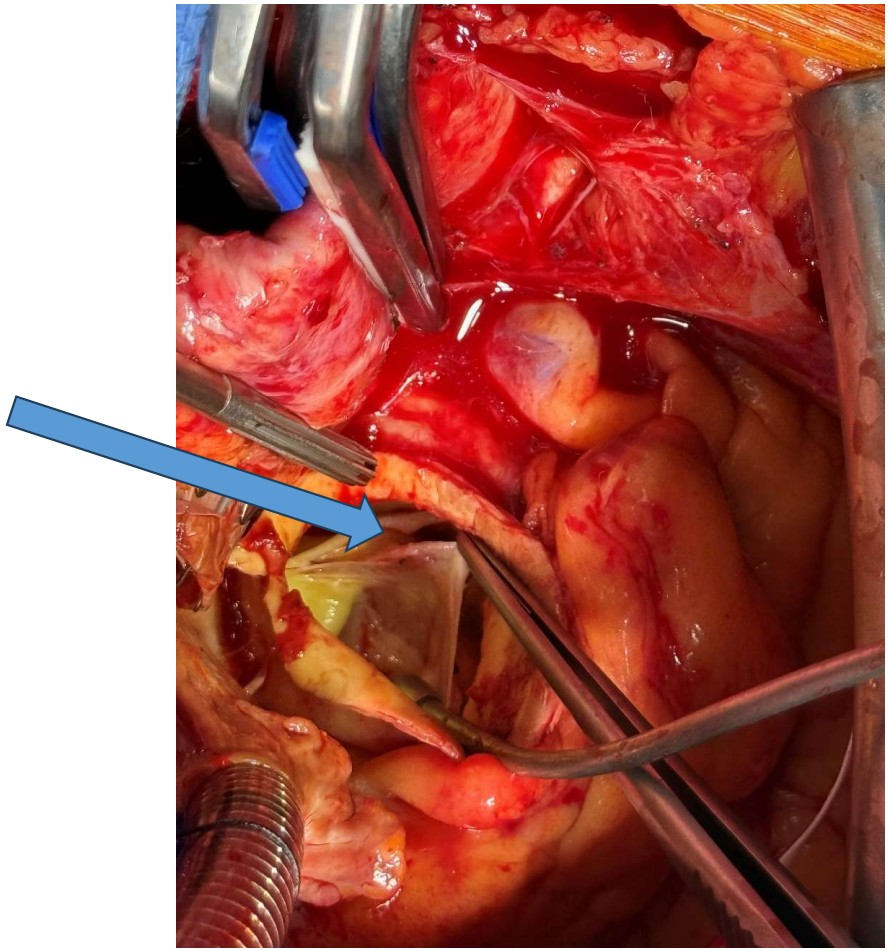
Ascending stent graft



Proximal ascending stent removal

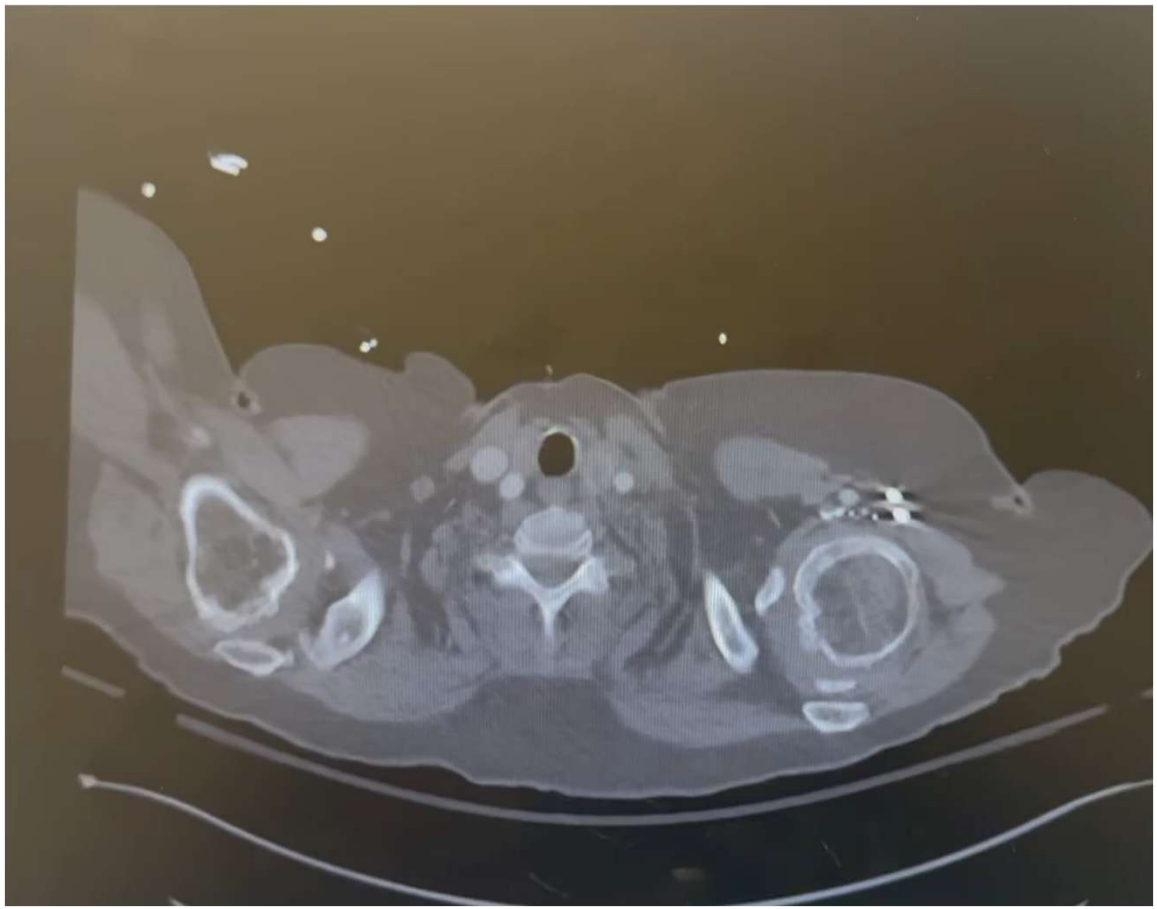


Case 2: OR for AVR/ascending repair 9/15/2025



Secured 45mm graft
to ascending aorta

Case 2: s/p AVR/ascending repair CT

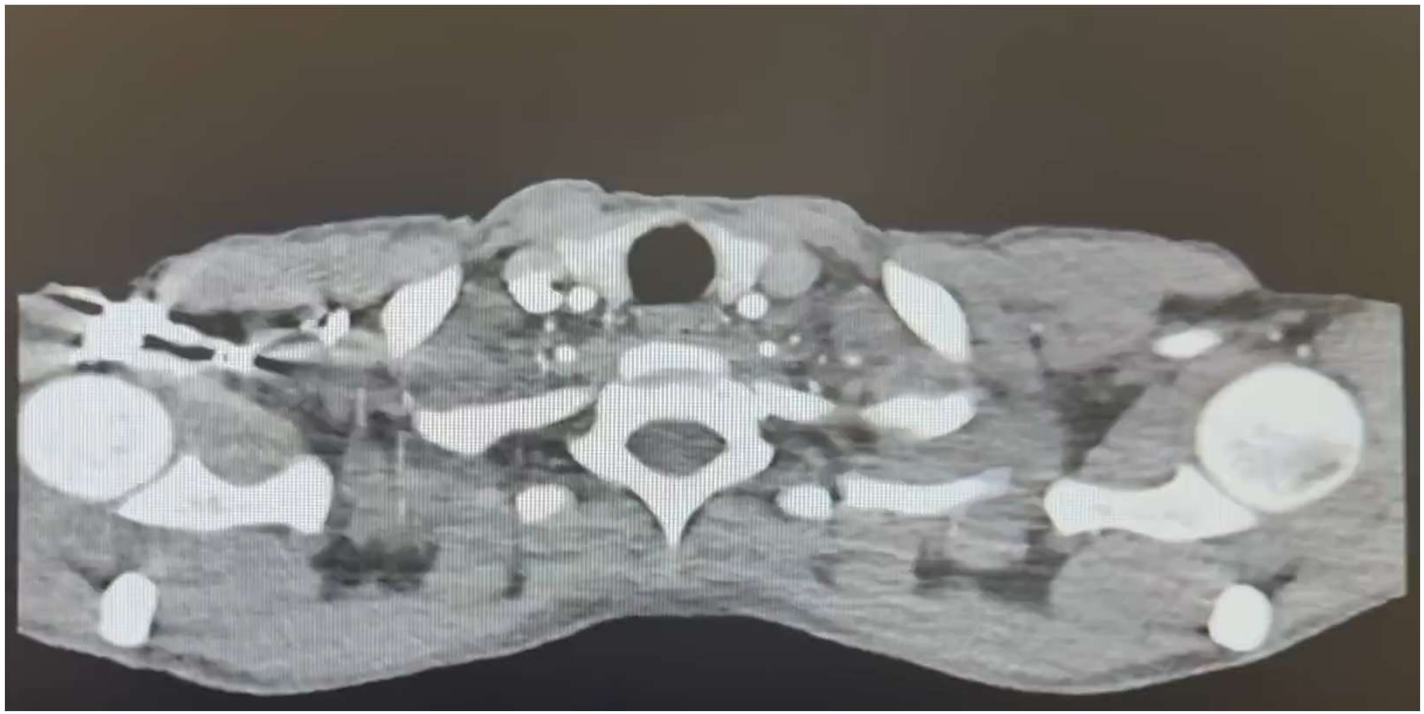


Case 3

- 54F presented with acute chest pain, SOB, MSSA bacteremia

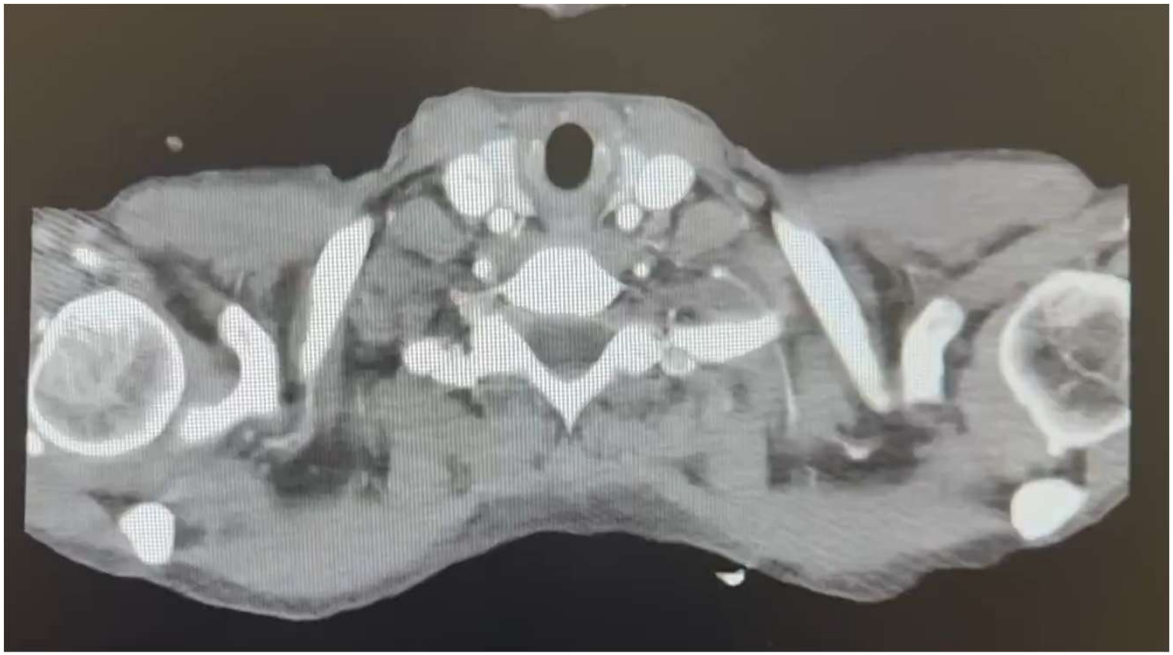
- PMHx:
  - Recurrent infections – lumbar osteomyelitis 2022, bilateral retroperitoneal abscesses s/p drainage 2023, RUE cellulitis 2024
  - Hepatitis C – incomplete treatment, h/o Hepatitis B
  - Antiphospholipid syndrome on Eliquis
  - May-Thurner syndrome s/p venous tPA and L CIA/EIA/CFV stenting
  - Severe protein-calorie malnutrition
  - Active tobacco abuse and polysubstance abuse, homelessness

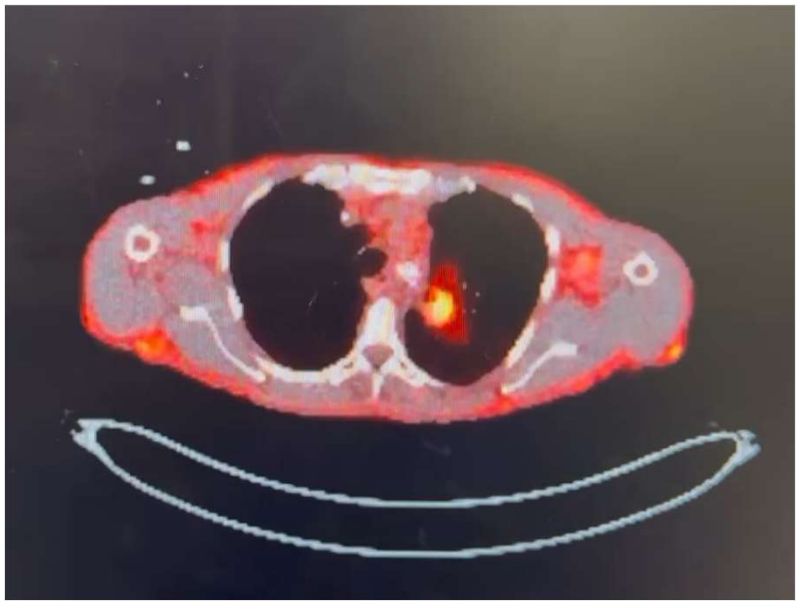
Case 3: Initial presentation: arch pseudoaneurysm



Focal outpouching of aortic arch <2cm distal to LSCA, enlarged mediastinal LN

Case 3: 6wk s/p TEVAR CT & PET Imaging





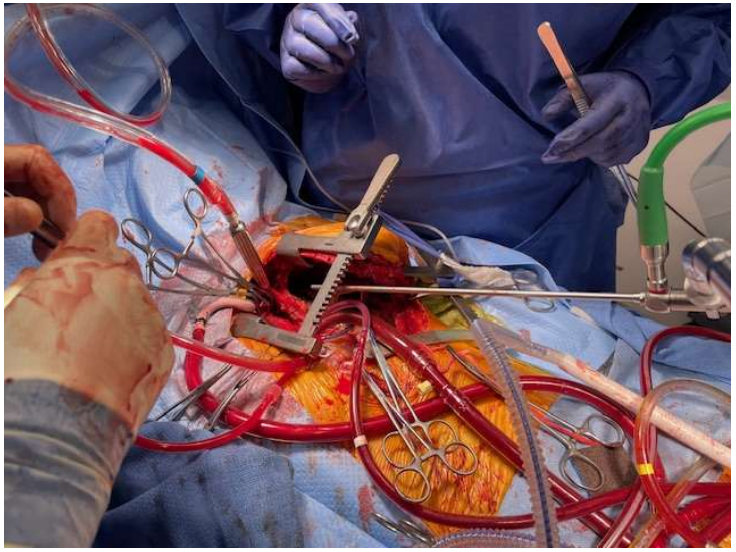
s/p 6 wks: FDG-avid aorta surrounding TEVAR and persistent bacteremia

Case 3: OR

What are the options:

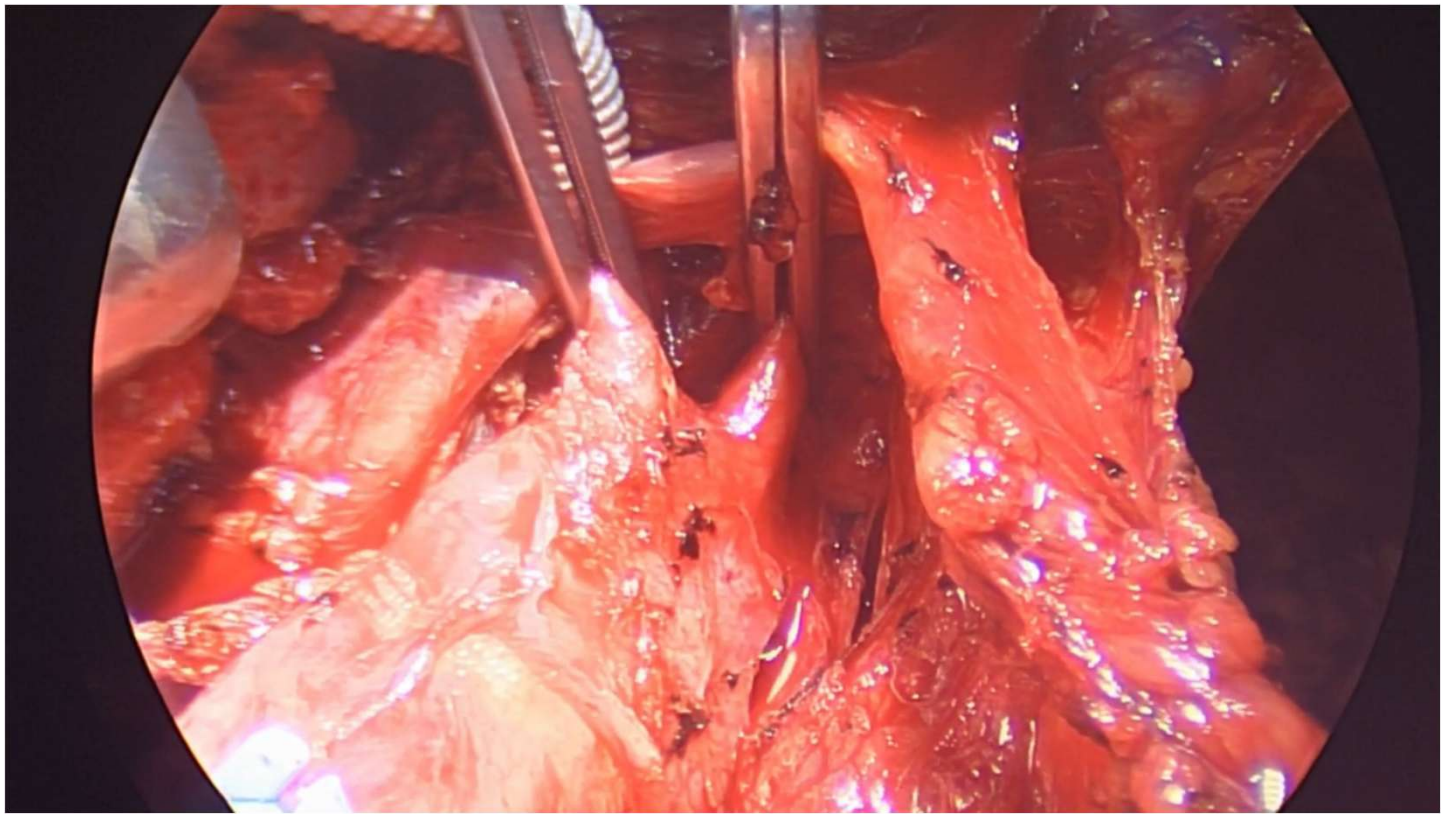
- Antibiotics, optimize, surgery if progression?
- Lifelong antibiotics and surveillance?
- Descending replacement via left thoracotomy? Circ arrest?
- Hemi-clamshell replacement of arch/descending aorta?
- Other?

Case 3: OR Setup w/ left hemiclamshell

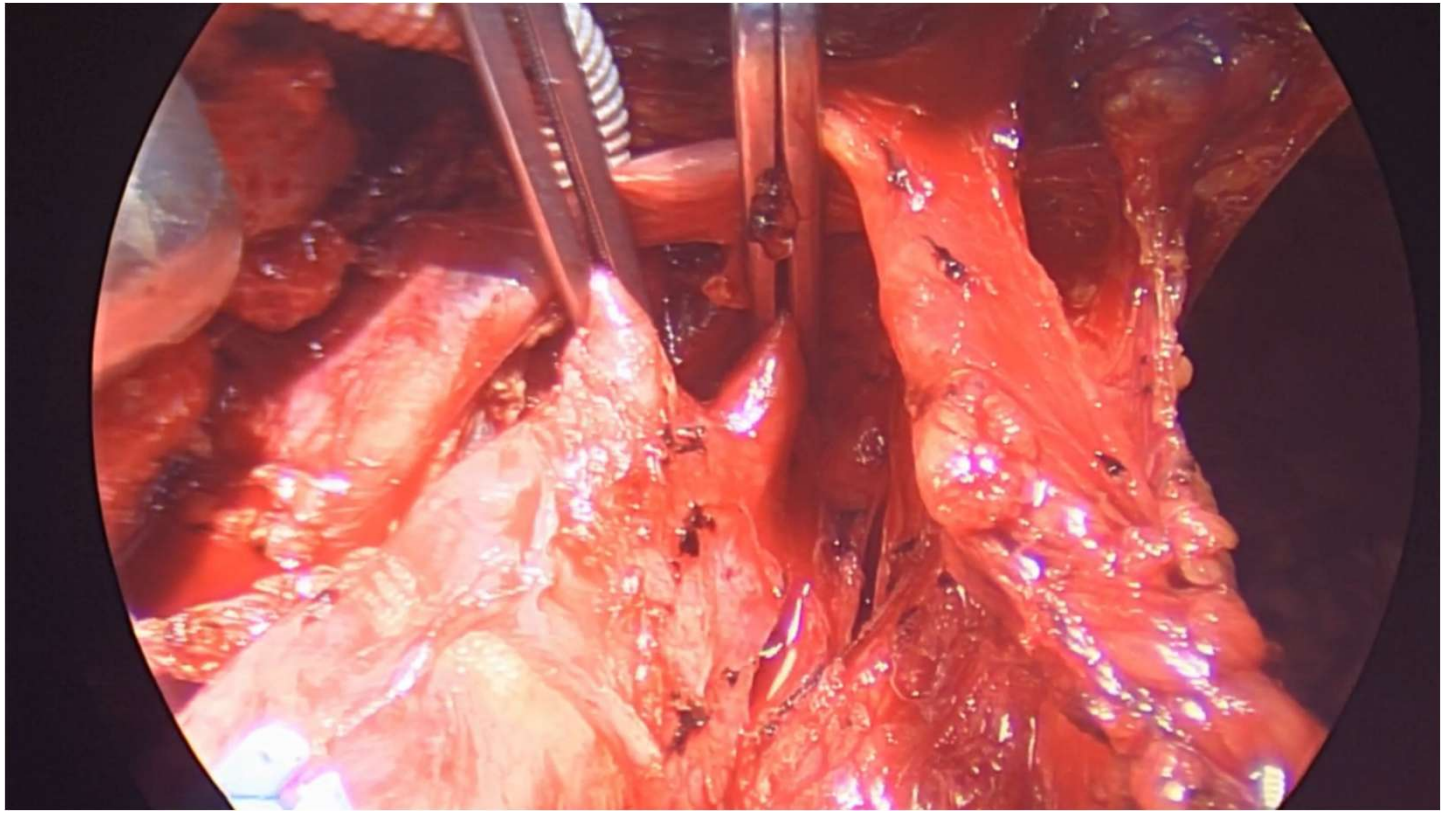


- 8mm innominate a.
- 8mm L femoral a.
- 4th ICS L hemiclamshell
- Cool to 32ºC
- Arrest heart
- Clamp innominate/LCCA
- Clamp distal to TEVAR
- Descending replacement

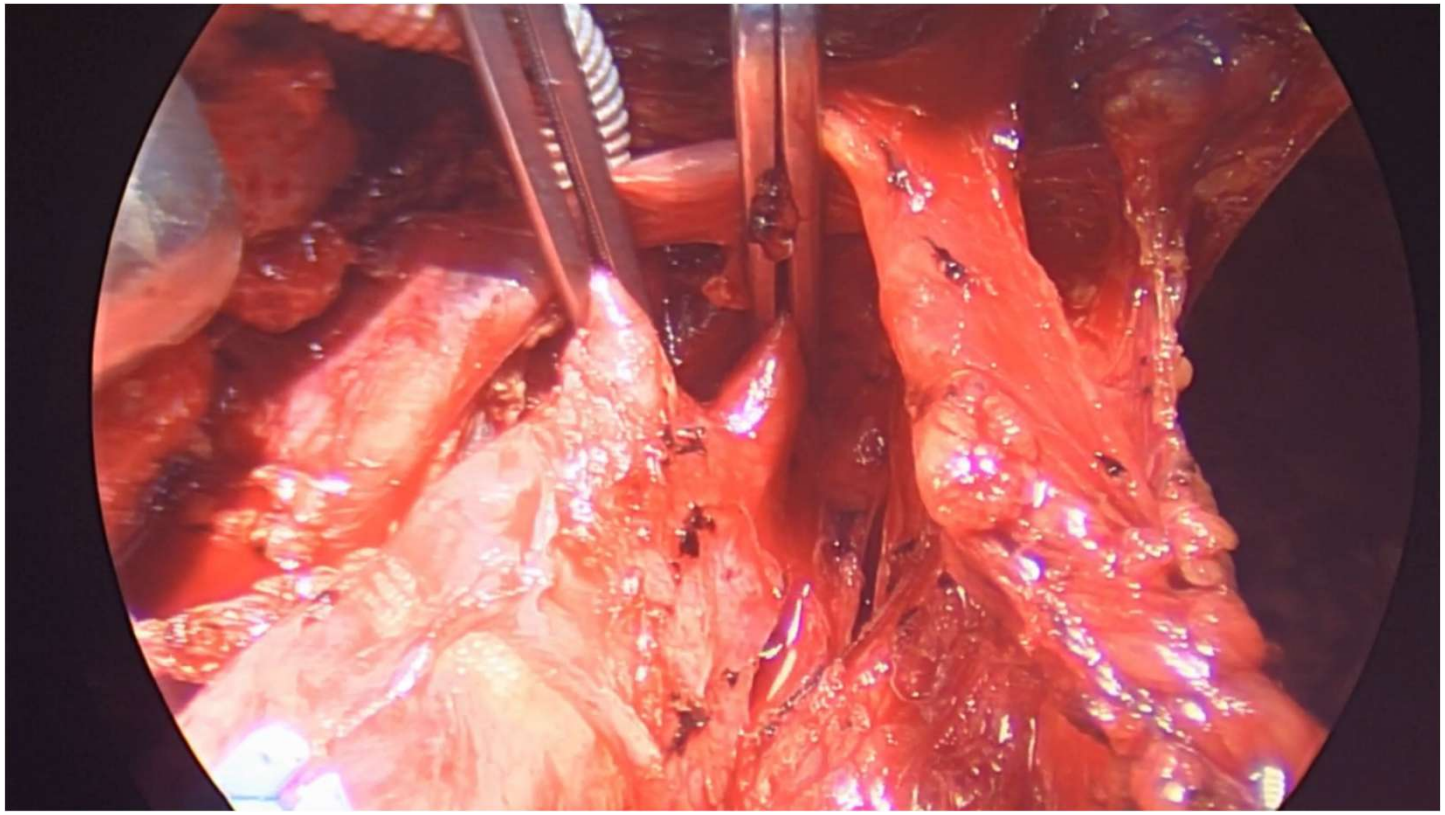
Case 3 infected TEVAR: OR



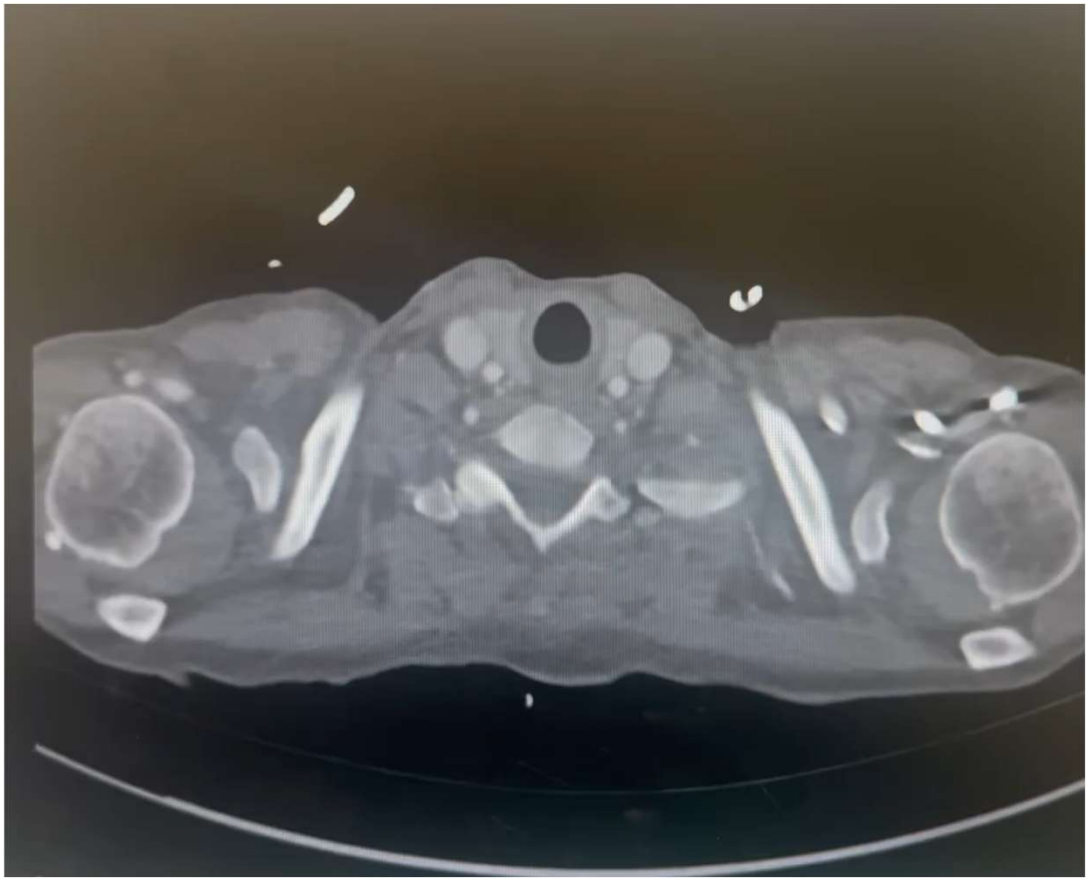
Case 3 infected TEVAR: OR



Case 3 infected TEVAR: OR



Case 3: Postop CT

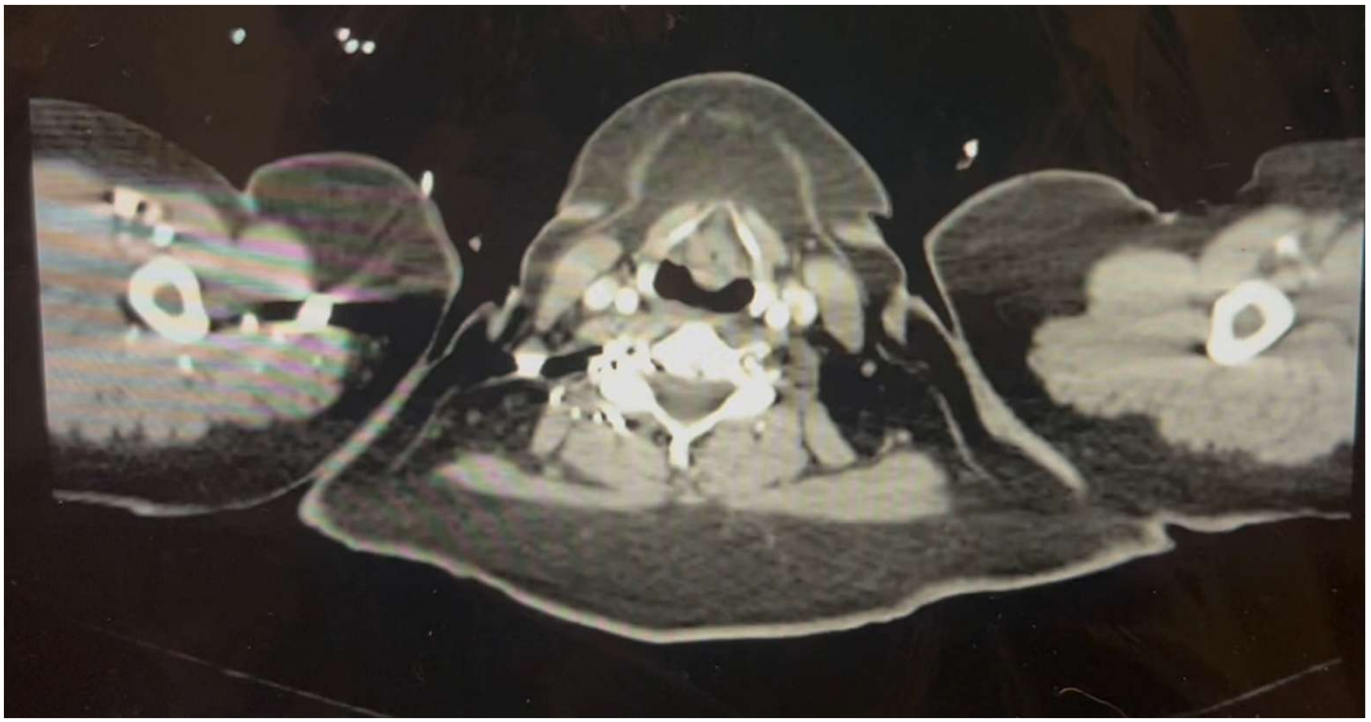


Case 4

- 49 yo F with unremitting left-sided chest and back pain

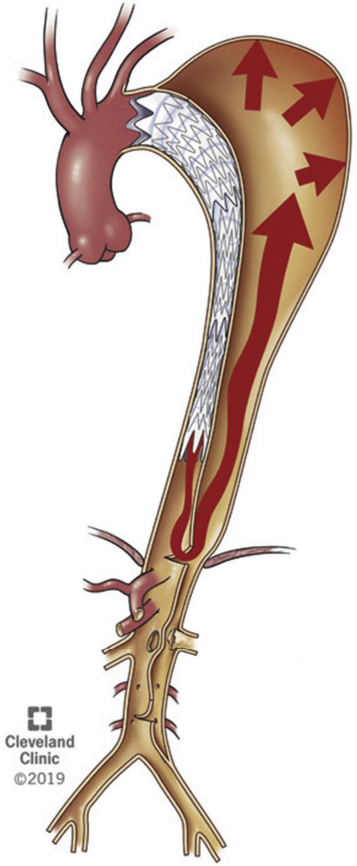
- PMHx:
  - MV repair in 2009
  - Acute type B dissection in 2010
  - L C-S bypass, TEVAR (Zones 3-4) 2010
  - Marfan syndrome diagnosed after treatment of type B dissection

Case 4 – Preop CT scan



- New blood pool around TEVAR
- New entry tear beyond TEVAR
- L subclavian remained patent after C-S bypass

Case 4 – New tear with FL flow around TEVAR



JTCVS 2022;163:1231

The Society of Thoracic Surgeons/American Association for Thoracic Surgery clinical practice guidelines on the management of type B aortic dissection

Thomas E. MacGillivray, MD,[a] Thomas G. Gleason, MD,[b] Himanshu J. Patel, MD,[c] Gabriel S. Aldea, MD,[d] Joseph E. Bavaria, MD,[e] Thomas M. Beaver, MD,[f] Edward P. Chen, MD,[g] Martin Czerny, MD,[h] Anthony L. Estrera, MD,[i] Scott Firestone, MS,[j] Michael P. Fischbein, MD,[k] G. Chad Hughes, MD,[g] Dawn S. Hui, MD,[l] Kalie Kissoon,[j] Jennifer S. Lawton, MD,[m] Davide Pacini, MD,[n] T. Brett Reece, MD,[o] Eric E. Roselli, MD,[p] and John Stulak, MD[q]

Uncomplicated
No rupture
No malperfusion
No high-risk features
High risk
Refractory pain
Refractory hypertension
Bloody pleural effusion
Aortic diameter >40 mm
Radiographic only malperfusion
Readmission
Entry tear: lesser curve location
False lumen diameter >22 mm
Complicated
Rupture
Malperfusion

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CONNECTIVE TISSUE DISORDERS

- **Open surgical repair over TEVAR is reasonable for more durable treatment in patients with connective tissue disorders and TBAD who have progression of disease despite OMT. (COR I, LOE B-NR)**
- **TEVAR is reasonable in patients with connective tissue disorders with acute complicated TBADs and anatomy favorable for TEVAR as a bridge to delayed open reconstruction. (COR IIA, LOE C-LD)**

JTCVS 2022;163:1231

Case 4: OR

What are the options:

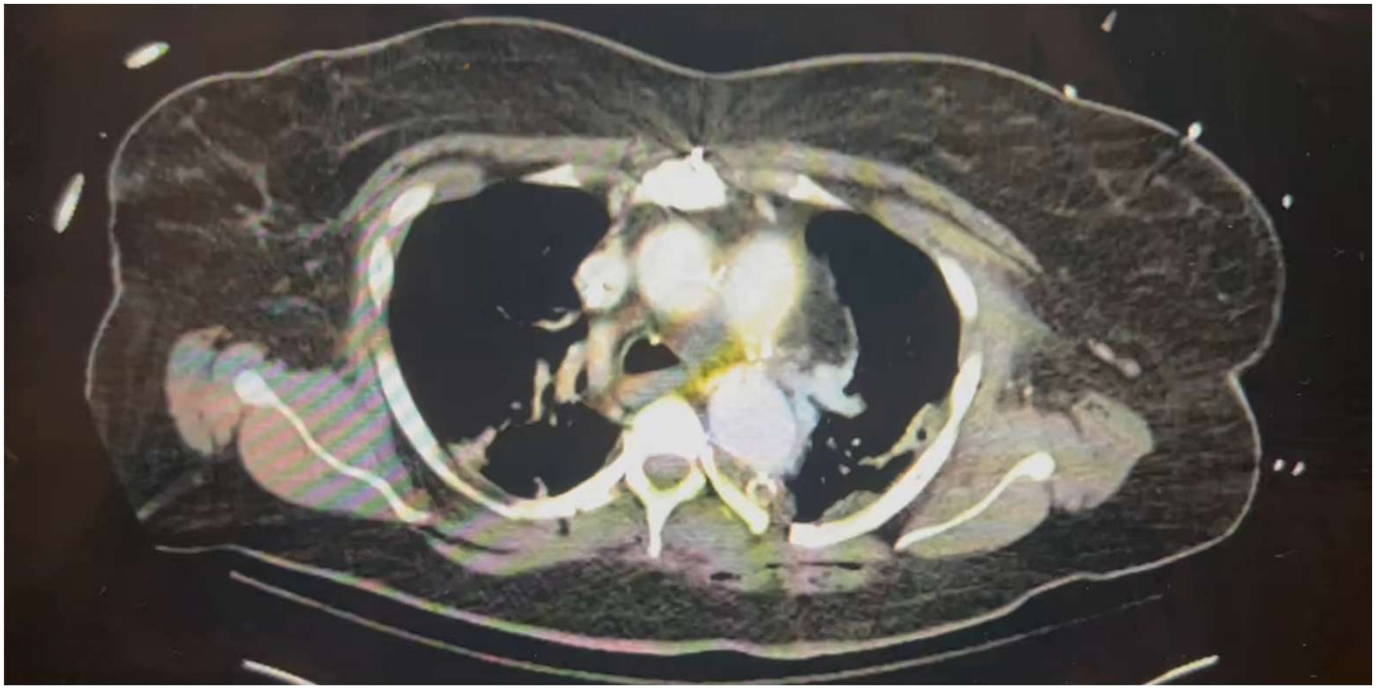
- TL TEVAR to celiac to cover new entry tear ± candy plug
- Distal fenestration with TEVAR to entire aortic diameter
- Extent IV Thoracoabdominal from distal TEVAR
- Open descending replacement with TEVAR extraction
- Other?

Case 4 – OR for descending replacement

- Lumbar Drain
- Partial CPB from left femoral vessels, L thoracotomy
- Zone 2 control, ligation of L subclavian
- Replacement of descending aorta from Zone 2 to distal descending (28 mm Dacron graft) with removal of TEVAR

- In ICU, loss of distal femoral pulses / elevated lactate levels

Case 4 – Post op CT scan



- New tear with TL occlusion 5 cm distal to aortic graft

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Uncomplicated
No rupture
No malperfusion
No high-risk features
High risk
Refractory pain
Refractory hypertension
Bloody pleural effusion
Aortic diameter >40 mm
Radiographic only malperfusion
Readmission
Entry tear: lesser curve location
False lumen diameter >22 mm
Complicated
Rupture
Malperfusion

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Case 4 – Second operative procedure / Postop CT

- TEVAR from descending Ao graft to celiac (Gore TAG 31-26 tapered)

Conclusions

- Determine if you need “now” management vs. “lifetime” management.
- Indications for arch surgery are still evolving as we define risk for a heterogenous population and determine anatomic suitability for endovascular treatment.
- Surgeons must remain vigilant of the unique complications associated with each type of repair strategy for optimal results.

Thank you!

Feel free to contact me with any questions or comments:

puja@wustl.edu

"*Be a free thinker and don't accept everything you hear as truth. Be critical and evaluate what you believe in*." -- Aristotle (384 - 322 BC)