hygeia hospital
Responsibility for life

HEAL Academy by HHG

Hybrid Conference

TRANSCATHETER HEART VALVES GREECE 2024

MAY 10-11, 2024

N. LOUROS
CONFERENCE CENTER
MITERA HOSPITAL

TAVI in Complex Scenarios

James L Velianou MD, FRCPC
Interventional and Structural Cardiology
Hamilton Health Sciences and Niagara Health
Associate Professor of Medicine
McMaster University
Hamilton, Canada

Potential Conflicts of Interest

Speaker's Name: James L Velianou

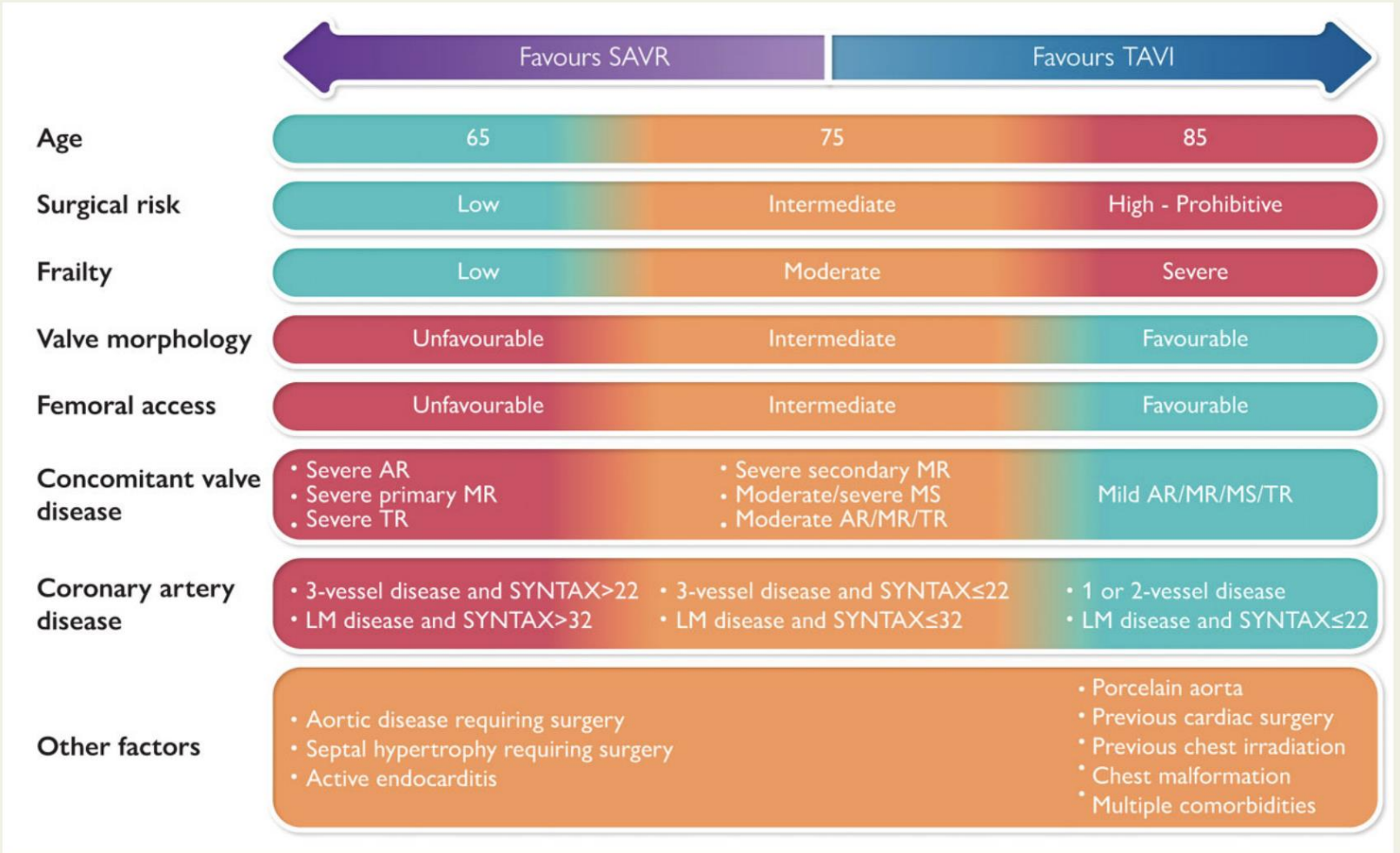
Consultant, research, educational support Edwards LifeSciences

Educational support Boston Scientific, Medtronic, Abbott

Not easy following ….

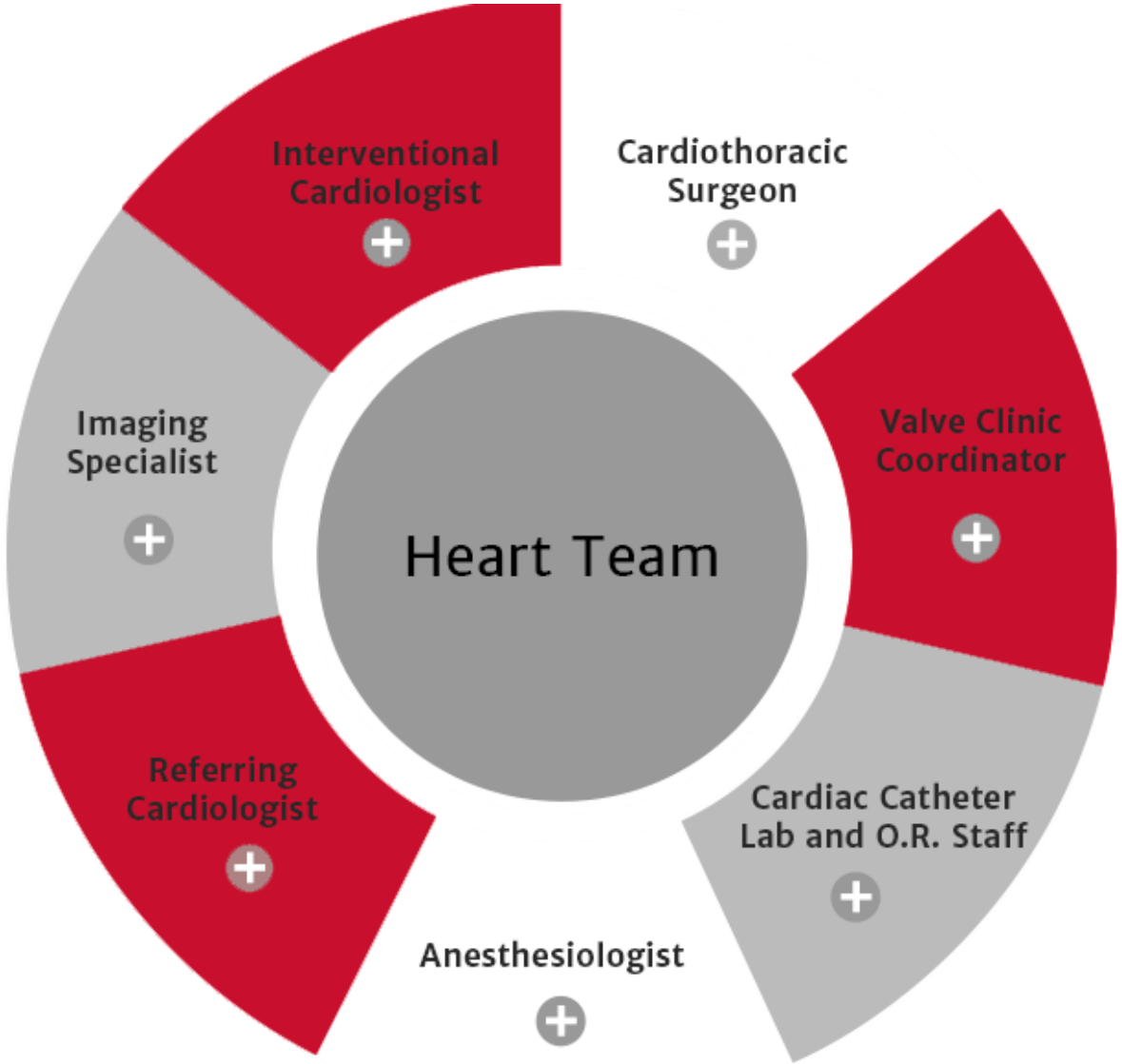
Drs Toutouzas, Tang and Bapat

Variety and Complexity in AS Patients determines Treatment Strategy



European Heart Journal (2022) **43**, 2729–2750

We need this!!!


Interventional Cardiologist
Cardiothoracic Surgeon
Imaging Specialist
Heart Team
Valve Clinic Coordinator
Referring Cardiologist
Cardiac Catheter Lab and O.R. Staff
Anesthesiologist

TAVR in Complex Clinical Scenarios

Access

- Vascular Access Issues: Small, diseased and tortuous peripheral arteries complicate access; alternatives like transapical or transaortic routes may be used.

Landing Zone

- Bicuspid Aortic Valves: Challenges due to abnormal anatomy, risk of leakage.
- Severe Calcification: Heavy calcification increases risk of complications such as annular rupture and coronary obstruction.
- Risk of Coronary Obstruction: Low-lying coronary arteries or heavy calcification may risk obstruction.
- Pre-existing Prosthetic Valves: Valve-in-valve procedures require careful sizing and risk assessment.

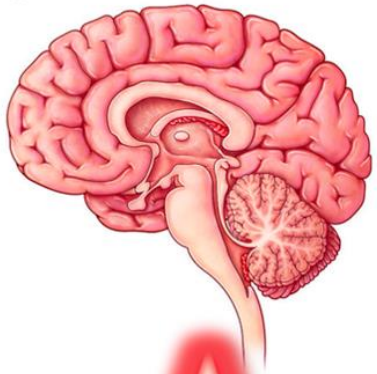
TAVR in Complex Clinical Scenarios

Other

- Electrical: pacing, arrythmia, AF
- Complex Heart Conditions: Conditions like severe mitral regurgitation, hypertrophic cardiomyopathy, or aortic aneurysms add complexity.
- Non-Cardiac Patient Factors such as frailty and lifespan limiting disease

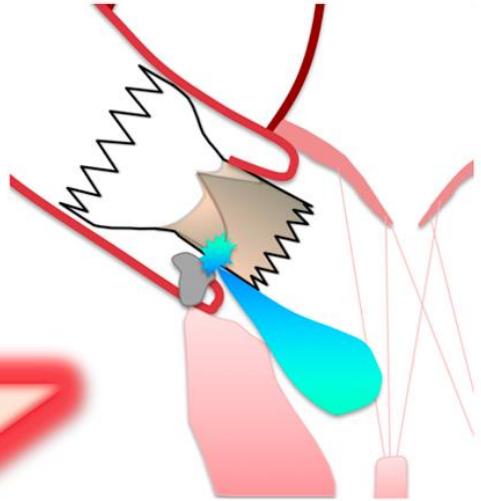
Stroke

Ischemic
”Shower”
Bleed



PVL

Annular Rupture
Coronary obstruction



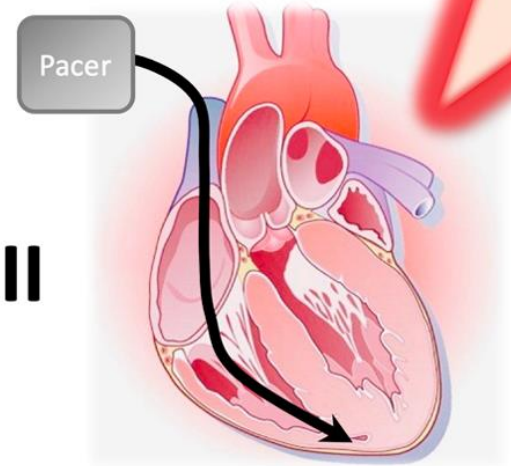
Vascular Compromise
Inability to AntiCoag

Bleeding

BIG FIVE

AF
VT

AVB °III

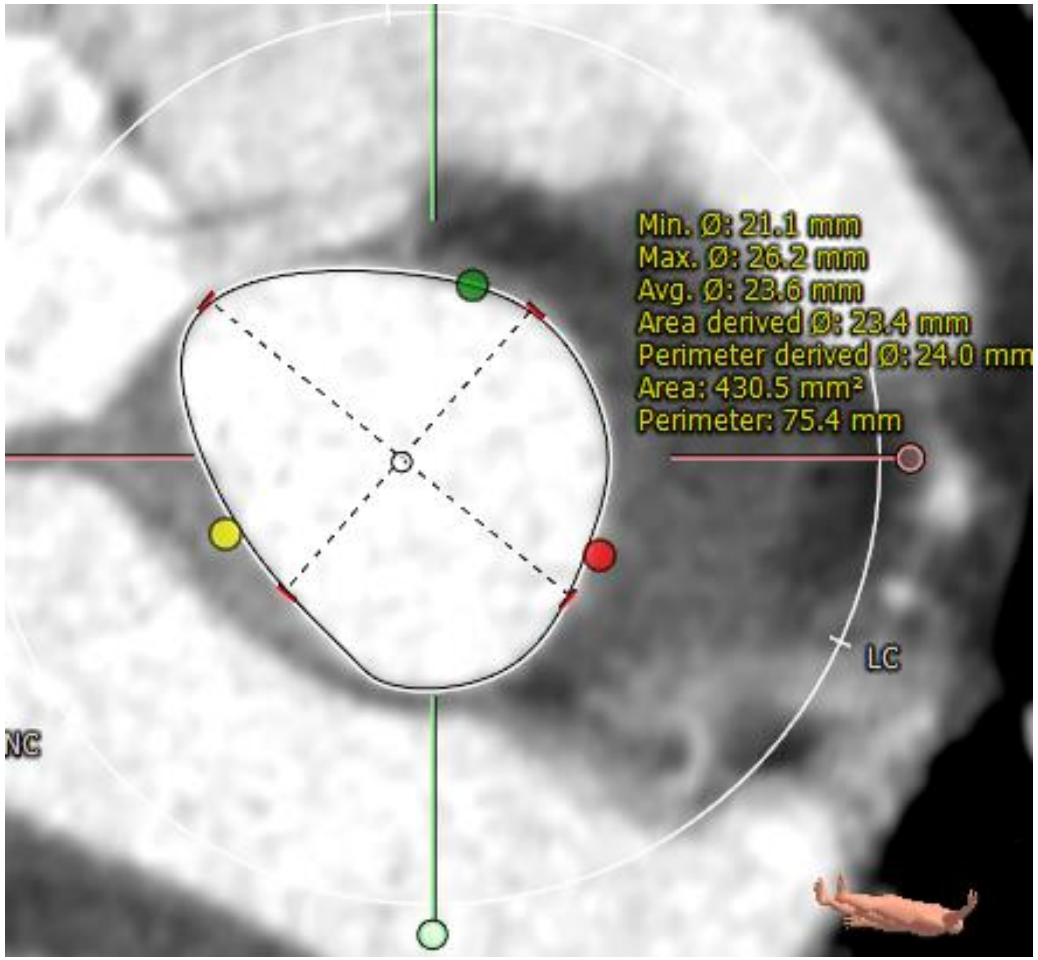


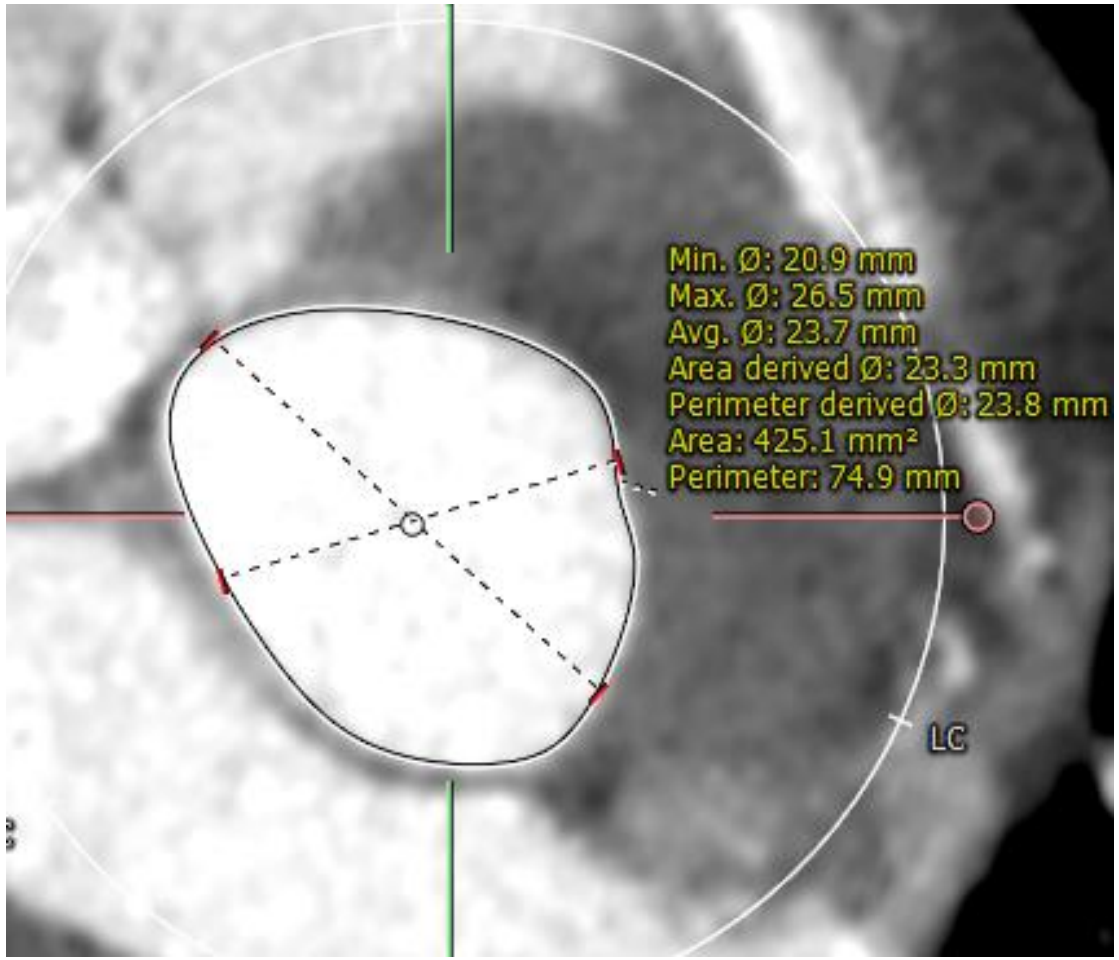
AKI

- **Eberhard Grube et al. *J Am Coll Cardiol Intv* 2019; 12:370-372.**

Complex Access Patient

- Frail 85F with HTN, COPD. BSA 1.26 m2 (Weight 36.3 Kgs, Height 152 cm)
- Left Ventricle: Left ventricle size is normal. Severely increased ventricular mass. Normal wall motion. This raises a suspicion of possible cardiac amyloidosis on the background of LVH from AS/HTN.
- Aortic Valve: Severe stenosis. Peak velocity is 4.0 m/s. Peak gradient is 62.8 mmHg. Mean gradient is 36.8 mmHg. Area by velocity time integral is 0.6 cm2. Doppler velocity index is 0.17. LVOT stroke volume is 37.9 ml/m2.


Min. Ø: 21.1 mm
Max. Ø: 26.2 mm
Avg. Ø: 23.6 mm
Area derived Ø: 23.4 mm
Perimeter derived Ø: 24.0 mm
Area: 430.5 mm²
Perimeter: 75.4 mm
LC
NC


Min. Ø: 20.9 mm
Max. Ø: 26.5 mm
Avg. Ø: 23.7 mm
Area derived Ø: 23.3 mm
Perimeter derived Ø: 23.8 mm
Area: 425.1 mm²
Perimeter: 74.9 mm
LC

TF Access in small arteries?

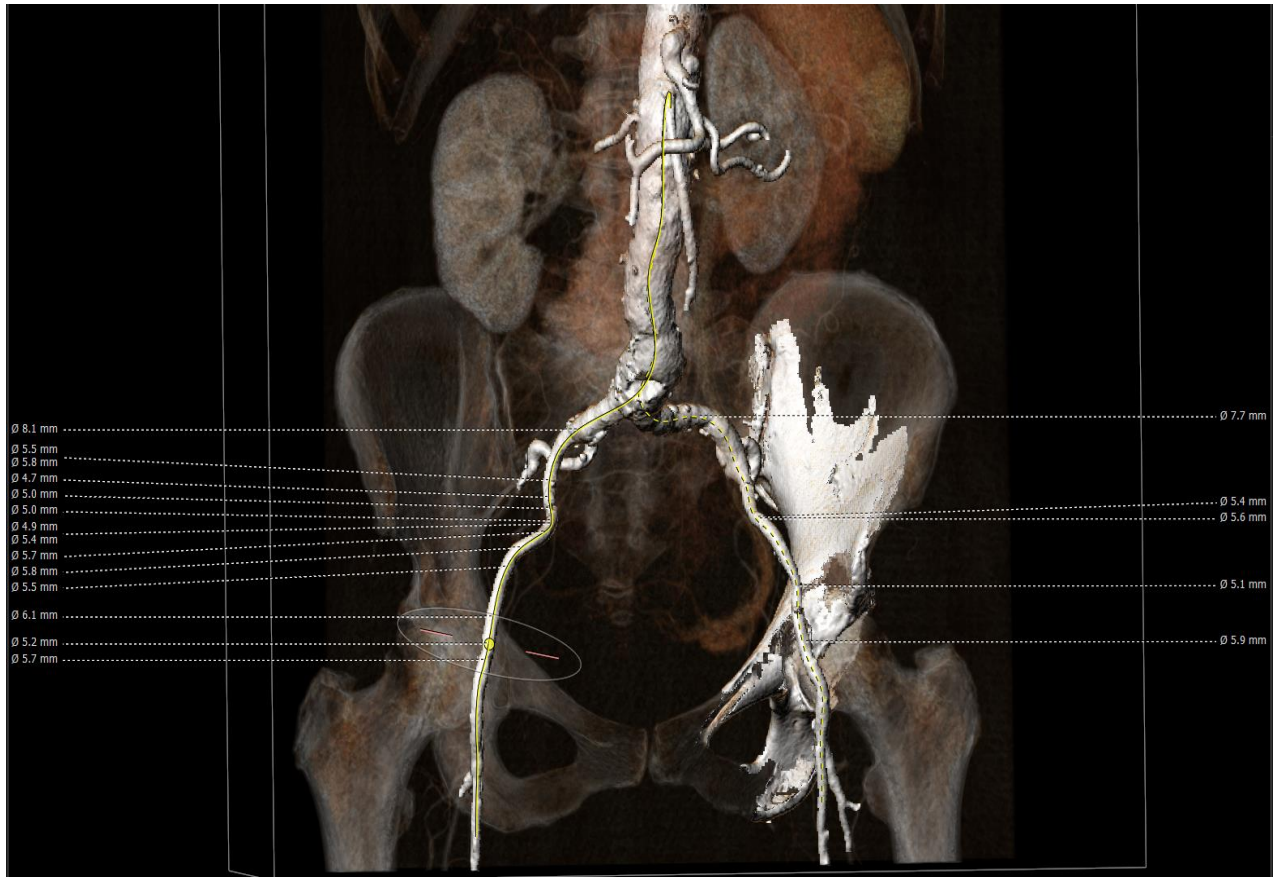
Iliofemoral arteries:

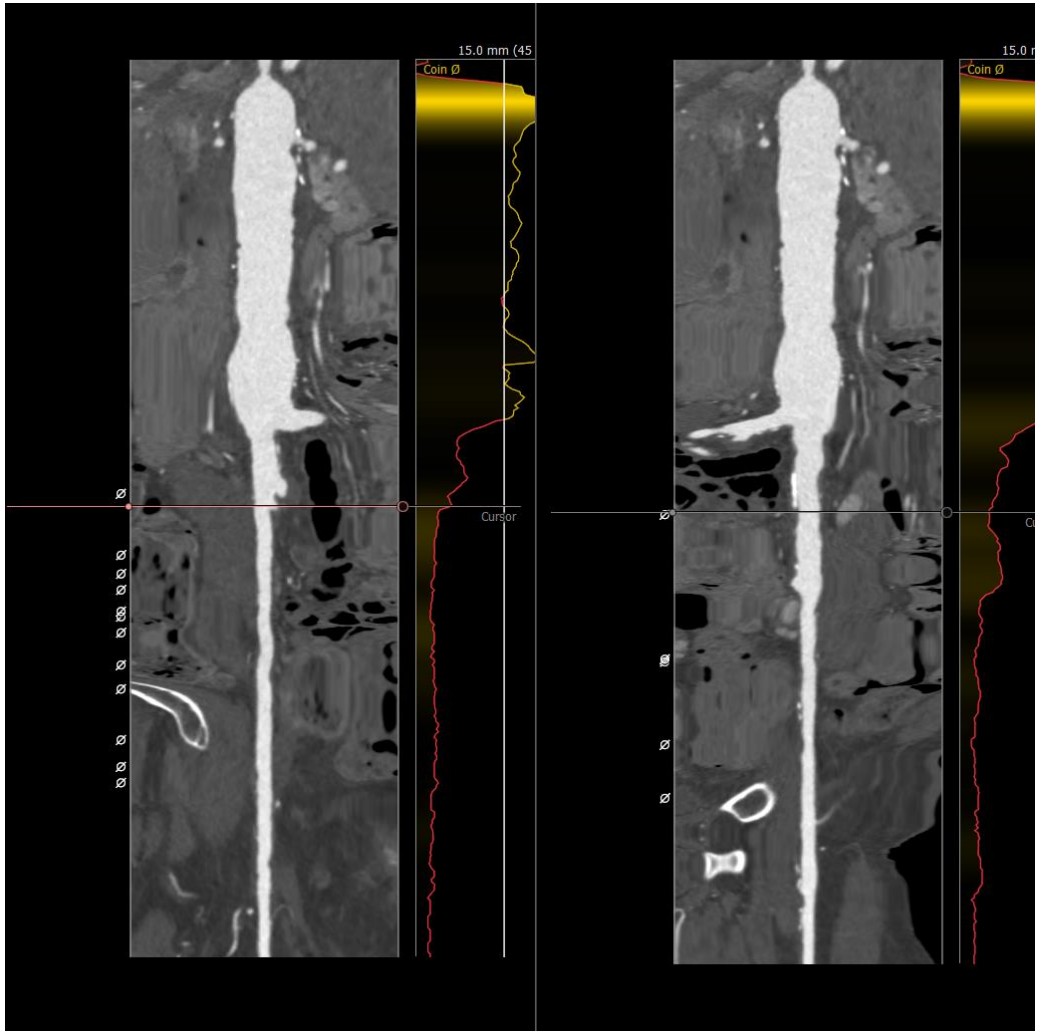
* Right Iliac minimum diameter: 4.7 mm
* Right external iliac minimum diameter: 5.7 mm
* Right common femoral artery minimum diameter: 6.1 mm
* Tortuosity: mild
* Calcification: mild

* Left Iliac minimum diameter: 5.4 mm
* Left external iliac minimum diameter: 5.1 mm
* Left common femoral artery minimum diameter: 5.9 mm
* Tortuosity: mild
* Calcification: mild

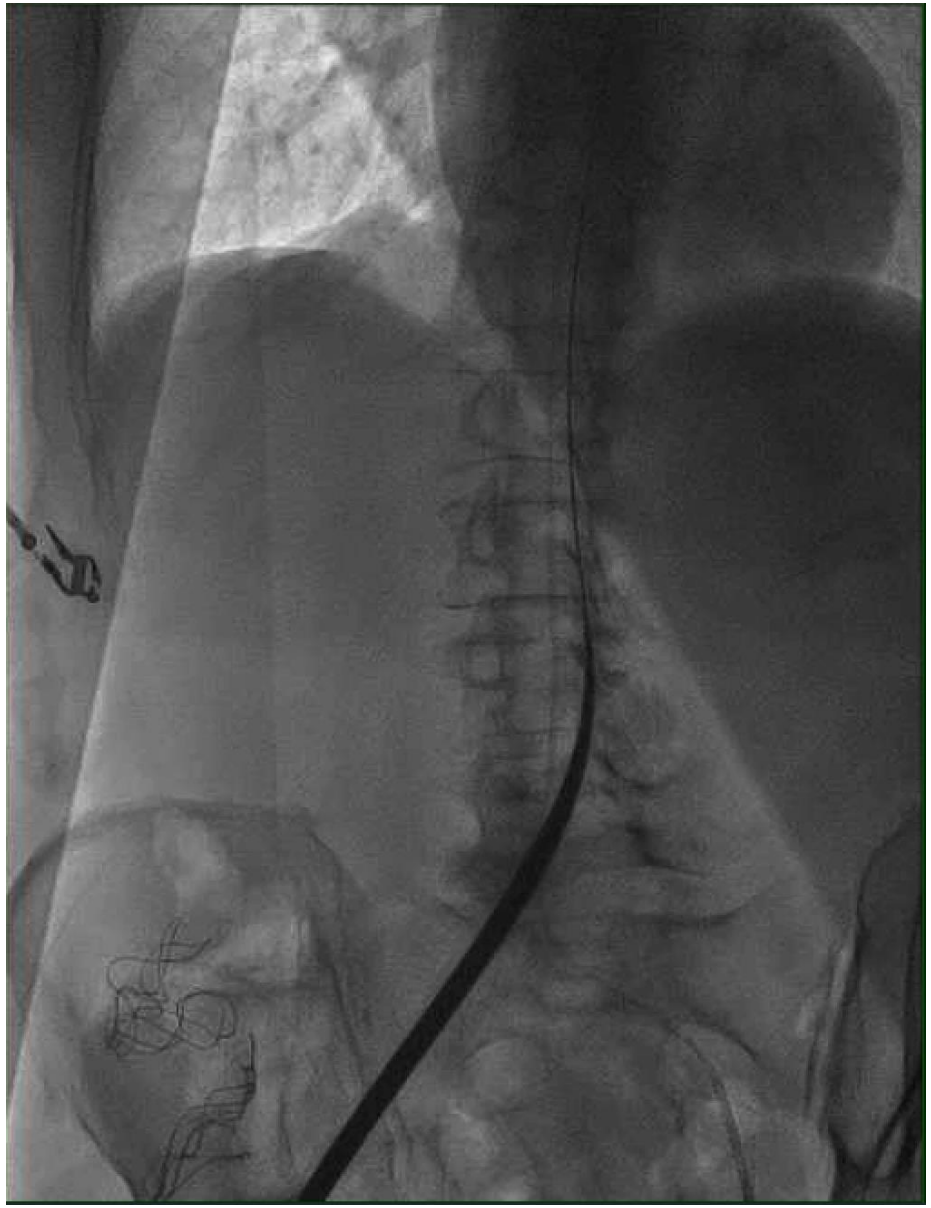
Impression

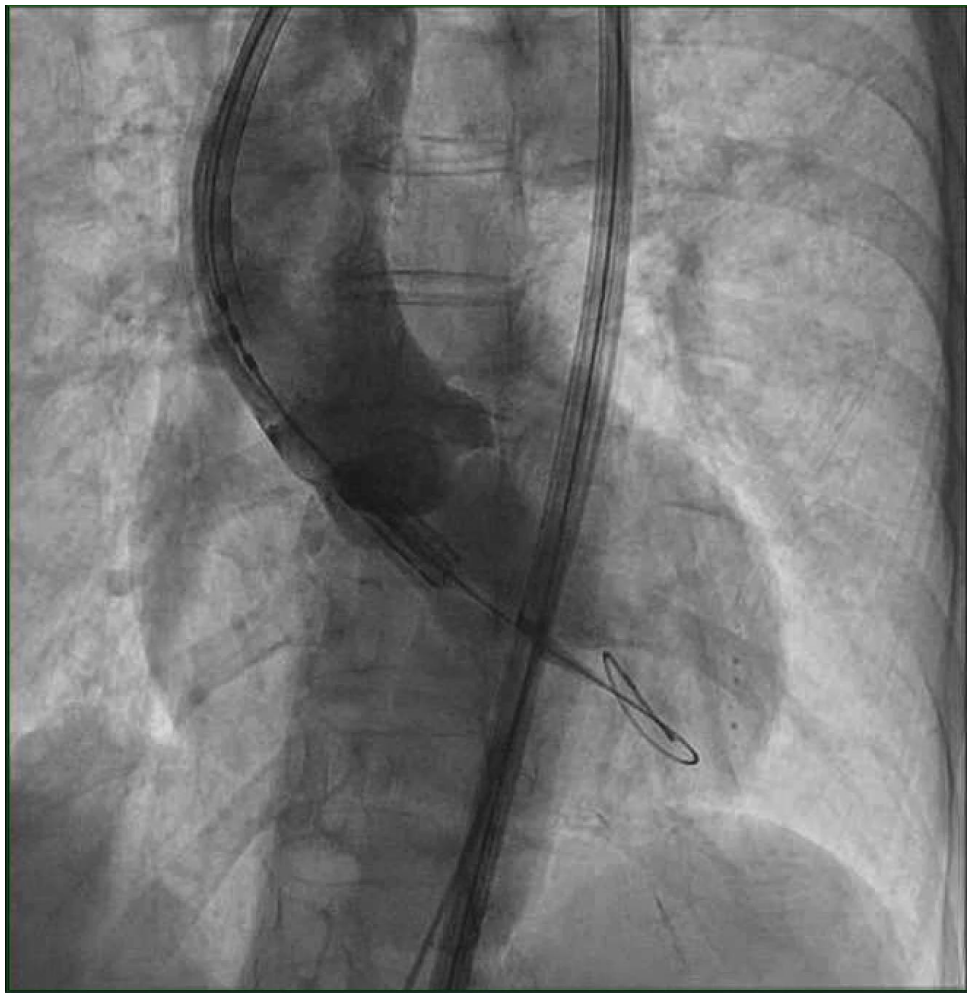
Anatomy suitable for percutaneous Left transfemoral with dilators TAVR with a Sapien 3 size 23 overfilled.
Invasive angiography at time of tavr due to low risk findings (normal/mild/low syntax) on CT


Ø 8.1 mm
Ø 5.5 mm
Ø 5.8 mm
Ø 4.7 mm
Ø 5.0 mm
Ø 5.0 mm
Ø 4.9 mm
Ø 5.4 mm
Ø 5.7 mm
Ø 5.8 mm
Ø 5.5 mm
Ø 6.1 mm
Ø 5.2 mm
Ø 5.7 mm
Ø 7.7 mm
Ø 5.4 mm
Ø 5.6 mm
Ø 5.1 mm
Ø 5.9 mm

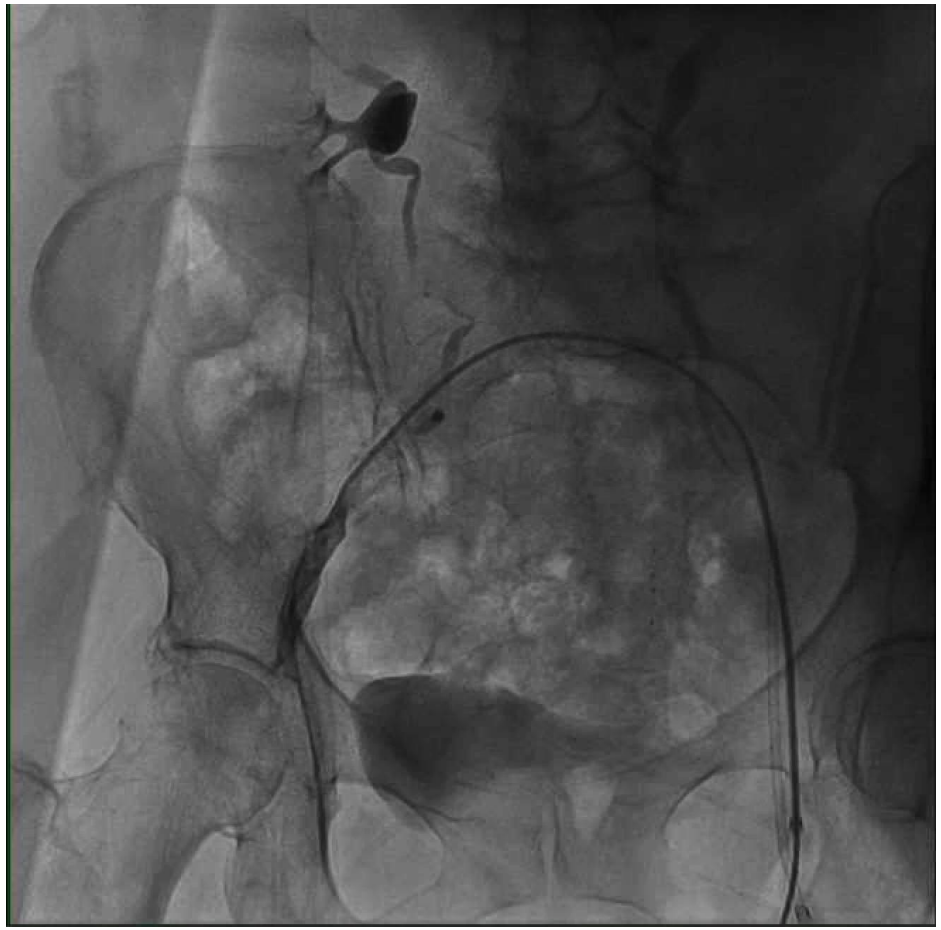

15.0 mm (45
Coin Ø
Cursor
15.0 m
Coin Ø

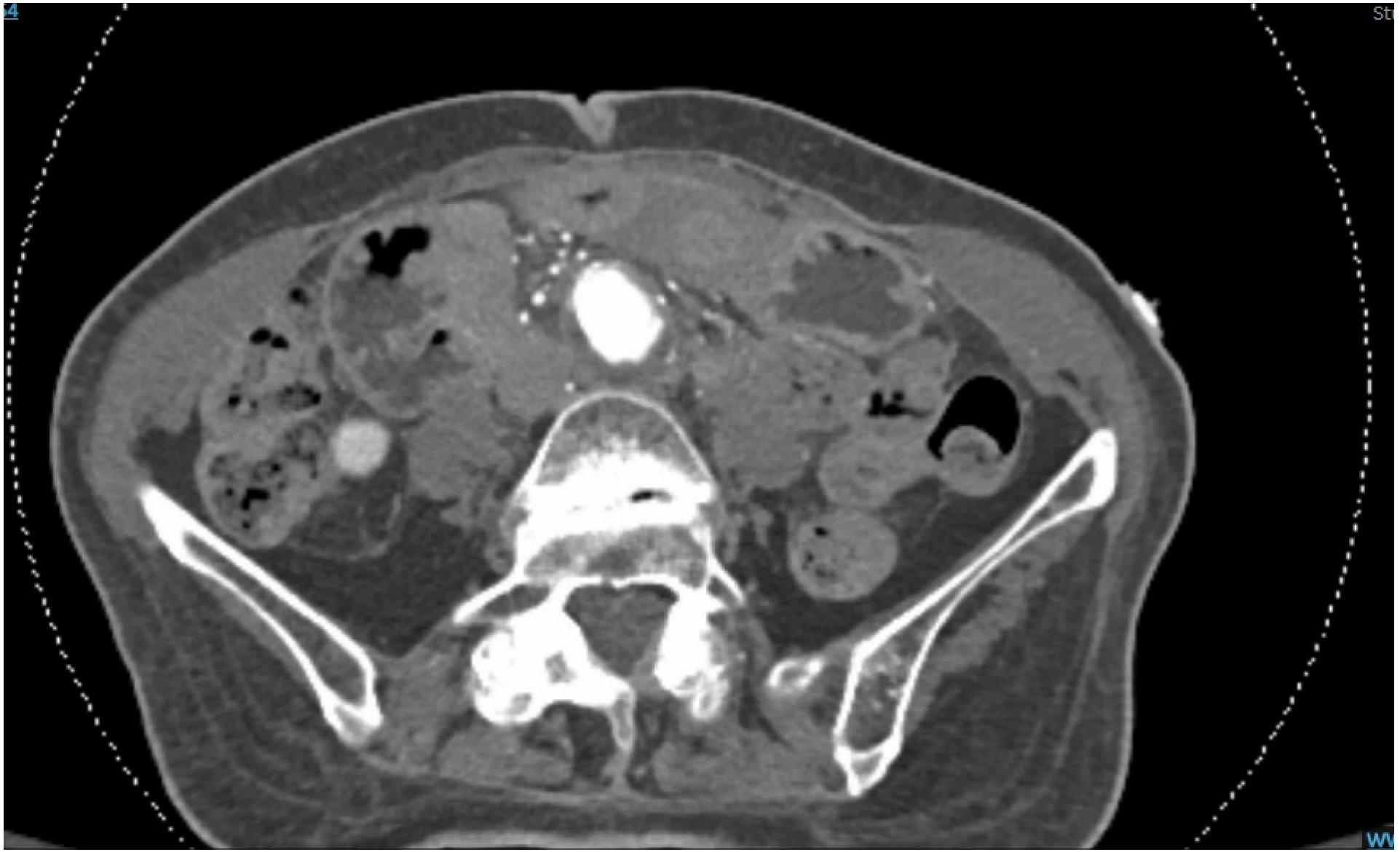
Truck to Tunnel Size?





The Procedure is not over after TAVR placed….





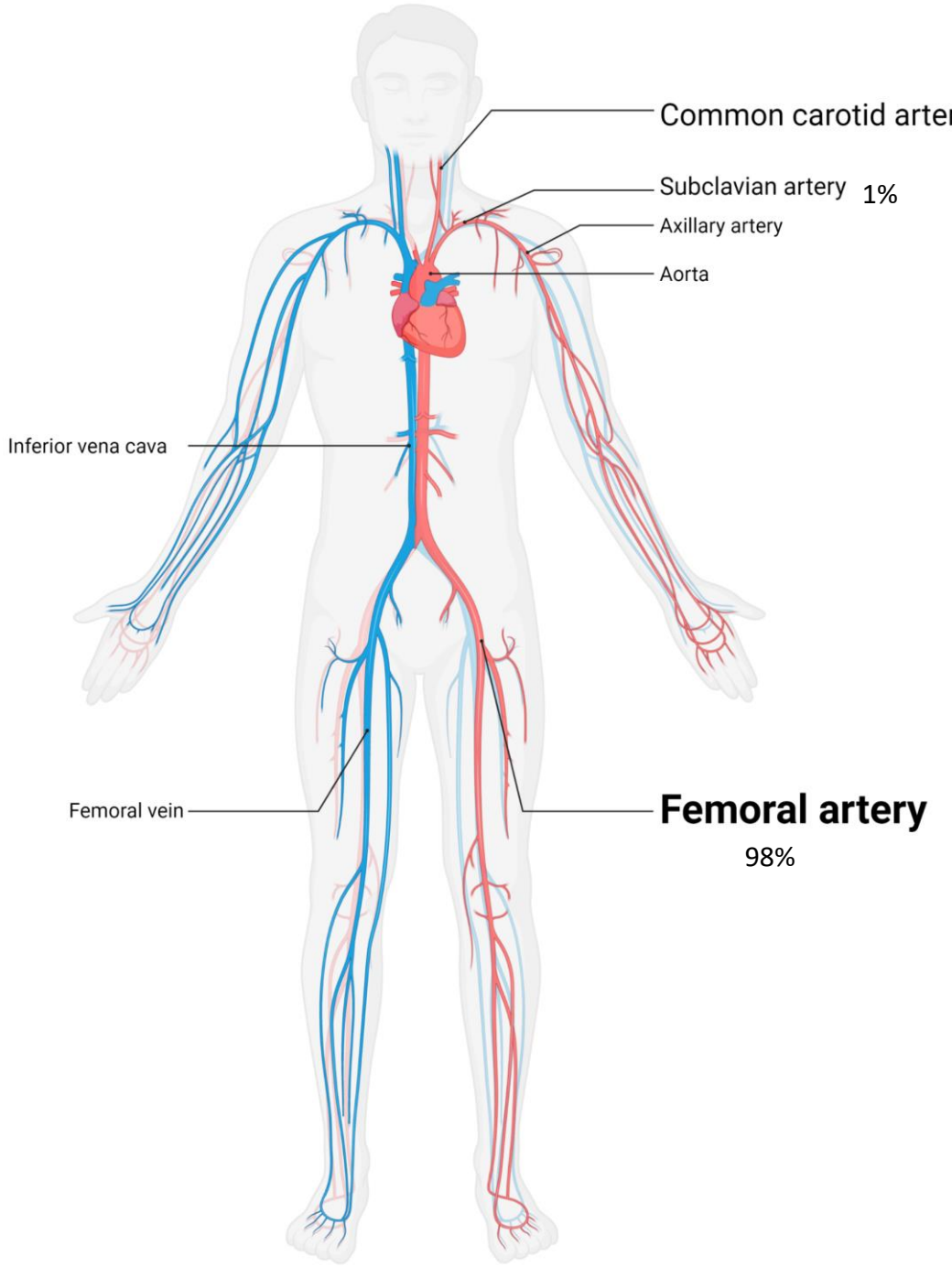
Vascular Post TAVR Care…..

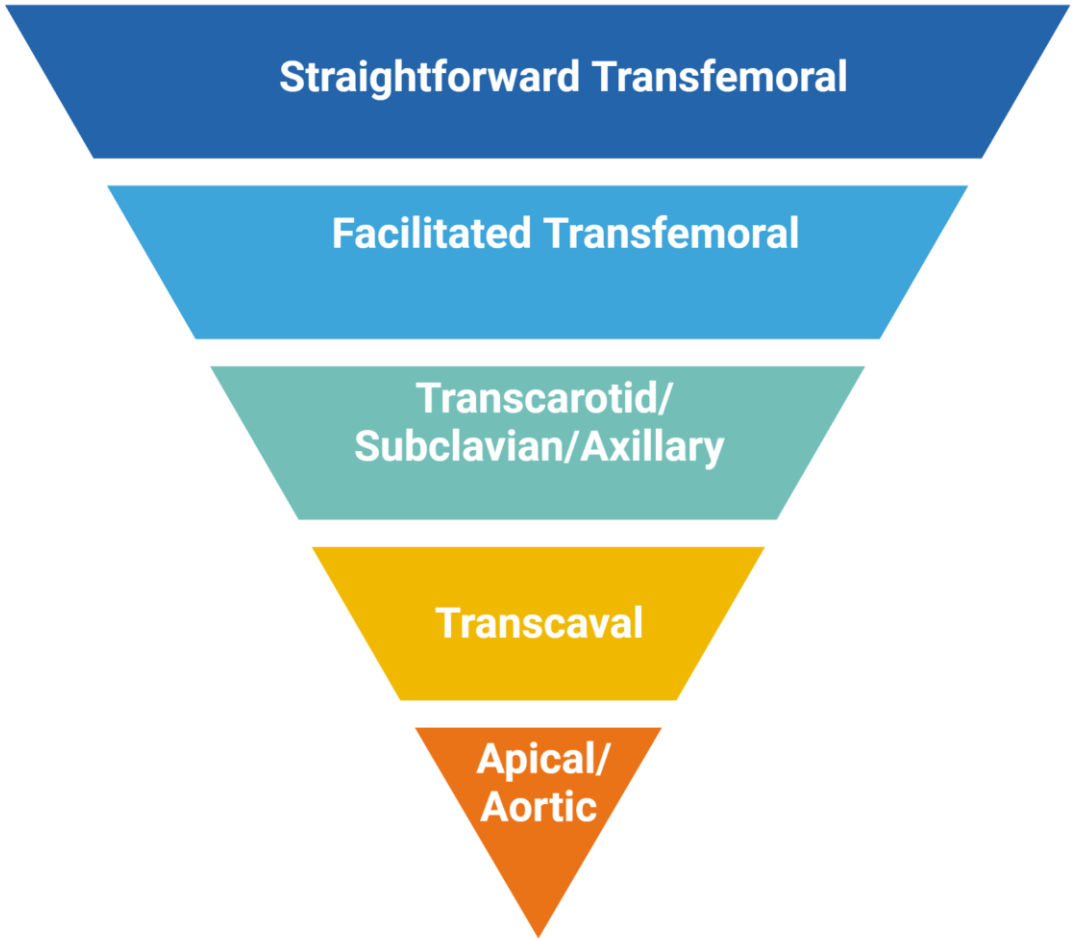
- Patient noted to have distal pulses on doppler post-procedure
- Patient admitted to CCU for observation and Vascular Sx f/u
- Stat CT and Repeat CT scan day 3 post-procedure showed unchanged and stable dissection
- Observed for 4 days – no clinical signs of acute leg ischemia
  - Dopplers always positive for pulses
- Follow-up 2 weeks post with vascular surgery
  - CT f/u Healed with stenosis
  - Not limited, medical Rx

Complex TF TAVR…Procedure can end before it starts!

- Extreme tortuosity – Utilizing stiff wires like Lunderquist wire to help straighten tortuosity
- ”Buddy Wires”, long sheaths
- Difficulty advancing sheath due to narrow lumen diameter – Utilizing dilators and Propofol/Rotaglide
- Calcified ilio-femoral arteries – PTA or Intravascular Lithotripsy
- Aortic/iliofemoral dissection –peripheral IVUS to ensure true lumen
- Cutdown or Alternate access depending on CT and US images

TAVR Access in 2024





Patient Between a Rock and a Hard Place…

- Frail 83 yo male with HTN, DLP, prostate Ca under surveillance
- Left Ventricle: Left ventricle size is normal with moderate concentric hypertrophy. **Ejection fraction is 59.7%**.
- TTE Aortic Valve: Aortic valve is likely tricuspid. Severely calcified cusps with calcification extending into the LVOT. Severe stenosis. **Mean gradient is 54.0 mmHg. Area by velocity time integral is 0.8 cm2. DVI is 0.20.**

Aortic valve calcium score: 5627

>1200 severe in females
>2000 severe in males

Aortic Annulus Area: : 599 mm2
Annular perimeter: 88 mm
Annular perimeter derived diameter: 28.1 mm
LVOT Area : 590 mm2

Co-planar Angle:: LAO 22 CRA 2

Left Ventricle: No LV thrombi detected.

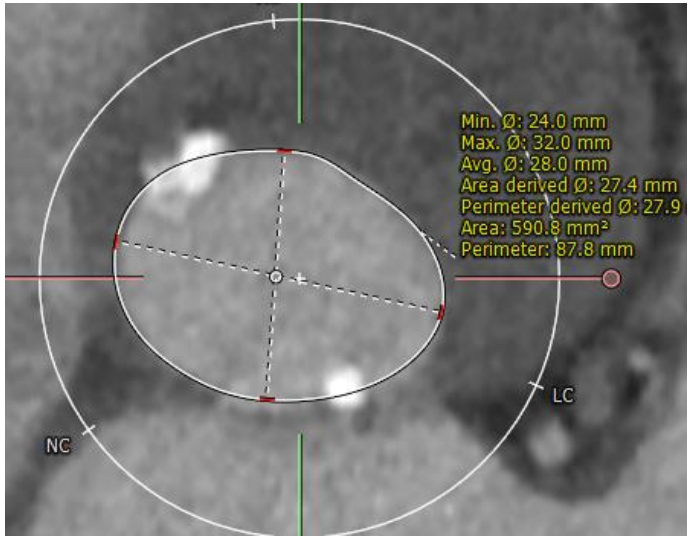
Left Atrial Appendage: No thrombus detected.

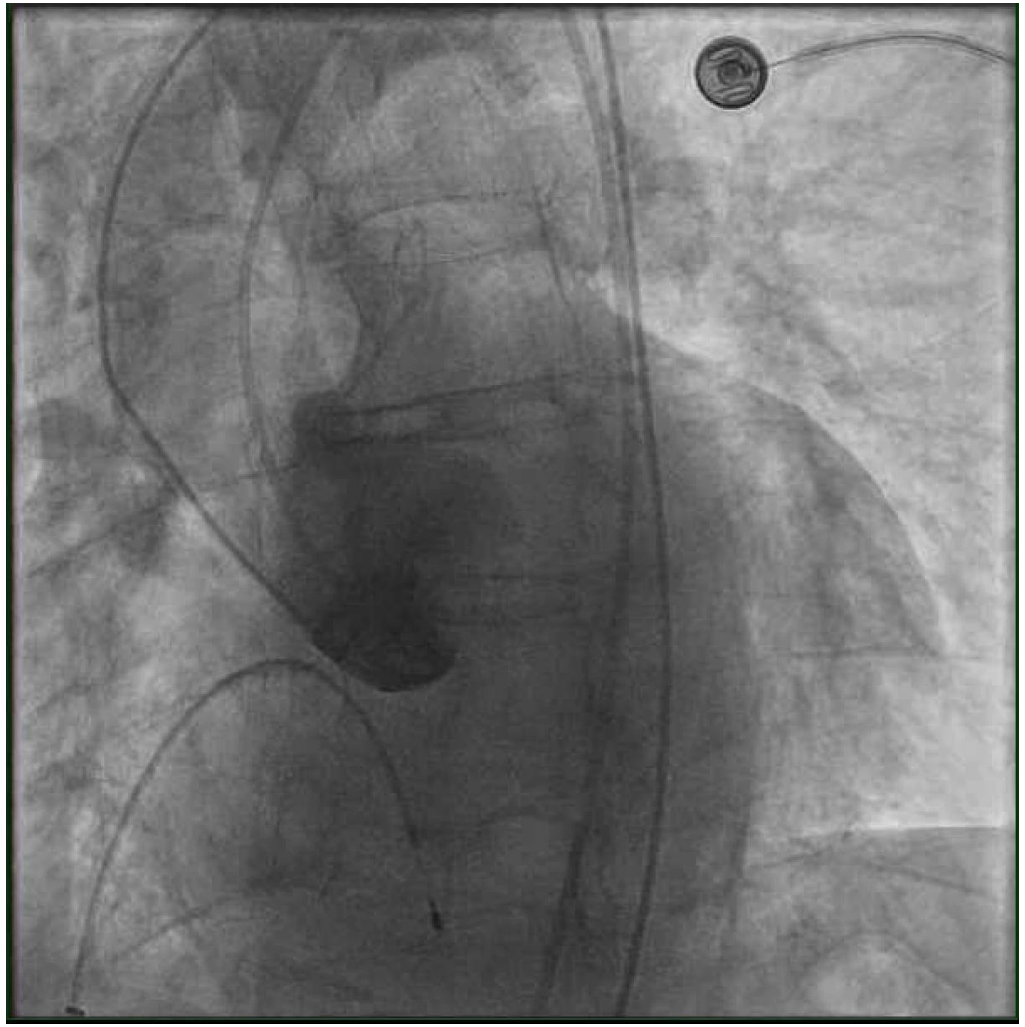
Calcification
* LVOT: Nodule at 11 and 5 o;clock
* Annulus: Nodule at 11 and 5 and 7 o;clock
* Leaflet: Severe
* STJ: None

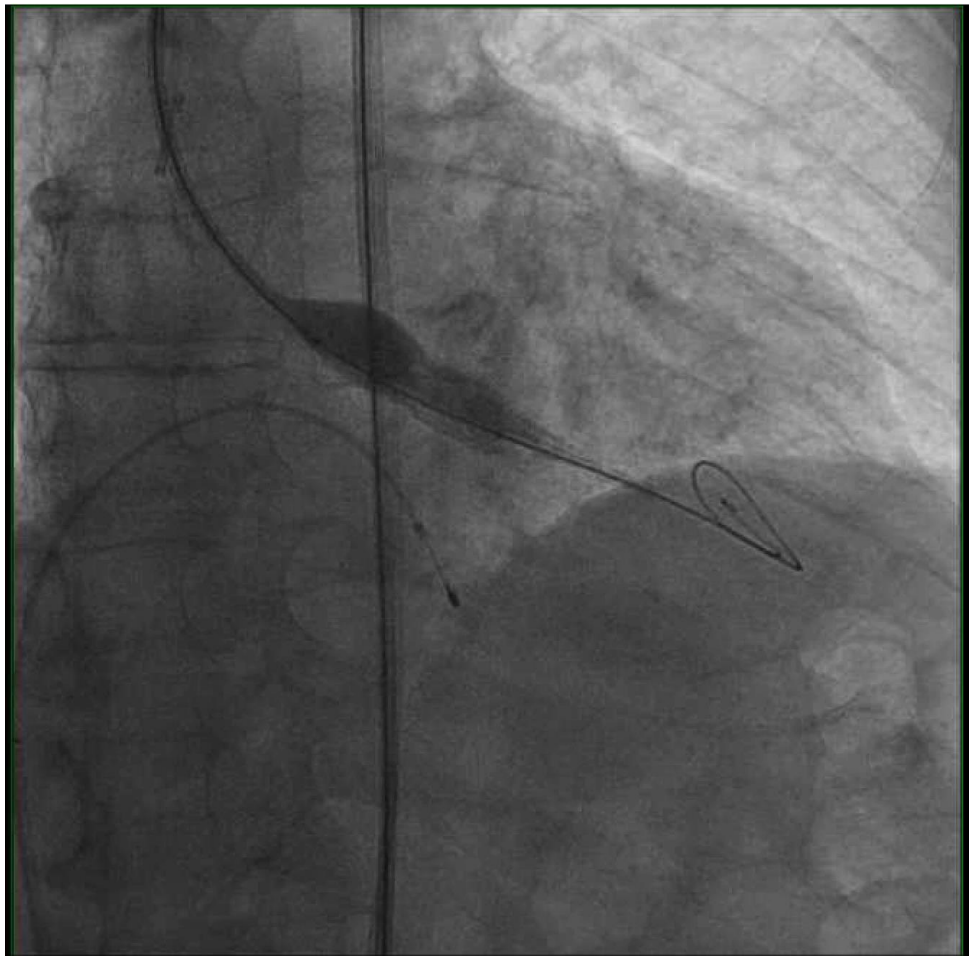
Sinus of Valsalva dimensions: 38 mm x 37 mm x 36 mm

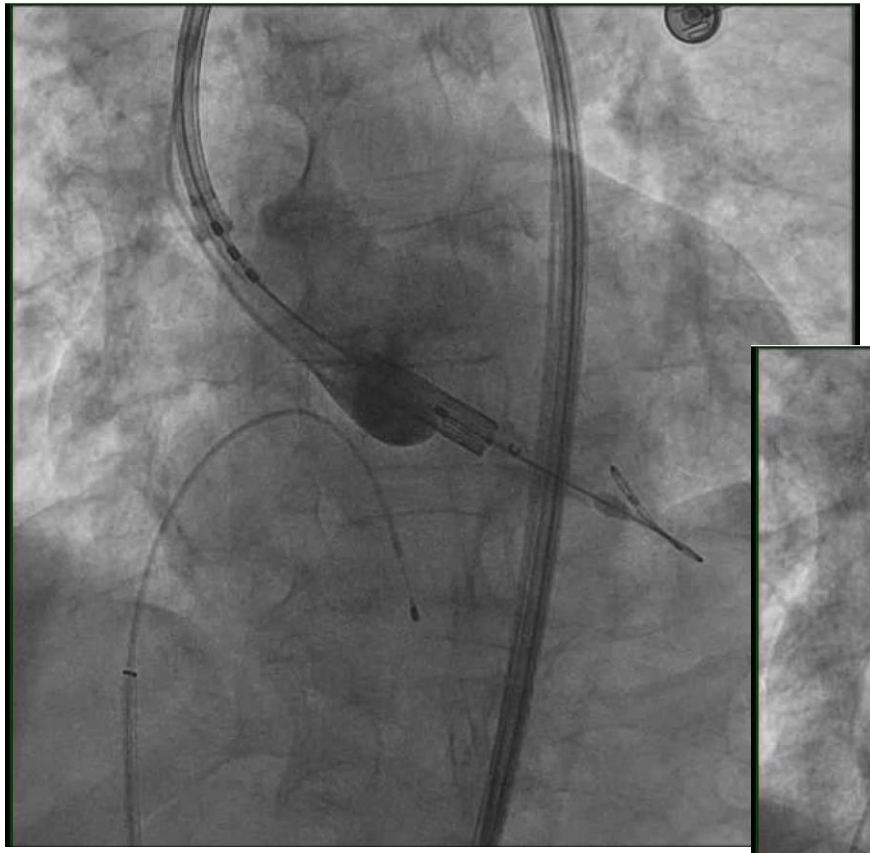
Distance of left coronary ostia from aortic annular plane: 19.8 mm

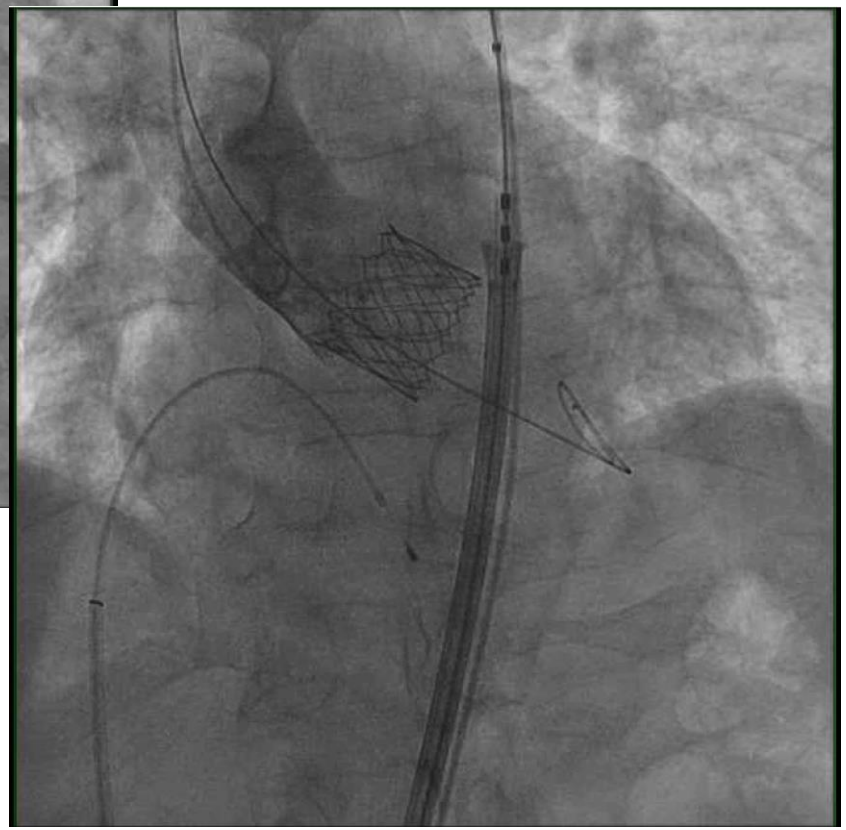
Left coronary leaflet length: 15.3 mm

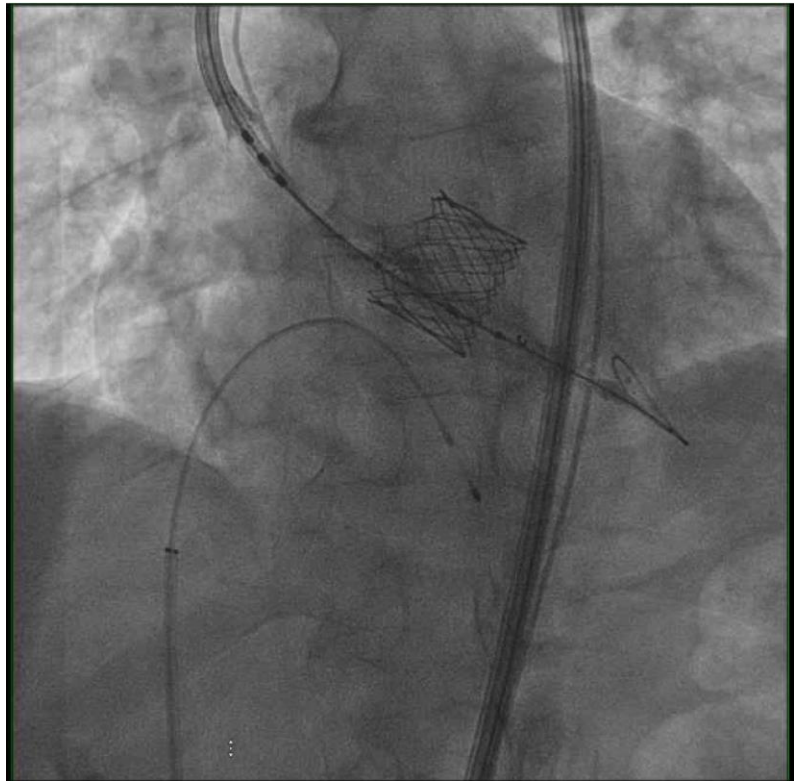


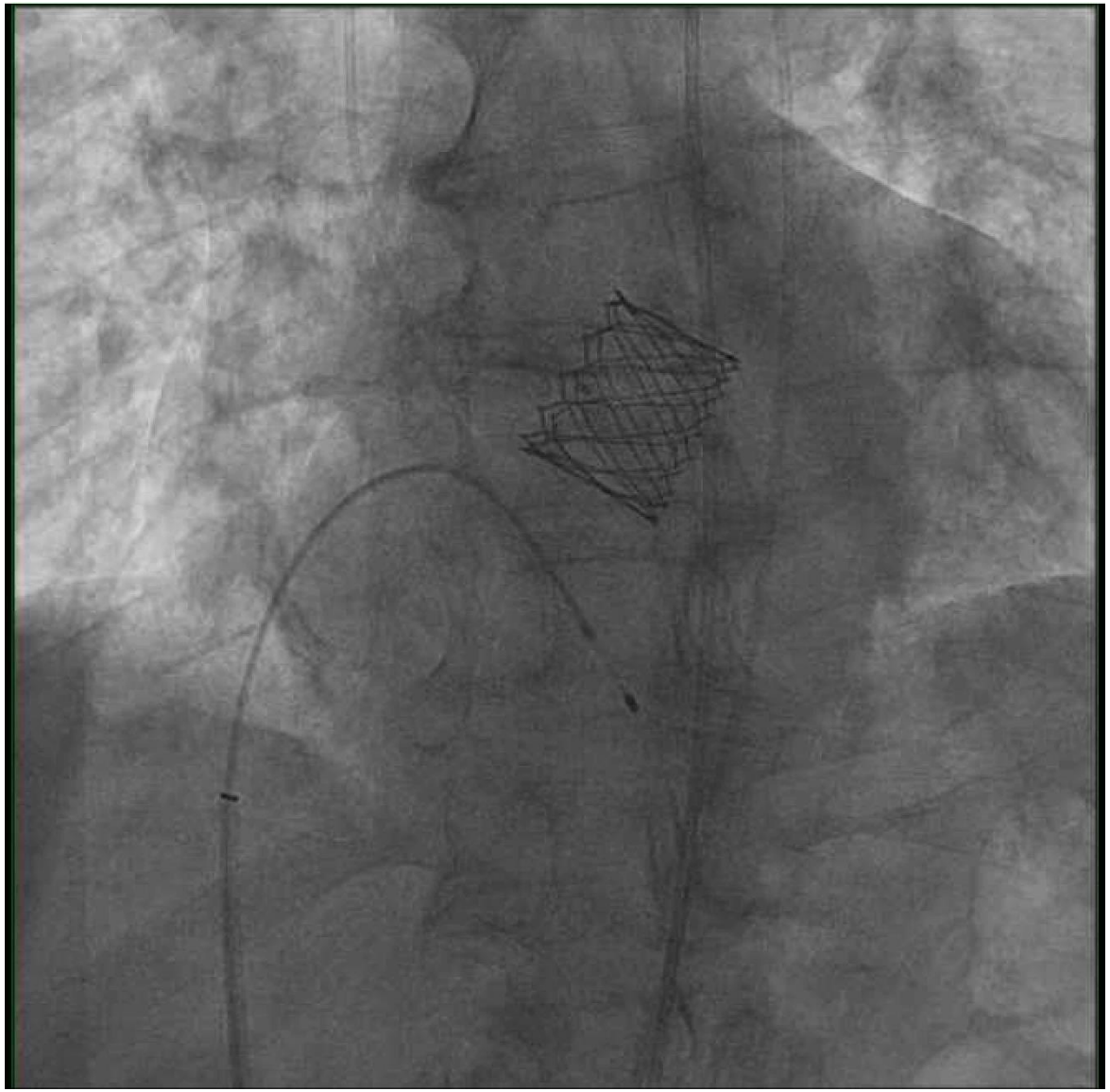


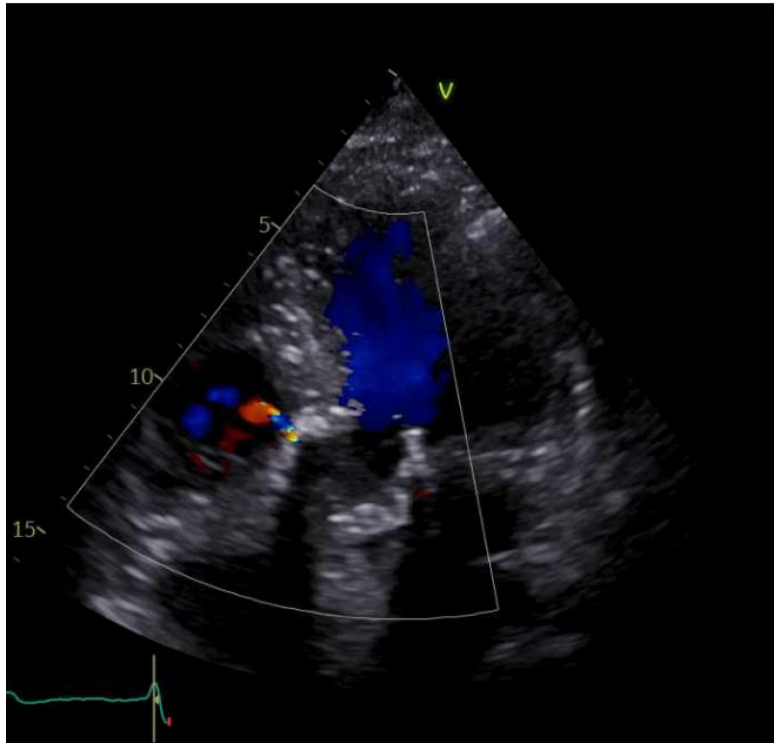


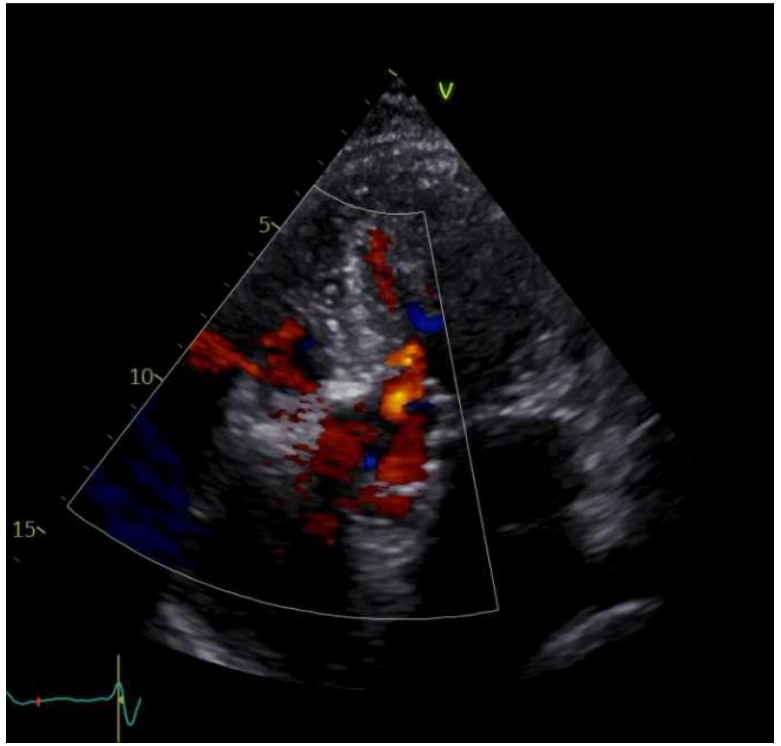




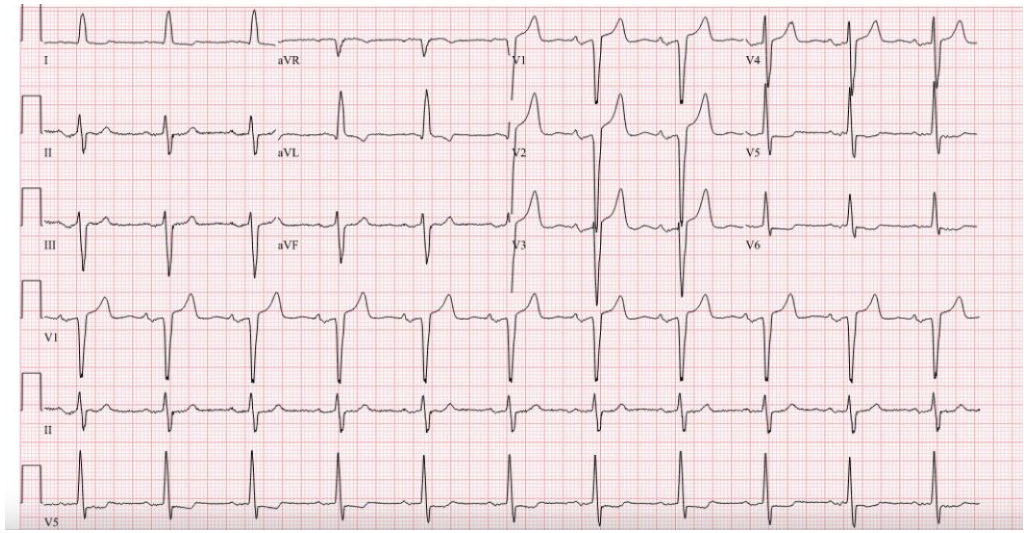




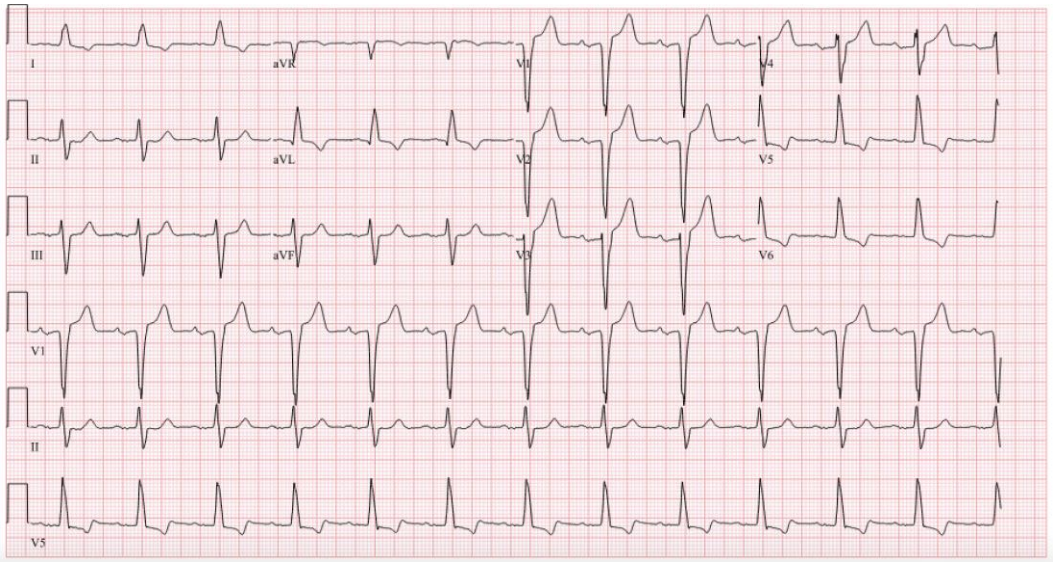




- There is abnormal continuous colour flow seen in the RV outflow tract, which may represent a fistula from the aortic root.
- Peak gradient is 68mmHg, Qp:Qs 1.15. Right ventricle is mildly dilated. Normal systolic function.
- Bioprosthetic aortic valve reveals no transvalvular regurgitation or paravalvular regurgitation.
- Peak gradient is 14.0 mmHg. Mean gradient is 7.6 mmHg. Area by velocity time integral is 2.3 cm2. Doppler velocity index is 0.70.

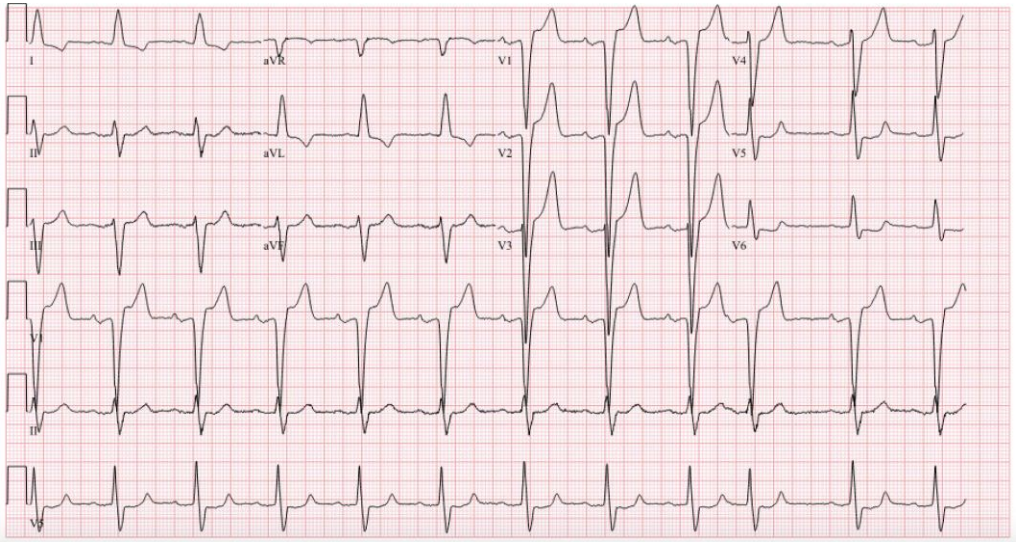


Pre-TAVI ECG, PR 114, QRS 110



Discharge ECG, PR230, QRS 122

Peri-TAVR, PR 228, QRS 142



Extended Holter Post-discharge

- Sinus rhythm had a prevalence of 79.63%
- Average minutely rate of 69 BPM,
- Bradycardia had rate of 38 BPM (1.6s), occurring on day 8 at 14:03. Longest pause with duration of 2.2 s (day 3 at 08:08).
- Ventricular ectopic activity consisted of 2276 episodes, of which 2067 were single, 146 were couplets, 32 were triplets, 31 were longer runs.
- The fastest episode of Ventricular Tachycardia had 115 beats, occurred on day 10 at 18:53, lasting 39s with average rate of 186 BPM and the longest episode had 115 beats, occurred on day 10 at 18:53, **lasting 39s with average rate of 186 BPM**.

Story Continues…..

- Patient called and readmitted to hospital for Holter findings
  - Had some episodes of “dizziness”, not present prior
  - EP opinion → post TAVR BBB related VT
  - Single chamber ICD inserted
  - Discharged without issue 3 days later

Story Continues to Continue…..

- Patient represented to ED 2 weeks later
- Complaint of SOB and found to have new pedal edema
- Admitted for IV diuresis
- Seen by CVSx for possible closure of aortic root to RV fistula
  - No indication given likely restrictive and no significant RV dilation or strain
- Discharged 2 days later after oral diuretics reinitiated
  - No readmissions since then

Predictors of Annular Rupture

	Univariate		Multivariable	
	Odds Ratio (95%CI)	P value	Odds Ratio (95%CI)	P value
LVOT calcifications moderate/severe	6.03 (2.35-15.45)	<0.001	12.45 (2.97-52.15)	0.001
Prosthesis oversizing ≥ 20%	8.76 (3.19-24.09)	<0.001	23.17 (4.77- 45.71)	<0.001
Balloon post-dilation	9.00 (2.59-22.08)	0.001	10.40 (1.54-30.46)	0.016

Adjusted for gender, MDCT annular area, MDCT LVOT area, presence of MDCT LVOT moderate to severe calcification, presence of MDCT aortic valve moderate to severe calcification, presence of prosthesis oversizing ≥20%, MDCT SV maximal diameter, and balloon post-dilation.

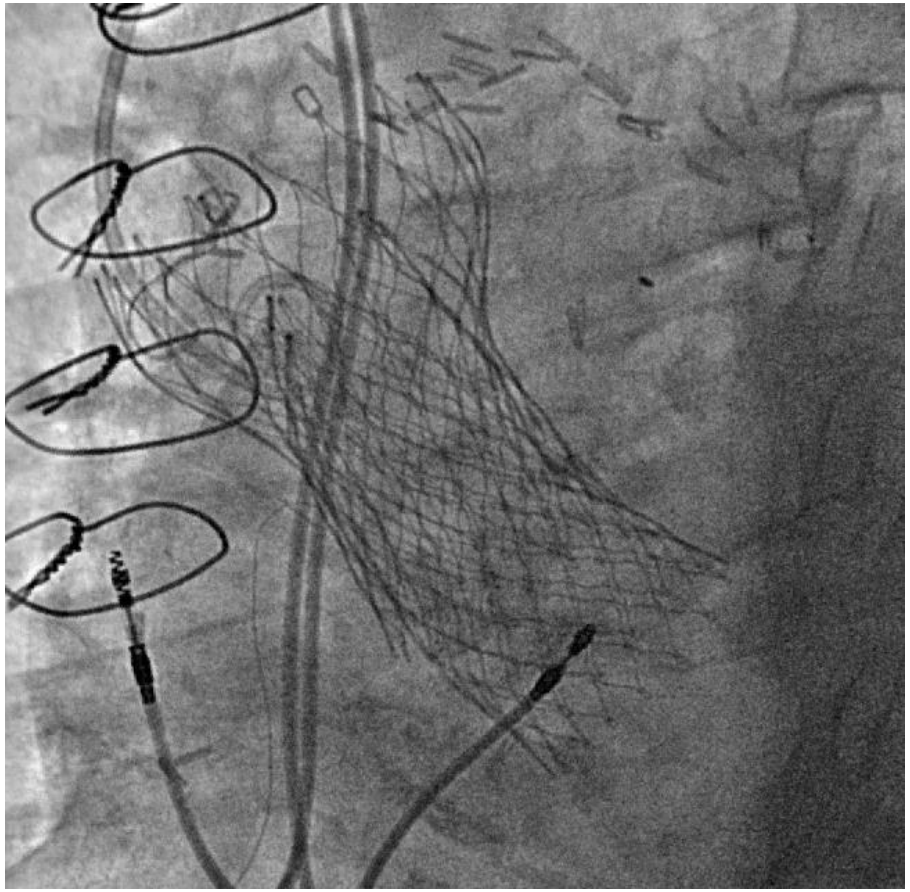
Barbanti et al, Circulation 2013; 128(3):244-53

Preventing Annular Complication in TAVR

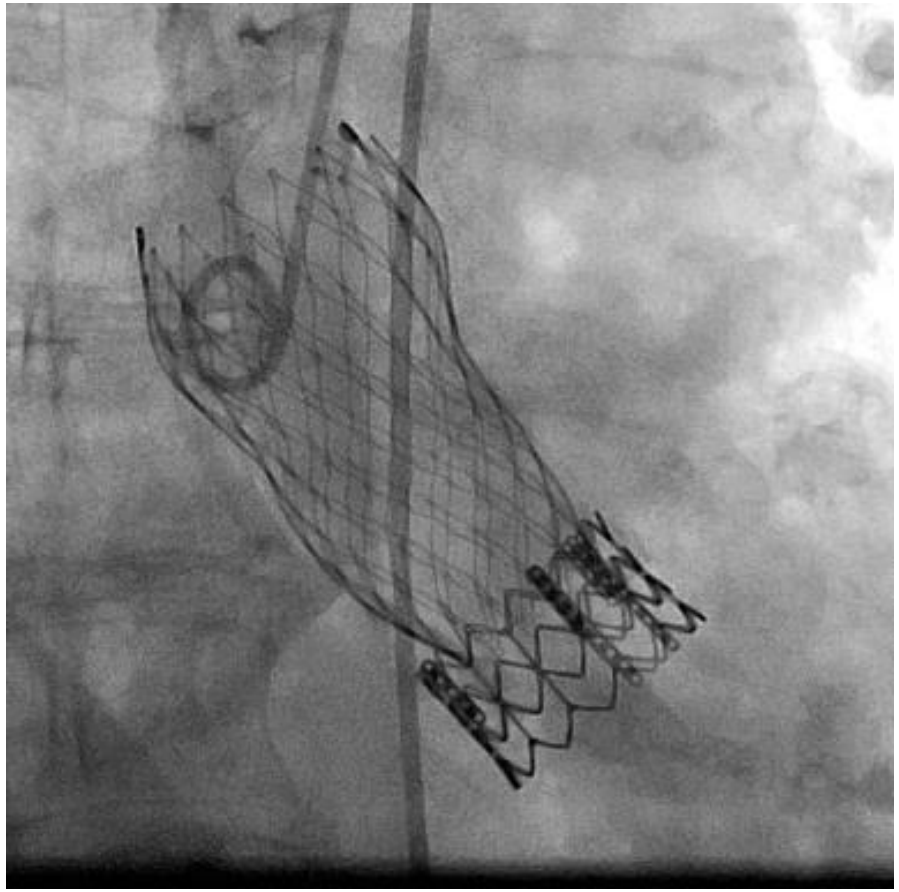
1. Prosthesis Sizing and Selection:
- Choose the correct prosthetic valve based on patient-specific anatomy.
2. Pre-Procedural Imaging:
- Meticulous use MSCT for assessing calcification and anatomy.
3. Modifying Balloon Inflation:
- Underfilling the deployment balloon, Slow, two-step deployment process allows controlled expansion.
4. Management of Calcification:
- In cases with significant calcification, careful evaluation is crucial.

Other ”annular” issues, Late coronary occlusion

Late after complicated TAVR



Late after redo TAVR



What does the heart team need?

- Procedural excellence
- Procedural range
- Procedural humility
- Trust
- A view to the long game

"The heart wants what the heart wants,
and yours wants a new aortic valve."

Cooperation provides best care!