Complex left main coronary artery stenting during valve-in-valve TAVR

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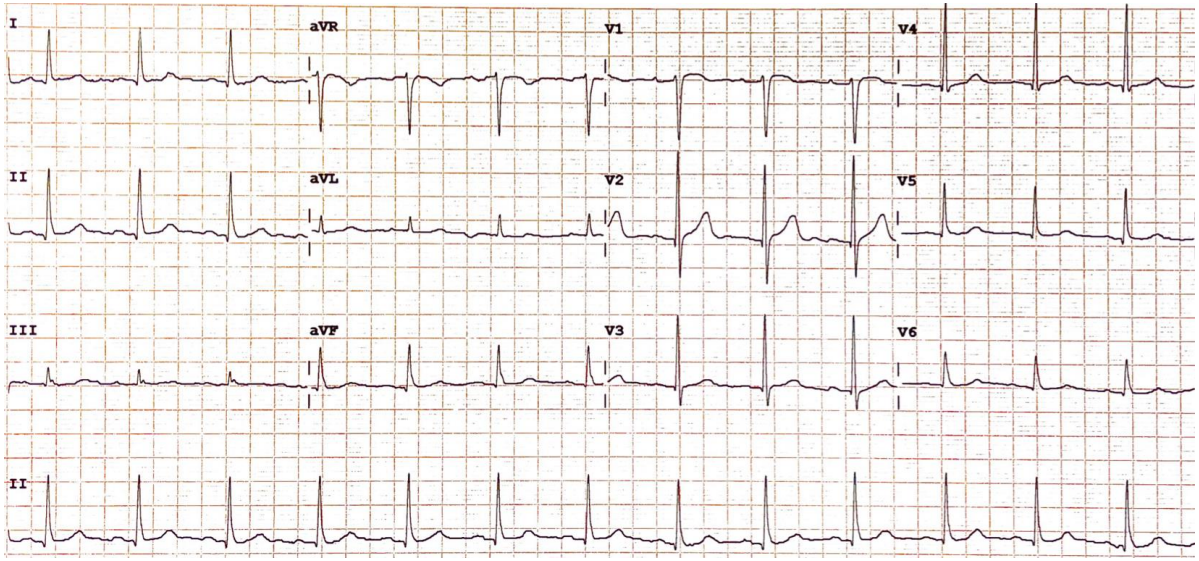
Background

- Coronary obstruction following TAVR is a life-threatening complication with high procedural and short-term mortality
- Although relatively uncommon in contemporary TAVR practice (<1%), specific subsets of patients, like valve-in-valve TAVR patients, remain at risk
- Valve-in-valve TAVR has become a more commonly performed procedure due to degenerated bioprostheses in high risk patients
- Complex coronary anatomy in patients undergoing TAVR is not uncommon

Clinical history

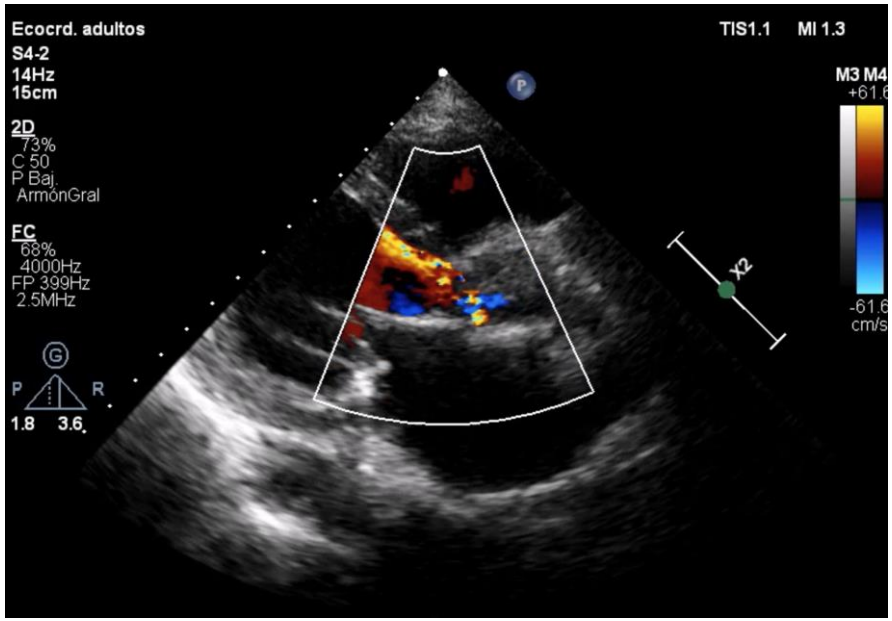
- 83 year old woman
- Past medical history
  - Type 2 diabetes mellitus
  - Hyperlipidemia
  - Severe symptomatic aortic stenosis → surgical AVR for a Mitroflow 19 bioprosthesis (2010)
- Aortic bioprosthesis dysfunction → severe regurgitation
  - Admission for heart failure
- Planned for TAVR valve-in-valve
  - STS 14.02%
  - Proceeded to pre-TAVR workup

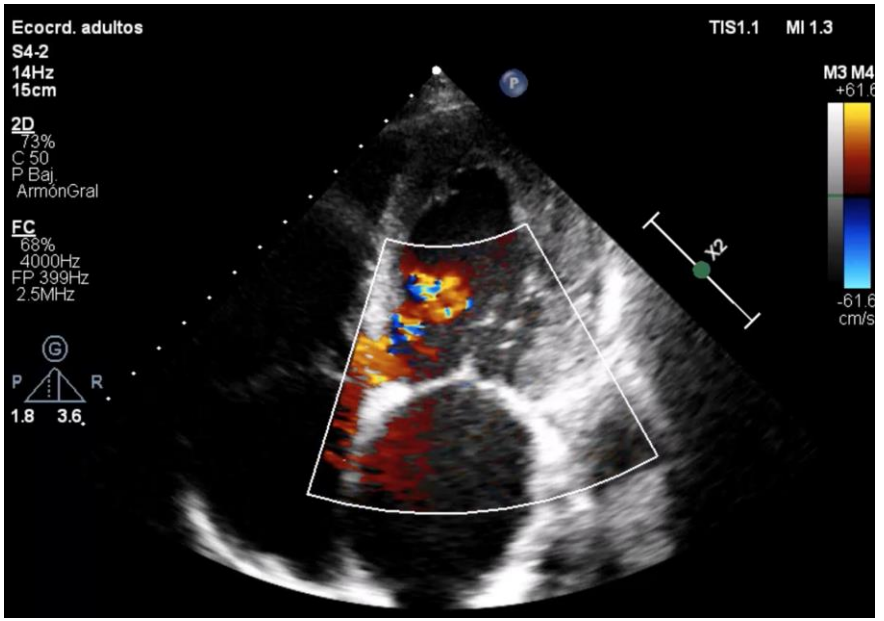
ECG and echocardiogram



Sinus rhythm
PR: 189 ms
QRS: 93 ms

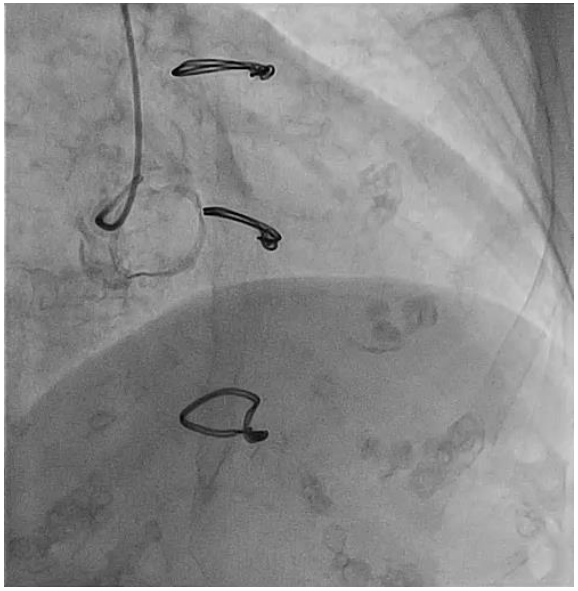
Thickened bioprosthetic leaflets
Severe regurgitation
Moderate stenosis
LVEF: 35%
Max gradient: 46 mmHg
Mean gradient: 23 mmHg



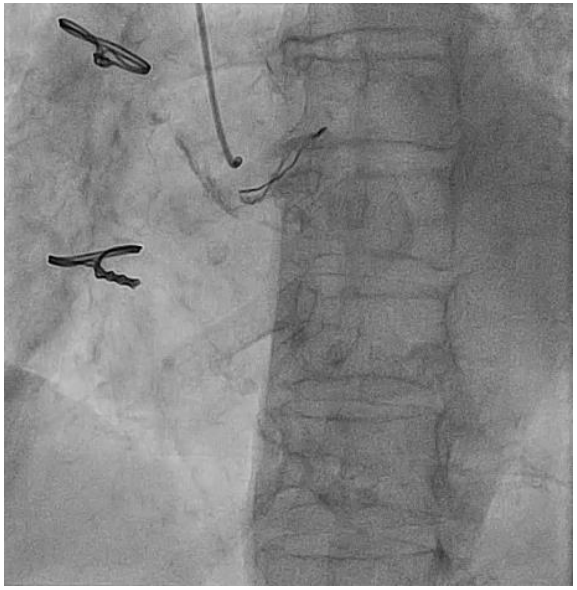


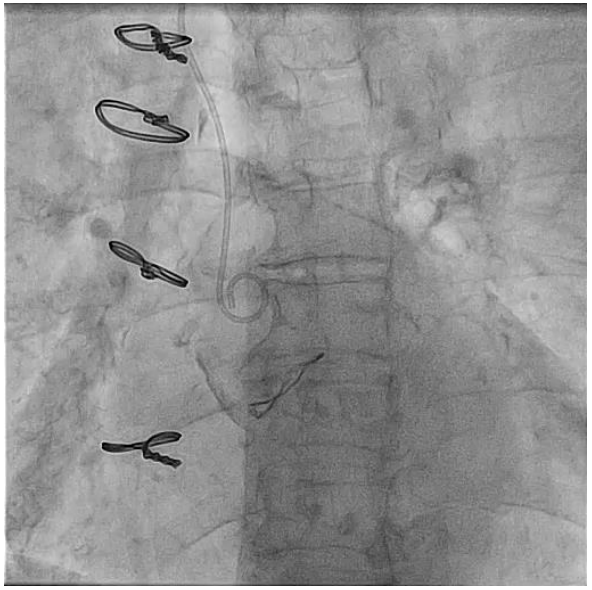
Coronary angiogram

Short left main coronary artery without significant stenosis



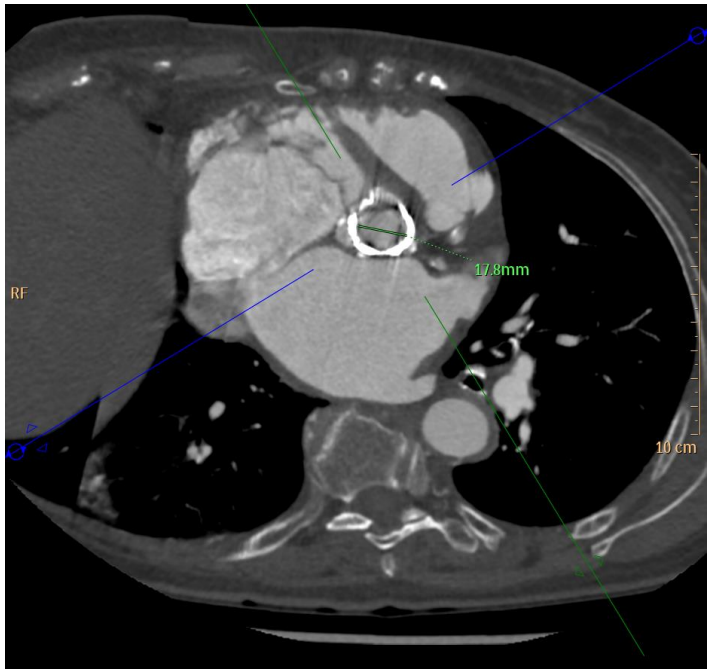
Right coronary artery without significant stenosis



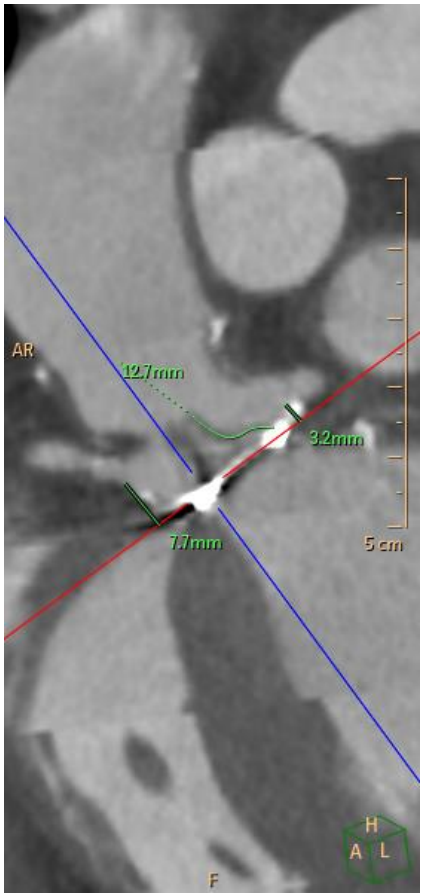


Low origin of coronary arteries with respect to bioprosthetic aortic valve

CT TAVR planning



Area: 235 mm^2
Perimeter 53.9 mm
Intraprosthetic diameter: 17.8 mm



Distance from bioprosthetic valve to:
- LM: 3.2 mm
- RCA: 7.7 mm

Long left coronary leaflet

LAD and LCX
(double-barrel anatomy
or “shotgun”)

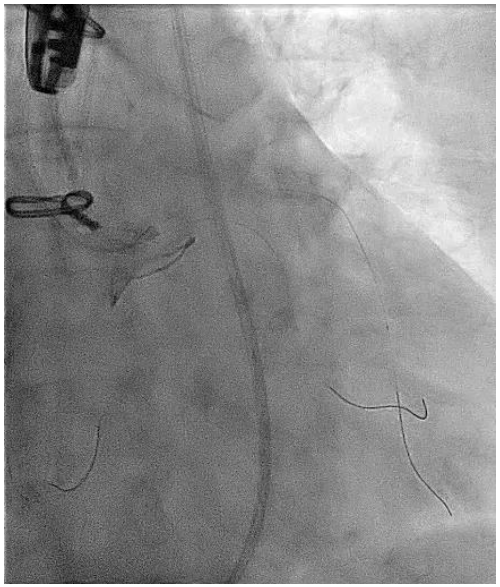
Portico 23 mm simulation
at LAD/LCX origin shows
distance: 5.5 – 5.7 mm

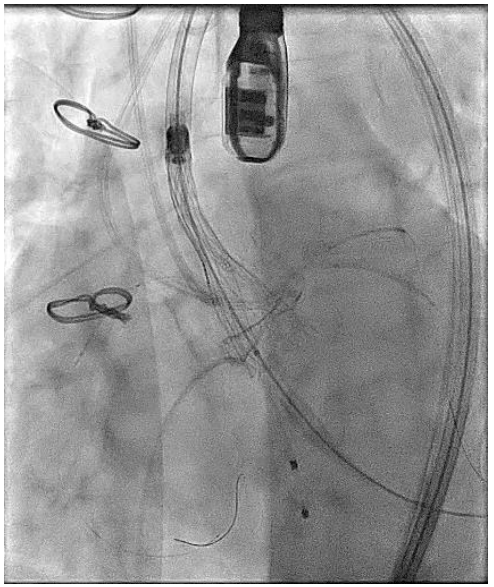
TAVR procedural planning

- Challenges in the case
  - Valve-in-valve procedure
  - Supra-annular bioprosthetic aortic valve
    - Small bioprosthetic annulus
    - Low coronary artery origin (high probability of coronary occlusion)
  - Coronary protection required (chimney technique)
    - Double-barrel coronary anatomy
    - Need for stents with great radial strength
  - TAVR postdilatation and annulus fracturing likely required

TAVR procedure

JR4 6 Fr GC
JL3.5 7 Fr GC
3 BMW 0.014” GW to distal LAD, LCX and RCA





Xience Sierra stents to:
LAD: 3x28mm
LCX: 3.5x28mm
RCA: 2.75x28mm

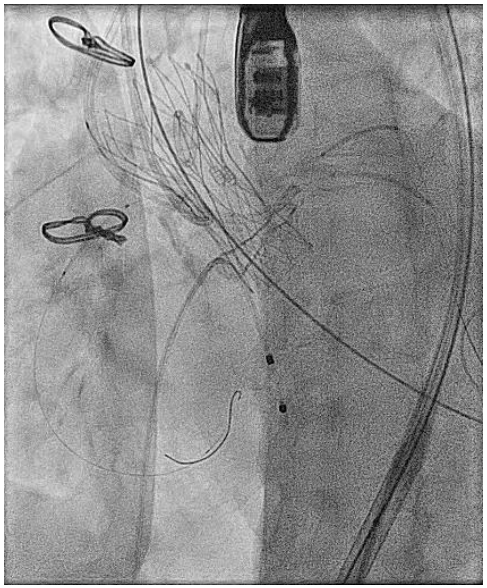
Portico 23mm deployment

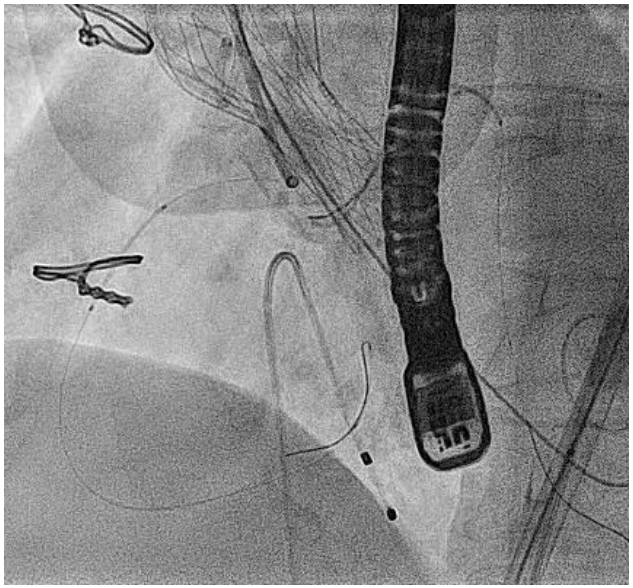
Deployed Portico

Mean gradient 6 mmHg

Moderate anterior paravalvular leak

Evident underexpansion





Patent right coronary artery

TAVR procedure

Decided to postdilate and fracture annulus

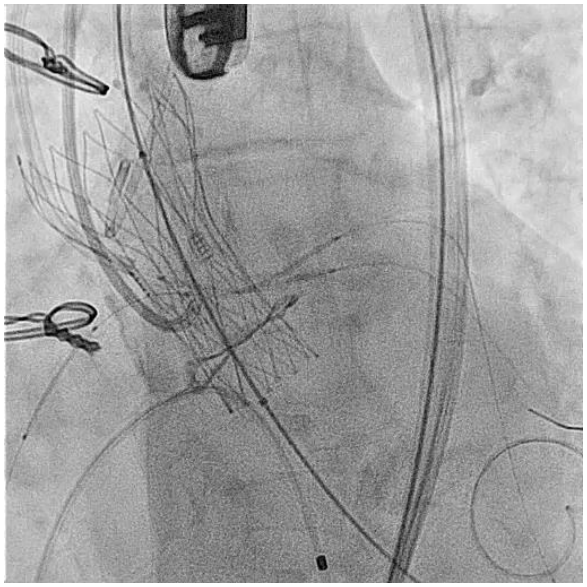
True Dilatation 20mm x 4.5cm non-compliant balloon

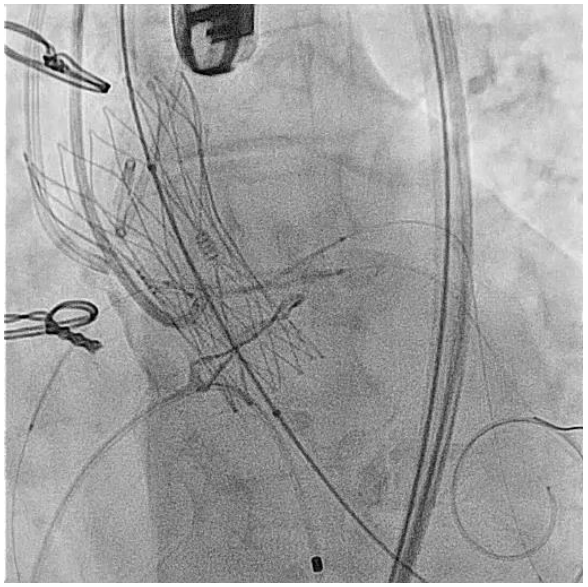
LAD and LCX stents positioning

Stents postdilation

Improved TAVR expansion

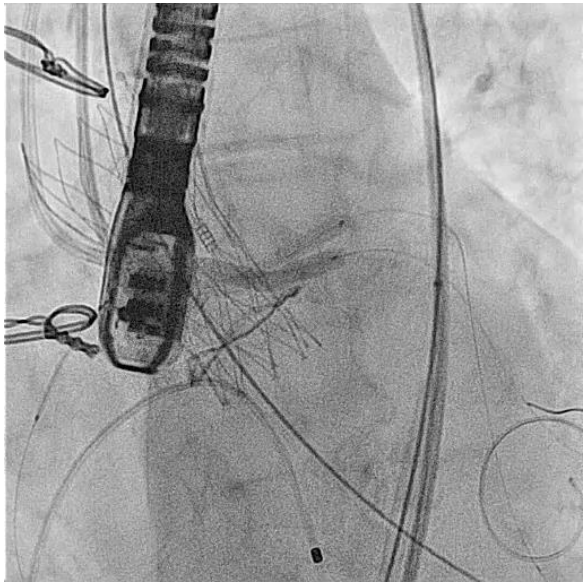
TEE:
- Mean gradient 6 mmHg
- Mild anterior paravalvular leak
- No pericardial effusion

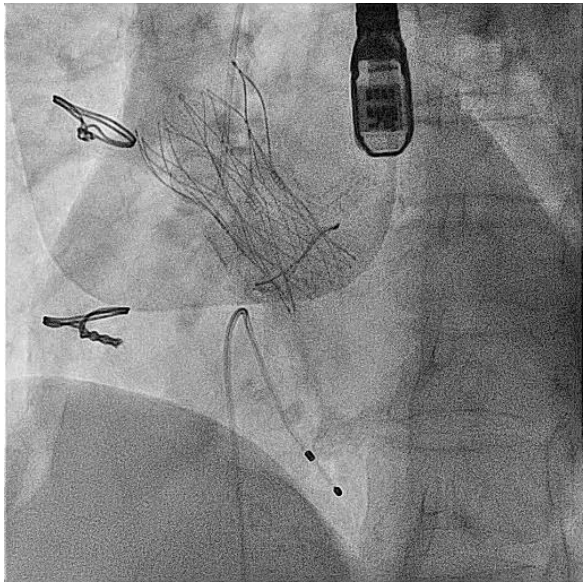




TAVR postdilation and annulus fracturing

Simultaneous LAD and LCX stents deployment (SKS technique)





Successful Portico 23mm valve-in-valve TAVR

Preserved coronary blood flow

Conclusions

- Valve-in-valve TAVR in degenerated supra-annular bioprostheses remains a challenging procedure due to high risk of coronary artery occlusion
- Coronary artery protection during TAVR in this subset of high-risk patients is mandatory
- Chimney stenting during TAVR has become an available technique to ensure coronary blood flow
- Low coronary ostia, inadequate sinus of Valsalva width, and, in the context of VIV procedures, surgical bioprostheses with externally mounted leaflets or a short virtual transcatheter valve-to-coronary ostium distance are known predictors of coronary artery occlusion
- Efforts should be made to implant a bioprostheses large enough to allow for a future valve-in-valve implant with optimal hemodynamics and clinical outcomes