Complications of TAVI:
prevention and management

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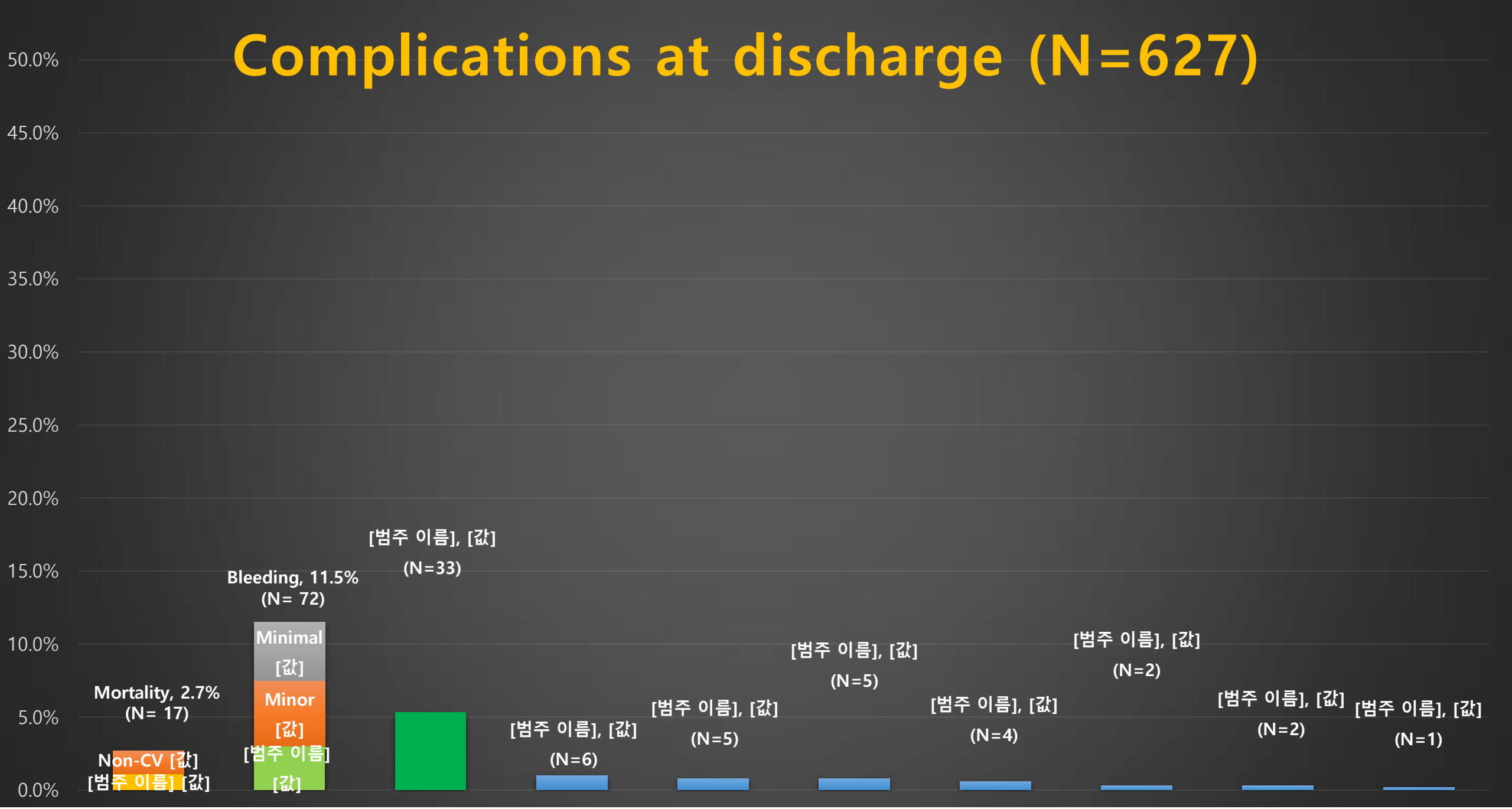
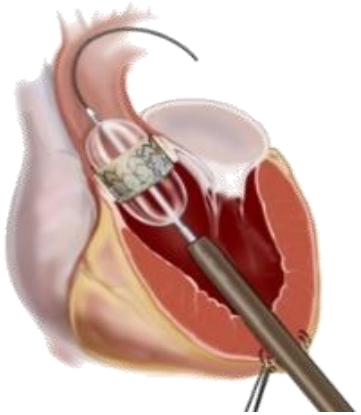
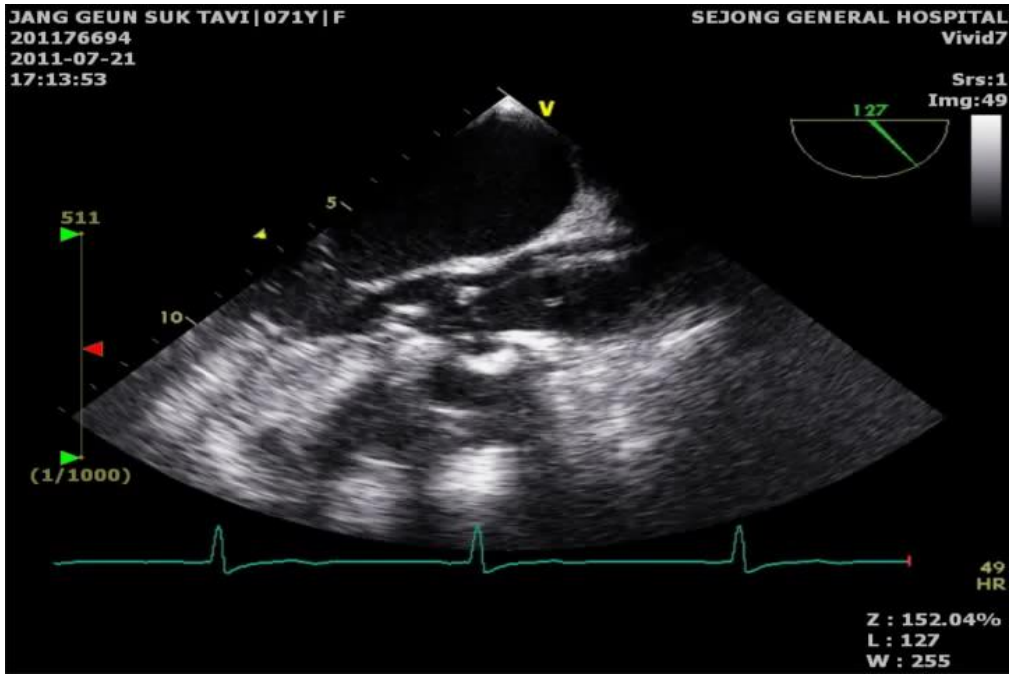
Complications at discharge (N=627)

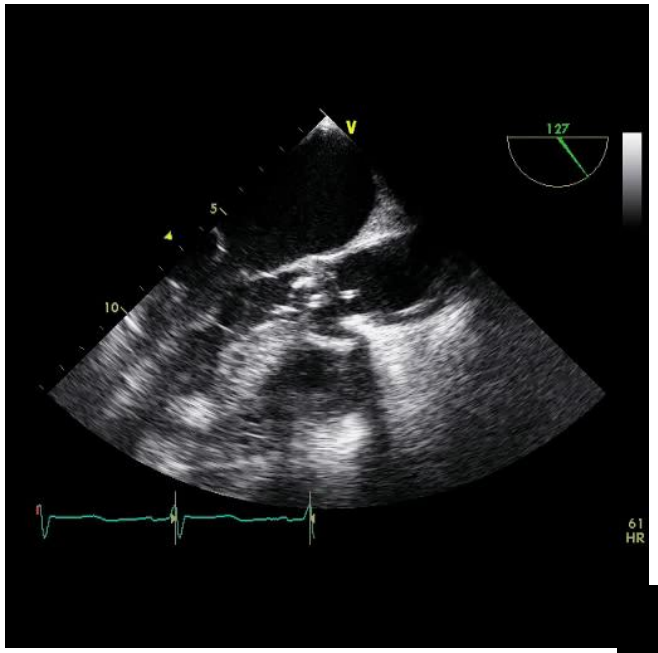


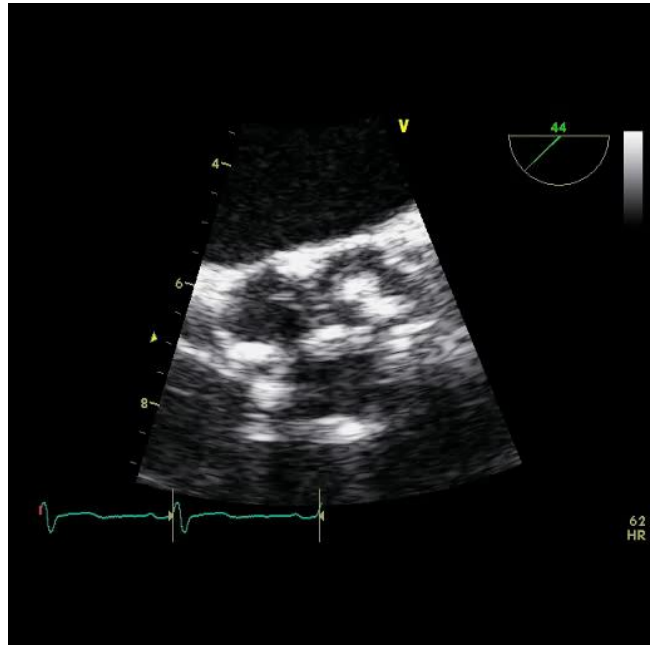
TAVI complicated with cardiogenic shock due to acute aortic regurgitation



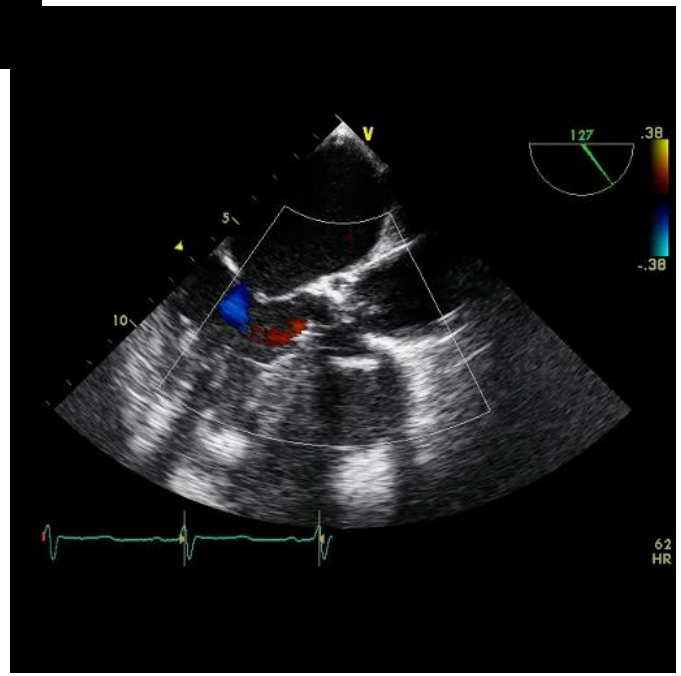
Aortic valve fracture after BAV..





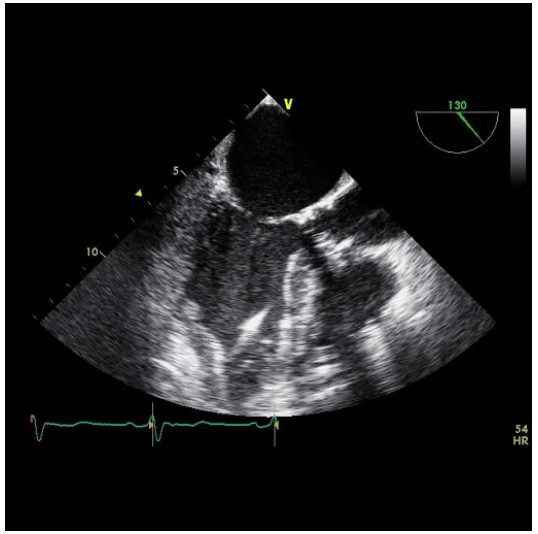


How about the degree of AR?

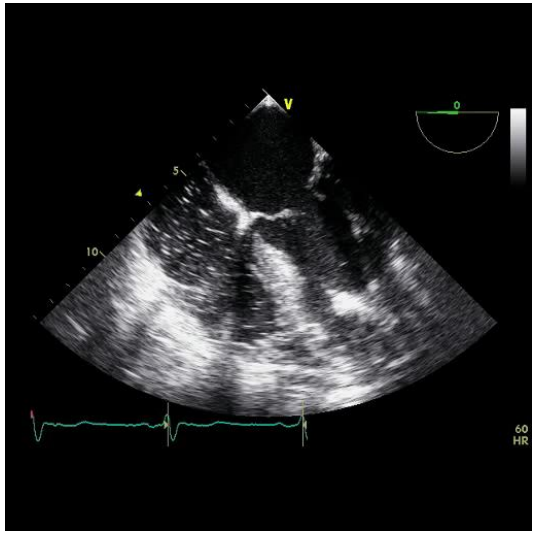


After the BAV……

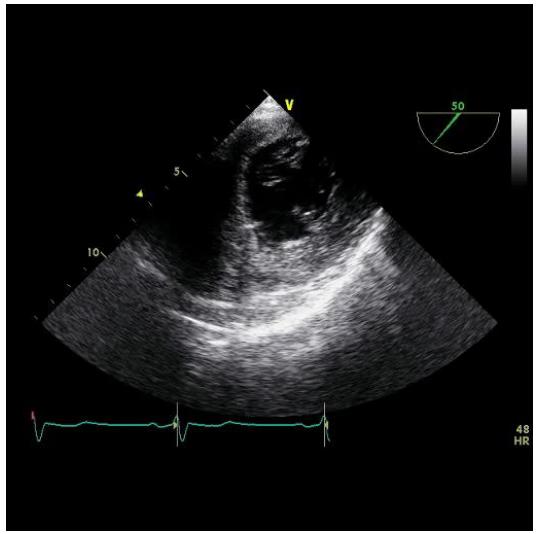
6 min

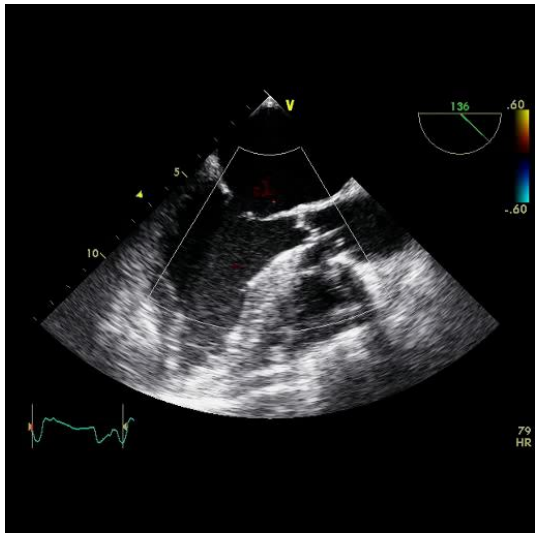


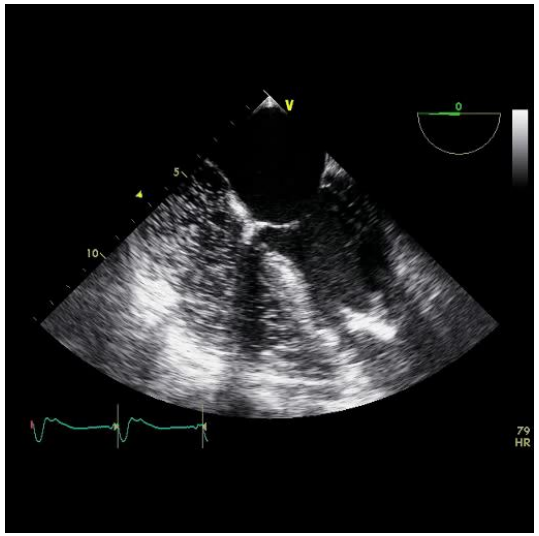
7 min

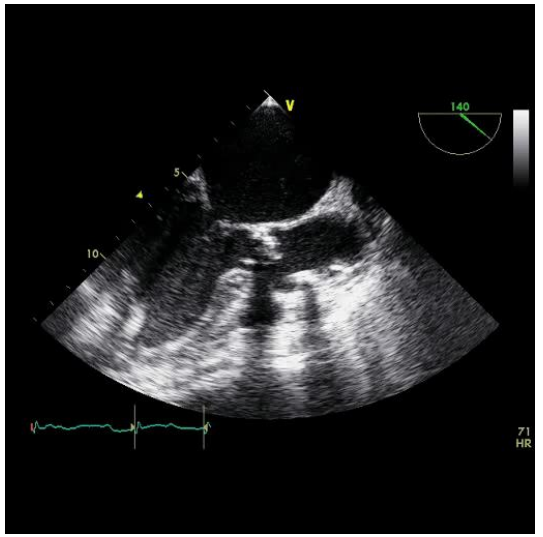


7 min







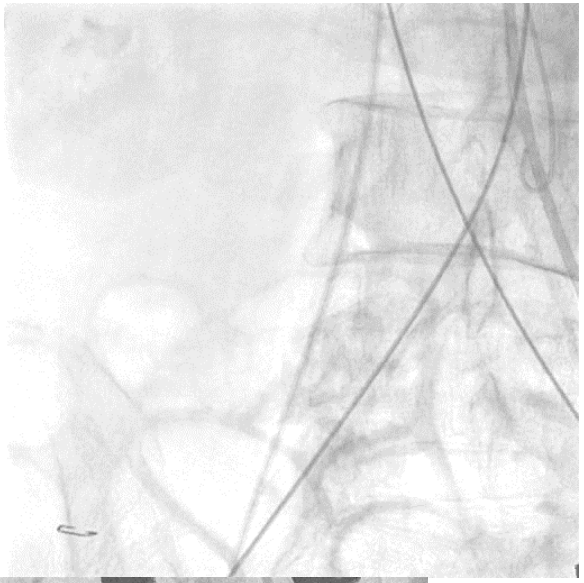


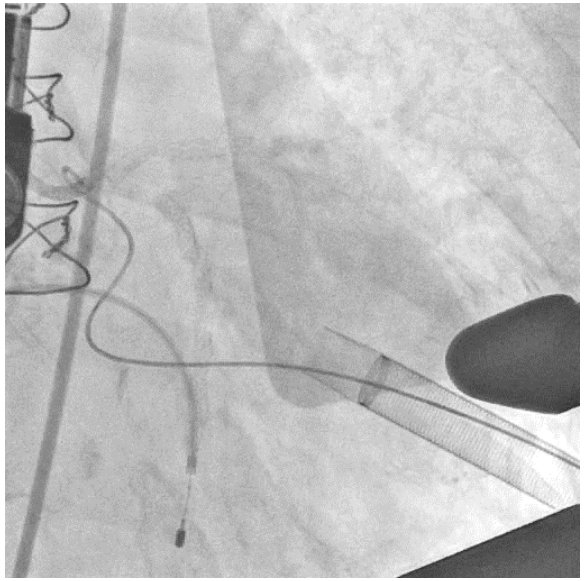
11 min

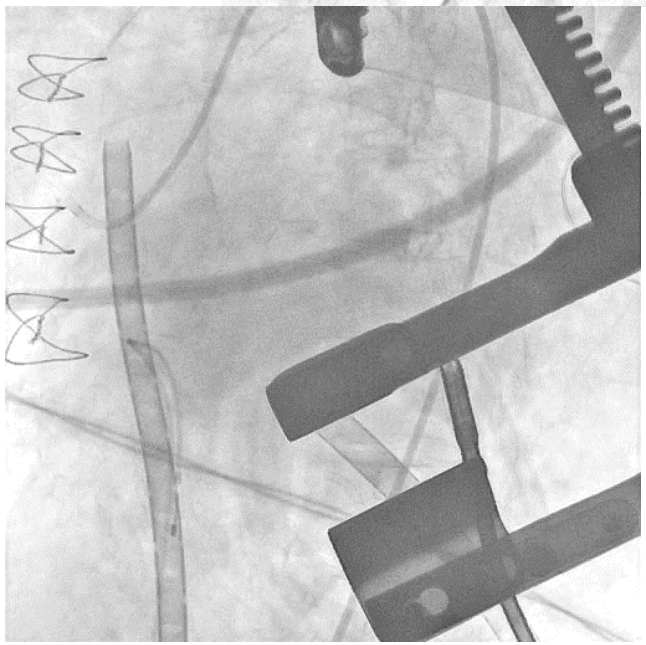
12 min

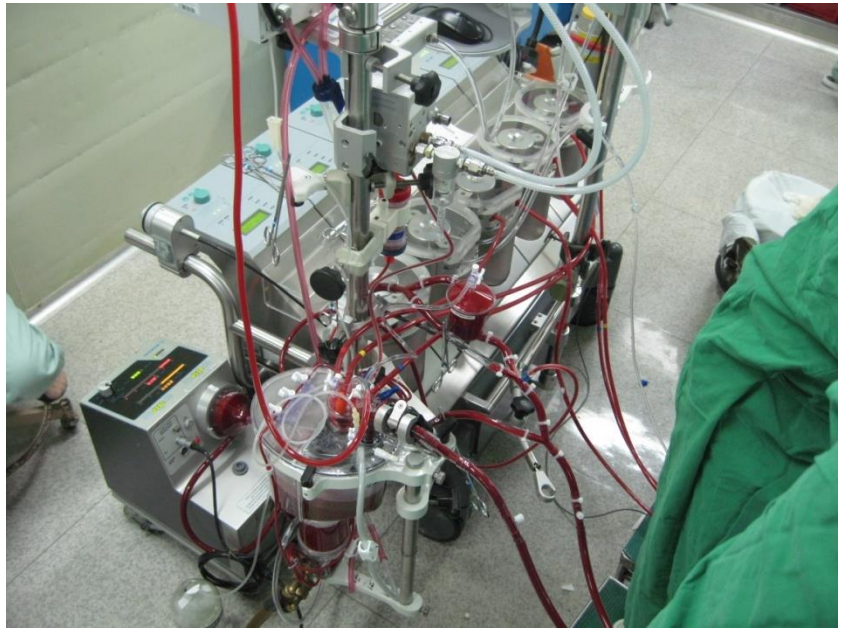
57 min

We applied CPR, CPB with LV vent system and Checked coronary angiogram !!

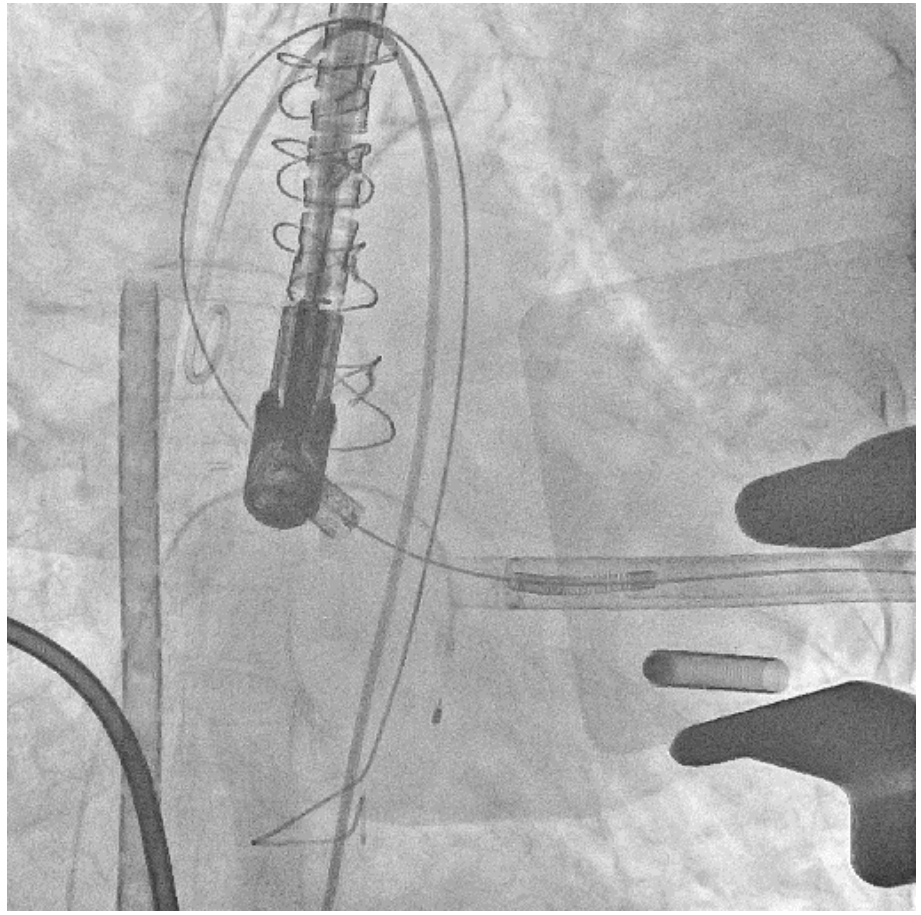


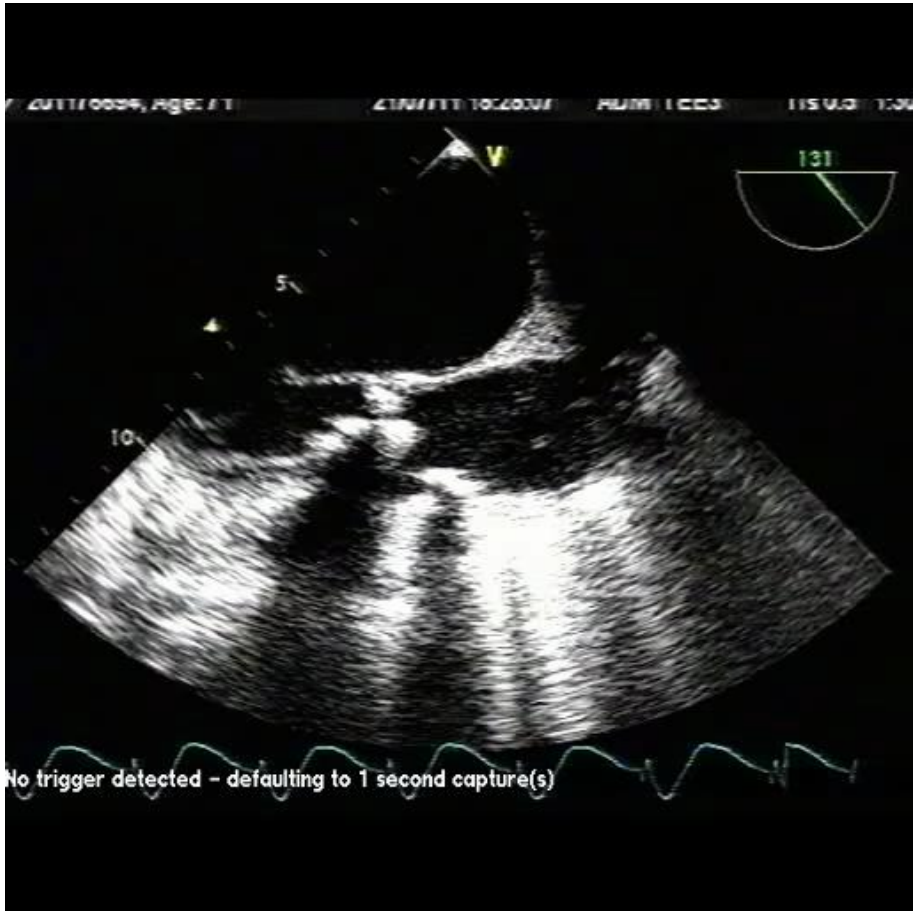




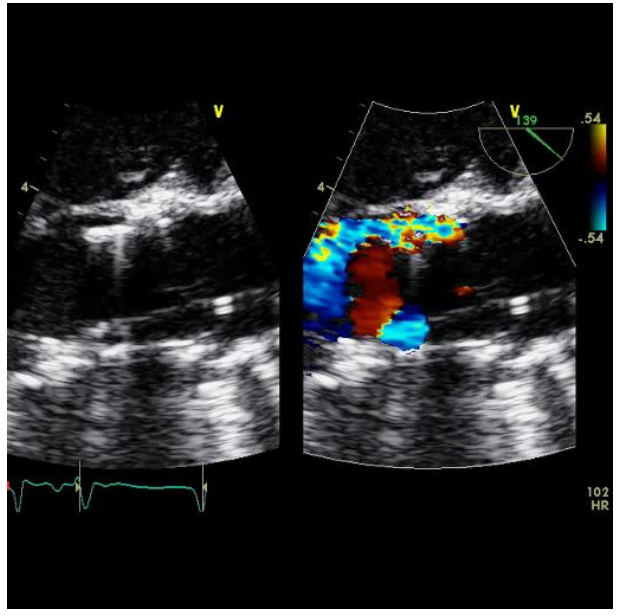


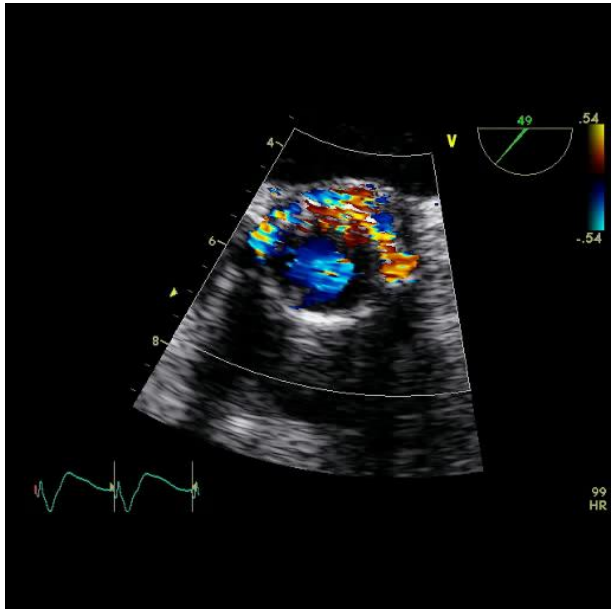
THV 26mm implantation

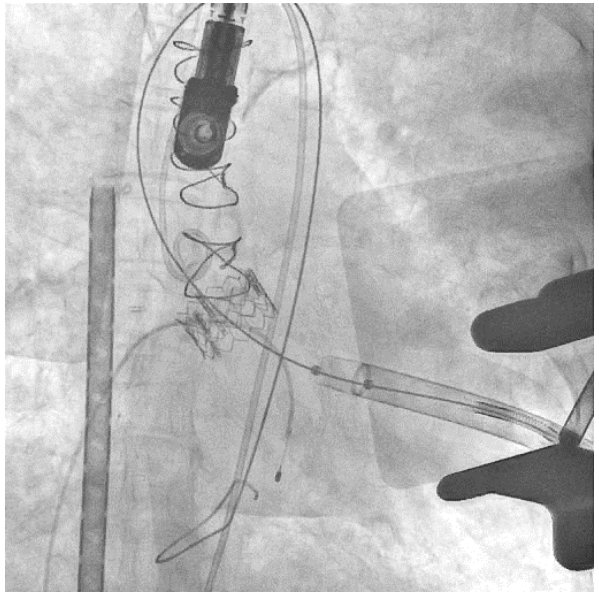


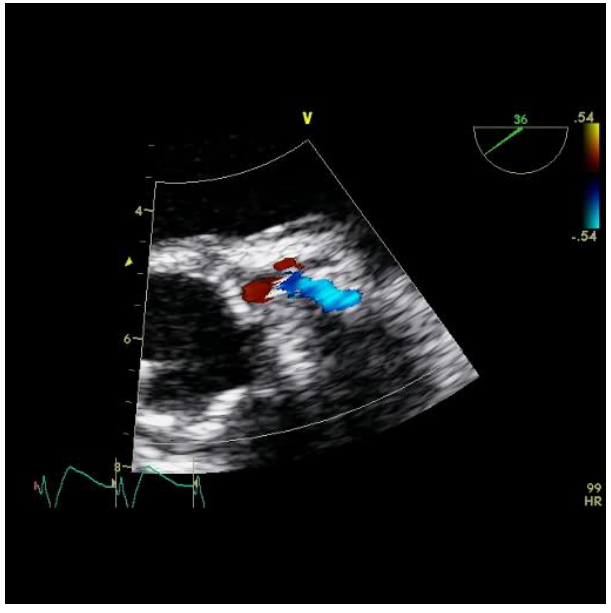


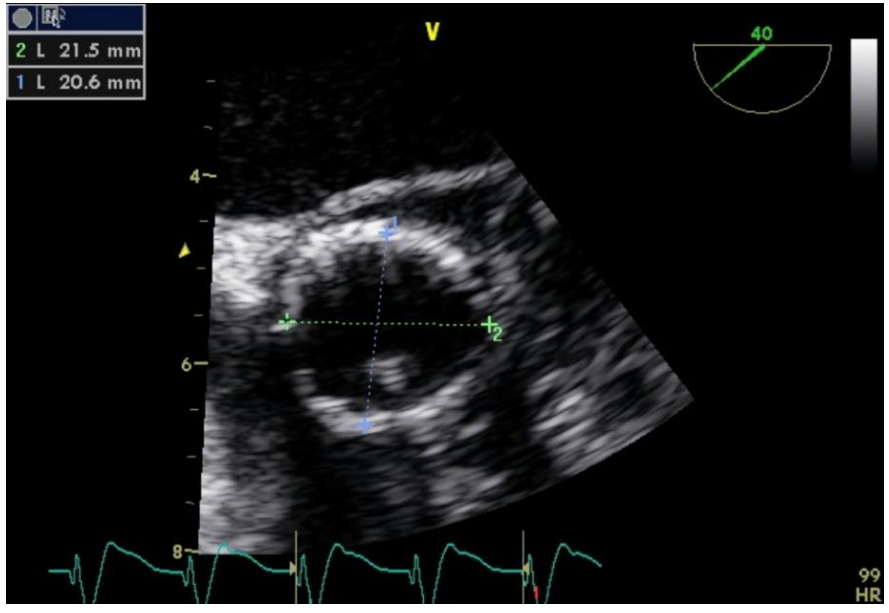
Significant paravalvular leakage after THV implantation…and gradual valve migration into the LV !!



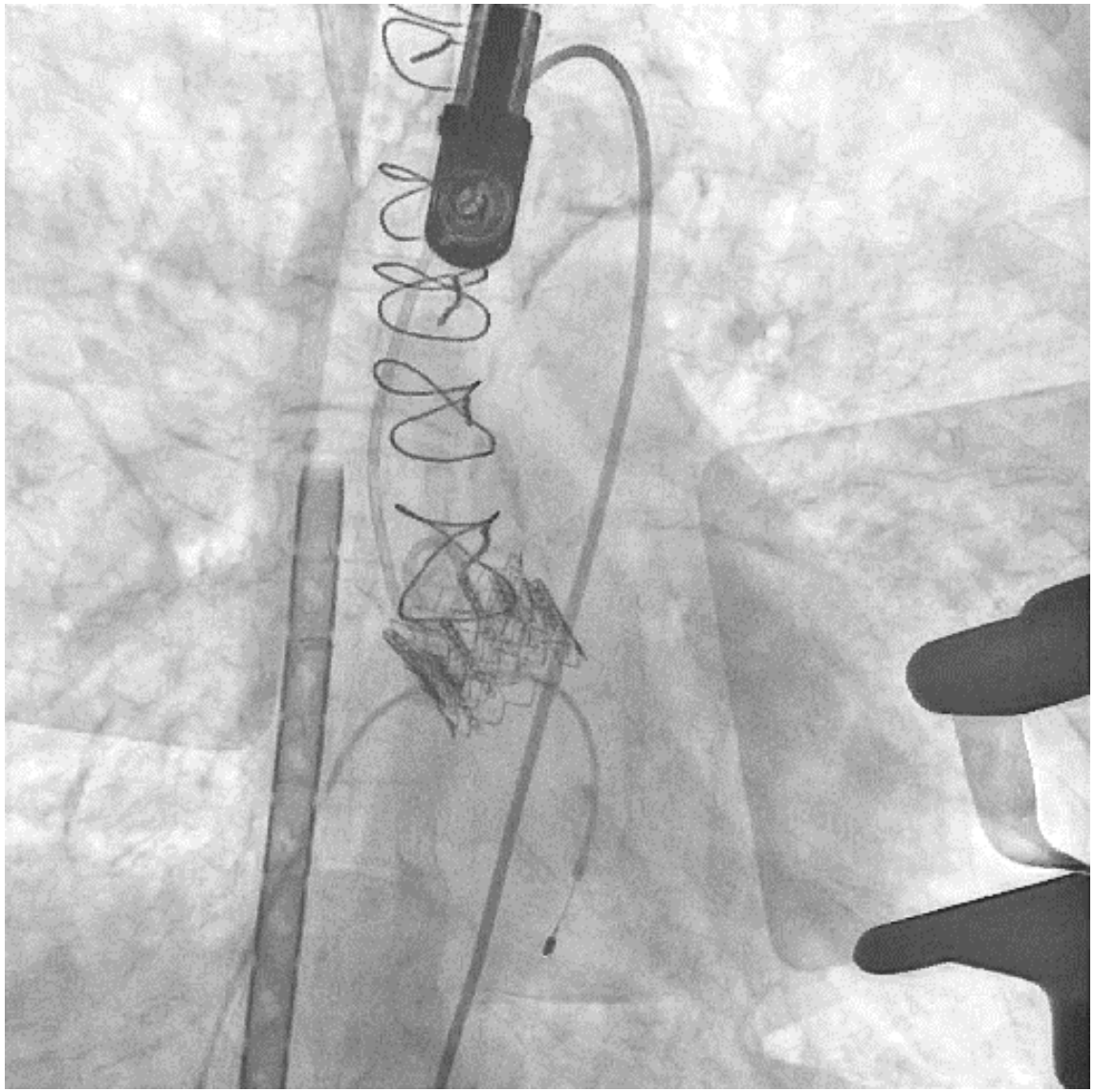




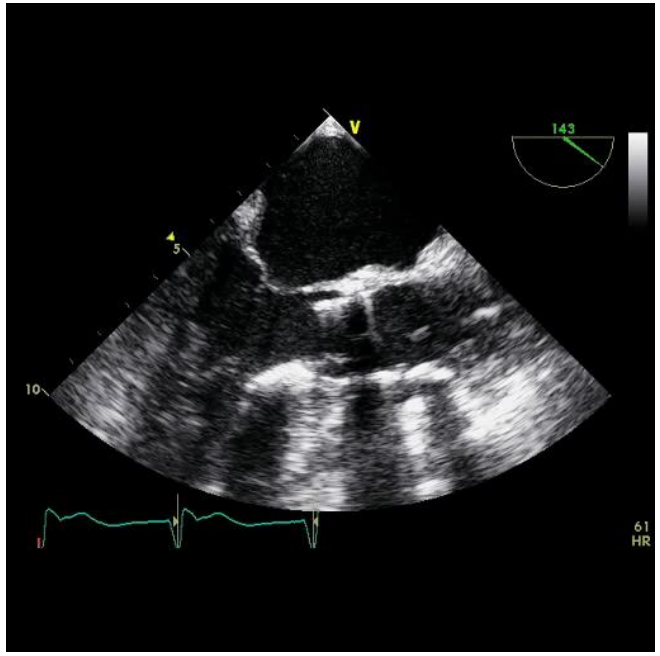


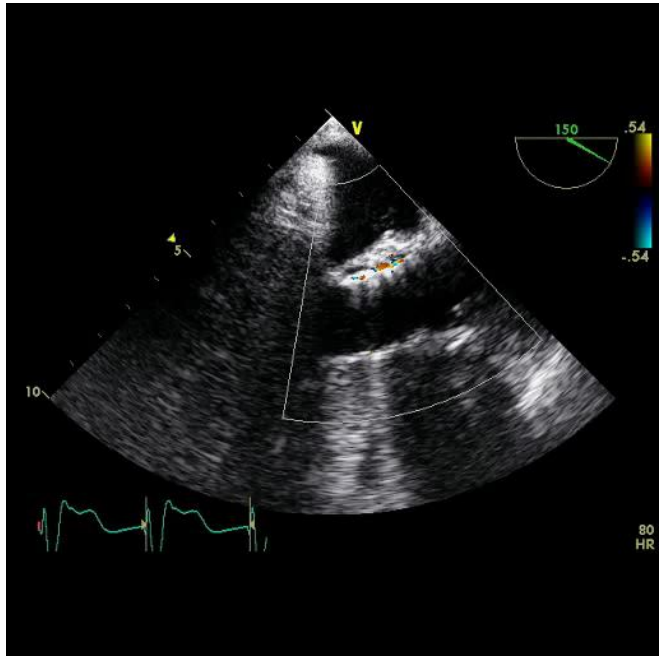


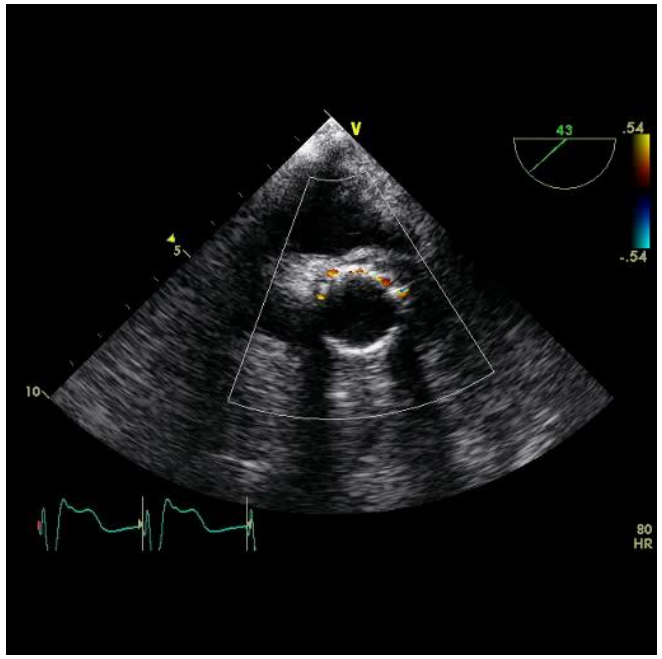
After valve in-valve technique..

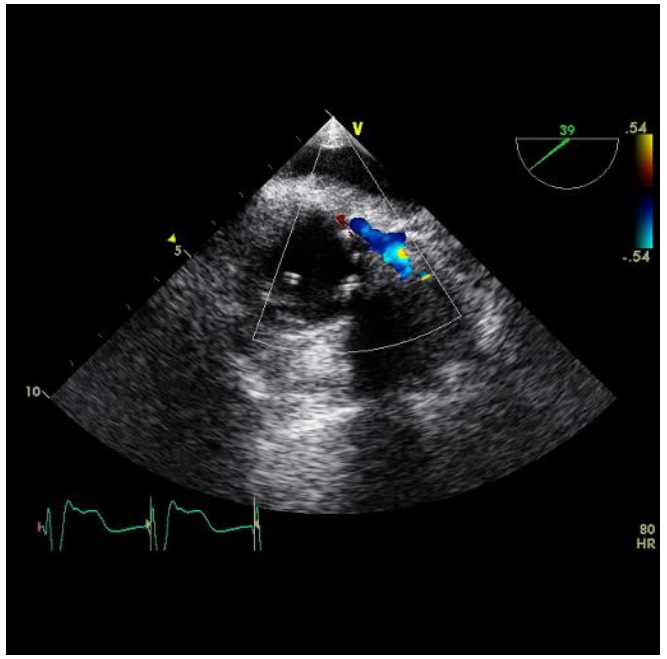


Valve in-valve: TEE findings





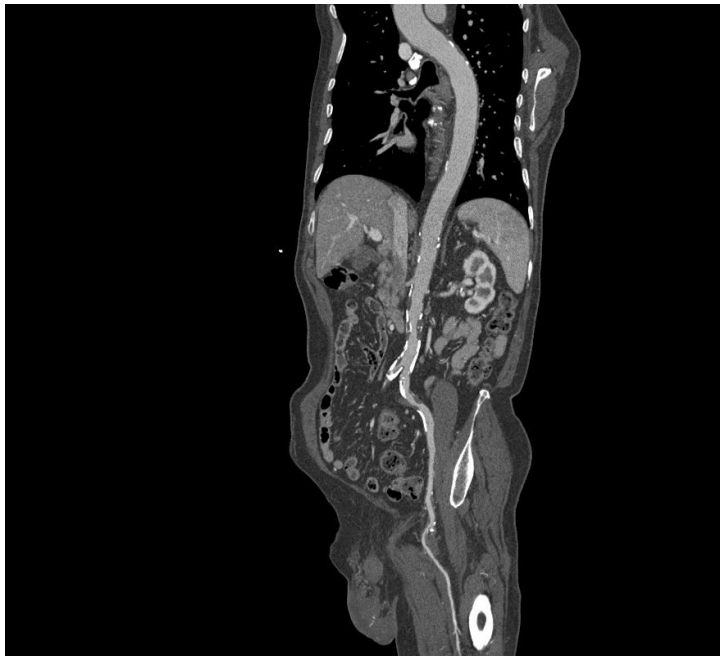


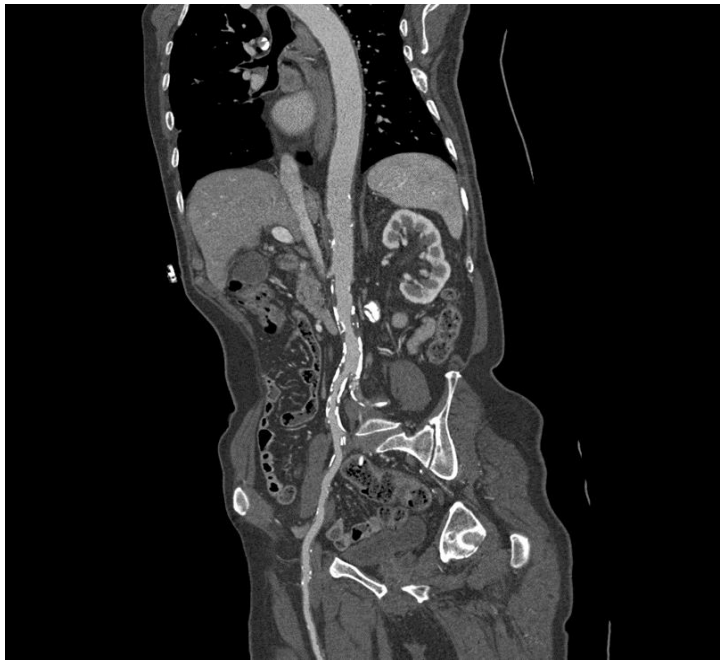


Vascular complication

- 74 years old/male
- Chief complaint: Dyspnea (NYHA III)

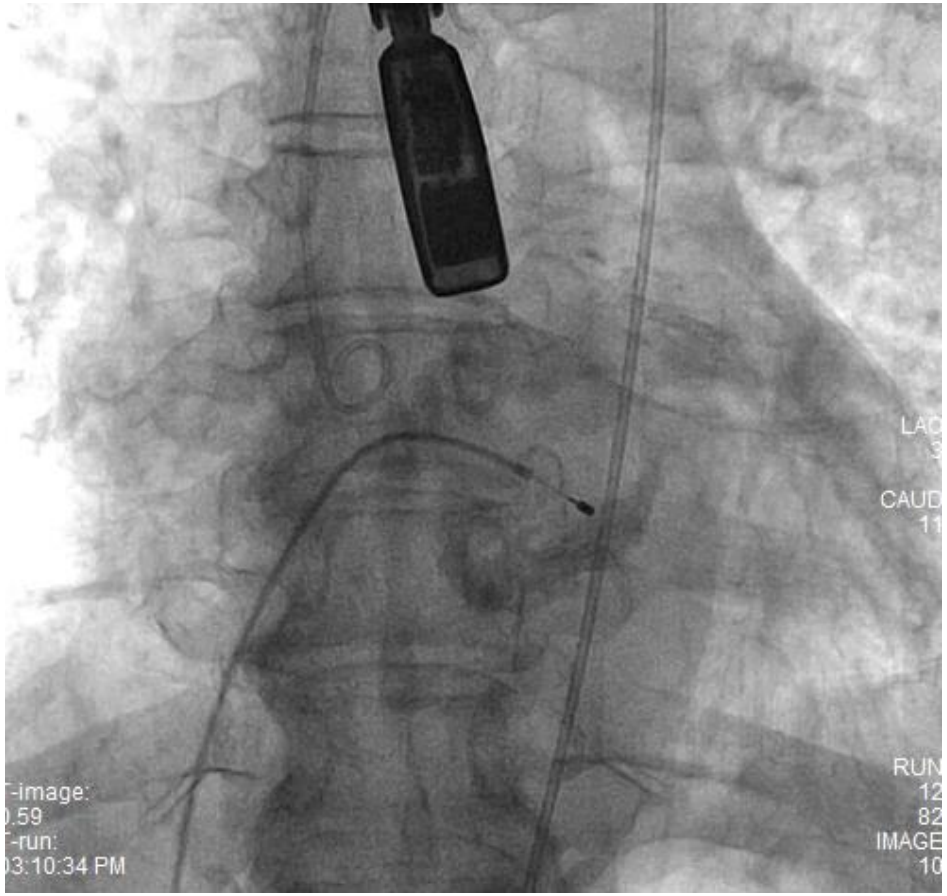
- Past medical history
  - DM / HTN
  - COPD: FEV1 : 1.42L (52%)
  - s/p PCI at LCX [2013]

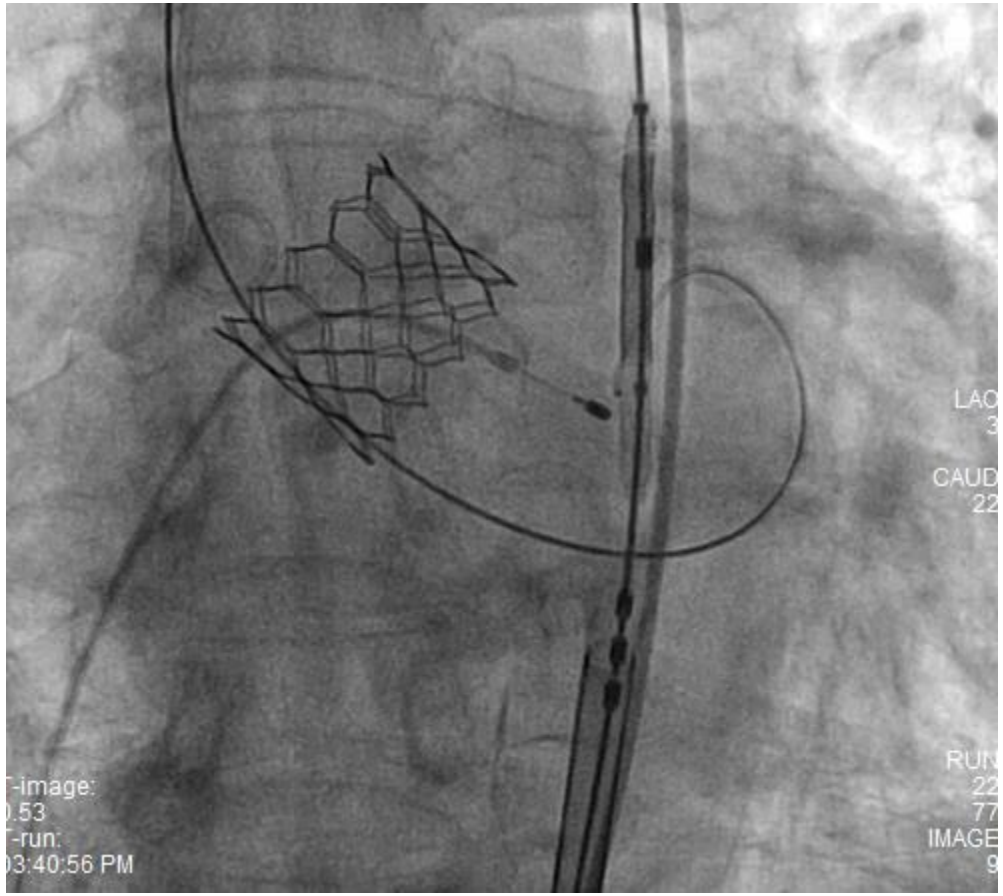




Rt. CIA : severe tubular eccentric stenosis up to 80%
Lt. CIA : moderate tubular eccentric stenosis up to 60%
Pre-dilataion : Armada 7.0mm 40mm -> residual stenosis 20%

Successful implantation of 26mm-sized Sapien3

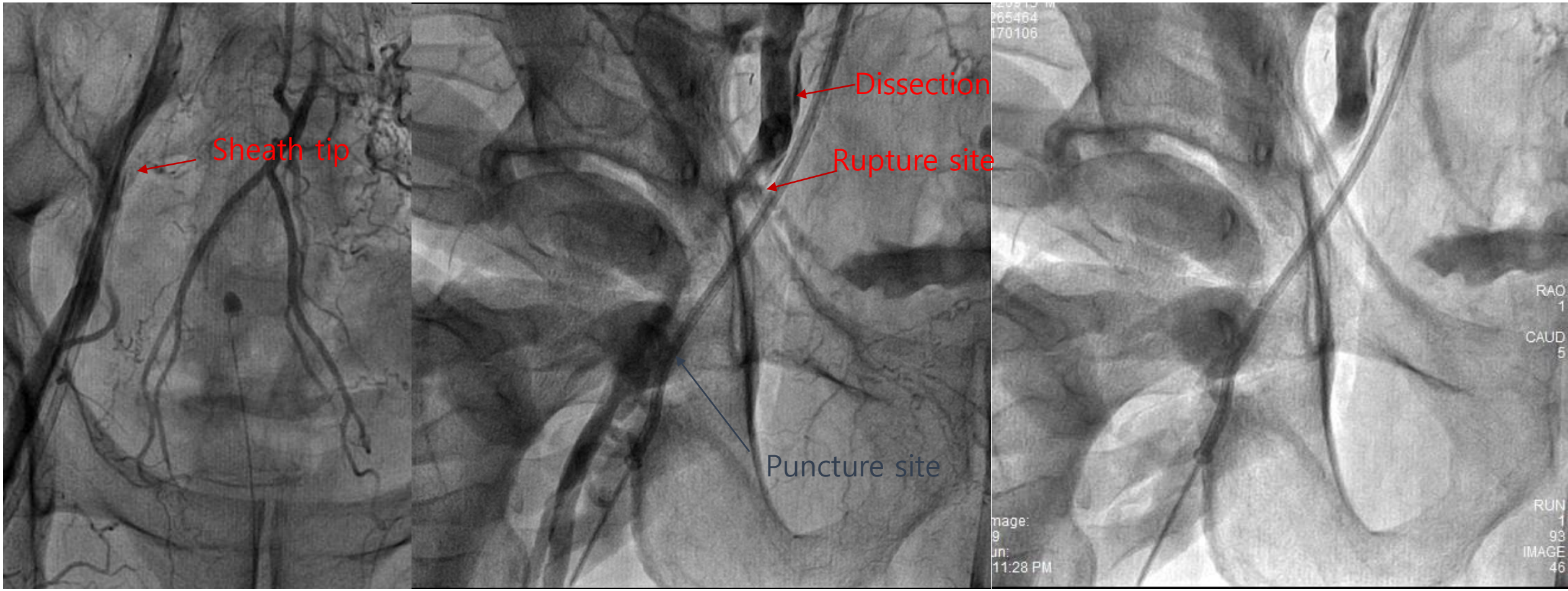




3 hours after TAVI

- Scrotal swelling in CCU
- V/S 151/68, 72/min -> 53/32, 90/min
- Hb 13.4 -> 9.0
- Massive hydration and inotropes
- Refractory hypotension

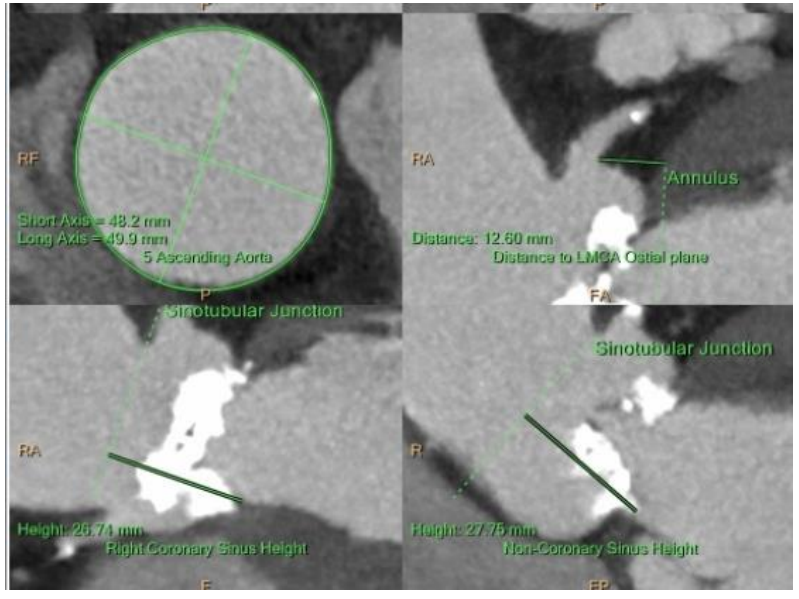
External iliac artery dissection and rupture

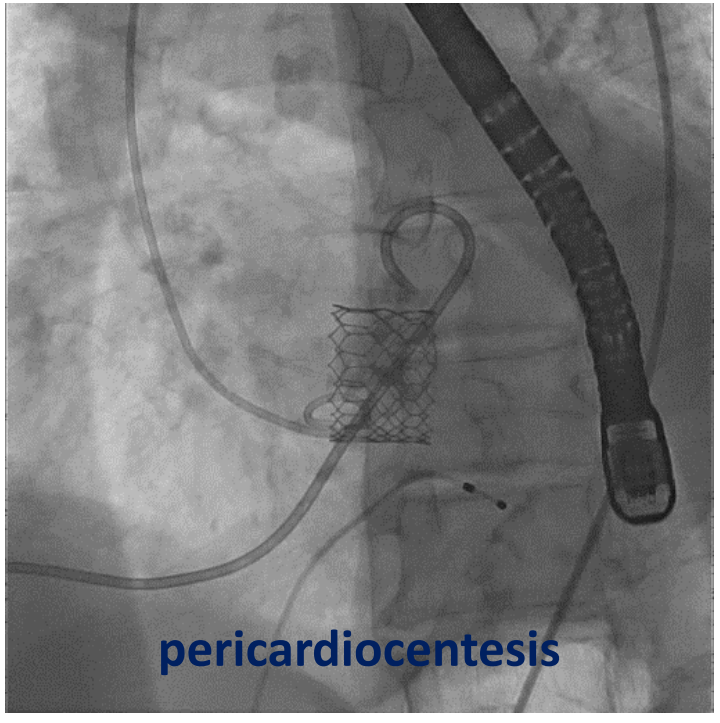


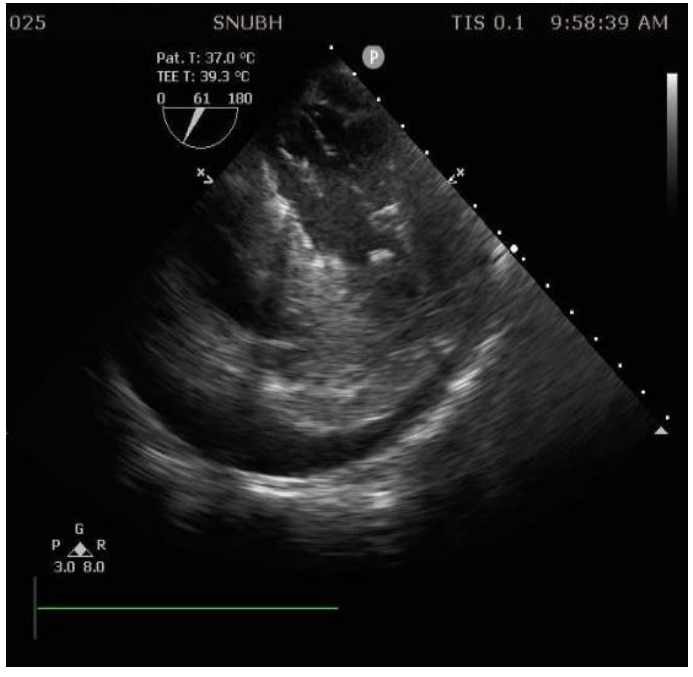
Successful stent graft implantation at ruptured site

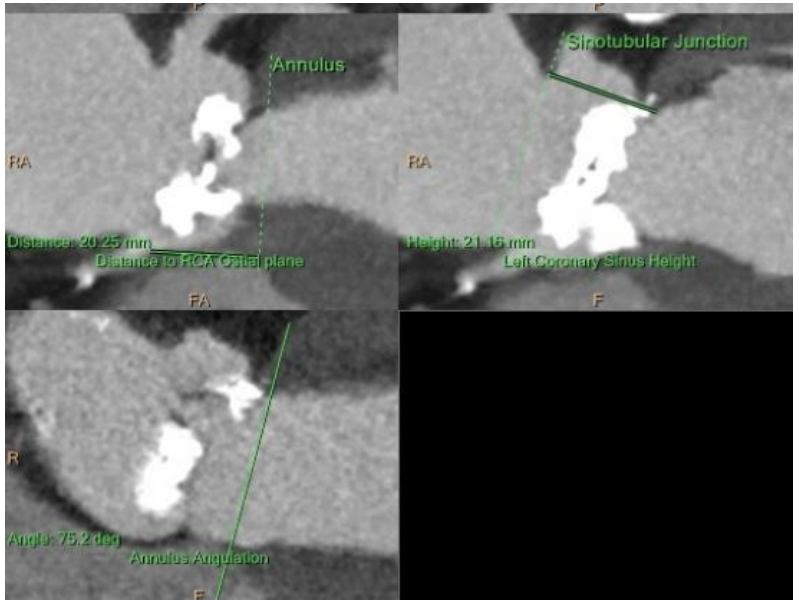
VIABAHN 6.0 x 50mm

Annular rupture due to severe calcification at LVOT





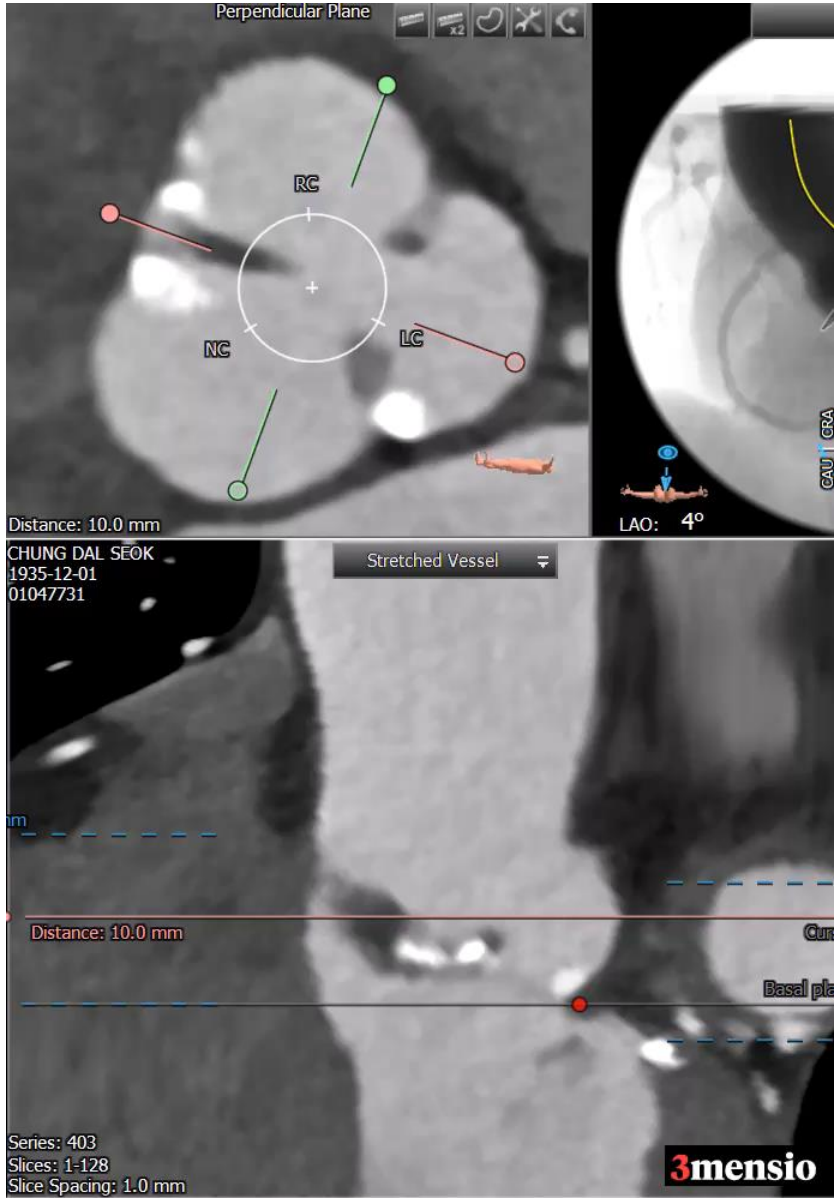


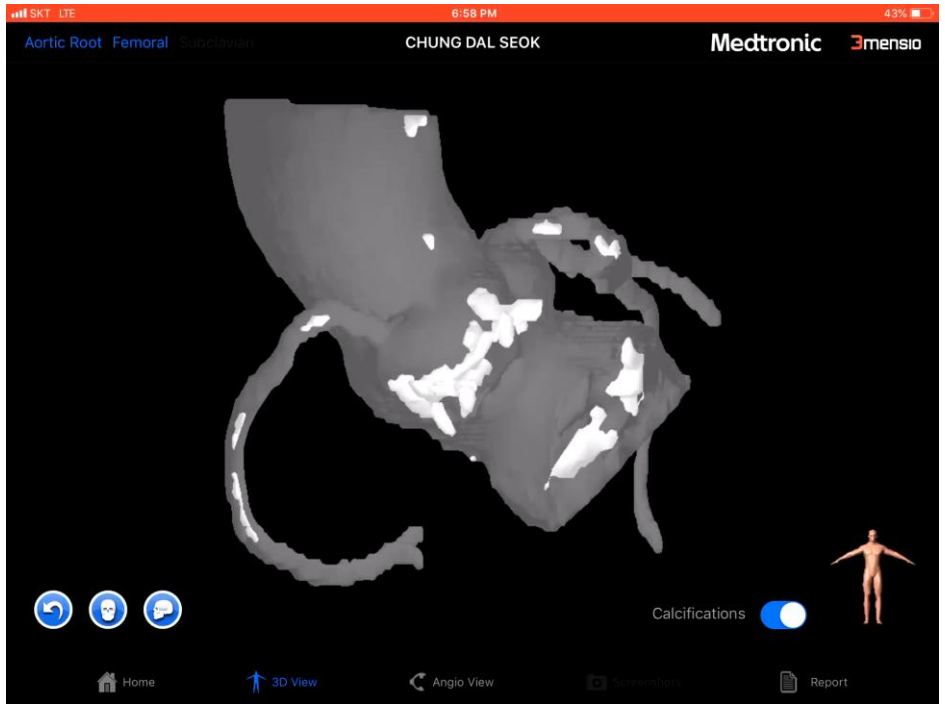


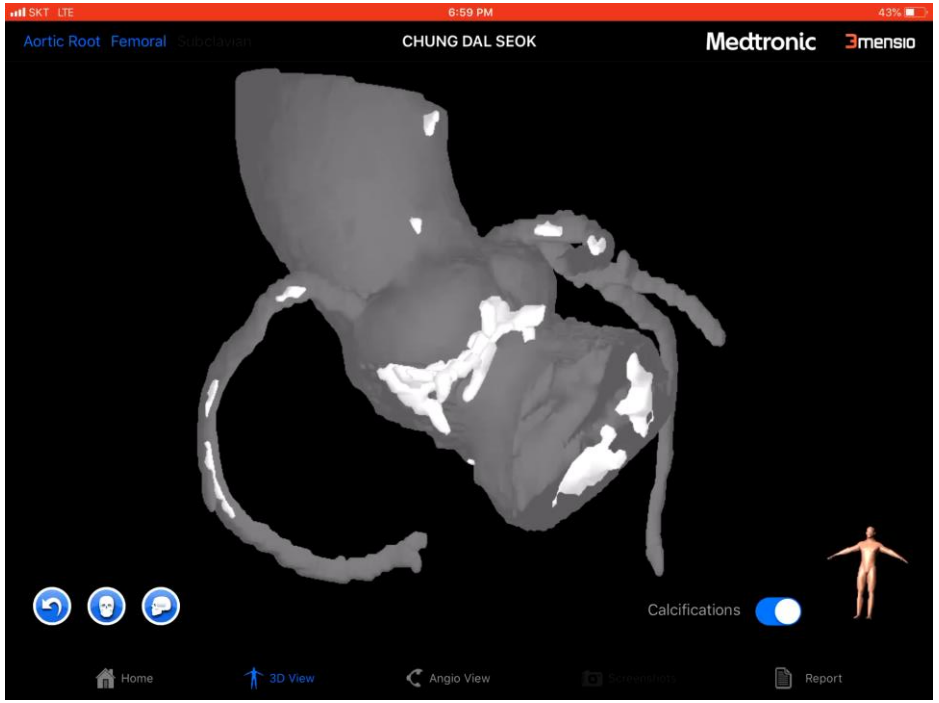
Emergency Op

Dagger-like Calcification

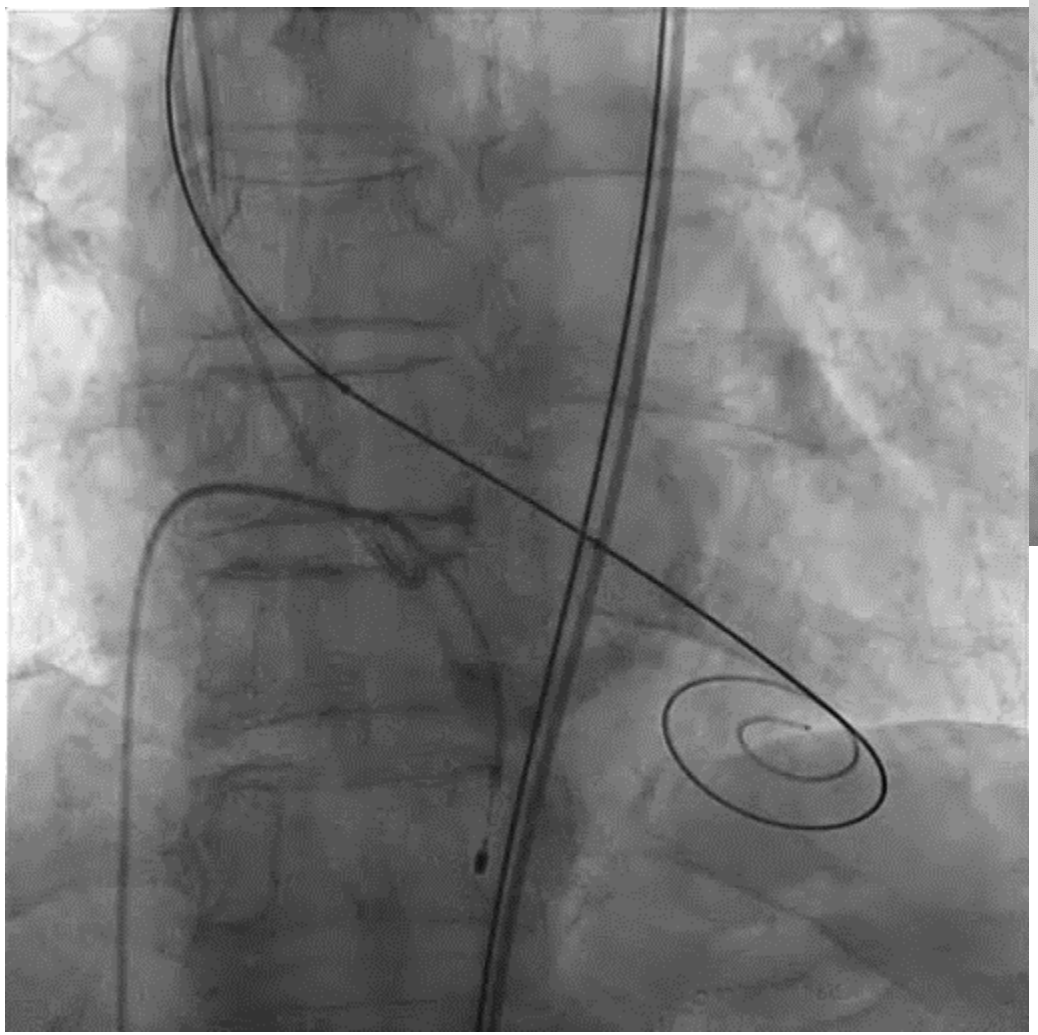
83 years /Male
Sp gastric ca
CKD stage IV
Femur neck fx
Anemia
Aspiration pneumonia
High frailty
STS score 11.5

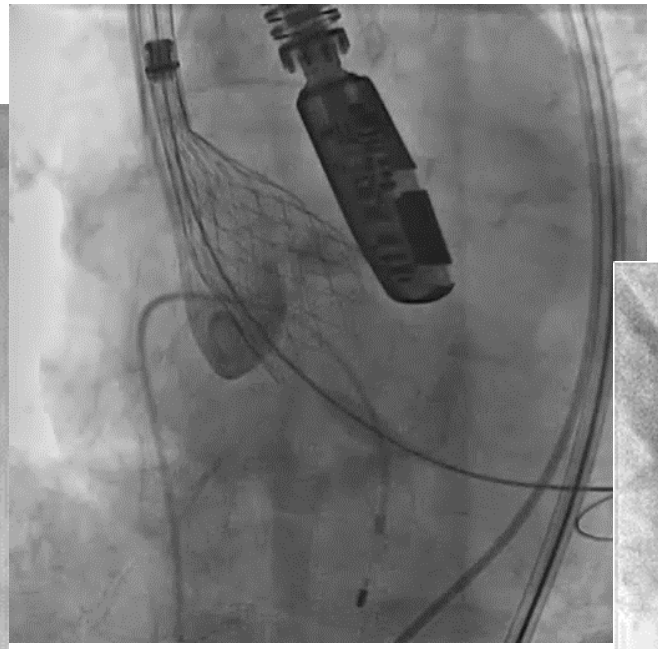


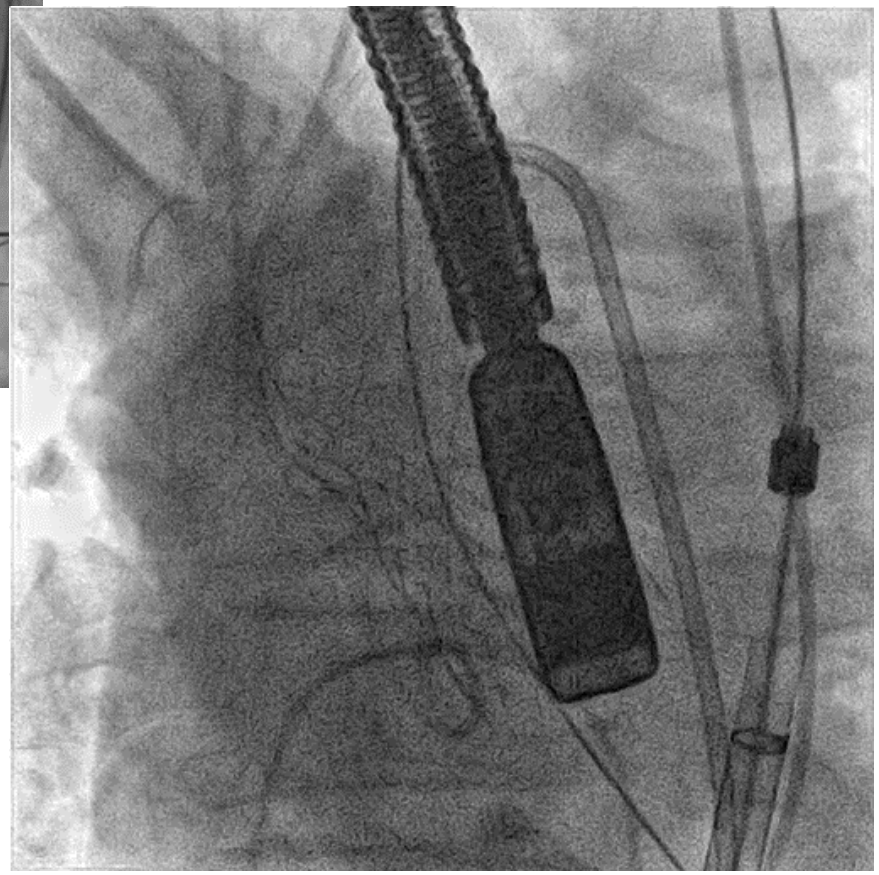




Annular rupture with cardiac tampone



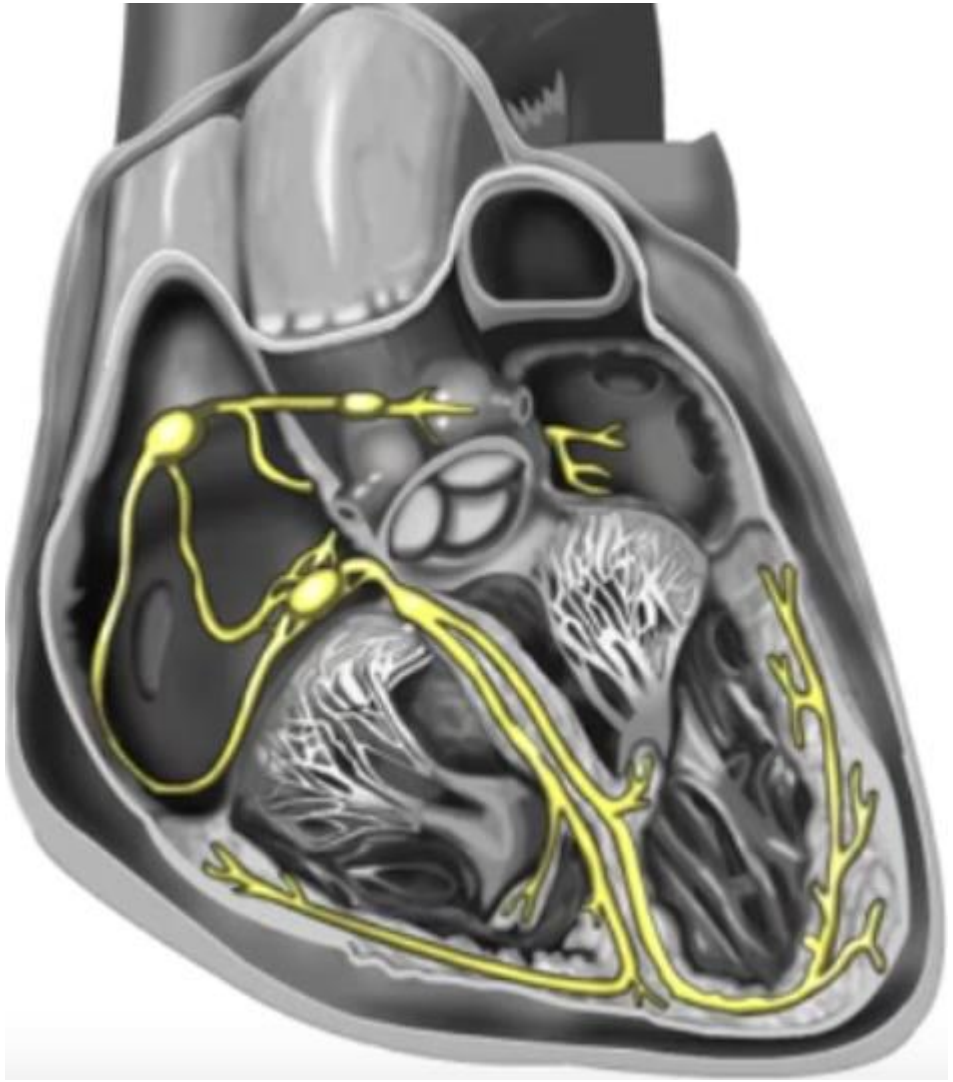


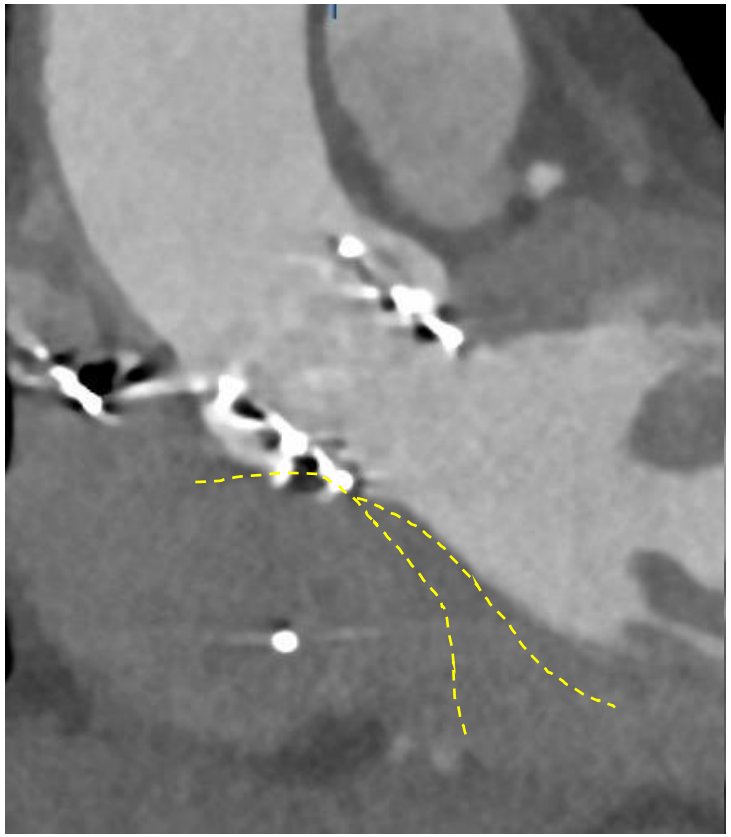


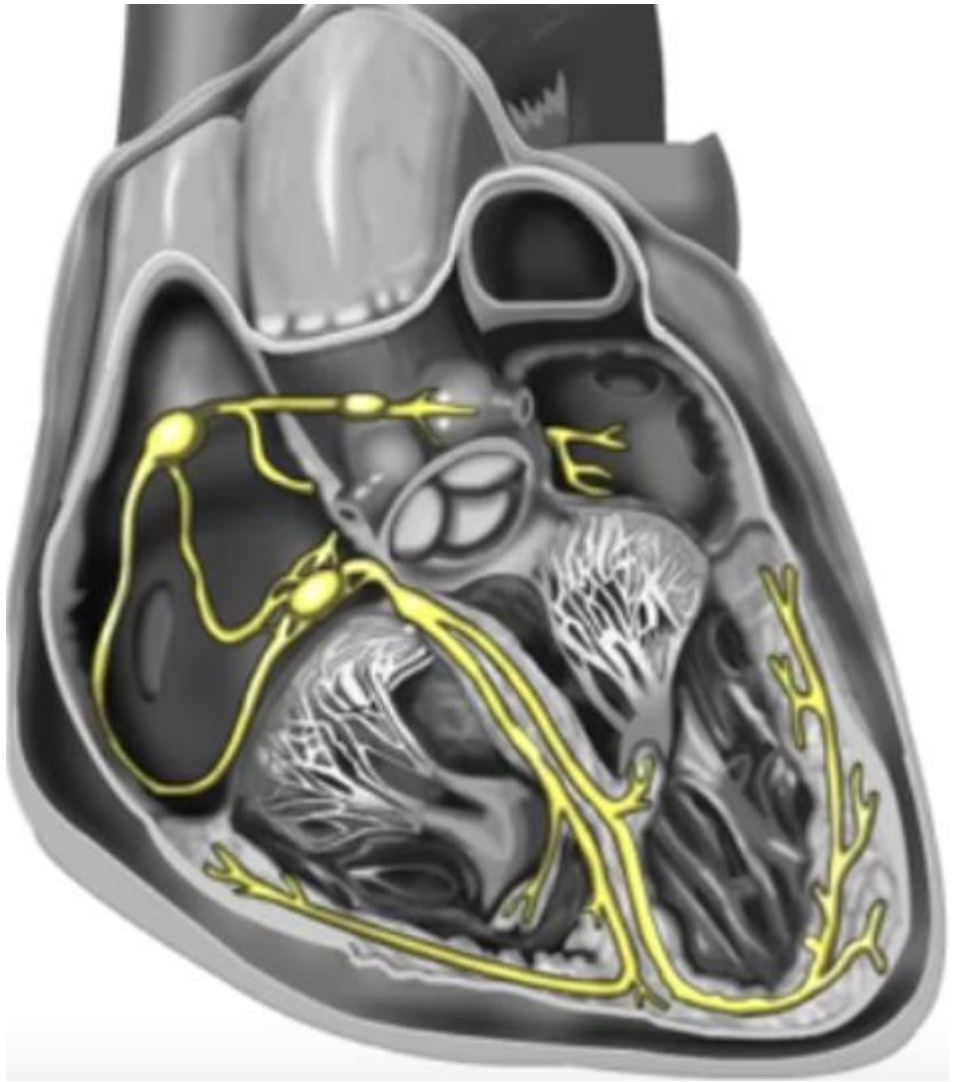
PPM implantation due to C-AVB

Predictors for PPM implantation

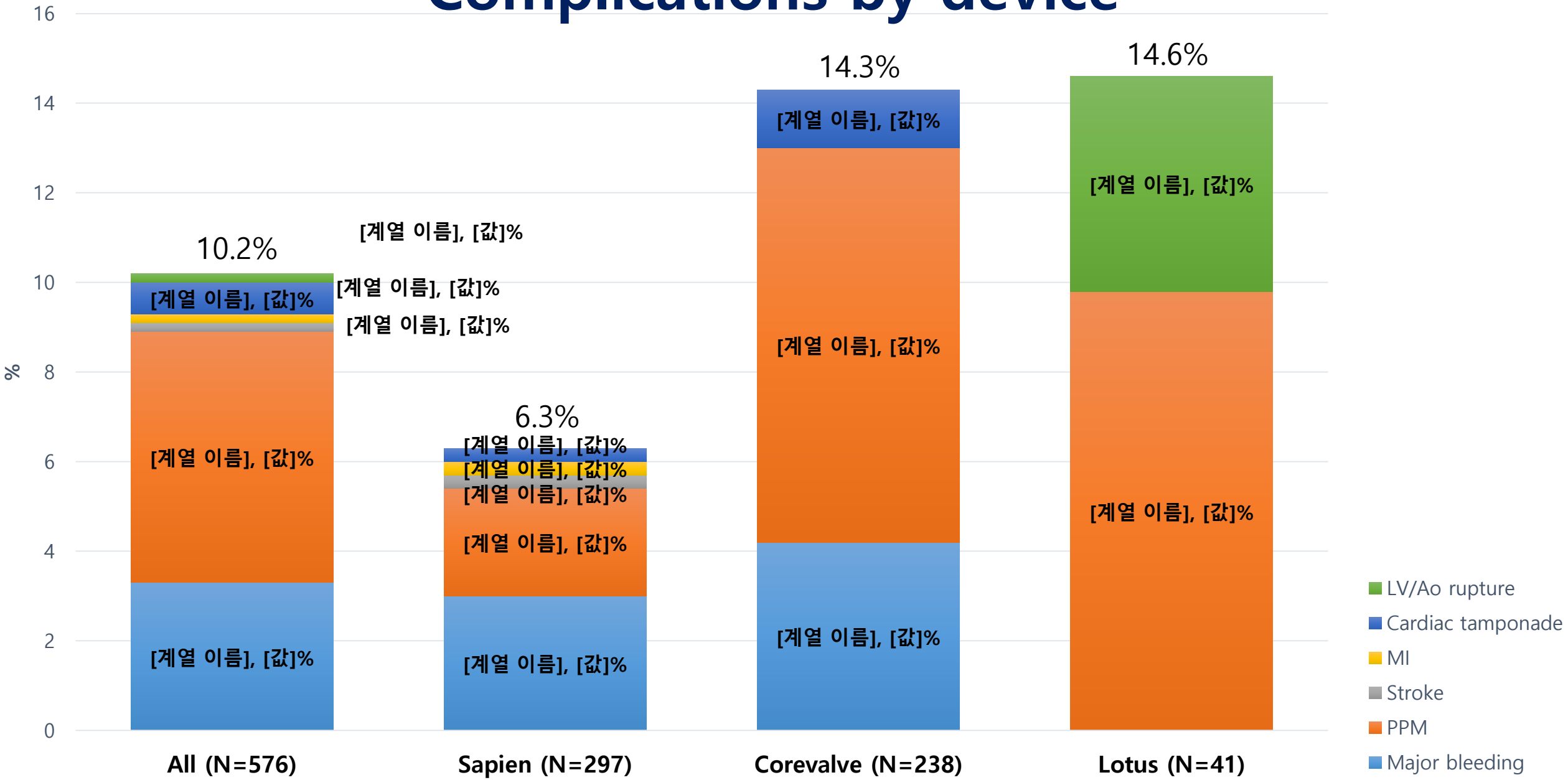
- **Patients factors**
  - Underlying conduction disturbances
    - RBBB >> LBBB >>nonspecific conduction abnormalities
  - Underlying ischemia , male, age > 75
  - Septum thickness
- **Device factors**
  - Self expandable valve > balloon expandable valve
  - over sizing, radial force of prosthesis
- **Procedural factors**
  - lower implantation
  - Post dilatation, BAV

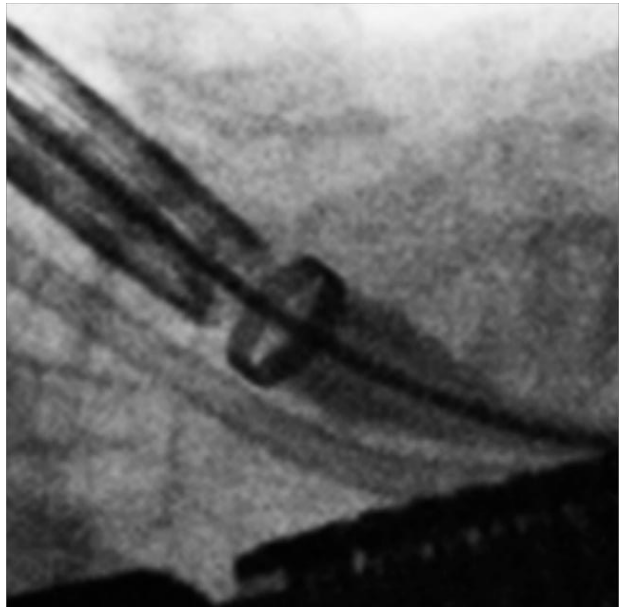


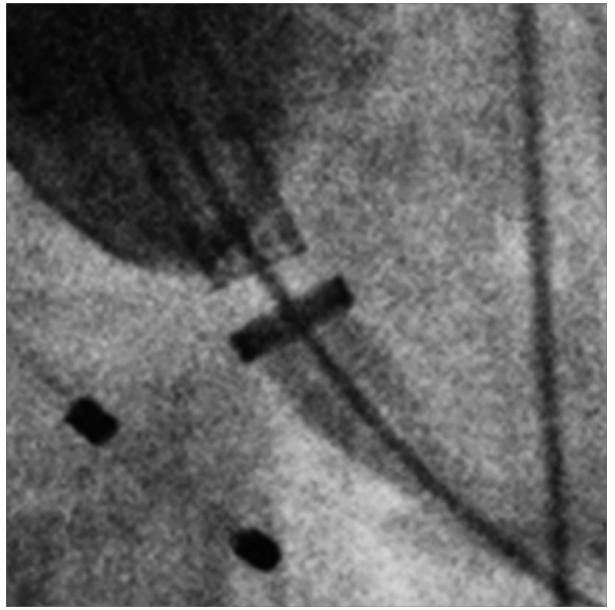


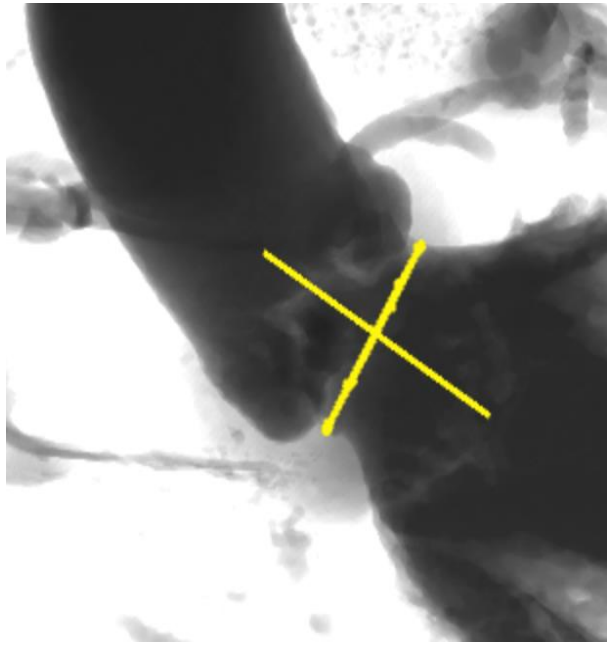


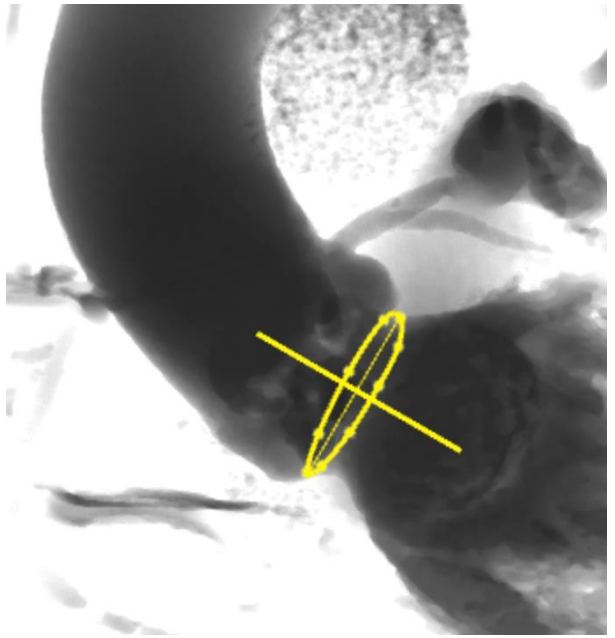
Complications by device



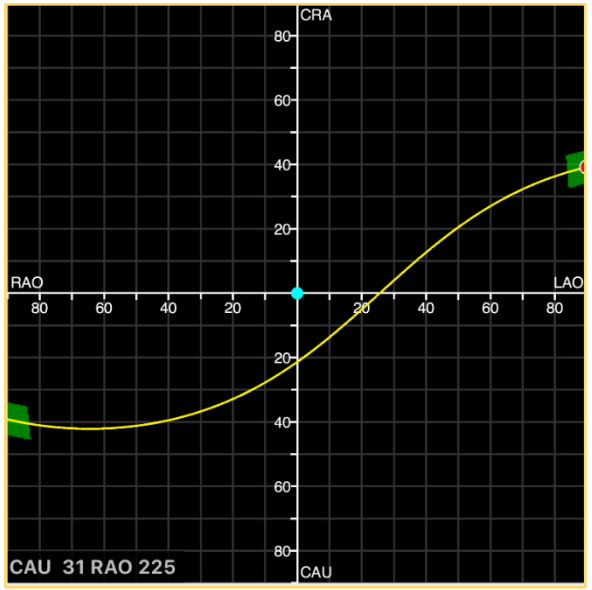




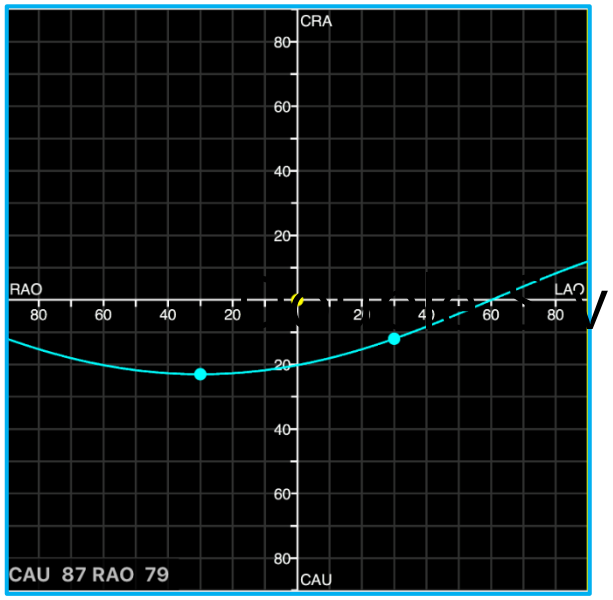




Optimal Angle

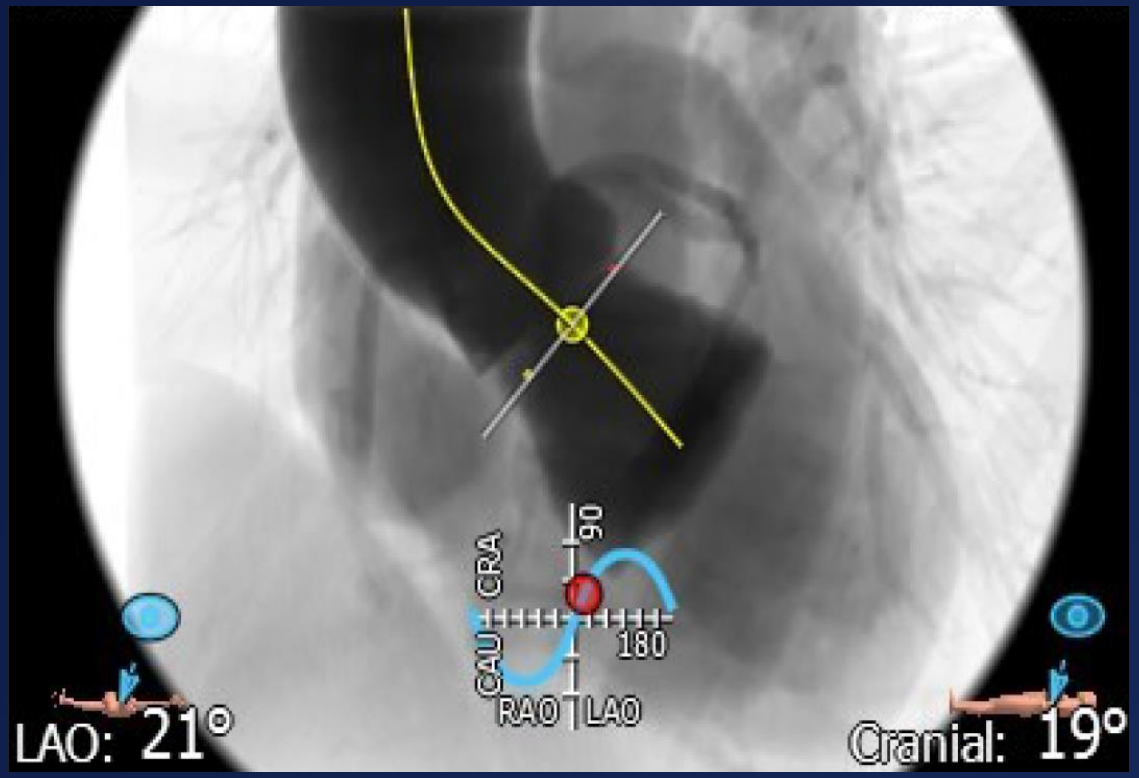


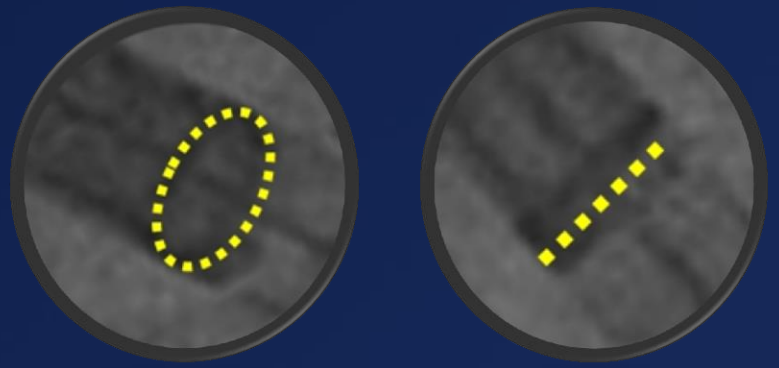
Delivery catheter



view

Nicolo Piazza Double-S technique





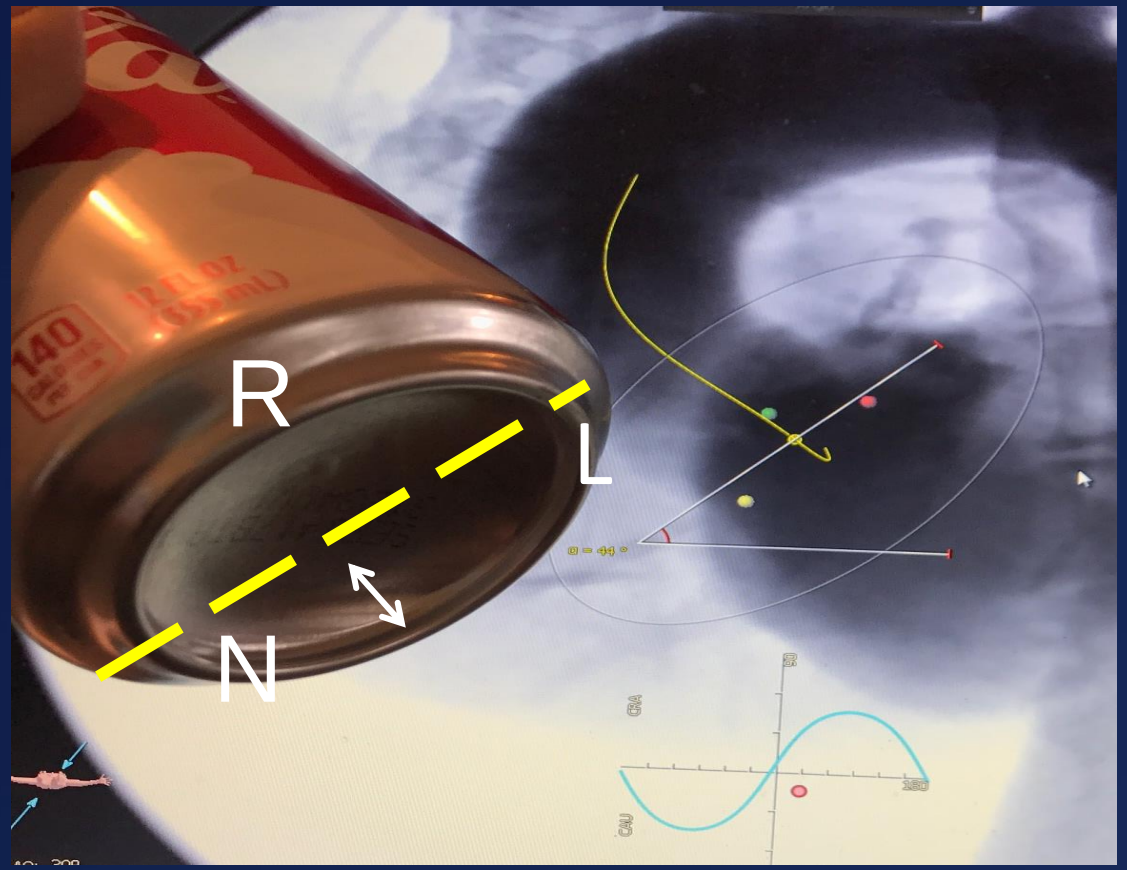
Optimal angle

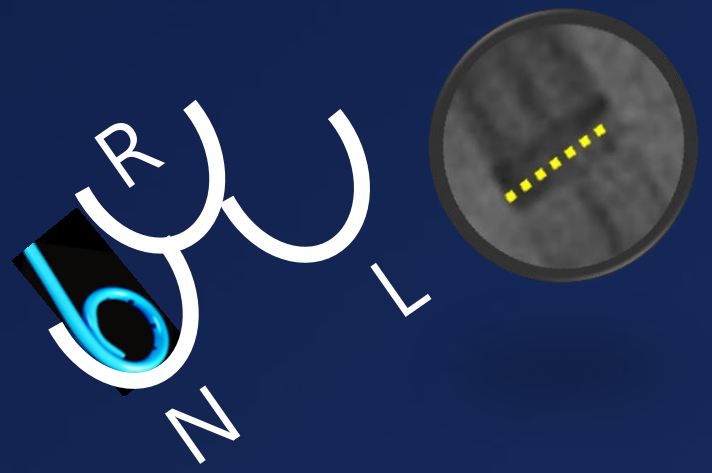
LAO 21 °

Cranial 19°

LAO ?

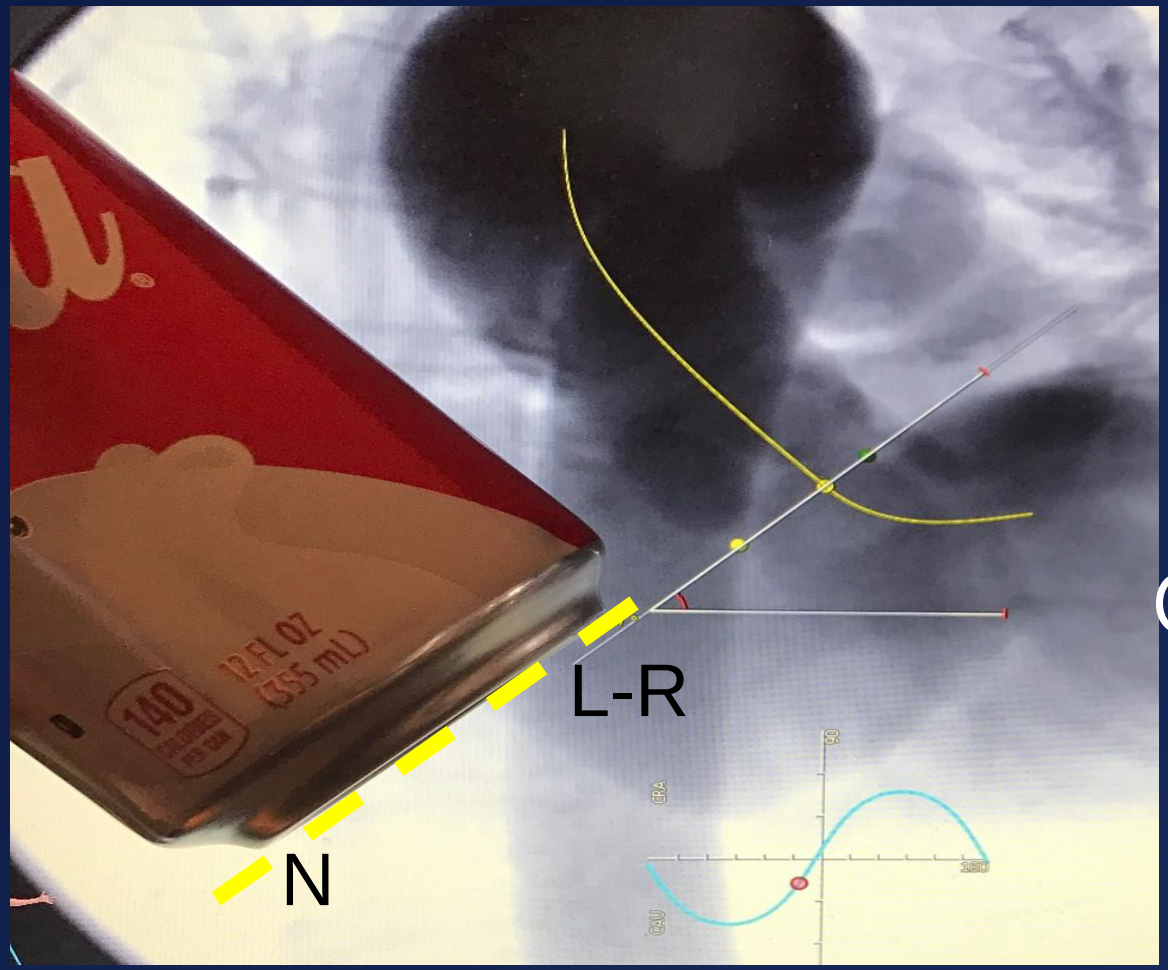
Caudal ?

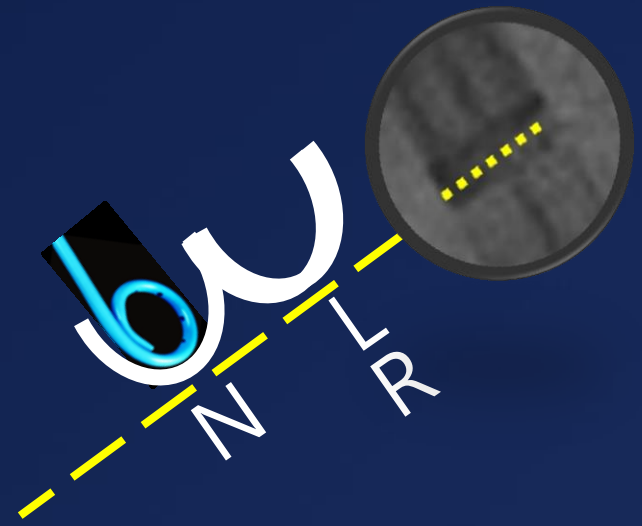




2-5 mm error

LAO 30 °
Caudal 15°





Optimal angle

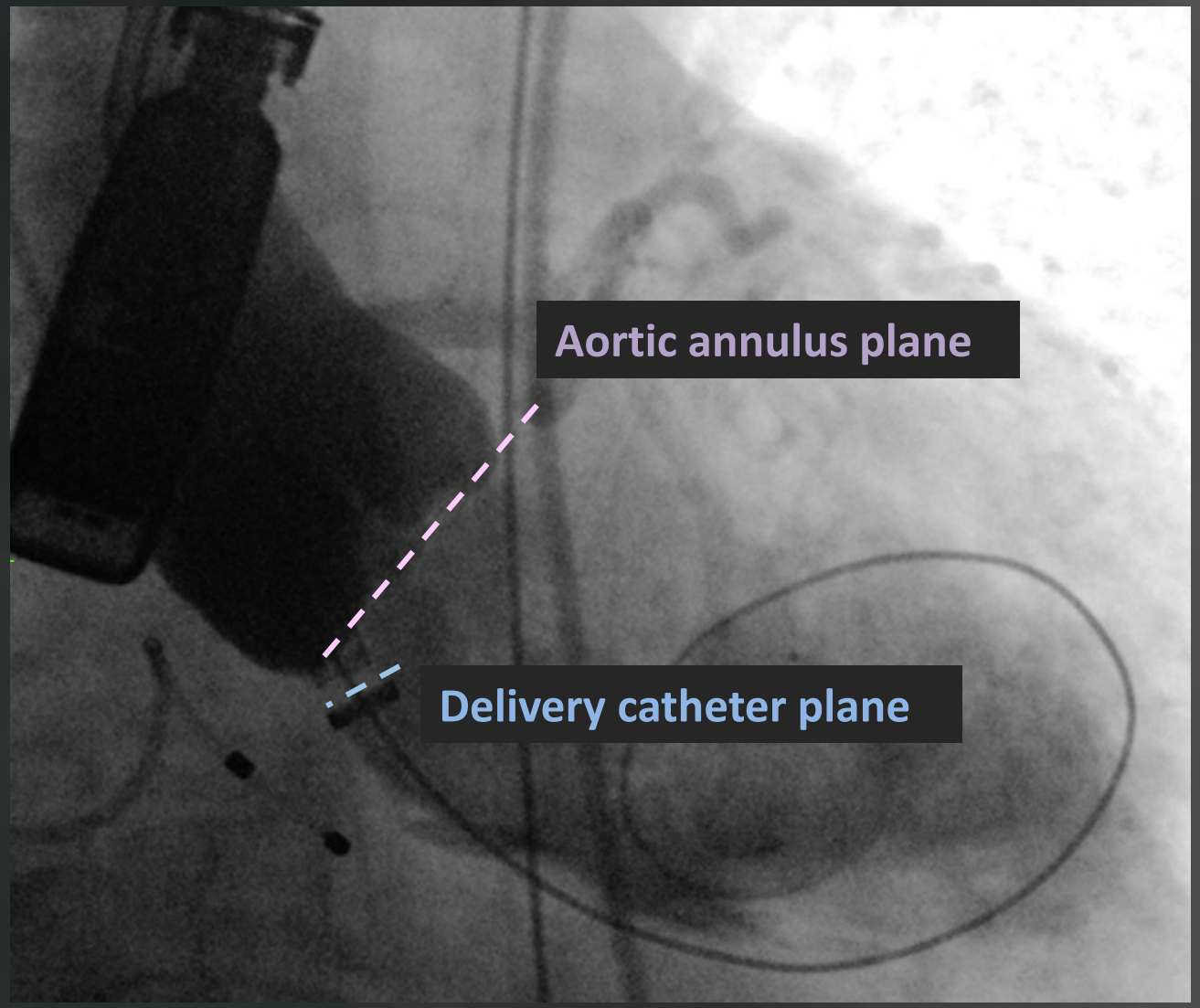
RAO 22 °

Caudal 18°

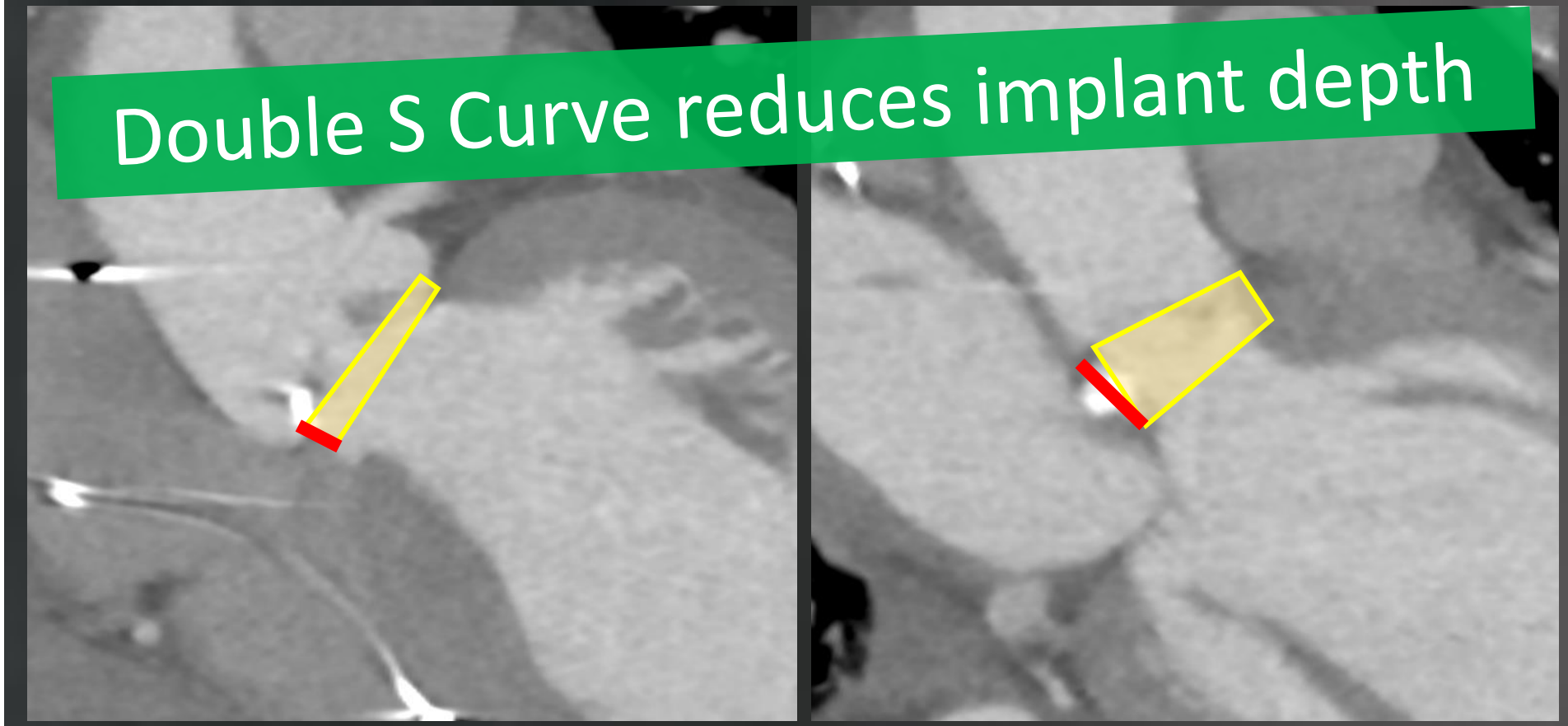
2-5 mm error(X)

The Ideal…..

Aortic Annulus & Delivery Catheter in plane



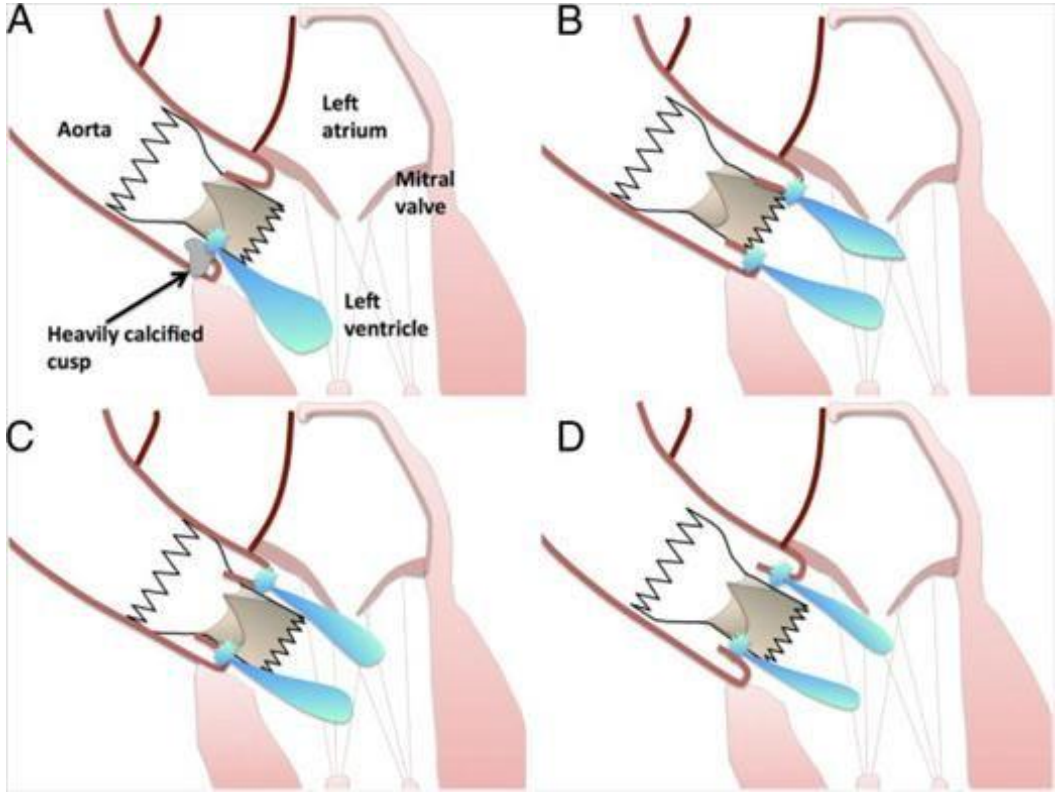
LVOT Parallax



RAO 20 Caud 12

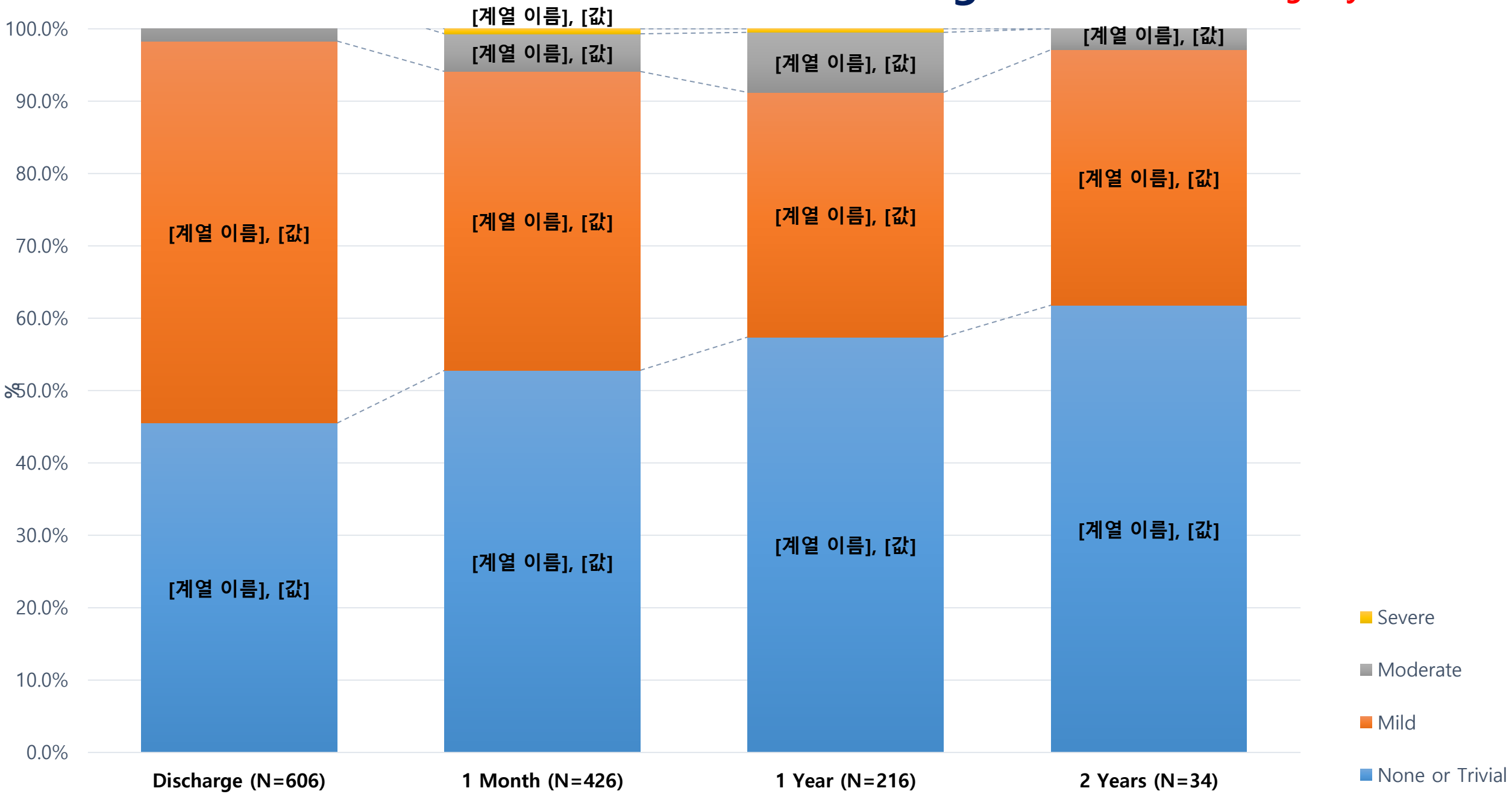
LAO 30 Caud 20

PVL


A
Aorta
Left atrium
Mitral valve
Left ventricle
Heavily calcified cusp
B
C
D

Paravalvular leakage

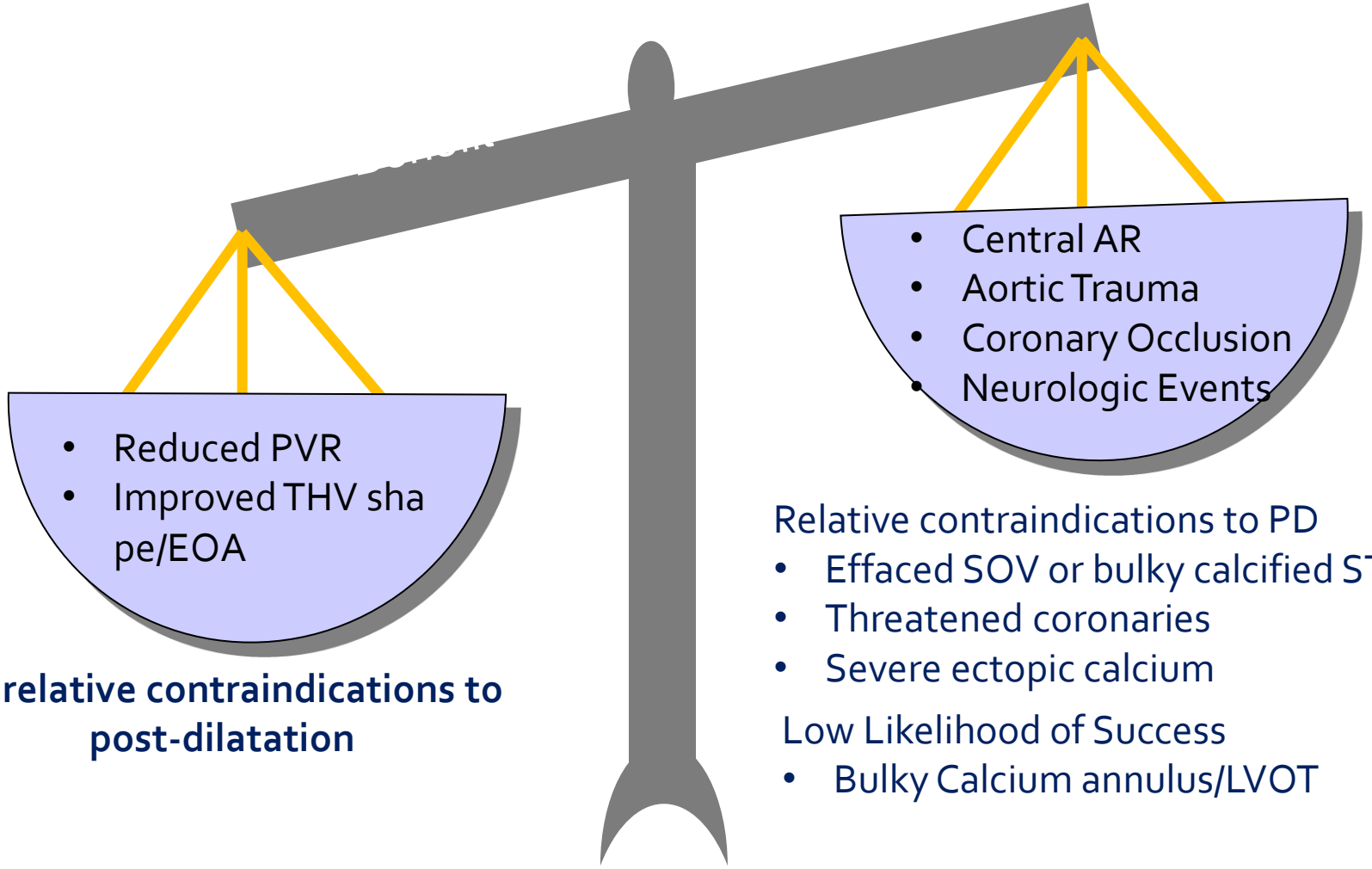
From K-TAVI registry



Management

- Balloon post-dilatation
- PVL closure
- Valve-in-valve

Post-dilatation Risk-Benefit Analysis



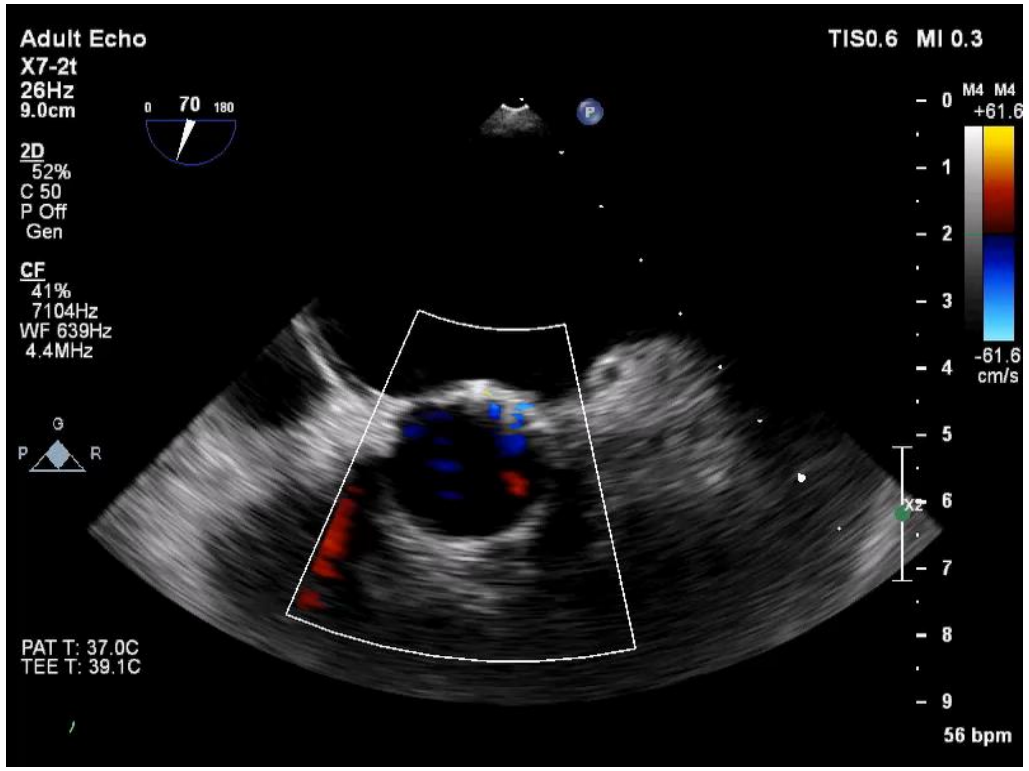
No relative contraindications to post-dilatation

Relative contraindications to PD
- Effaced SOV or bulky calcified STJ
- Threatened coronaries
- Severe ectopic calcium

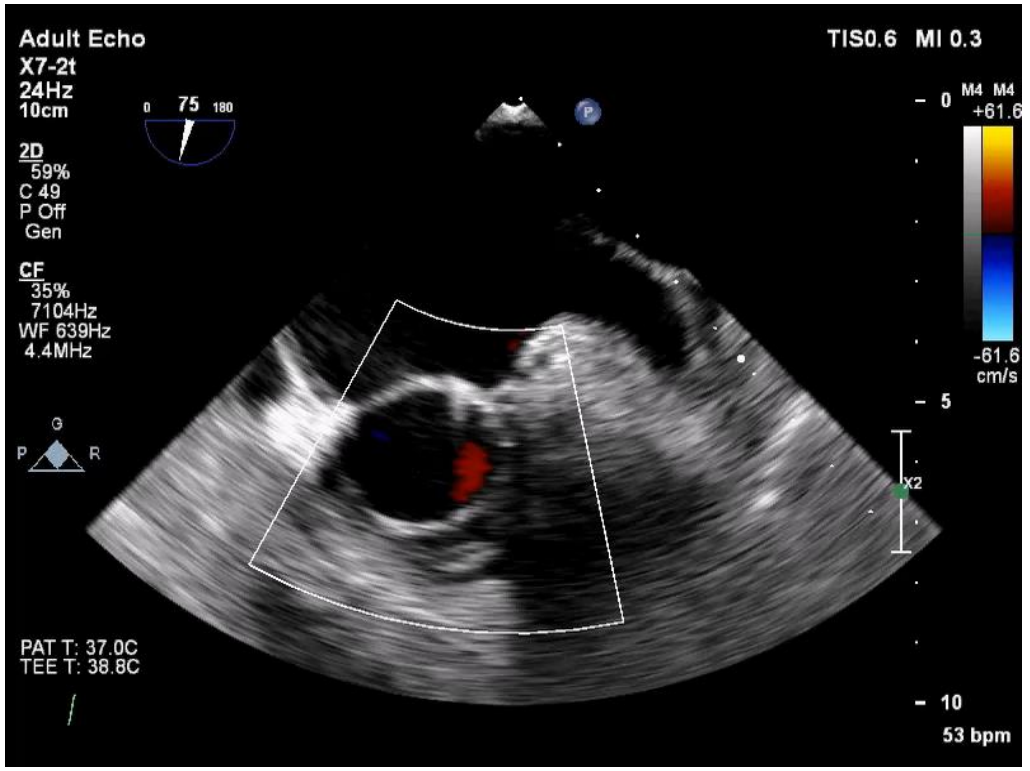
Low Likelihood of Success
- Bulky Calcium annulus/LVOT

Risk-Benefit of PVL Closure Device or Second T HV

Spontaneous Regression



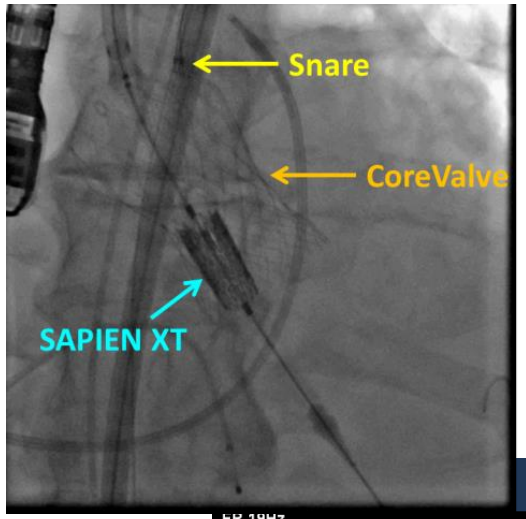
Immediate Post-TAVR

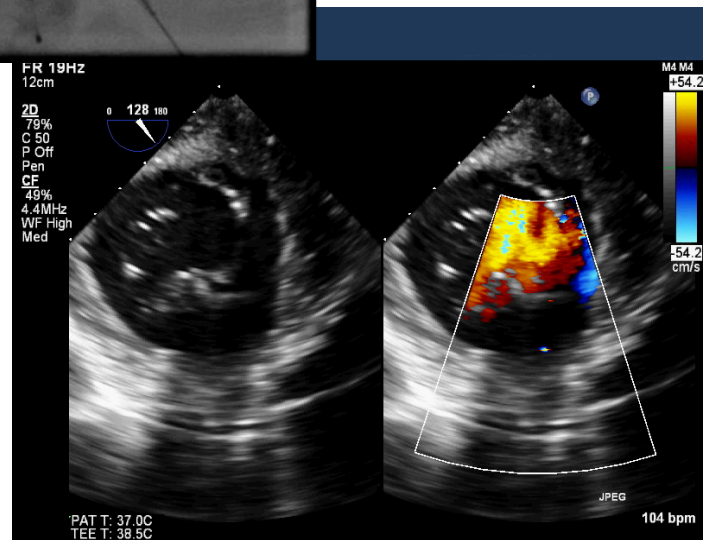


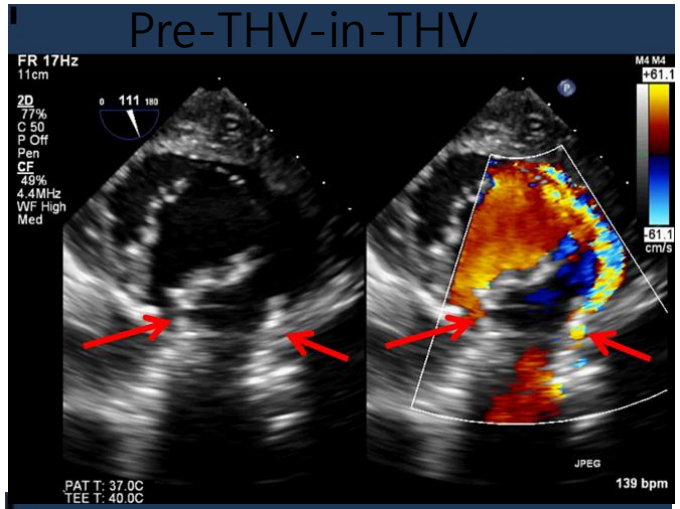
5 minutes Post-TAVR (no intervention)

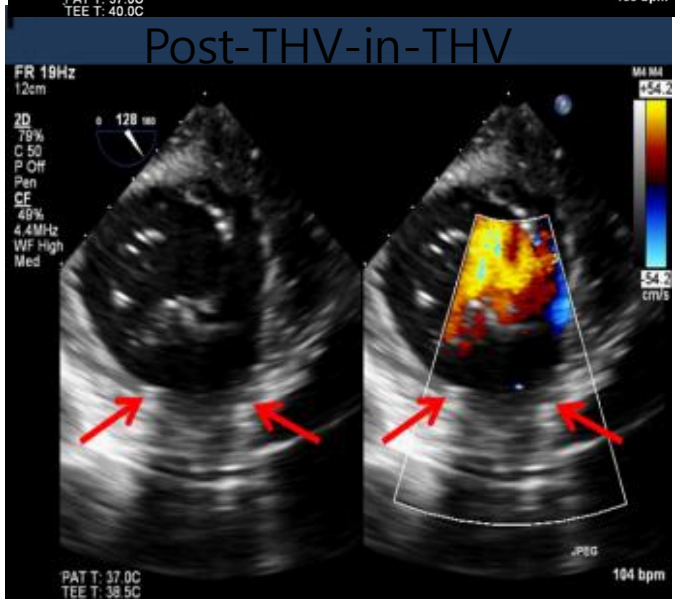
Small jets seen (frequently between the stent cells) and directed into the ce nter of the LVOT, may regress over the first 5-10 minutes

THV in THV





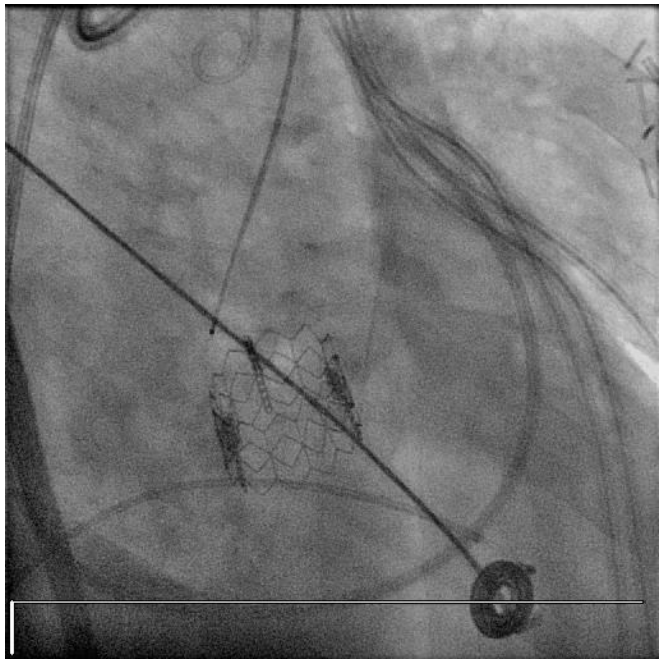




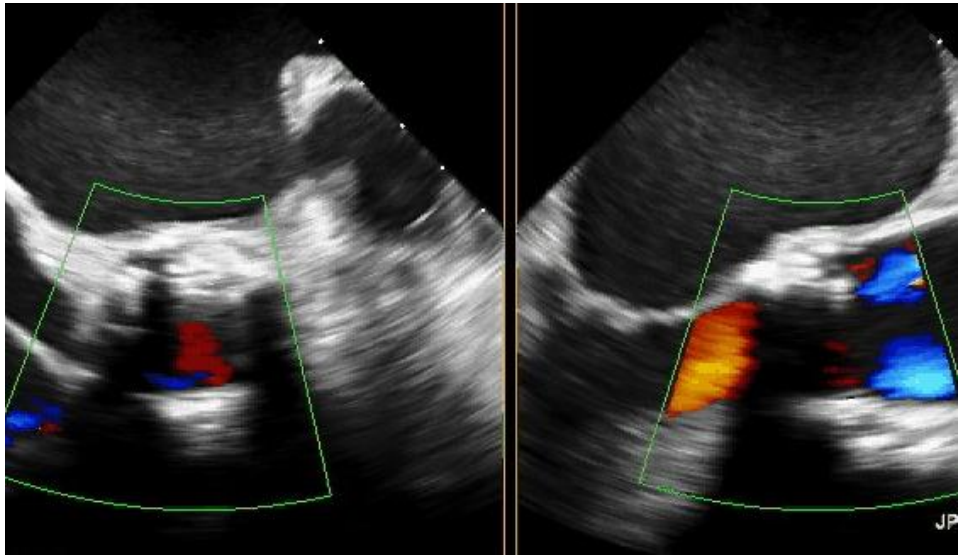
SAPIEN in CoreValve salvage: CoreValve was snared and SAPIEN XT po sitioned at the anatomic anulus

- Final AVA = 1.9 cm2
- Trivial residual paravalvular regurgitation

Paravalvular Closure Device



- In same setting, PVL was crossed wit h a glide wire and a 4F sheath
- AVP 4 device was advanced through the 4F glide cath
- Using echo and fluoroscopic guidanc e, it was deployed across the defect
- Echo post revealed reduced PVL

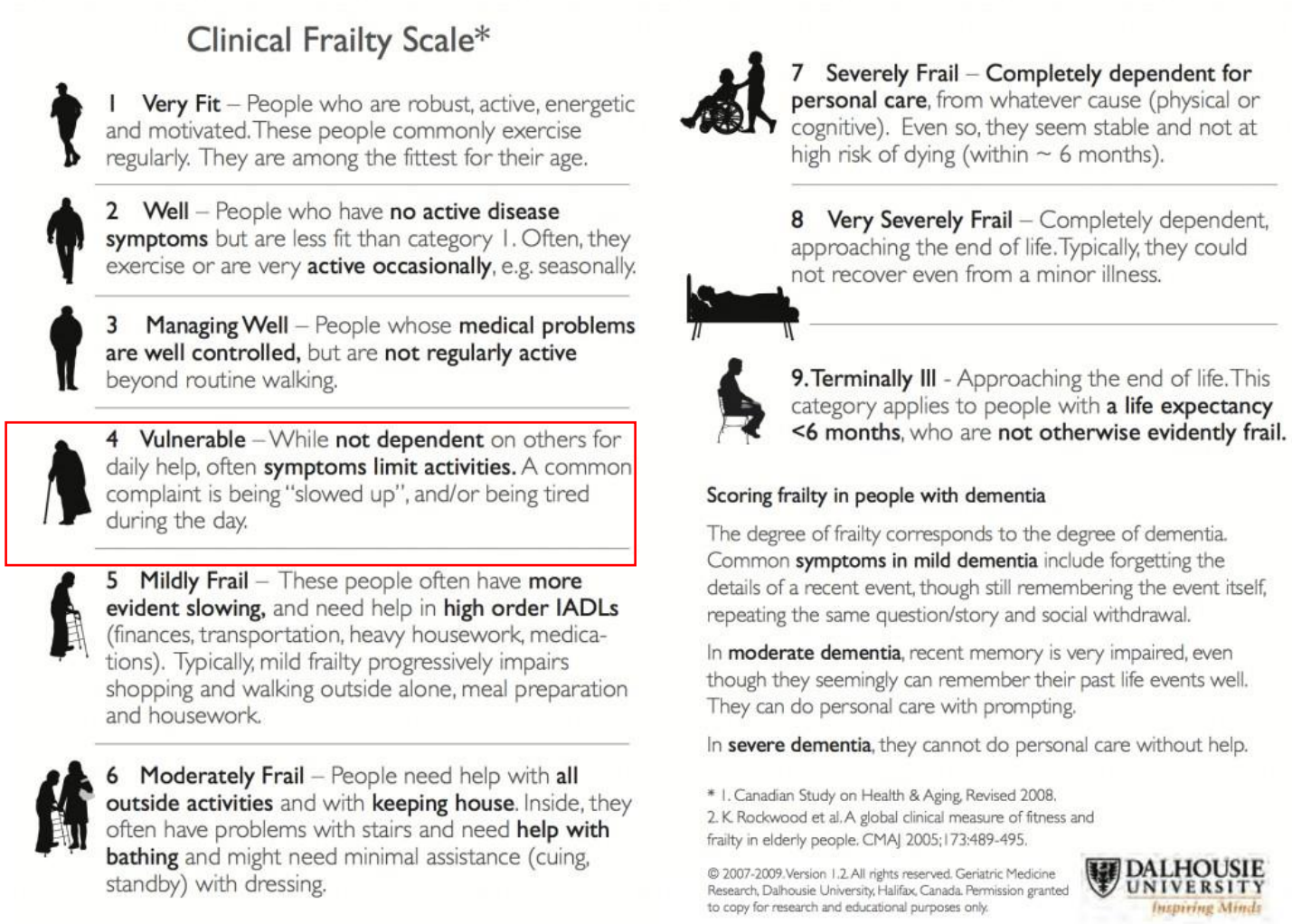


Don't be too upset, when it comes to the hell of it.

- ***Combined complications*** ***in real world practice are always possible.***

Brief case summary

- Female / 78 YO
- C.C: NYHA III-IV dyspnea
- STS PROM: 4.75%
  - h/o breast ca., s/p CCRT
  - Chronic constrictive pericarditis
  - Hostile chest: Chest wall abscess



Clinical Frailty Scale*

1 **Very Fit** – People who are robust, active, energetic and motivated. These people commonly exercise regularly. They are among the fittest for their age.

2 **Well** – People who have **no active disease symptoms** but are less fit than category 1. Often, they exercise or are very **active occasionally**, e.g. seasonally.

3 **Managing Well** – People whose **medical problems are well controlled,** but are **not regularly active** beyond routine walking.

4 **Vulnerable** – While **not dependent** on others for daily help, often **symptoms limit activities.** A common complaint is being "slowed up", and/or being tired during the day.

5 **Mildly Frail** – These people often have **more evident slowing,** and need help in **high order IADLs** (finances, transportation, heavy housework, medications). Typically, mild frailty progressively impairs shopping and walking outside alone, meal preparation and housework.

6 **Moderately Frail** – People need help with **all outside activities** and with **keeping house**. Inside, they often have problems with stairs and need **help with bathing** and might need minimal assistance (cuing, standby) with dressing.

7 **Severely Frail** – **Completely dependent for personal care**, from whatever cause (physical or cognitive). Even so, they seem stable and not at high risk of dying (within ~ 6 months).

8 **Very Severely Frail** – Completely dependent, approaching the end of life. Typically, they could not recover even from a minor illness.

9. **Terminally Ill** - Approaching the end of life. This category applies to people with **a life expectancy <6 months**, who are **not otherwise evidently frail.**

Scoring frailty in people with dementia

The degree of frailty corresponds to the degree of dementia. Common **symptoms in mild dementia** include forgetting the details of a recent event, though still remembering the event itself, repeating the same question/story and social withdrawal.

In **moderate dementia**, recent memory is very impaired, even though they seemingly can remember their past life events well. They can do personal care with prompting.

In **severe dementia**, they cannot do personal care without help.

* 1. Canadian Study on Health & Aging, Revised 2008.
2. K. Rockwood et al. A global clinical measure of fitness and frailty in elderly people. CMAJ 2005;173:489-495.

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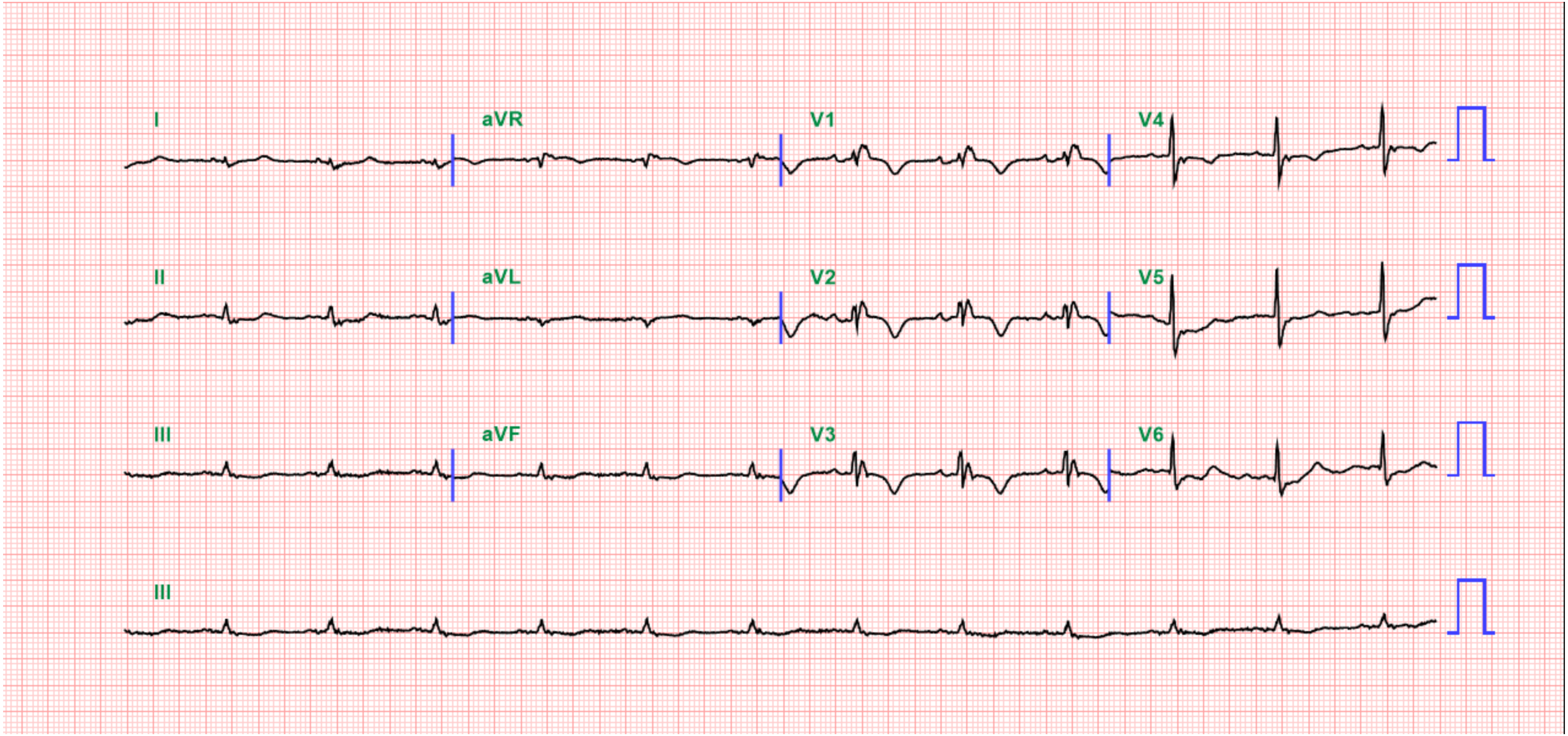
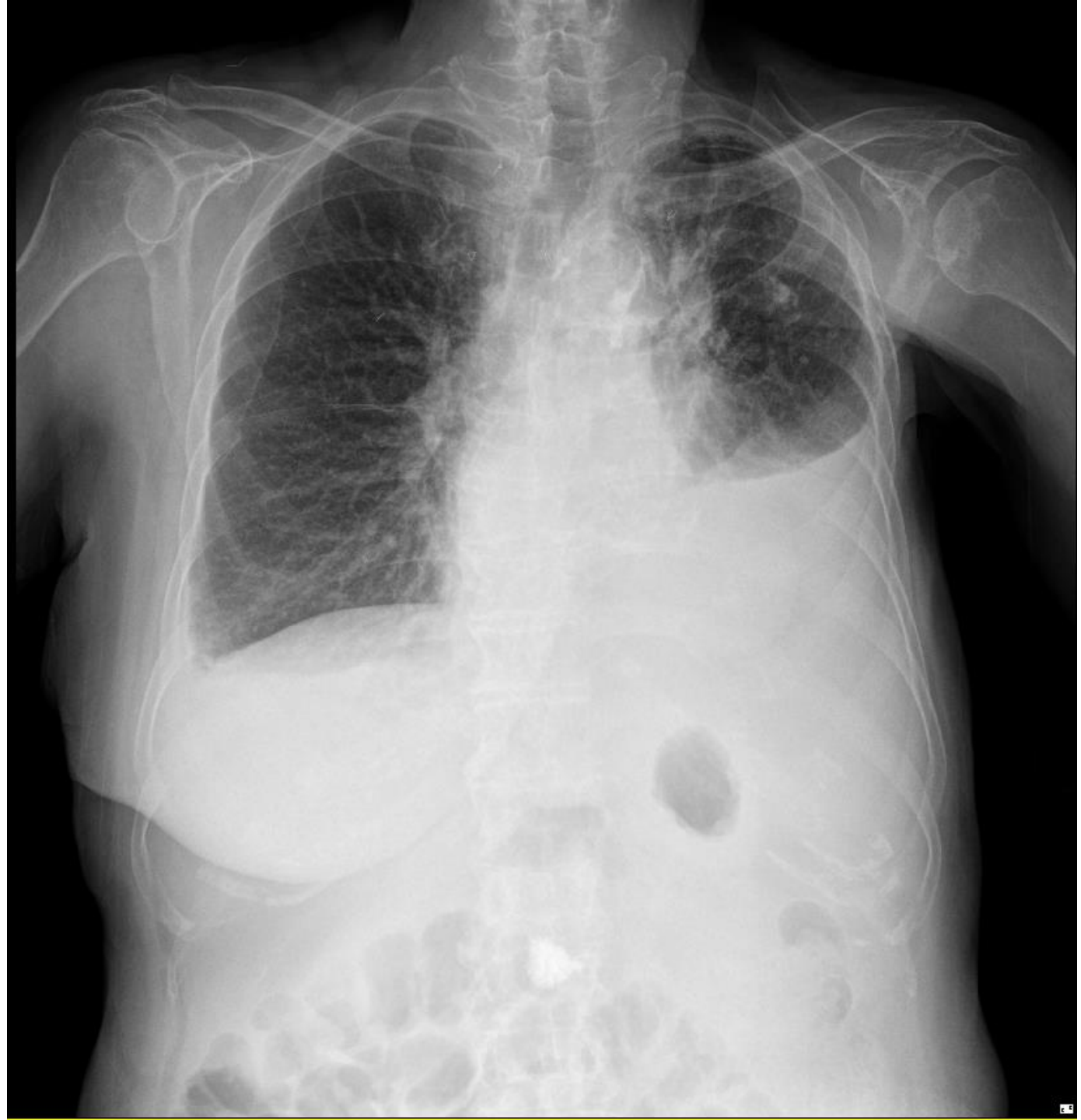
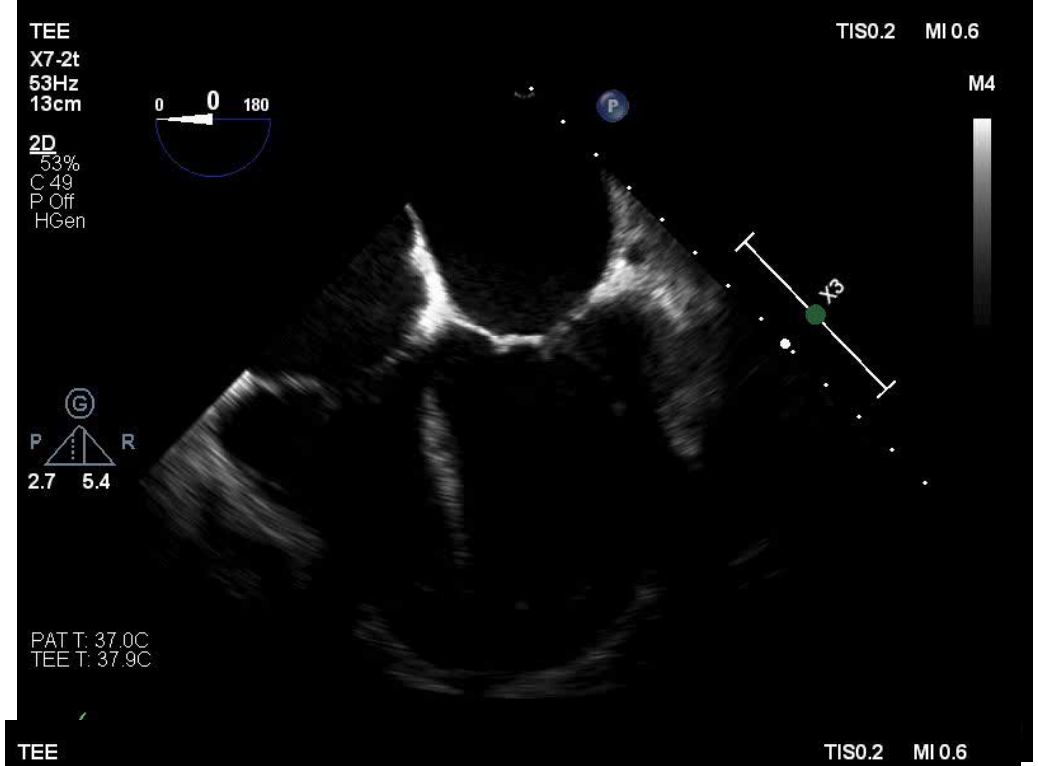
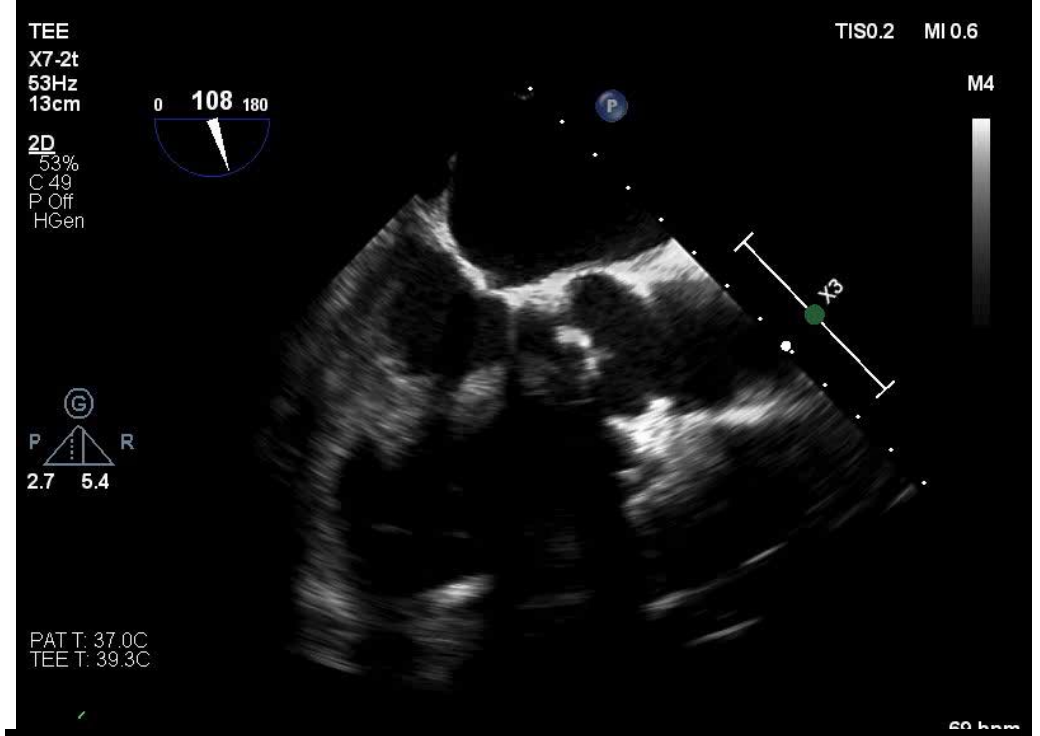
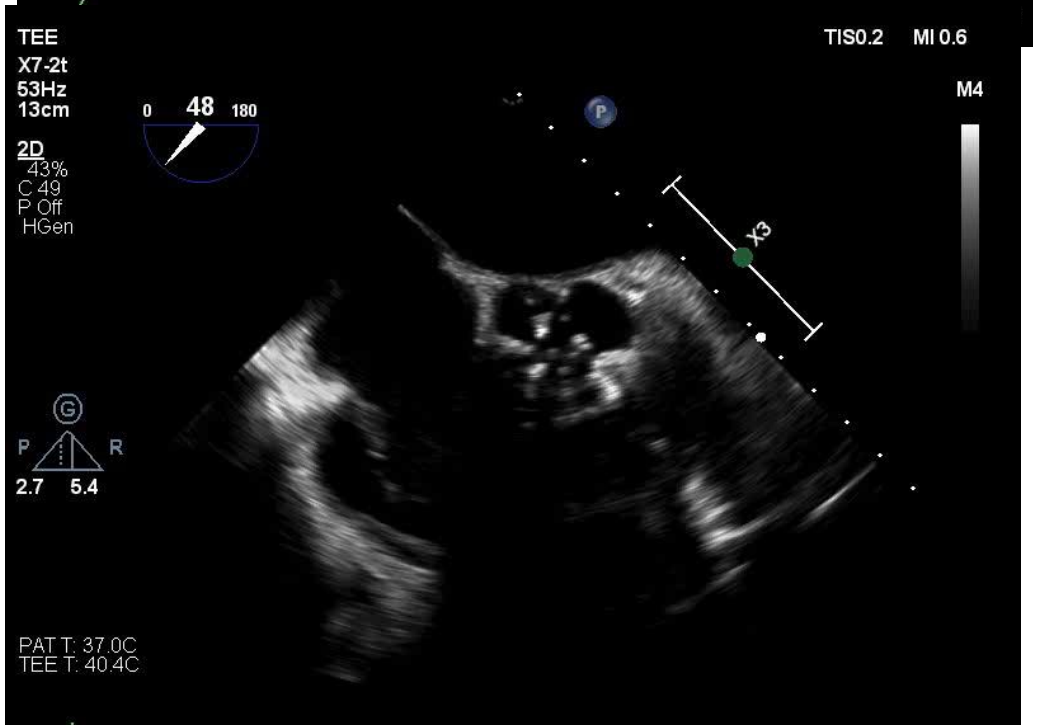
Pre-existing RBBB



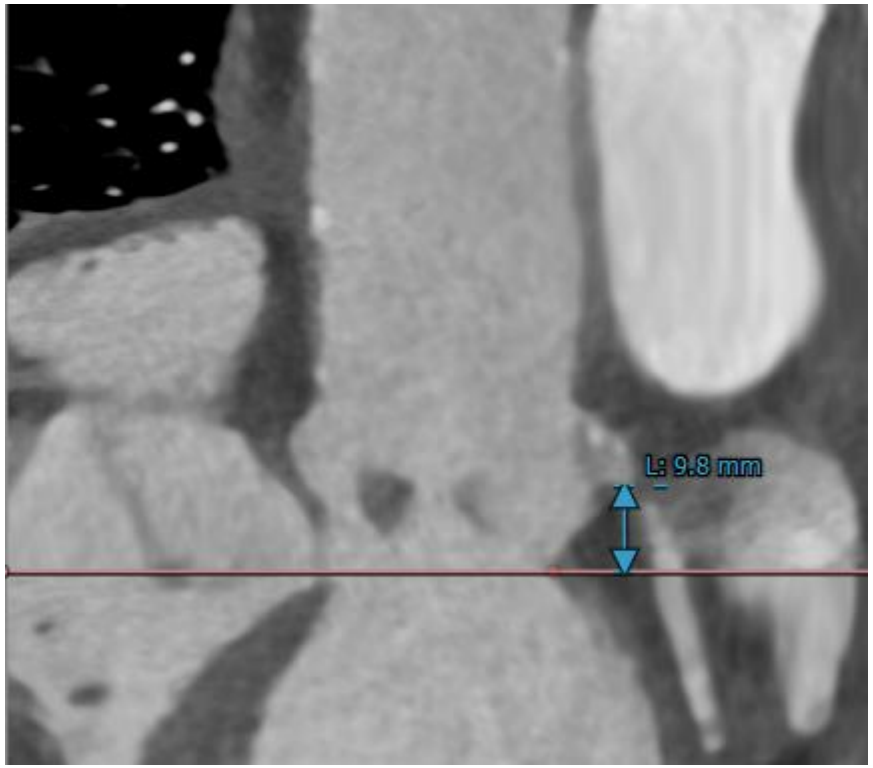


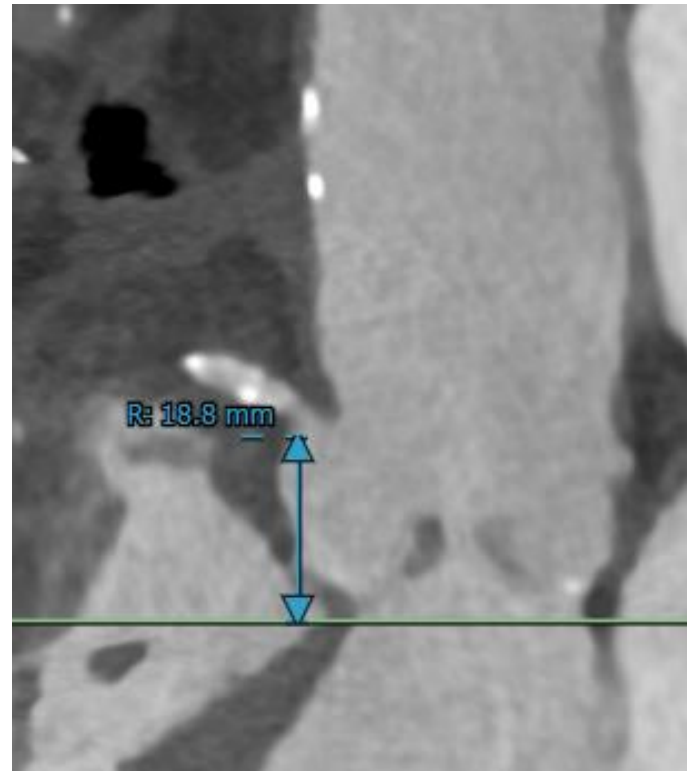

TEE
X7-2t
53Hz
13cm
2D
53%
C 49
P Off
HGen
TIS0.2 MI 0.6
M4
0 0 180
X3
P R
2.7 5.4
PAT T: 37.0C
TEE T: 37.9C

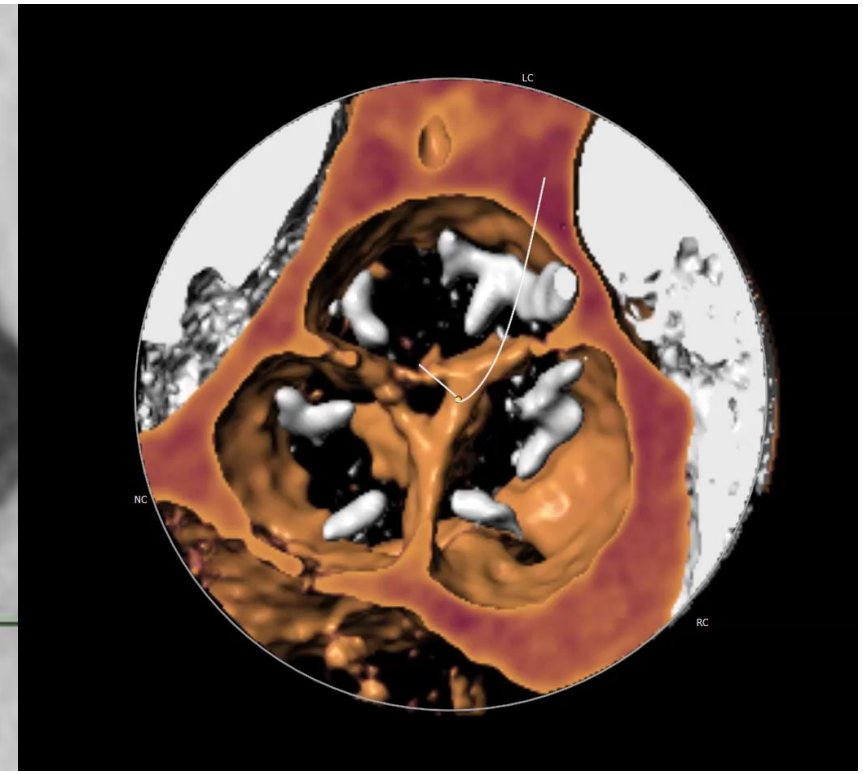

TEE
X7-2t
53Hz
13cm
2D
53%
C 49
P Off
HGen
TIS0.2 MI 0.6
M4
0 108 180
X3
P R
2.7 5.4
PAT T: 37.0C
TEE T: 39.3C


TEE
X7-2t
53Hz
13cm
2D
43%
C 49
P Off
HGen
TIS0.2 MI 0.6
M4
0 48 180
X3
P R
2.7 5.4
PAT T: 37.0C
TEE T: 40.4C

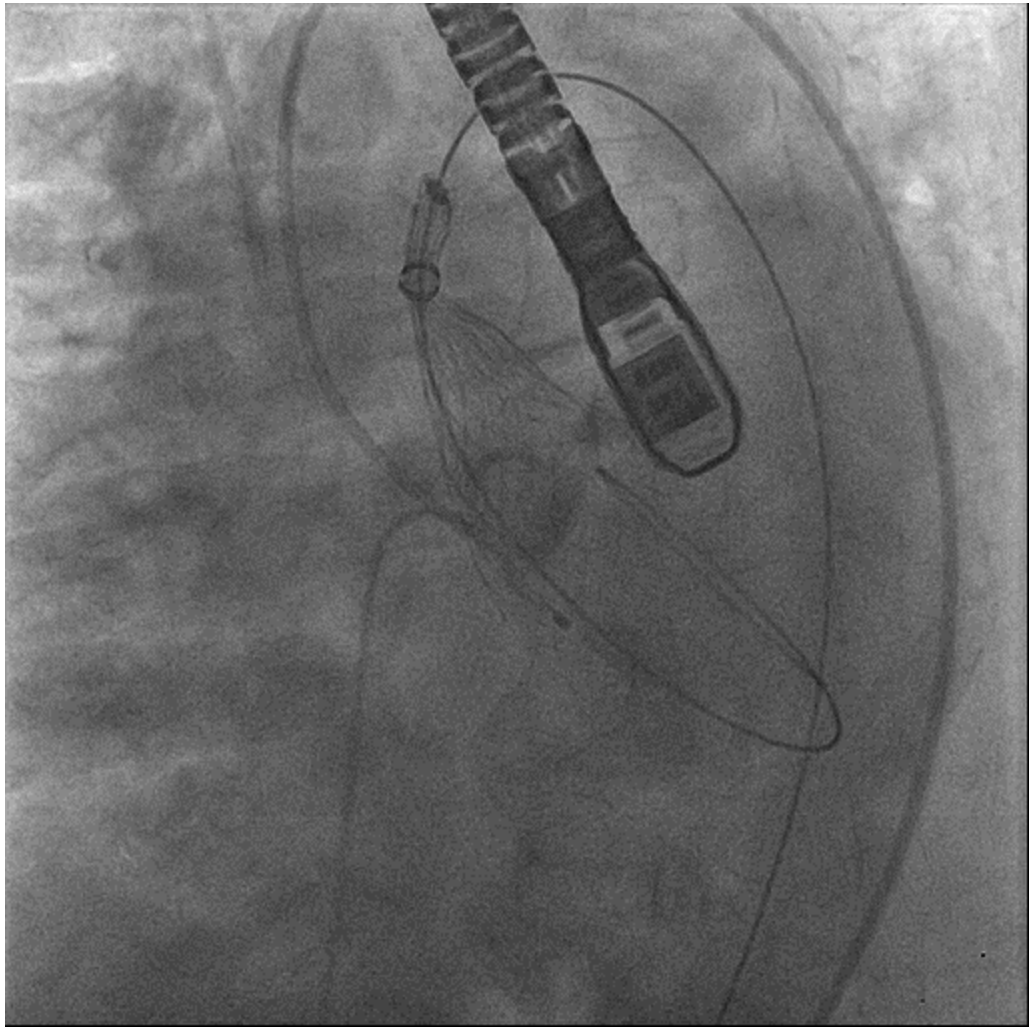

TEE
X7-2t
39Hz
13cm
3D Beats HVR
Live 3D
2D / 3D
% 46 / 52
C 49 / 30
HGen
TIS0.2 MI 0.5
M4
0 50 180
PAT T: 37.0C
TEE T: 40.4C

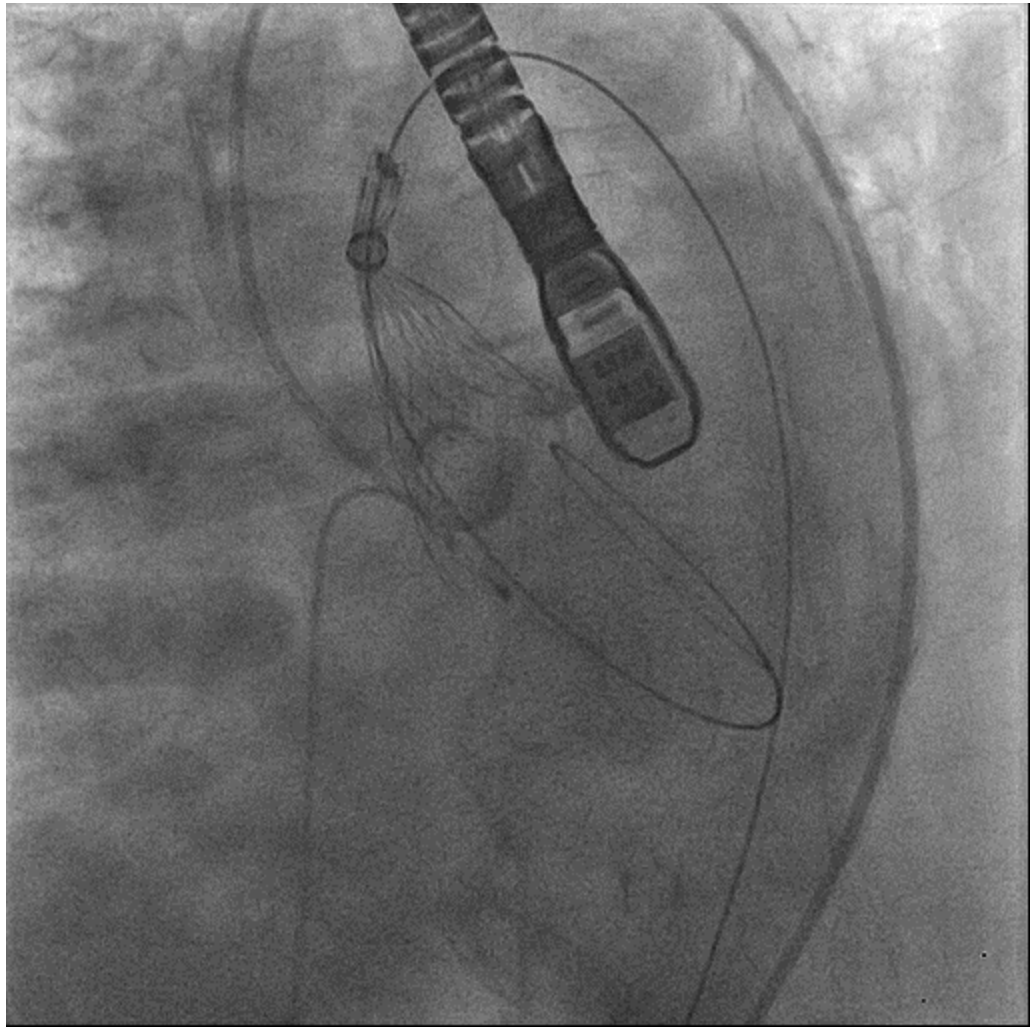

L: 9.8 mm

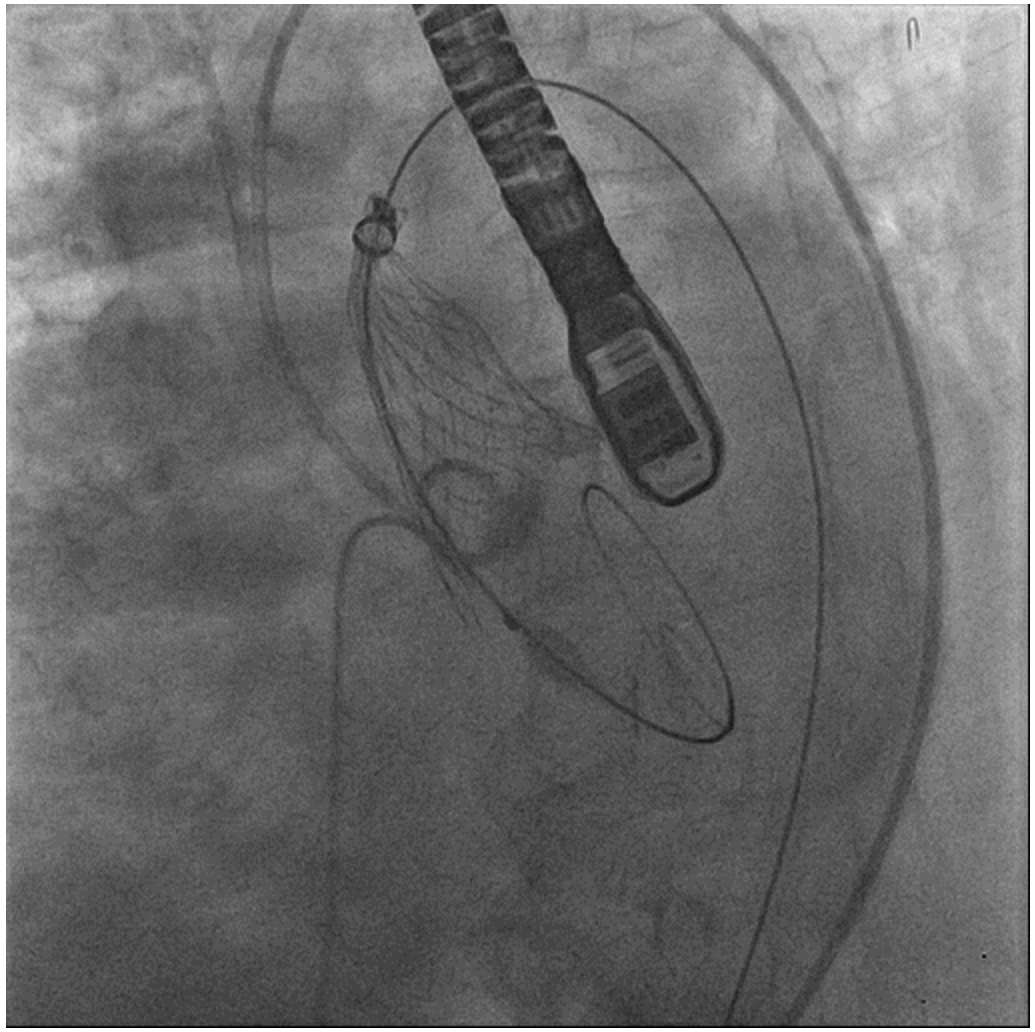

R: 18.8 mm

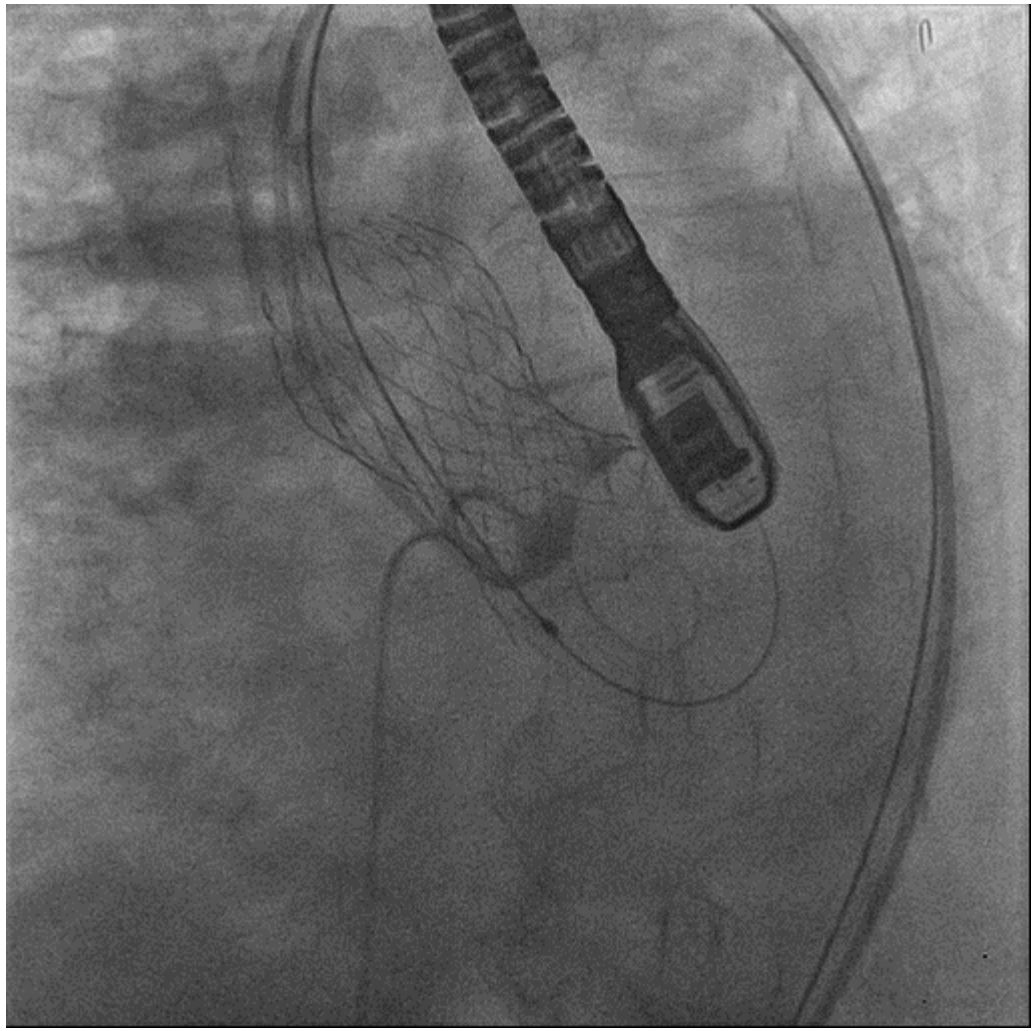

LC
NC
RC

31mm CoreValve: During valve implantation, cardiac arrest was developed

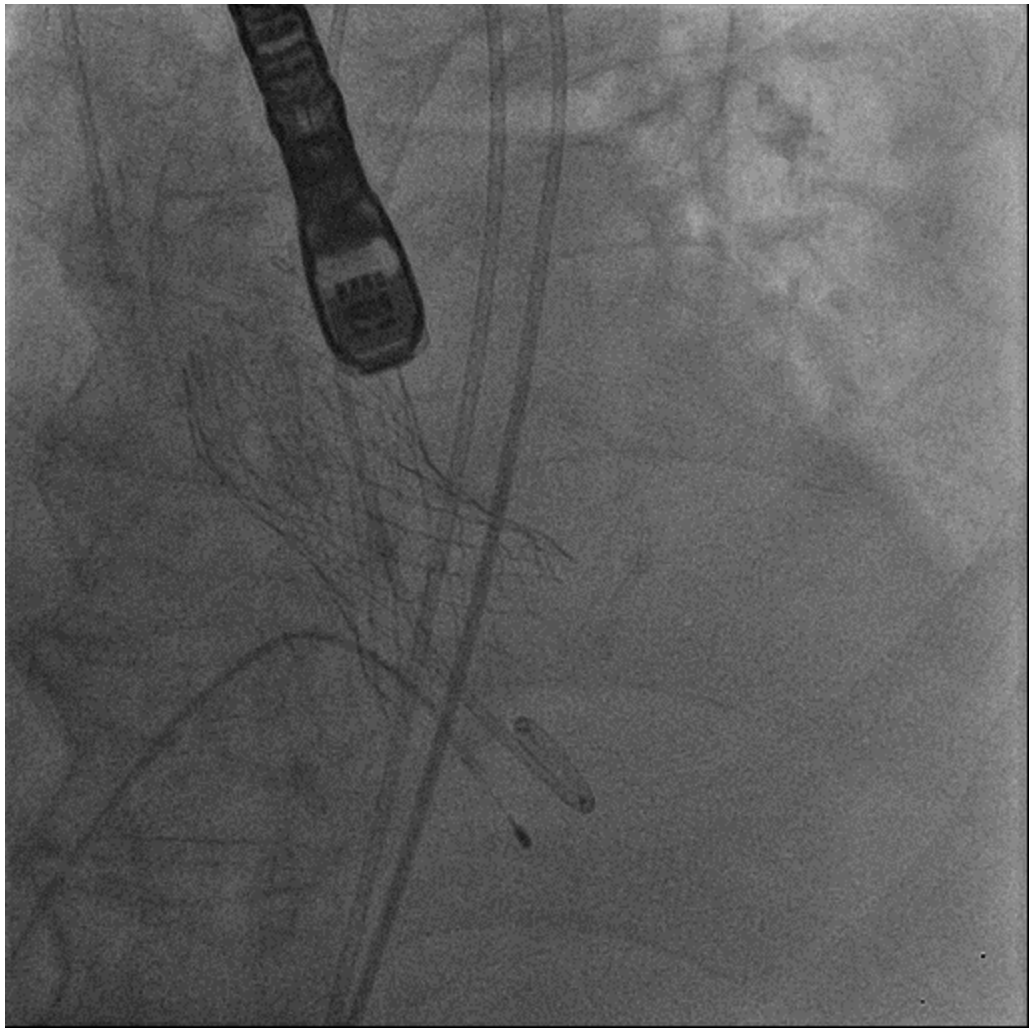


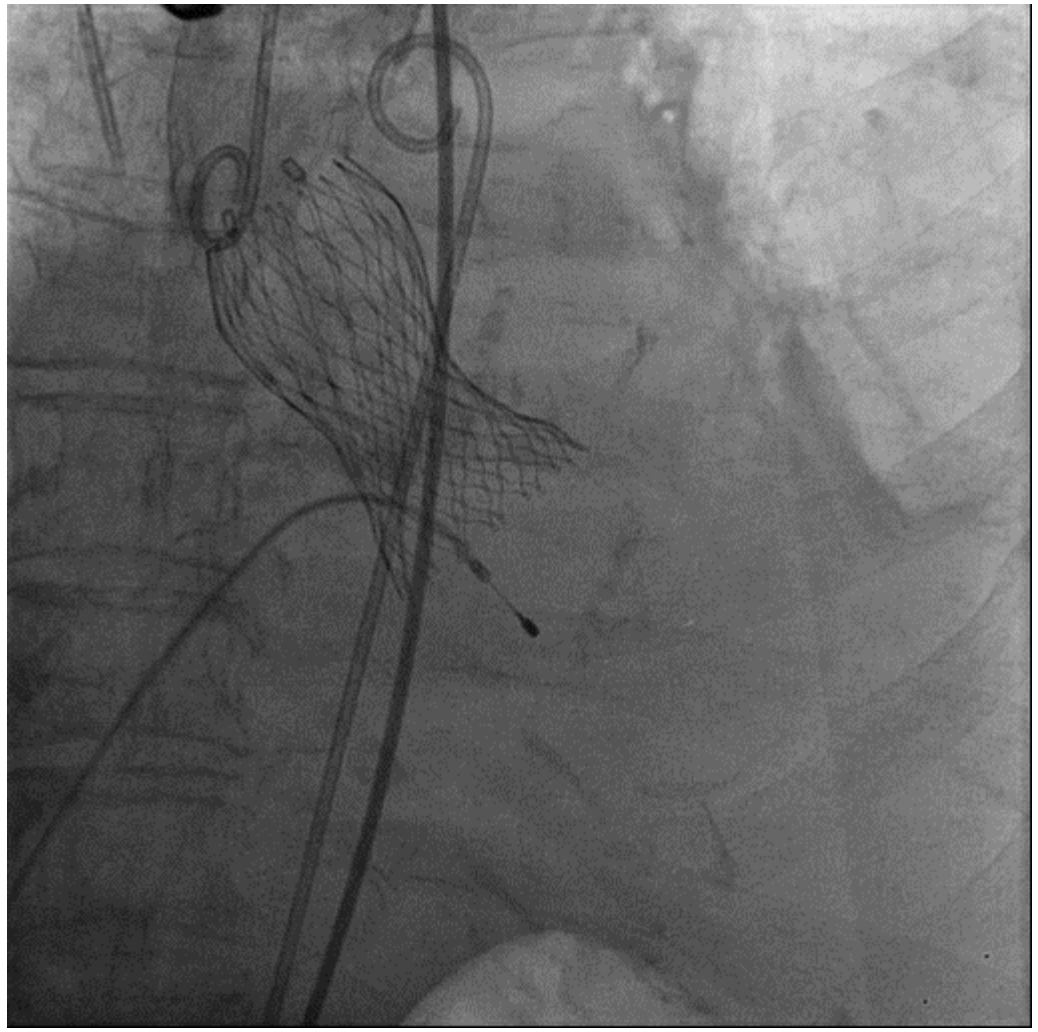




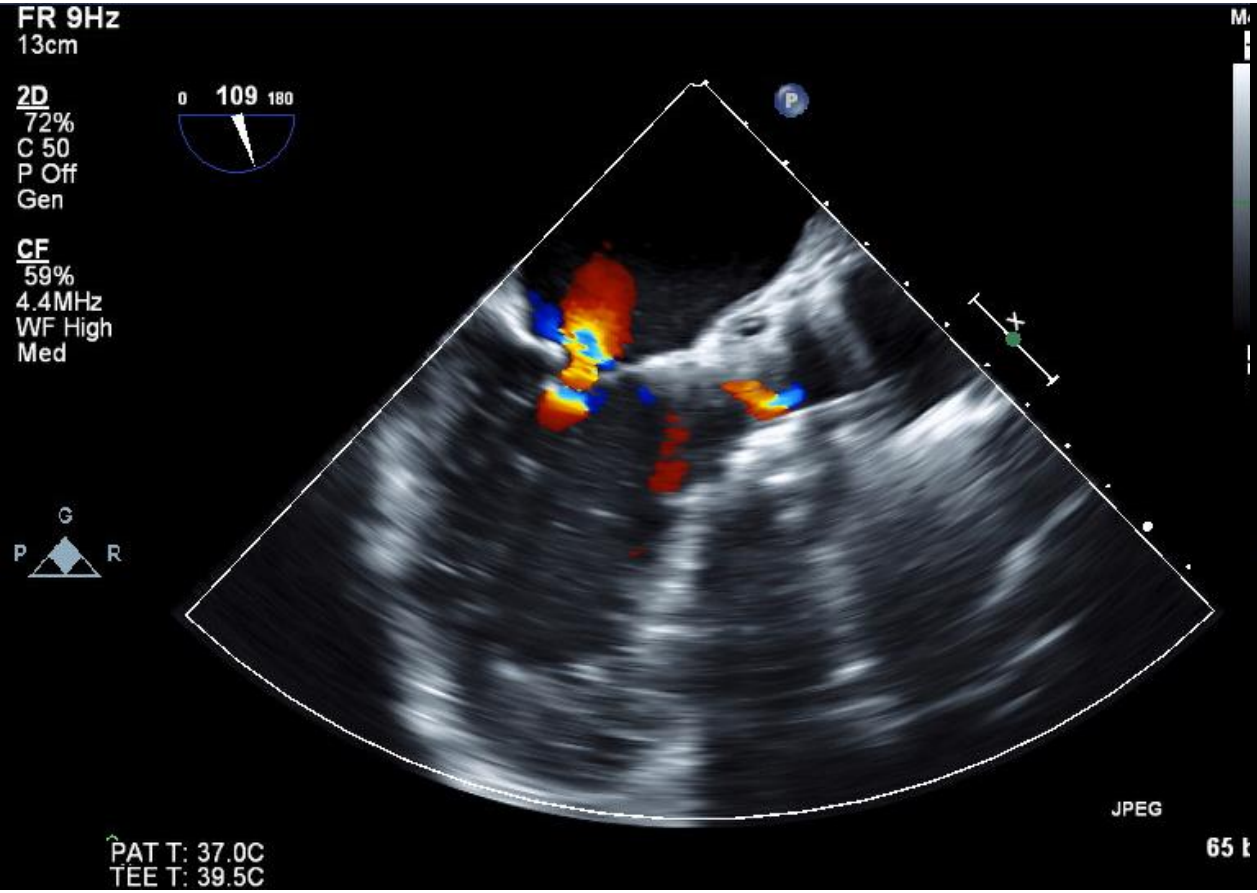


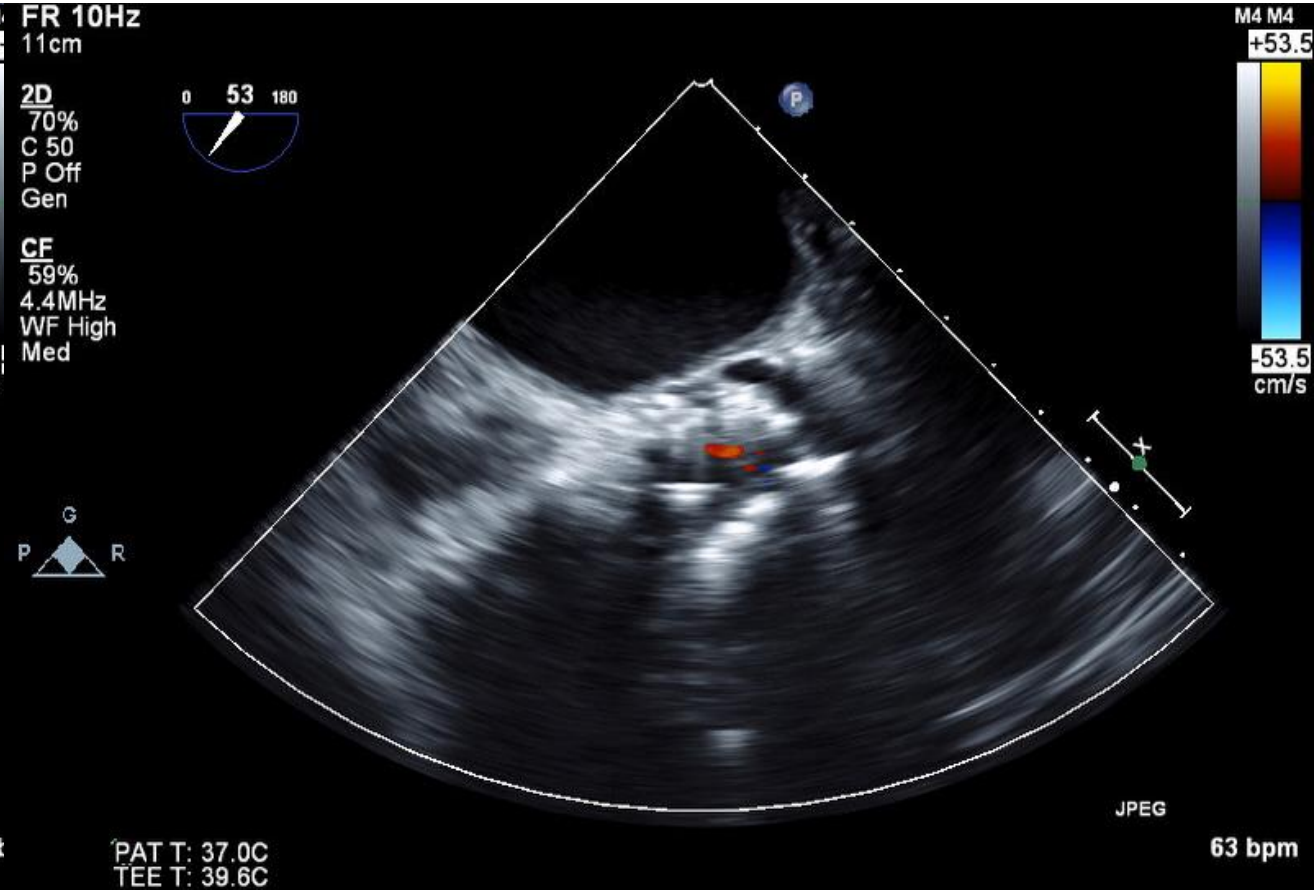
After about 3 minutes of CPR, spontaneous circulation was restored



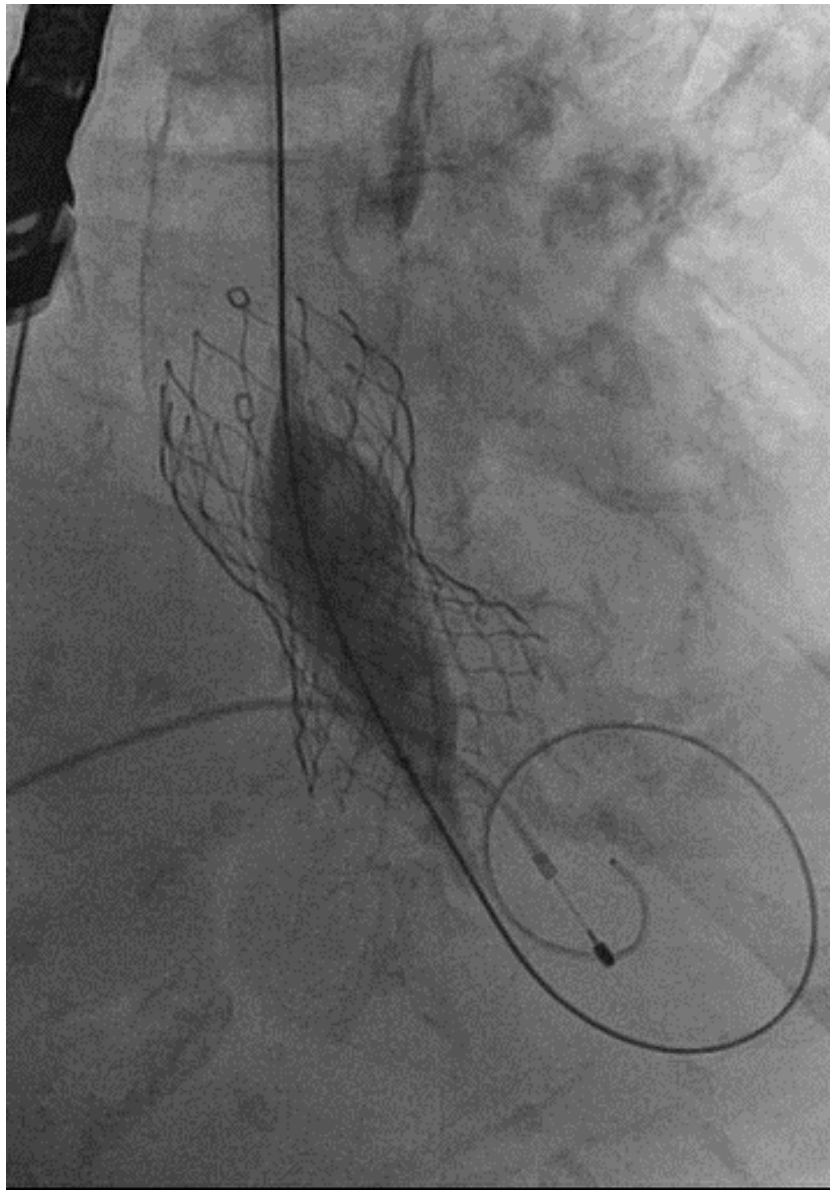


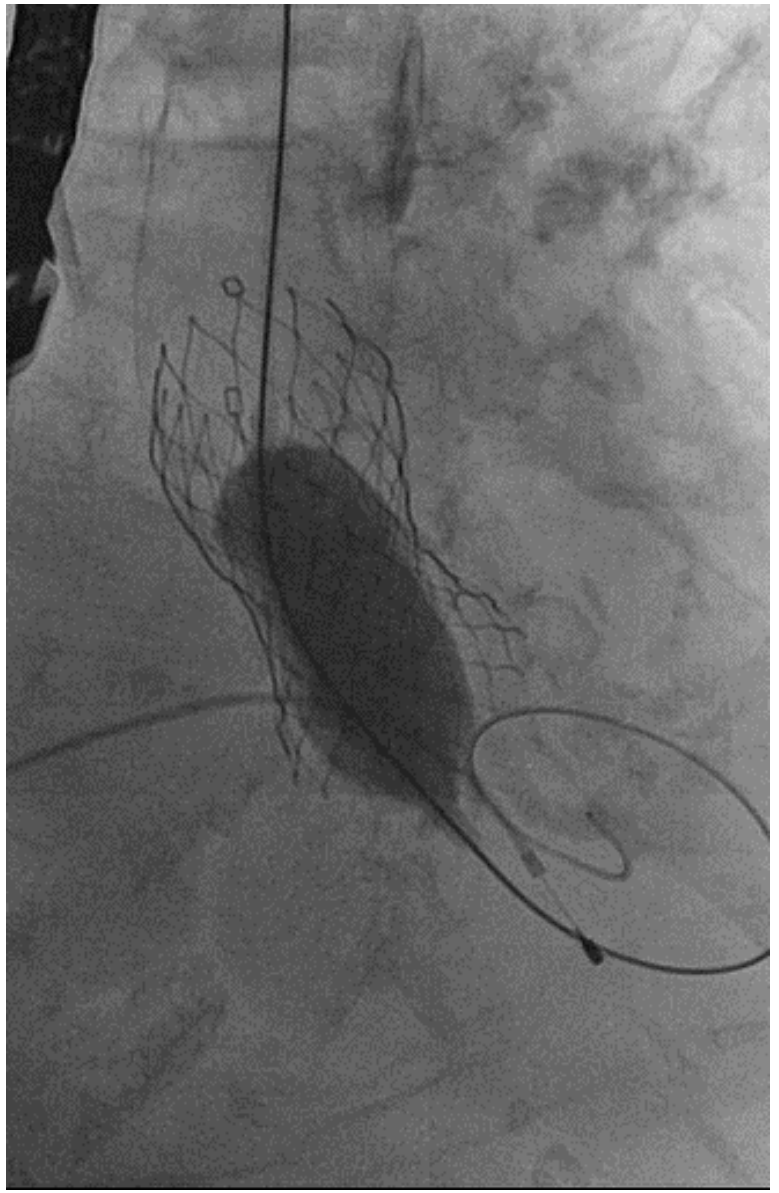
Intra-procedural TEE: moderate PVL



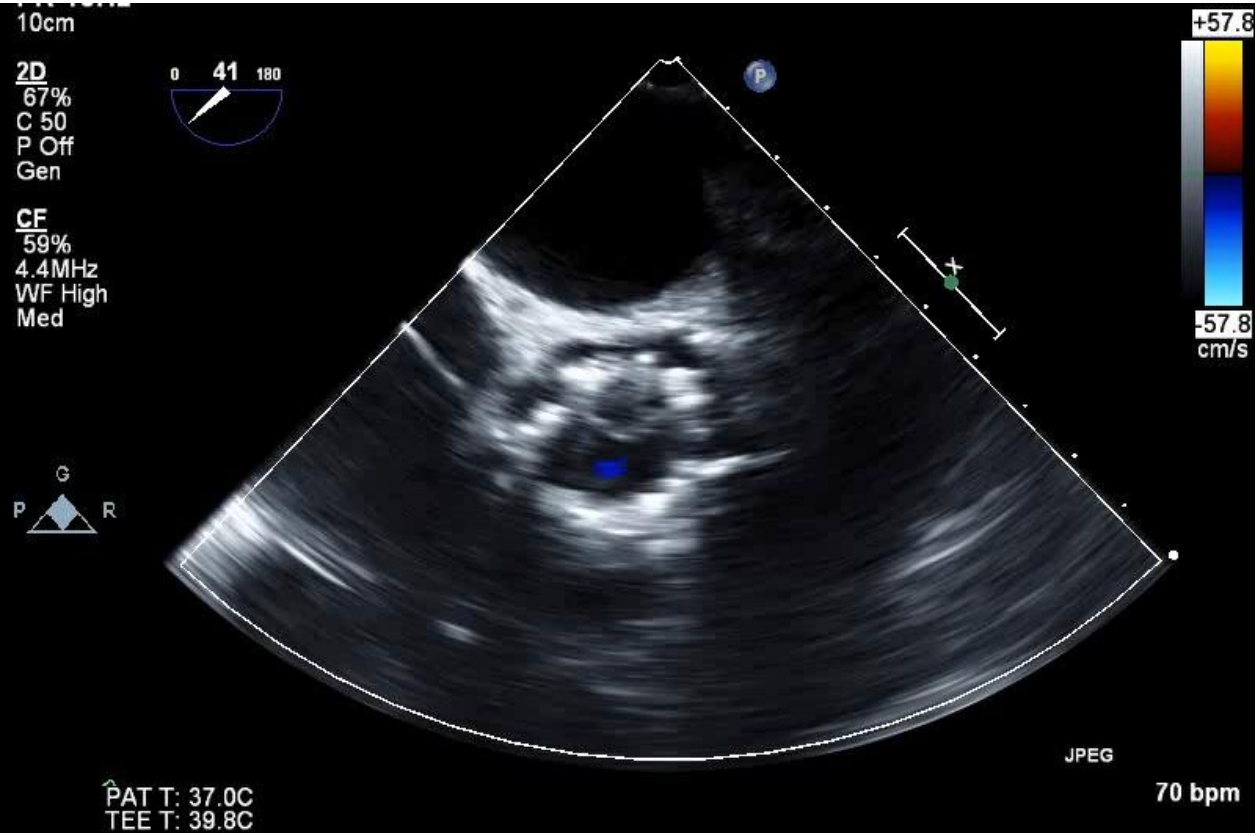


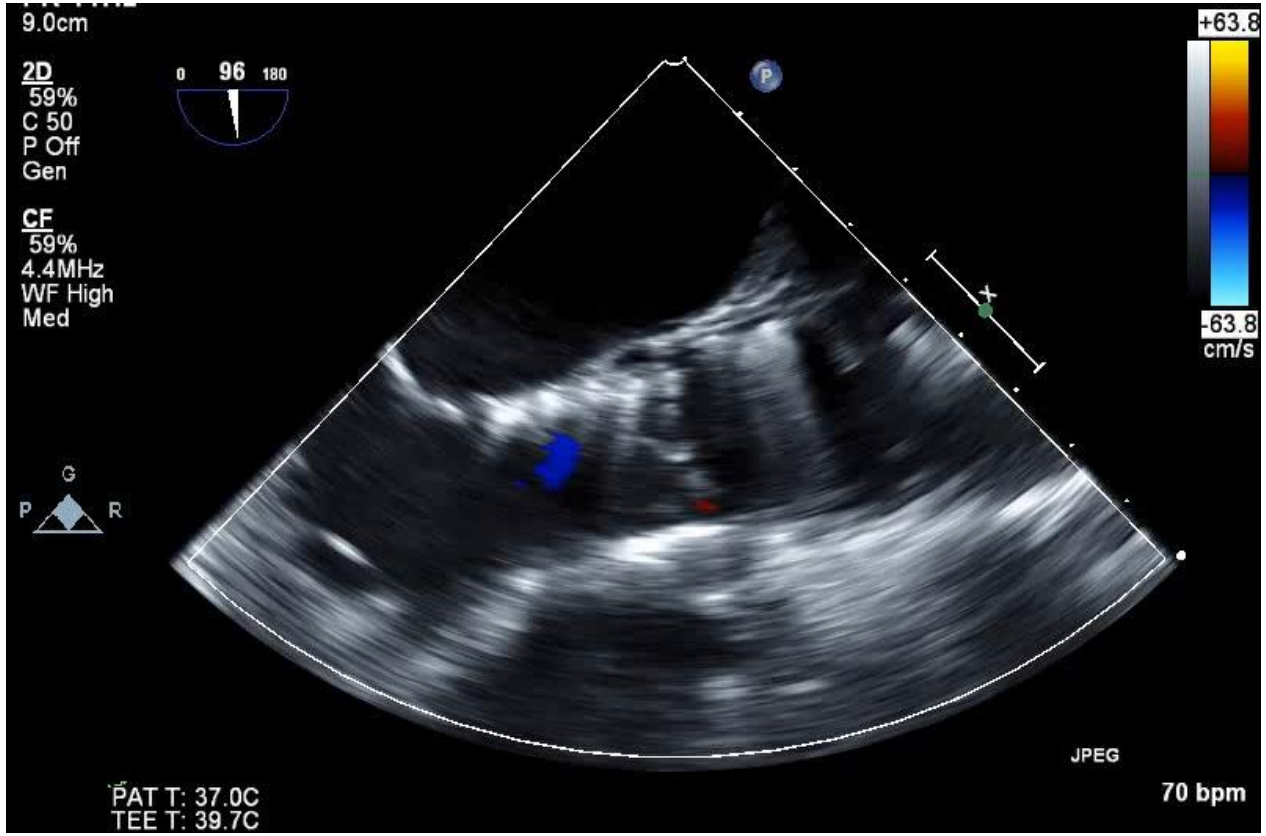
Post-dilation: 25mm-sized balloon



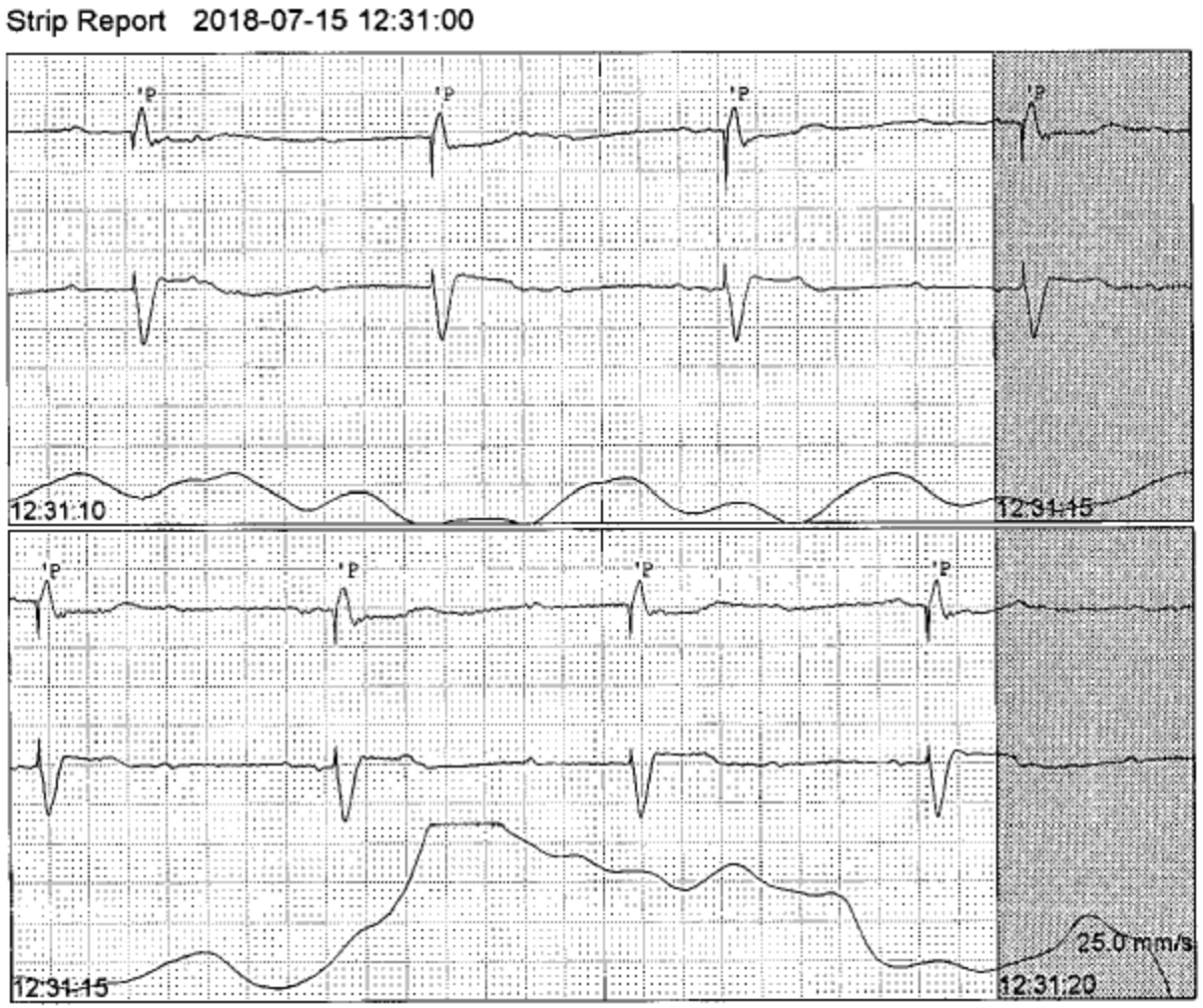


F/U Intra-procedural TEE: moderate -> trivial PVL

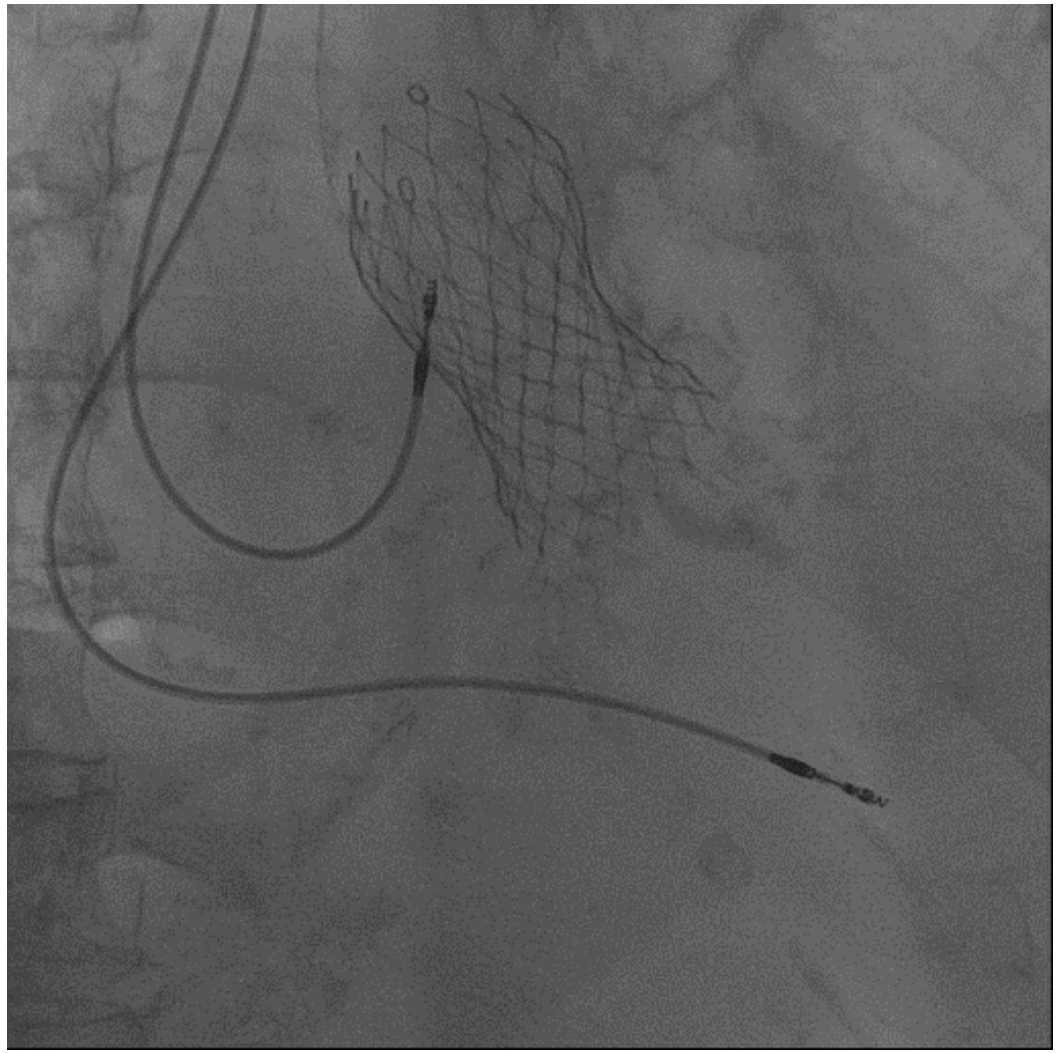




CAV, 3 days after TAVR



PPM implantation, 6 days after TAVR



In Conclusion

- Proper patient selection is very important to prevent disasterous complications such as annular rupture, especially in patients with unfavorable calcification patterns.
- Selection of proper device or optimal procedure based on the anatomical characteristics is important to prevent PPM implantation.
- We have to always prepare for possible emergencies such as severe AR, annular rupture, coronary obstruction.

Minimalism of TAVI

No General Anesthesia. No Conscious Sedation. No TEE.

freely talk with patient during TAVI

Thank you for your attention !