

“Lotus” : Next Generation Valve

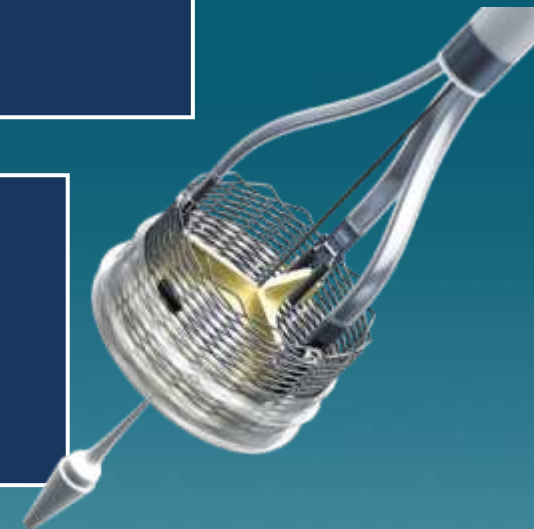
Advantage & Disadvantage

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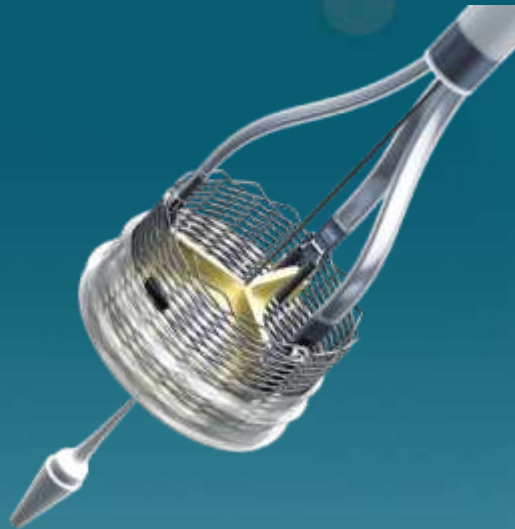


- Perfect result in tough situation
 - Safest result in risky situation
 - ✓ **LVOT calcification**
 - ✓ **Heavy eccentric calcification**
 - ✓ **Bicuspid AS**
- : risk of Leakage or Tear**

- **LOTUS valve is preferred**
 - ✓ **To minimize paravalvular leak**
 - ✓ **With complete repositionability**

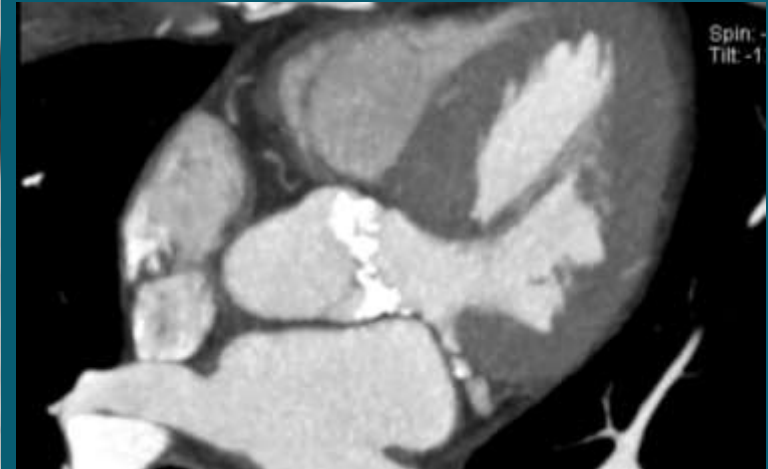
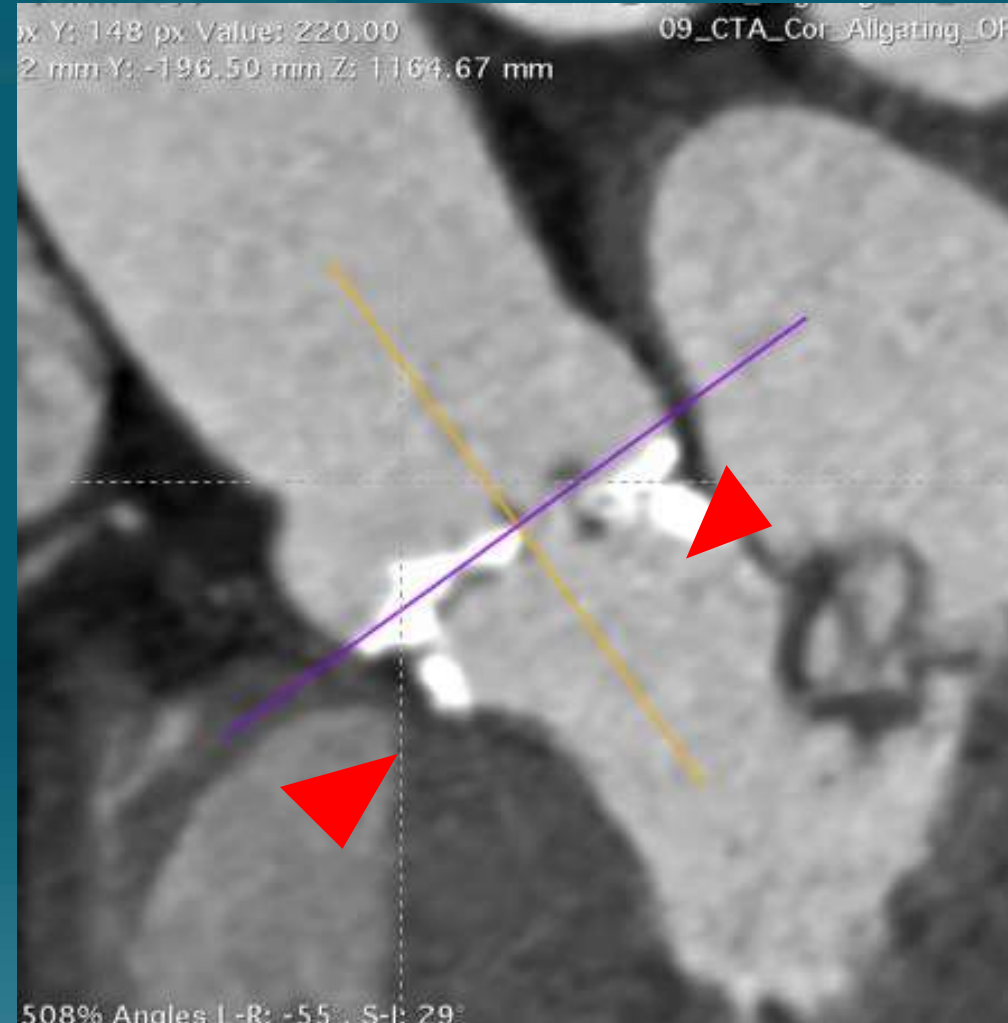


LVOT calcification



Calcified tricuspid aortic valve with LVOT involvement

CT angiography (2016.6.30.)



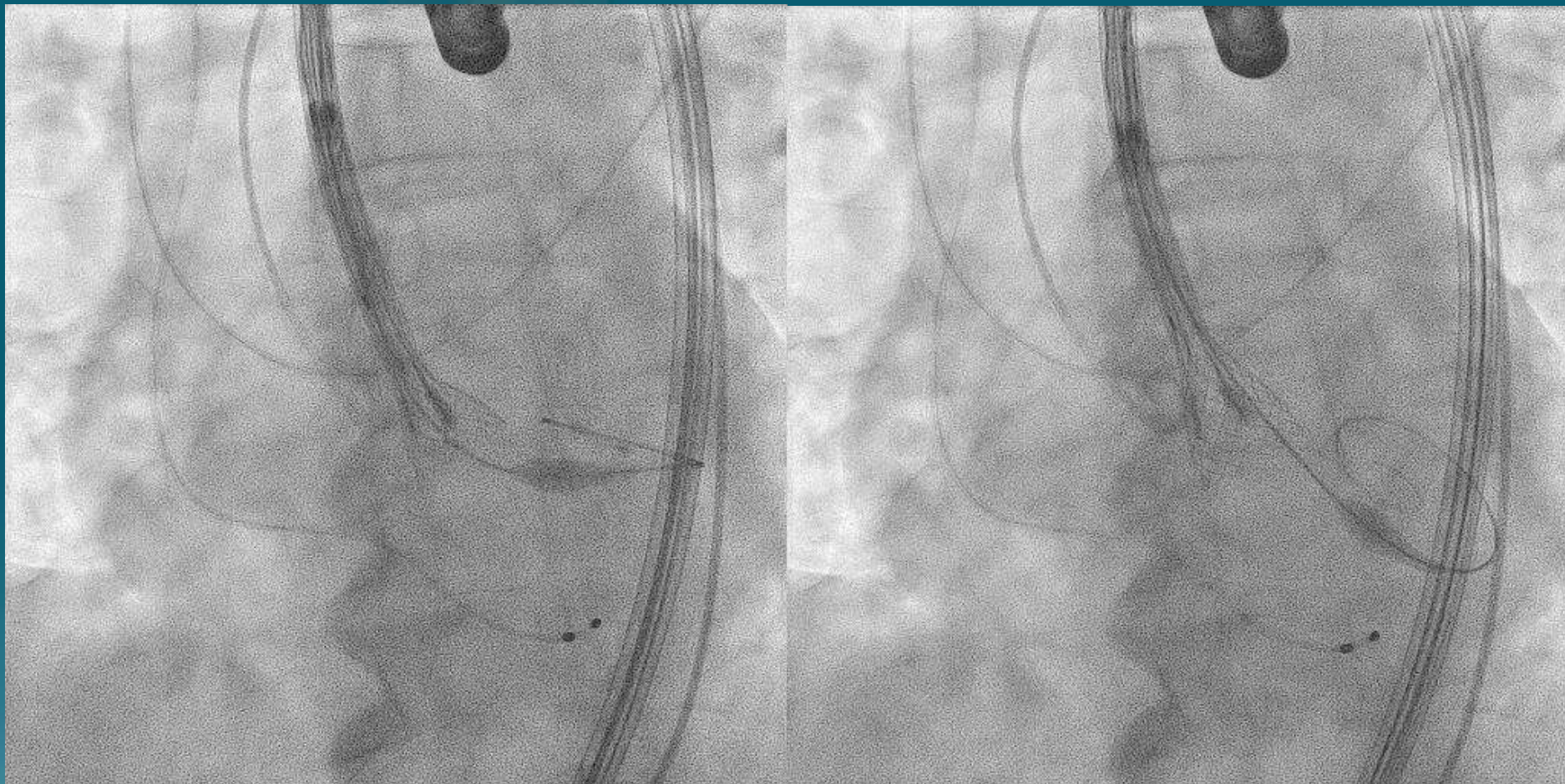
Annulus Angulation
45.7°

TAVI Lotus 23mm (2016-10-06)

Avoid deep insertion of valve during unsheathing

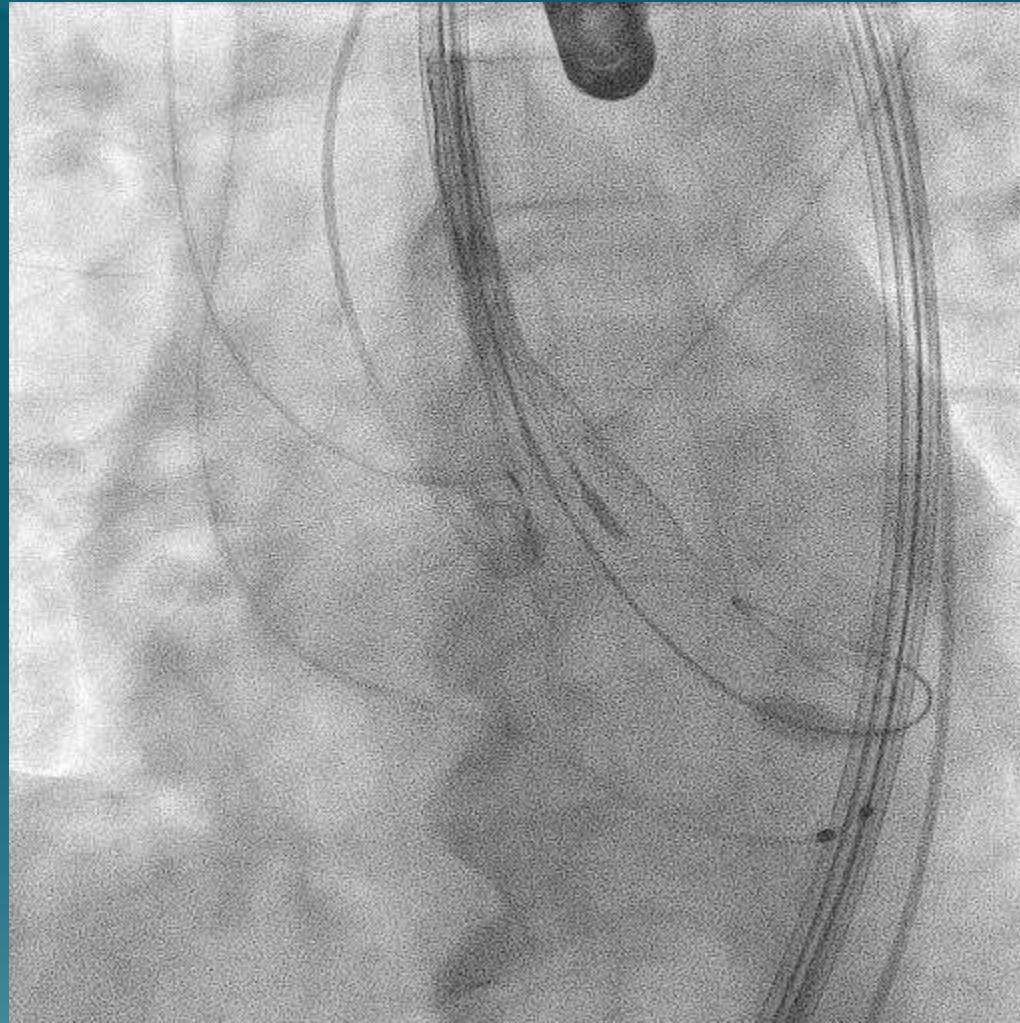
Adjust the distal edge of POST at annulus plane

Adjust the angle to make three POSTs at single plane



TAVI Lotus 23mm (2016-10-06)

Maintain level of distal edge of POST at annulus plane
by pushing wire into LV apex & pulling sheath if necessary

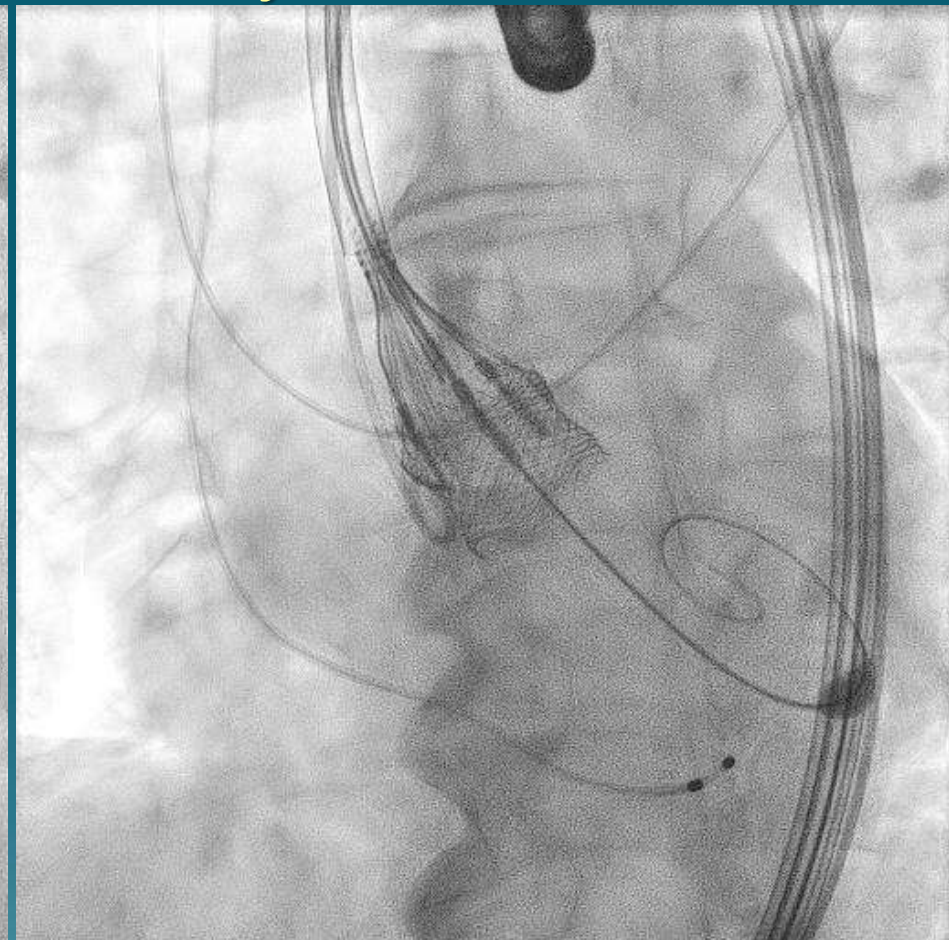
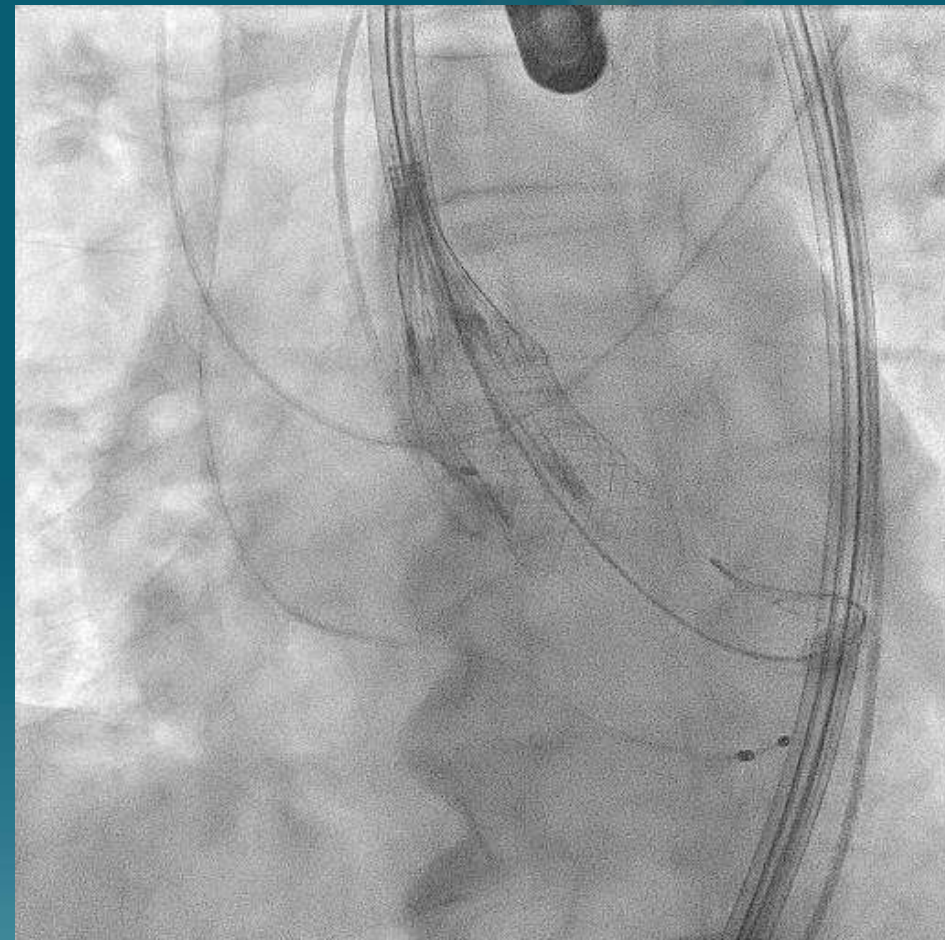


TAVI Lotus 23mm (2016-10-06)

Adjust the angle to make three POSTs at single plane for proper assessment of depth

When valve indentation appears, start lay-over

Locking (no further movement) & check the depth or leakage or coronary flow

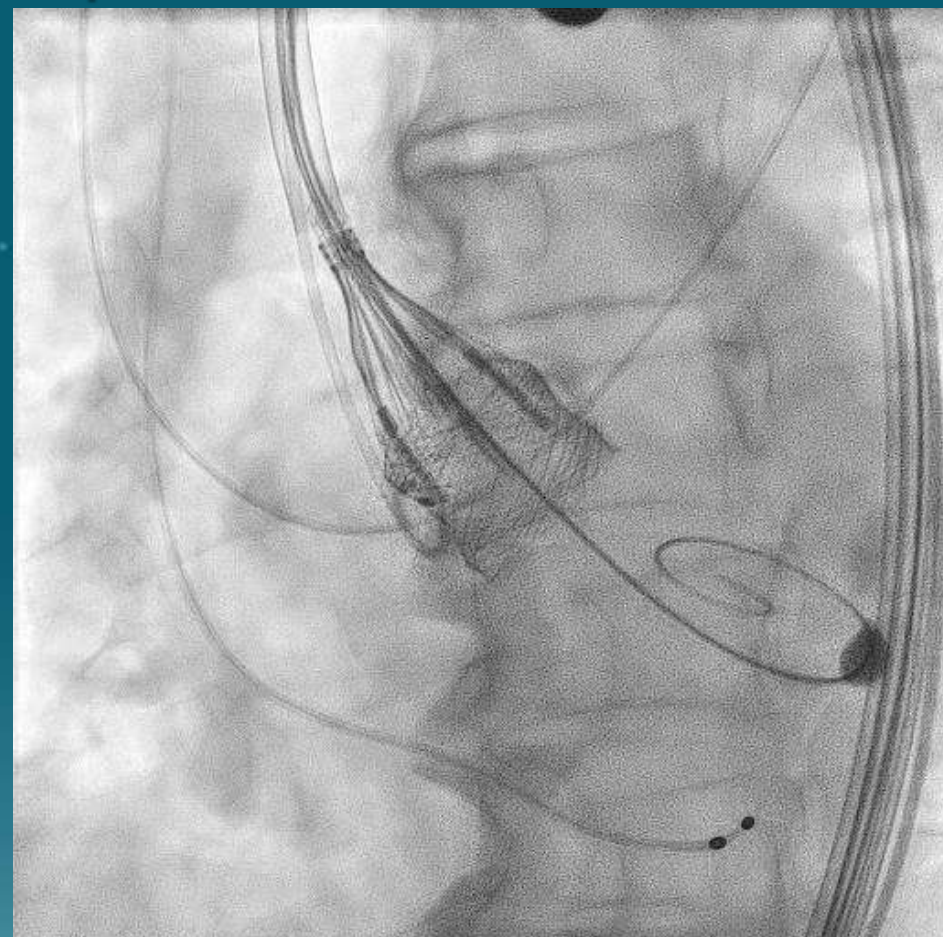
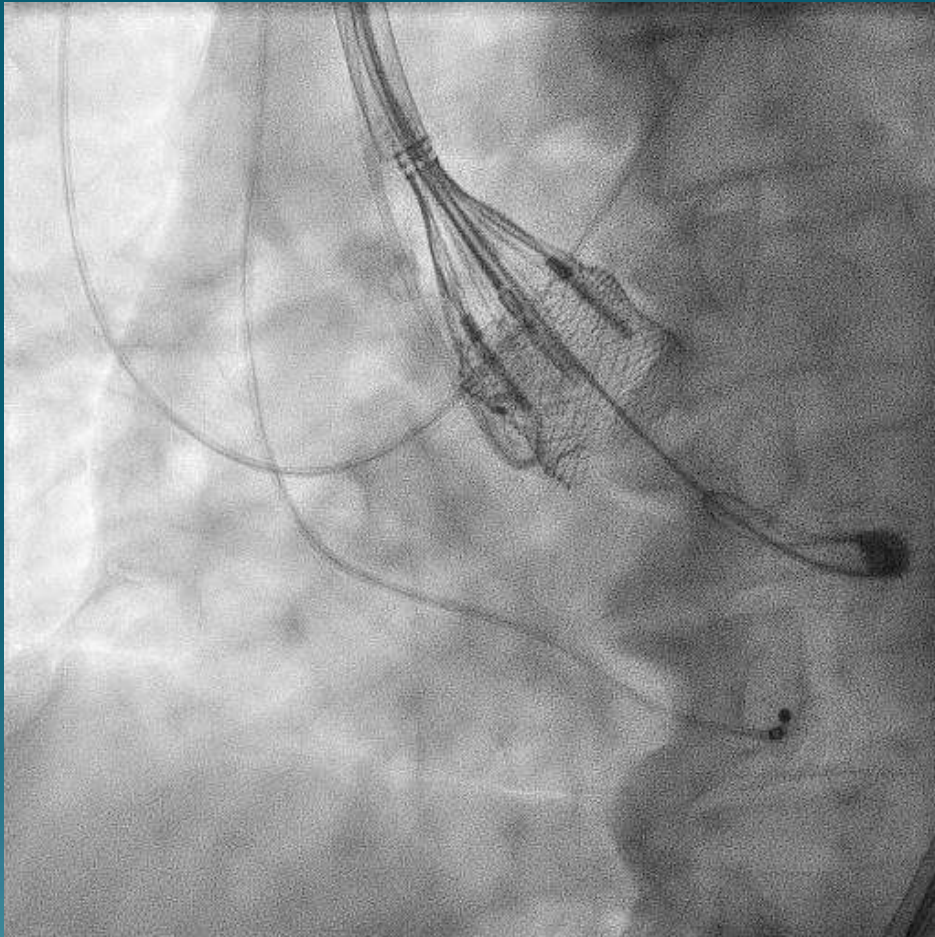


TAVI Lotus 23mm (2016-10-06)

Adjust the angle to make three POSTs at single plane for proper assessment of depth

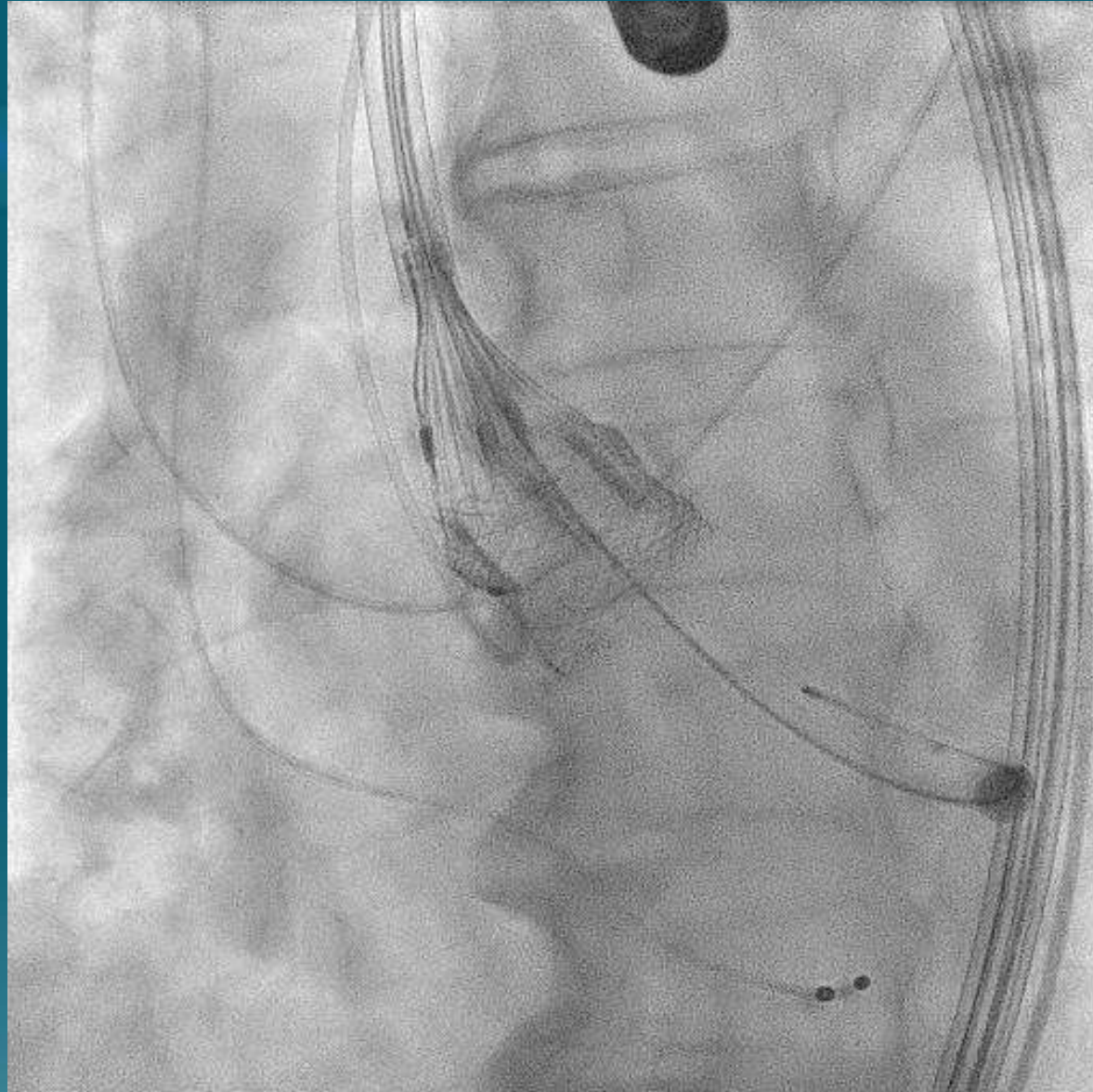
Check collar/buckle/post locked

Final check of depth or leakage or coronary flow
Optimal indentation at mid-valve



TAVI Lotus 23mm (2016-10-06)

Release



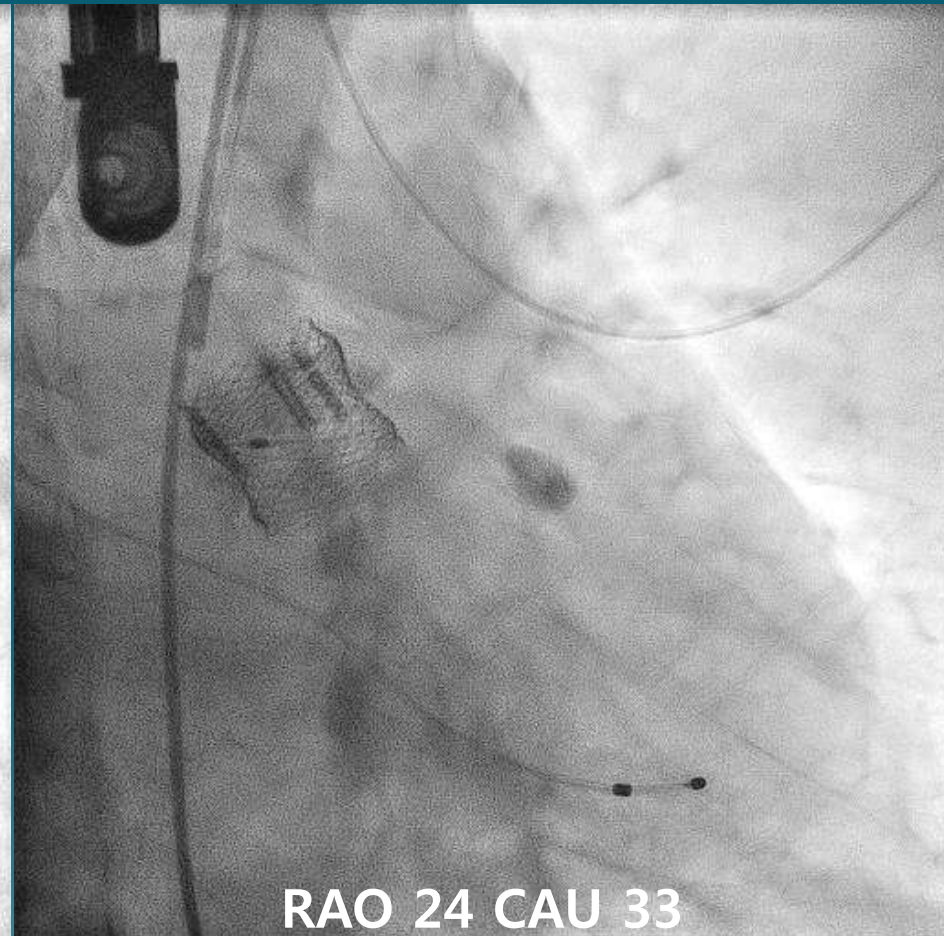
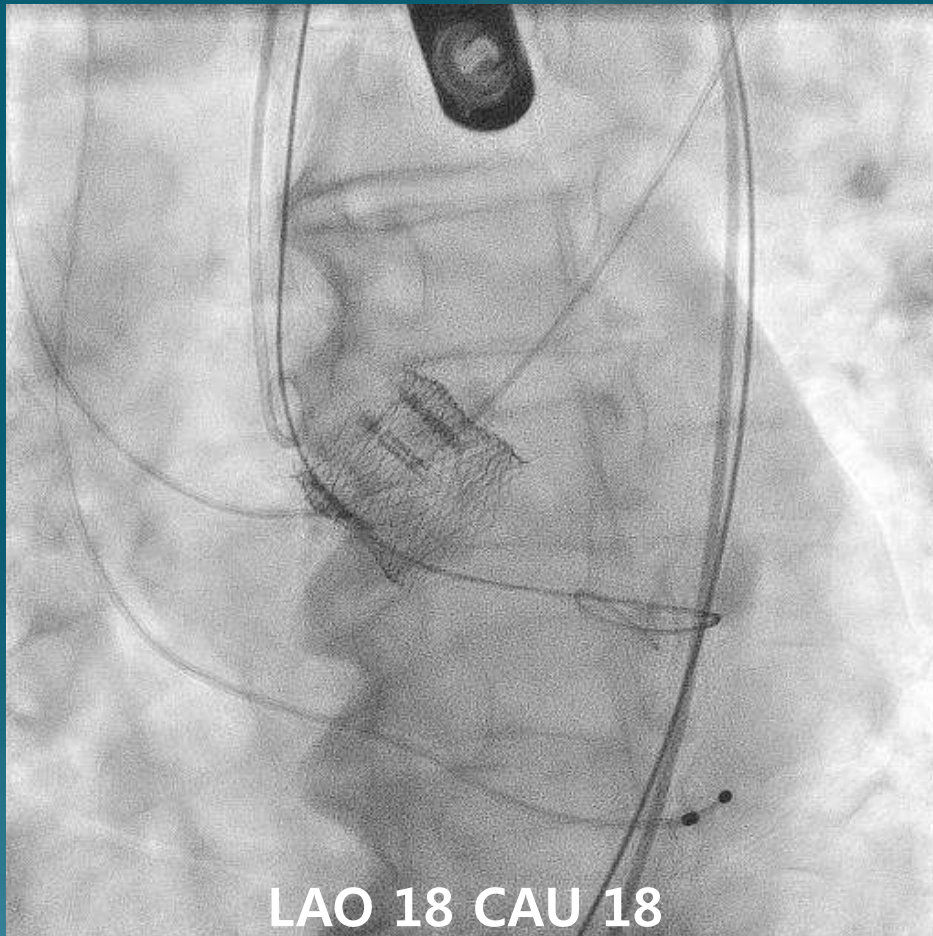
TAVI Lotus 23mm (2016-10-06)

Final angiography w/wo stiff wire in situ

Wire-bias makes trans-valvular regurgitation

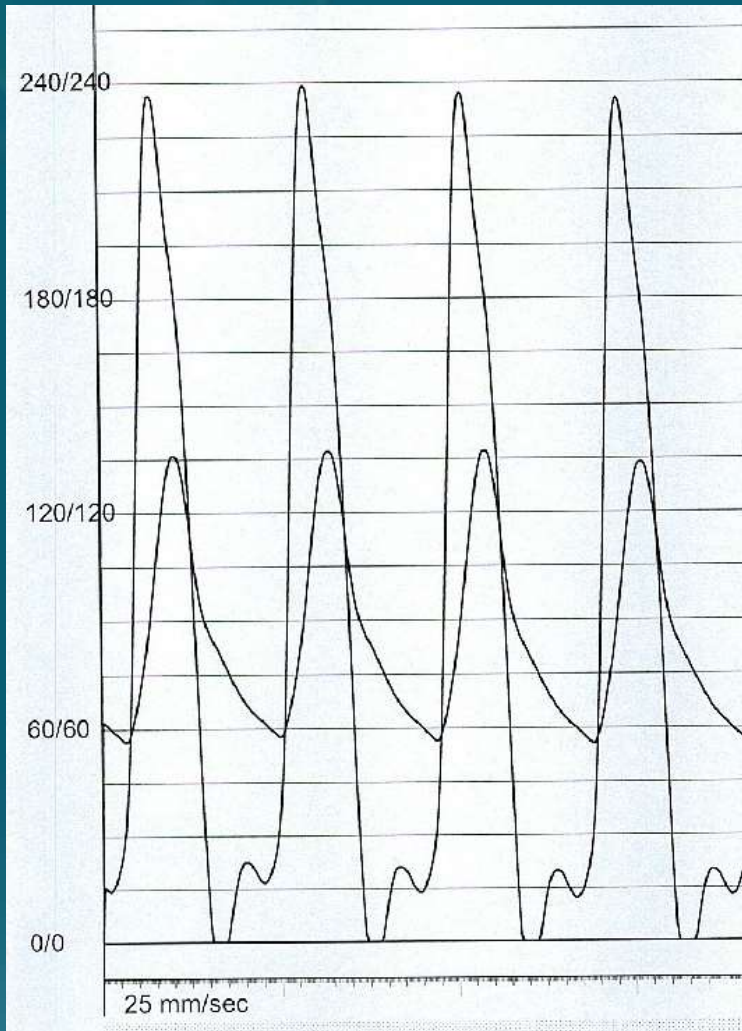
Trans-valvular leakage d/t wire

Perfect result after wire-removal



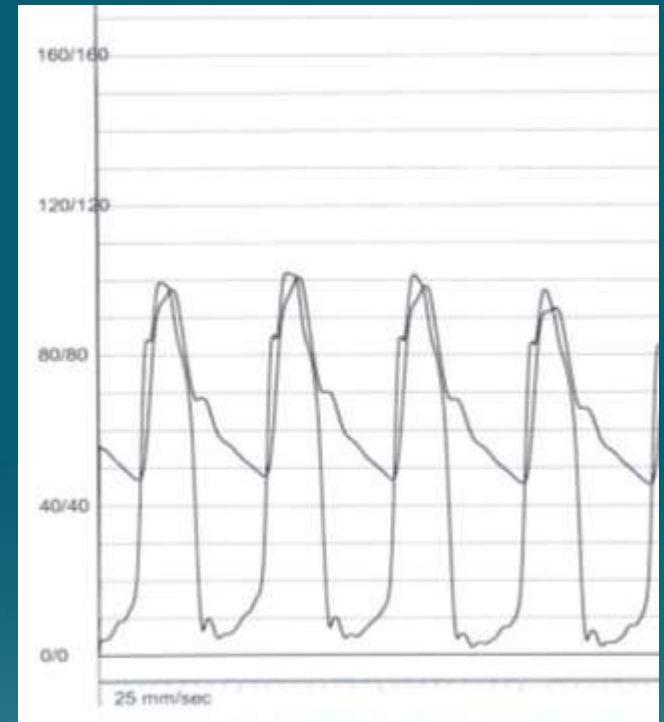
TAVI Lotus 23mm (2016-10-06)

Immediate improvement of hemodynamics



AV mean PG 73 mmHg

23 mm
LOTUS
Valve



AV mean PG < 5 mmHg

TAVI Lotus 23mm (2016-10-06)

Perfect AR Index suggesting 'No Leakage'

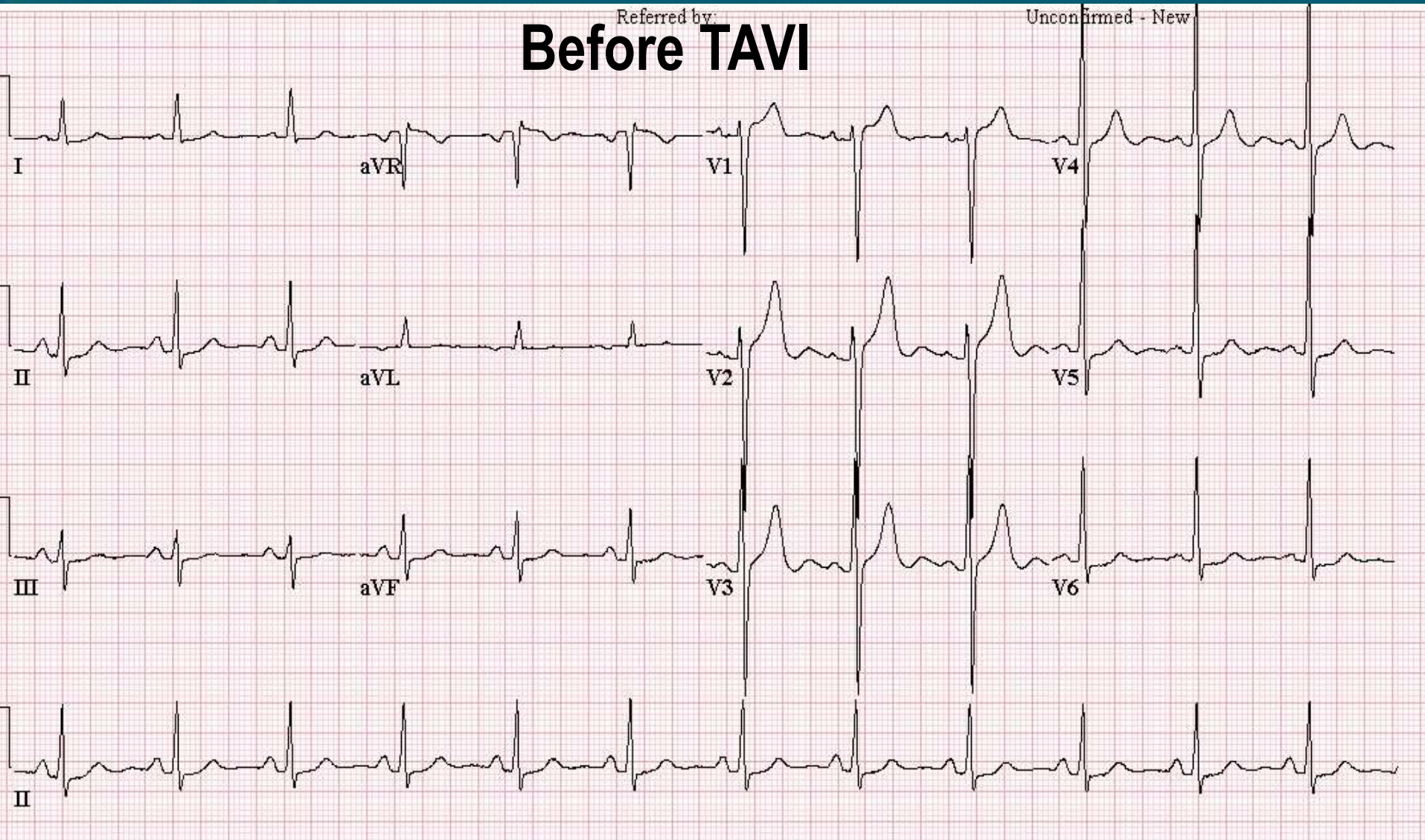
| | PRE TAVI | | | | POST TAVI | | | |
|----------|-----------|-----|-----|----|-----------|----|-----|----|
| Ao. | SP | 136 | DP | 56 | SP | 96 | DP | 46 |
| LV. | SP | 237 | EDP | 17 | SP | 96 | EDP | 13 |
| AR Index | 29 | | | | 34 | | | |

$$\text{AR Index} = (\text{Ao.DP} - \text{LV.EDP} / \text{Ao.SP}) \times 100$$

- Around 10 = Severe
- Around 20 = Moderate
- Around 30 = Mild
- More than 30 = Good

TAVI Lotus 23mm (2016-10-06)

Serial ECG findings before and after TAVI



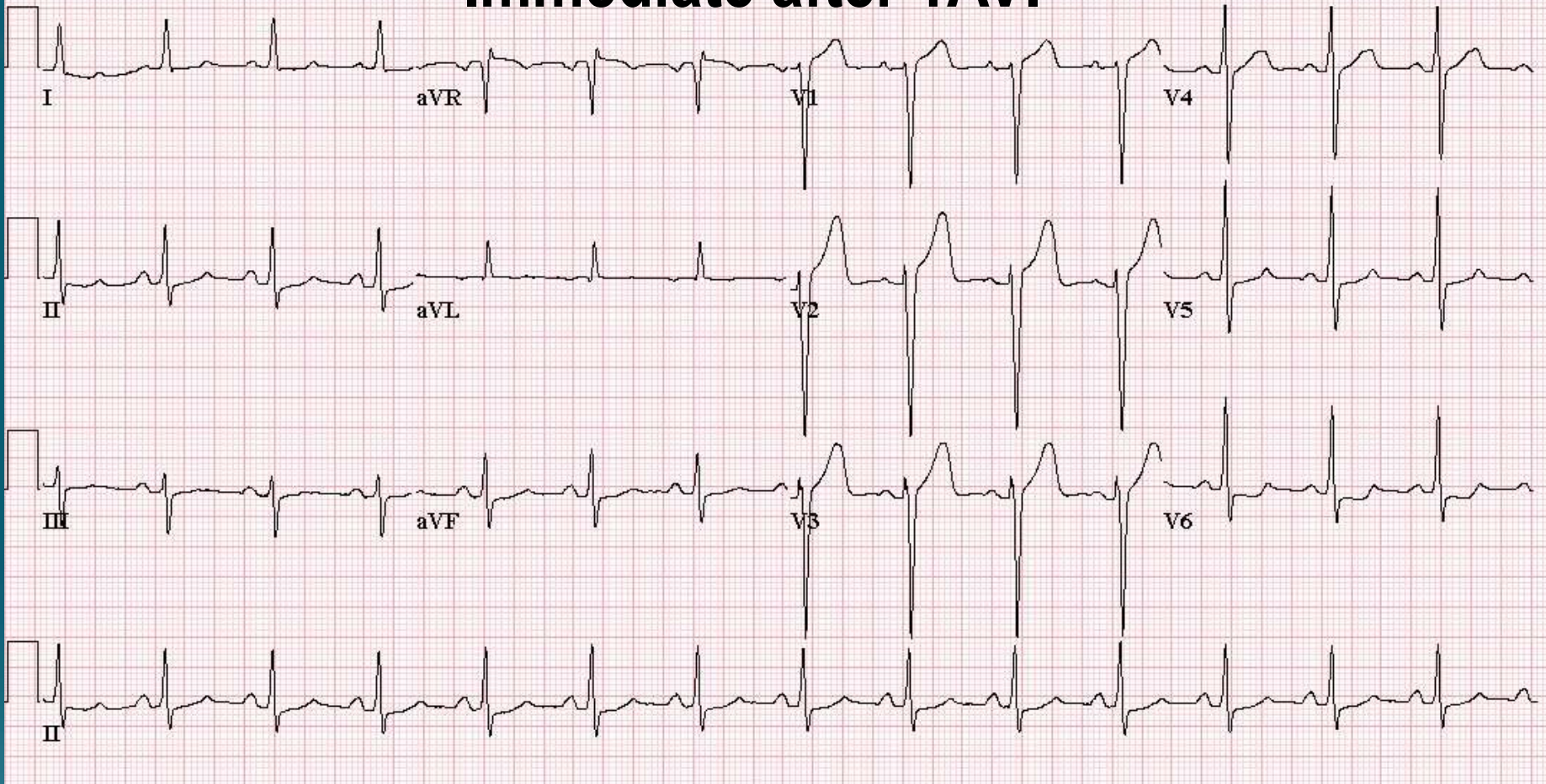
TAVI Lotus 23mm (2016-10-06)

Serial ECG findings before and after TAVI

Referred by:

Confirmed By: REPORT UNCONFIRMED

Immediate after TAVI



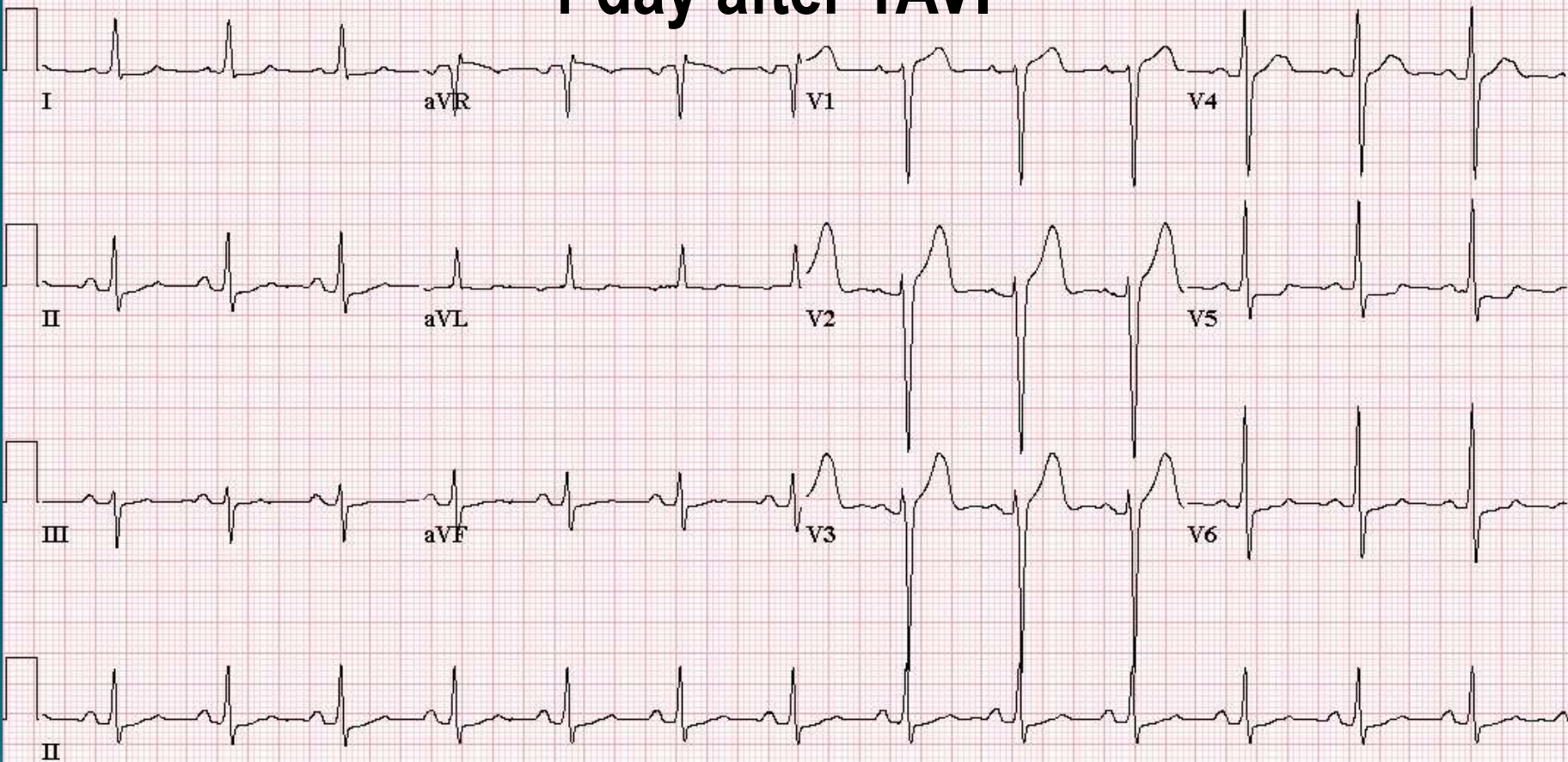
TAVI Lotus 23mm (2016-10-06)

Serial ECG findings before and after TAVI

Referred by:

Confirmed By: REPORT UNCONFIRMED

1 day after TAVI



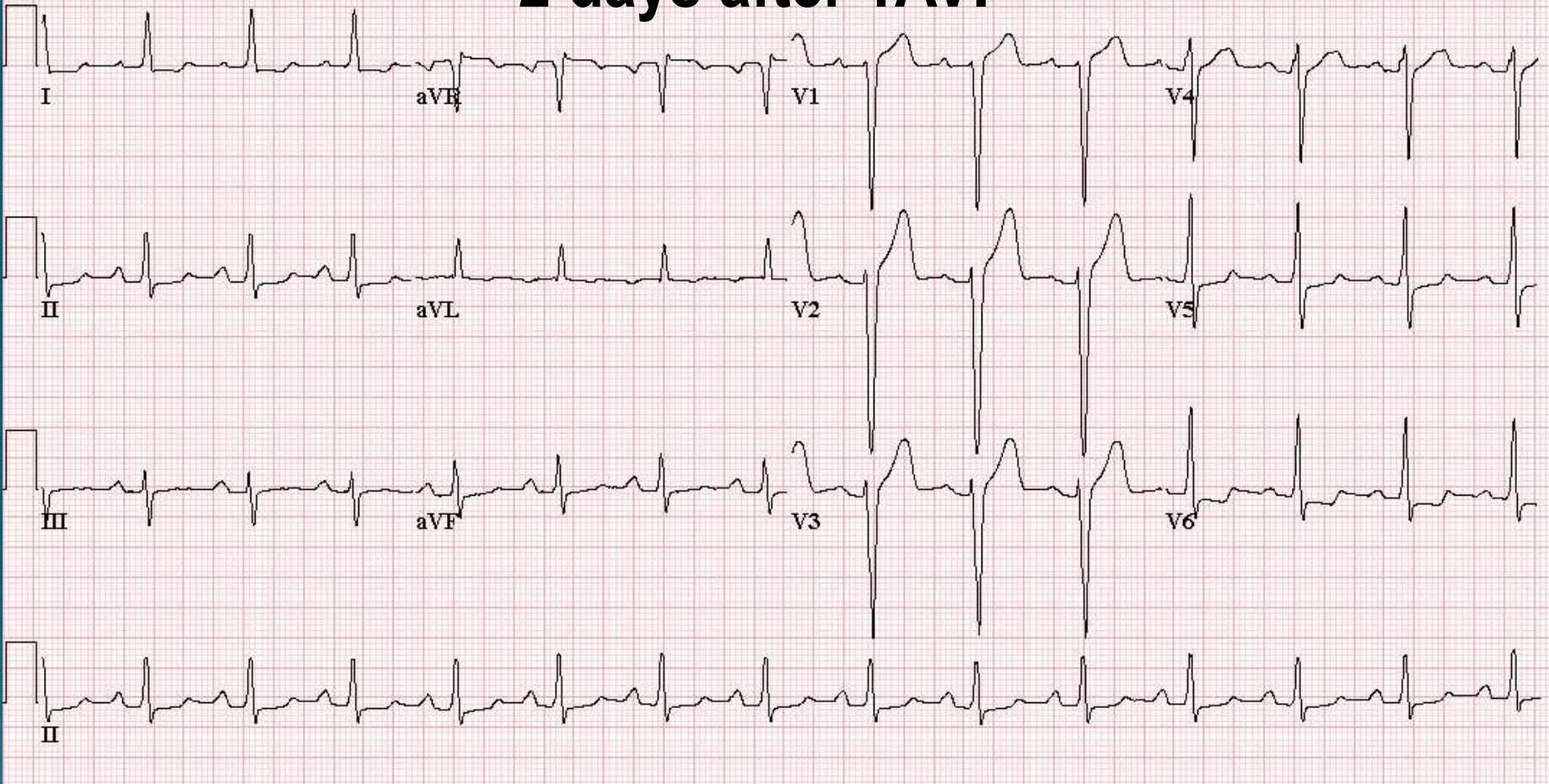
TAVI Lotus 23mm (2016-10-06)

Serial ECG findings before and after TAVI

Referred by:

Confirmed By: REPORT UNCONFIRMED

2 days after TAVI



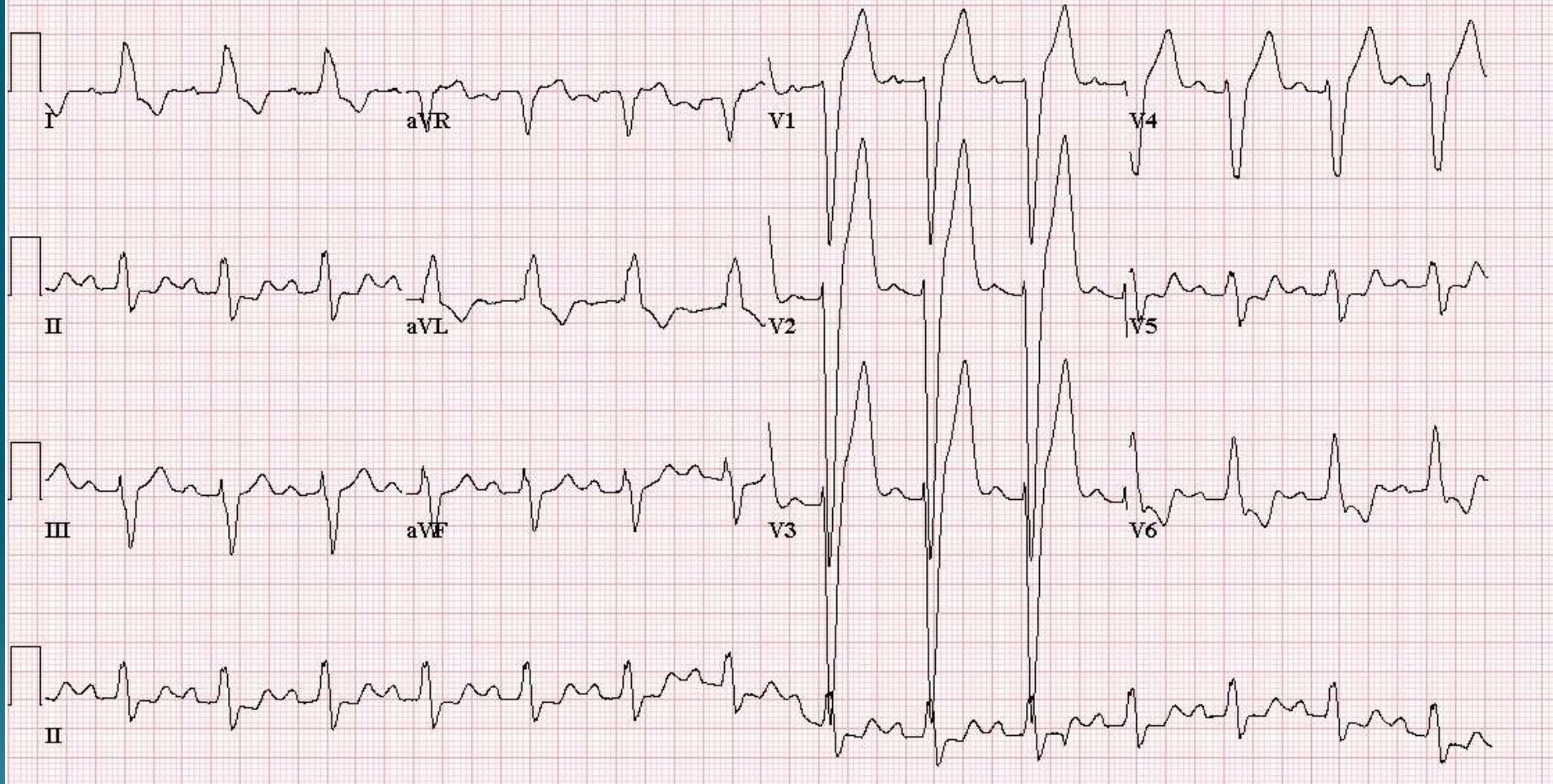
TAVI Lotus 23mm (2016-10-06)

Serial ECG findings before and after TAVI

Delayed onset of LBBB at 3 days after TAVI

Referred by:

Confirmed By: REPORT UNCONFIRMED



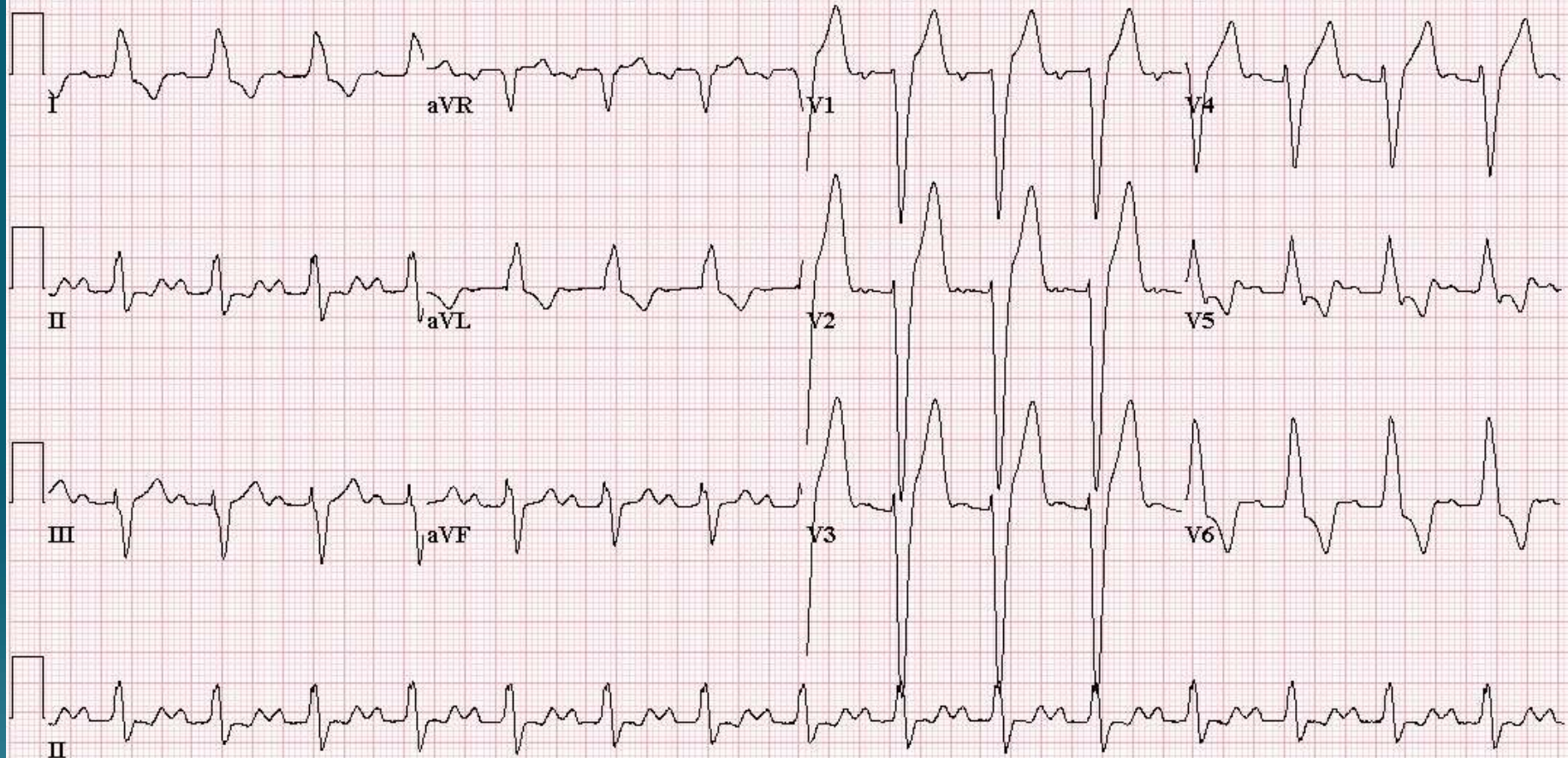
TAVI Lotus 23mm (2016-10-06)

Serial ECG findings before and after TAVI

LBBB continues on day-5 since day-3 after TAVI

Referred by:

Confirmed By: REPORT UNCONFIRMED



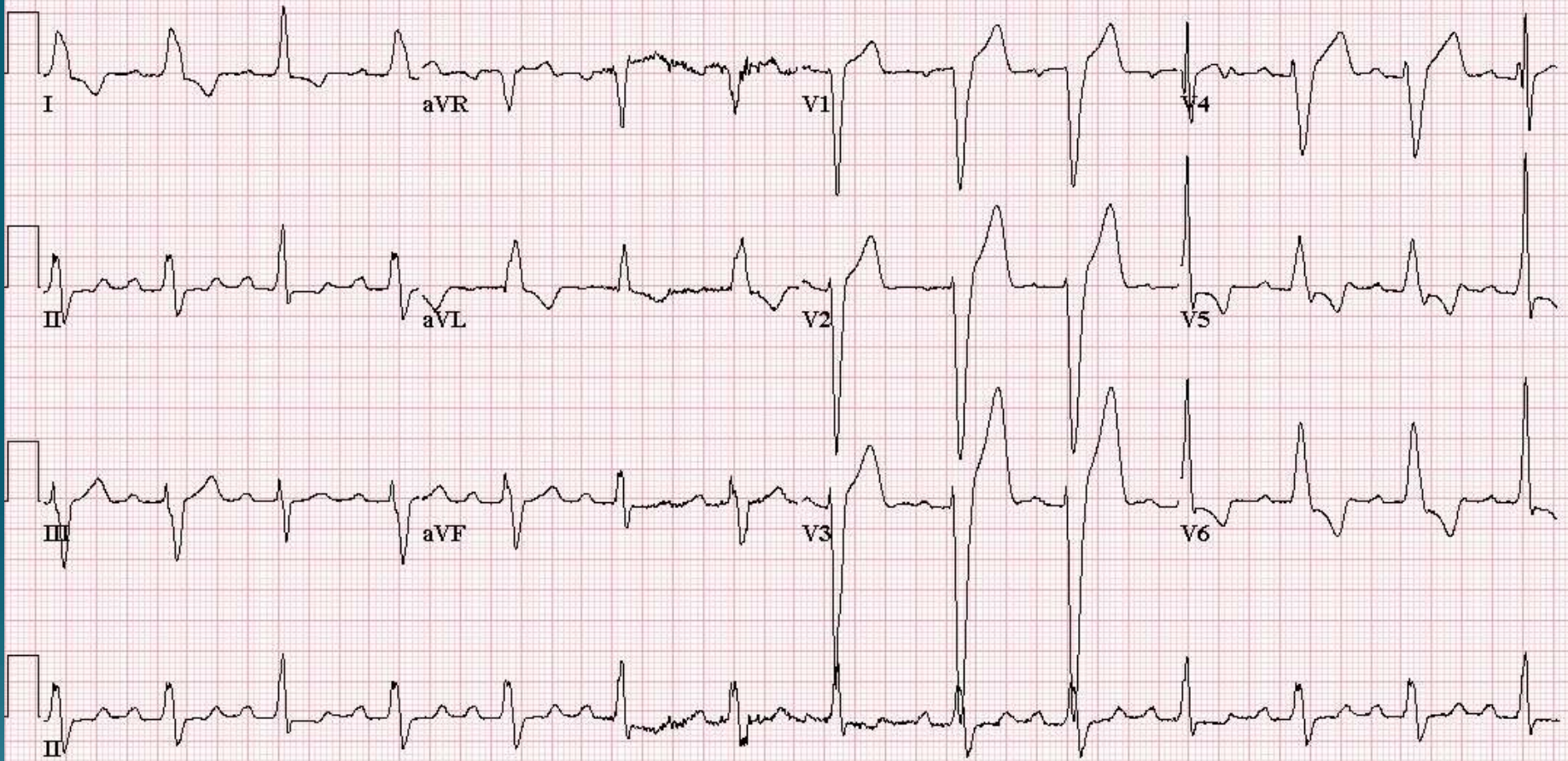
TAVI Lotus 23mm (2016-10-06)

Serial ECG findings before and after TAVI

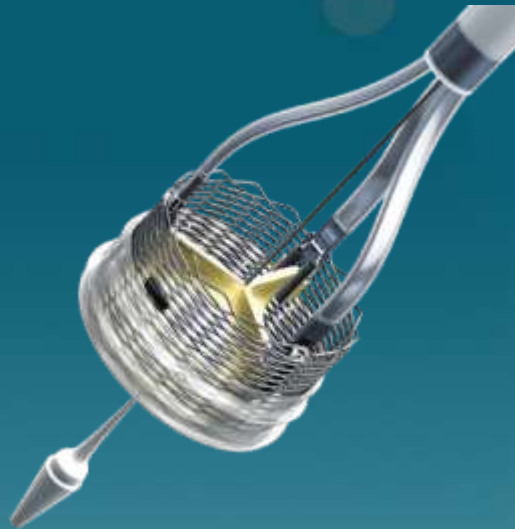
LBBB continues on day-7 since day-3 after TAVI

Referred by:

Confirmed By: REPORT UNCONFIRMED



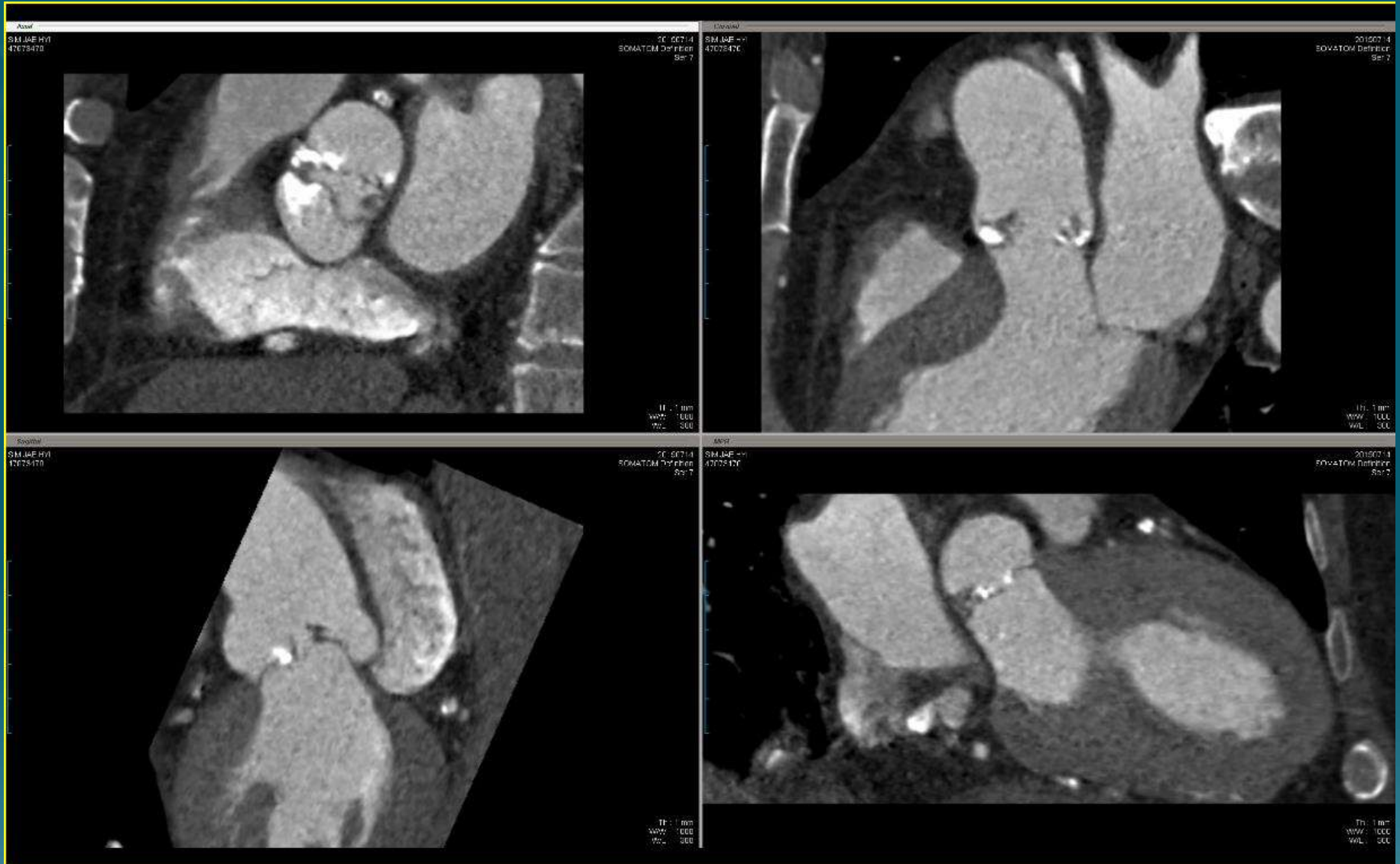
Bicuspid Aortic Stenosis



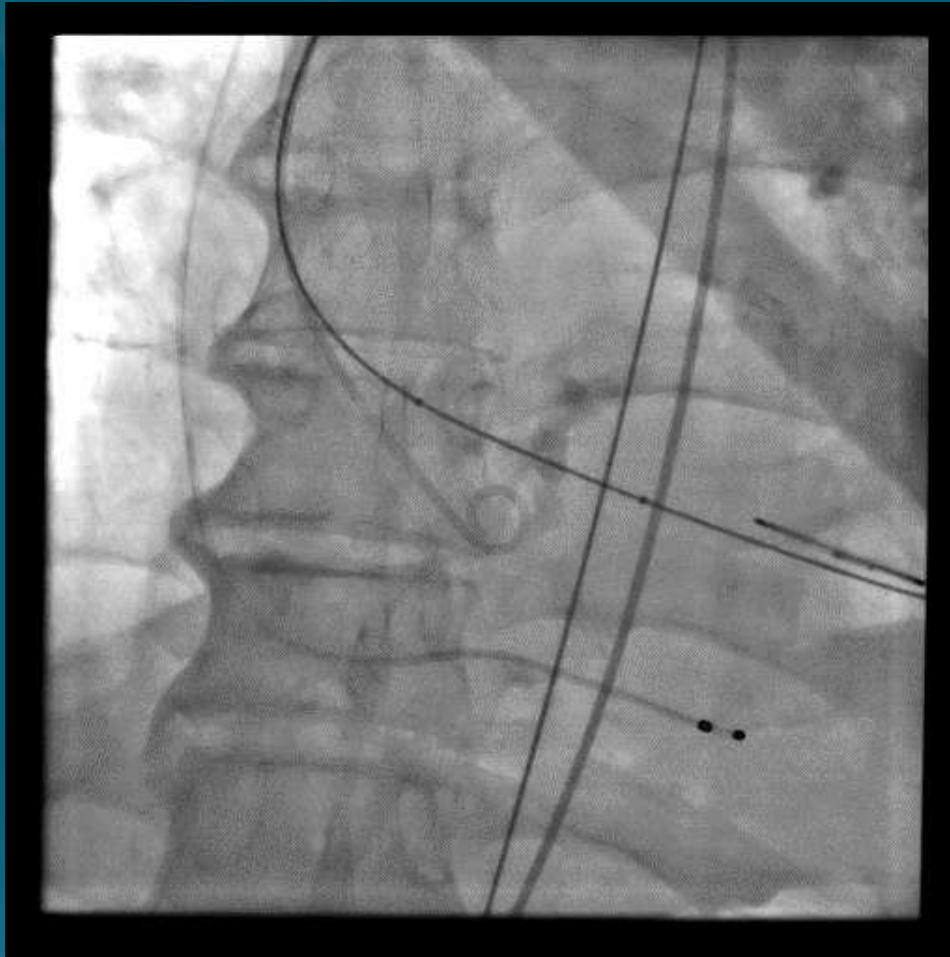
SHIM JH (47073470) treated with Lotus valve

- 68 YO Male , 174.8 Cm, 78 Kg, BMI : 25.53
- Angina (onset: 4 months ago) – CCS class II
- Severe AS (2015.07.13 ; AVA 0.5 Cm²)
- Uncontrolled DM on insulin (HbA1c 10.7% - 2015.07.13)
- 2VD (2015.07.13 – CAG ; 2VD > 2015.07.15 PCI to LCx, LAD)

CT angiography : L-N fused bicuspid AV



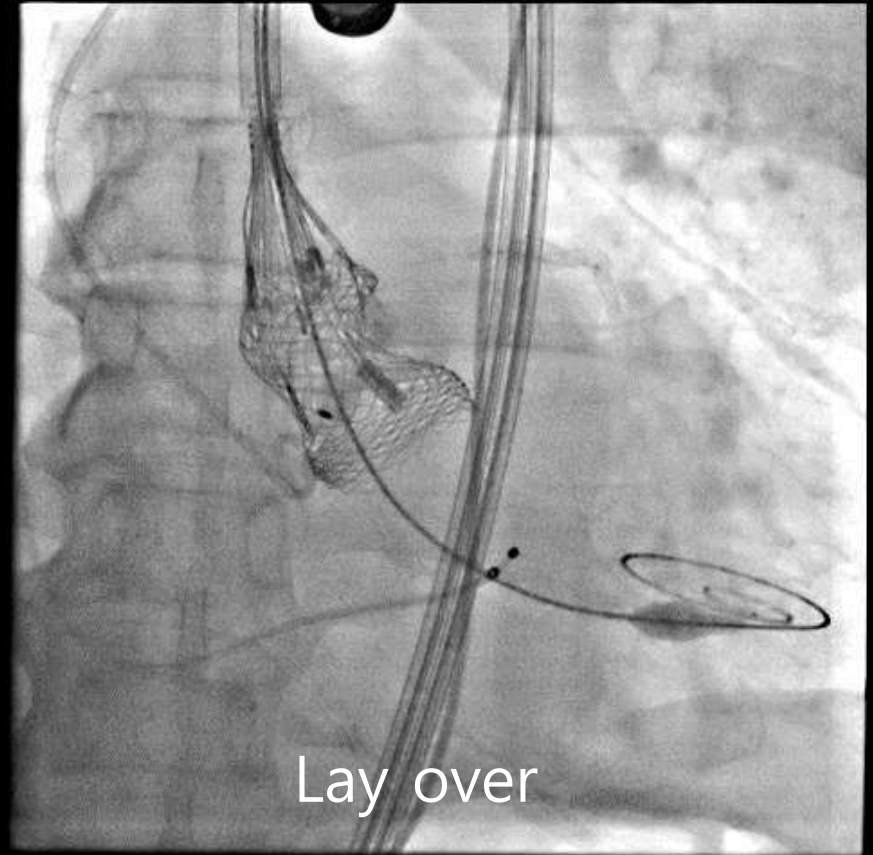
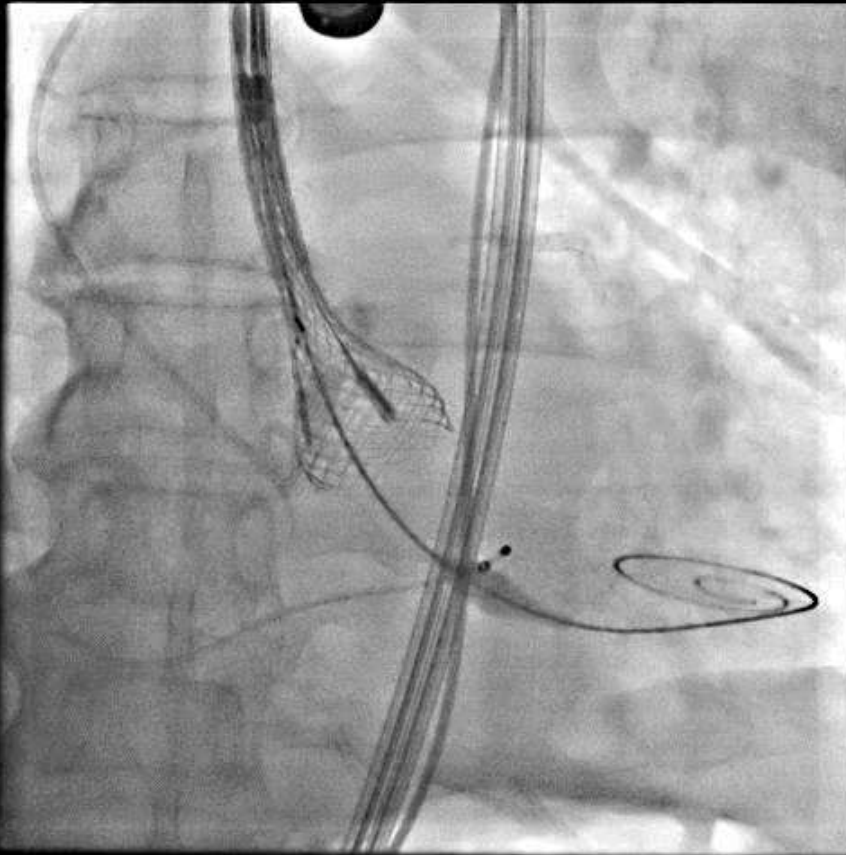
TAVI procedure (2015-09-09) – Pre Ballooning



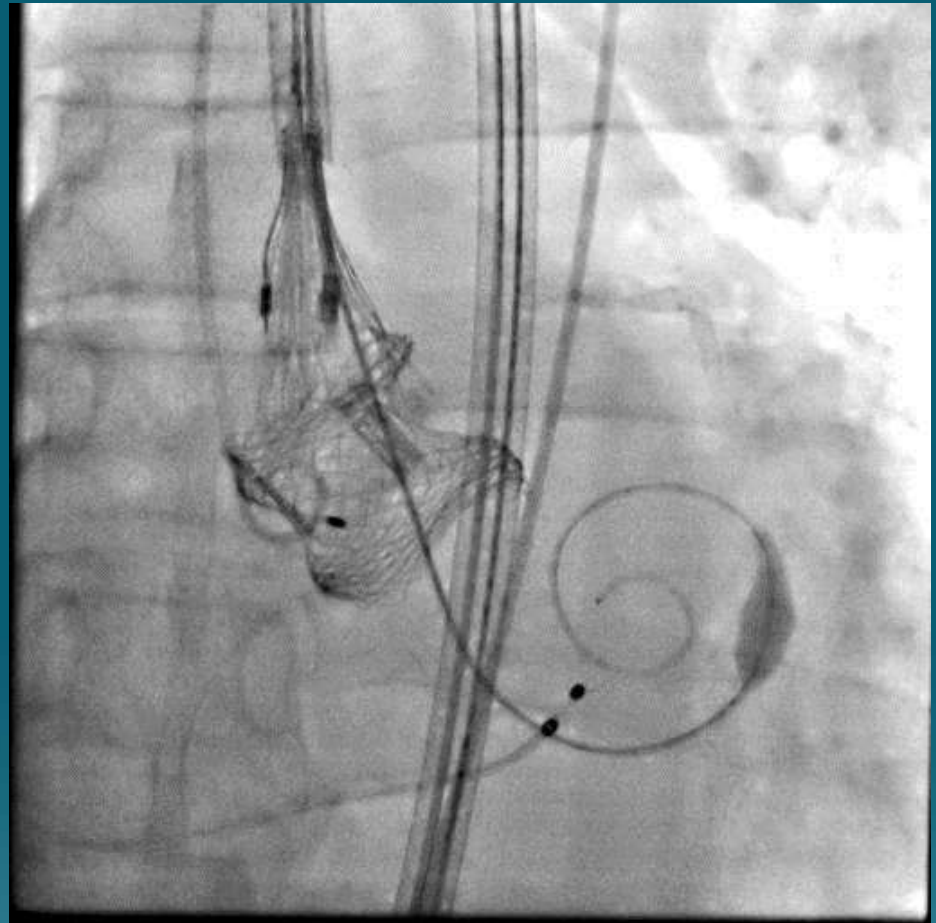
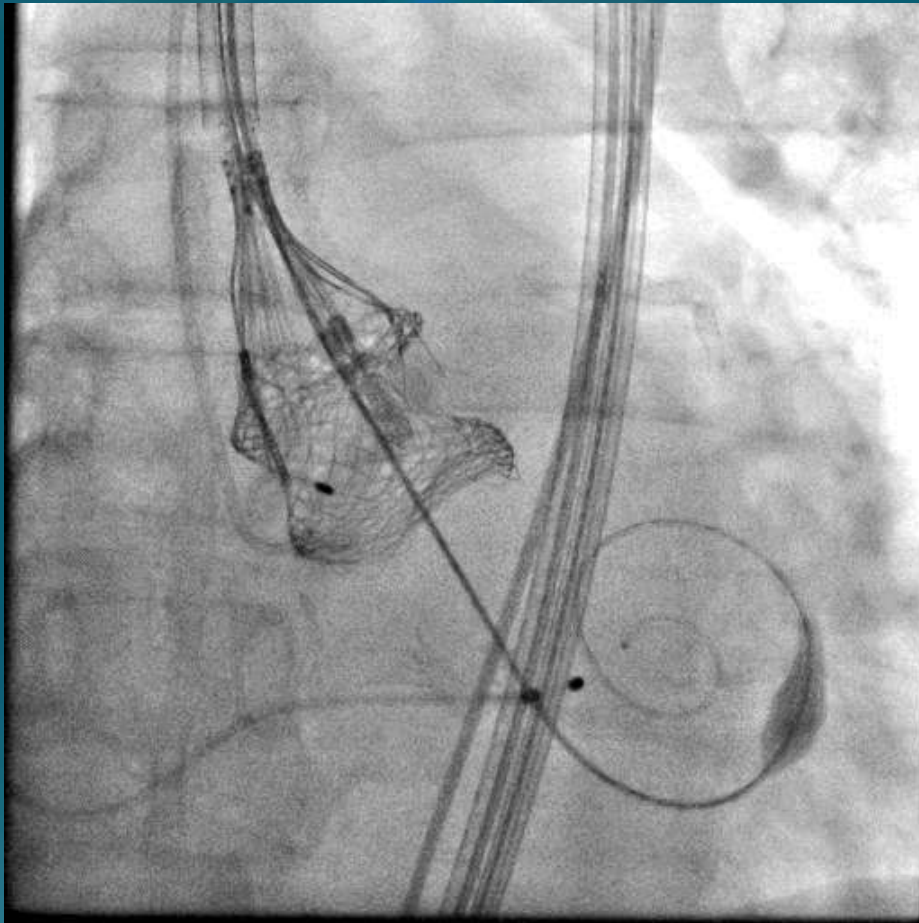
Pre Ballooning (22*40)



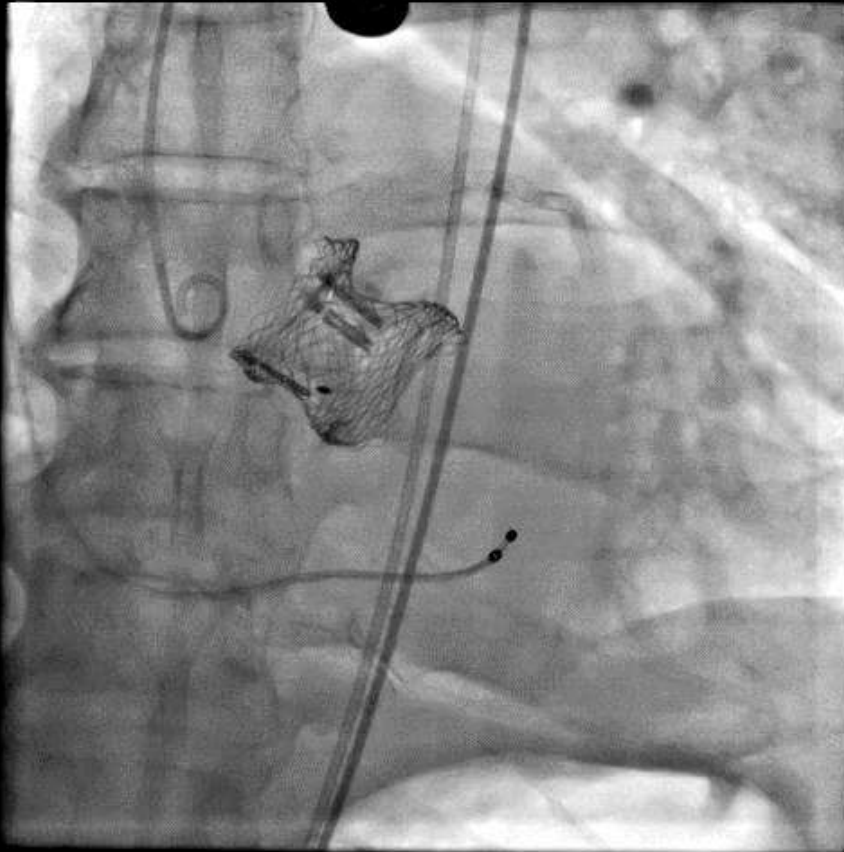
TAVI (2015-09-09) – 27mm Lotus Valve Implantation



TAVI (2015-09-09) – LotusValve Release



TAVI (2015-09-09) : LotusValve final

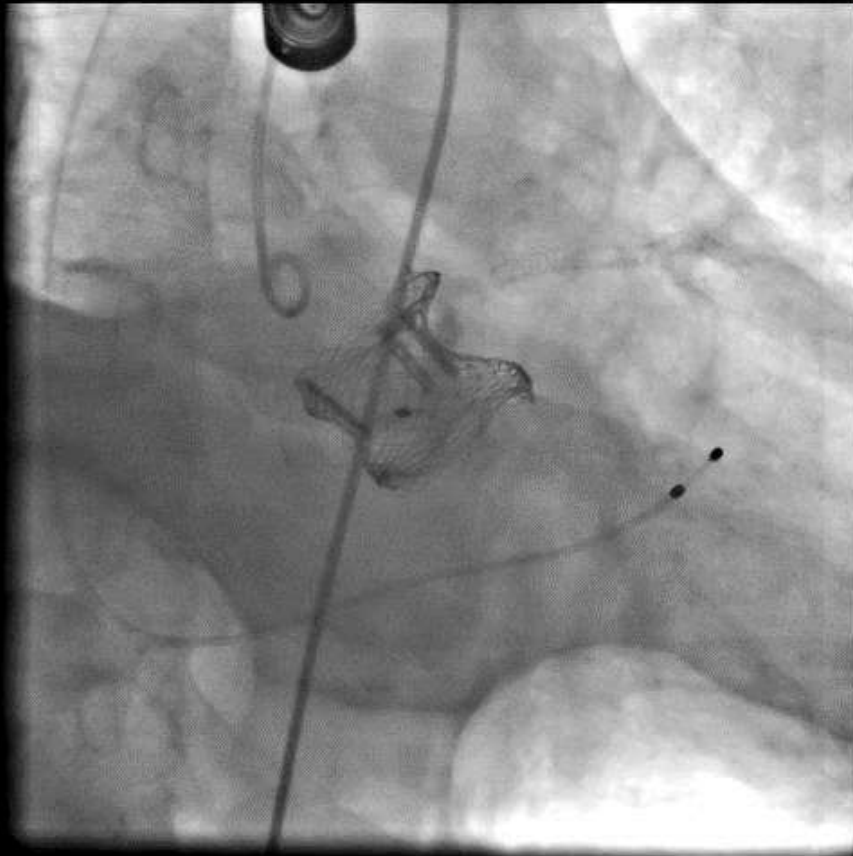


Final Ao. CAU 10

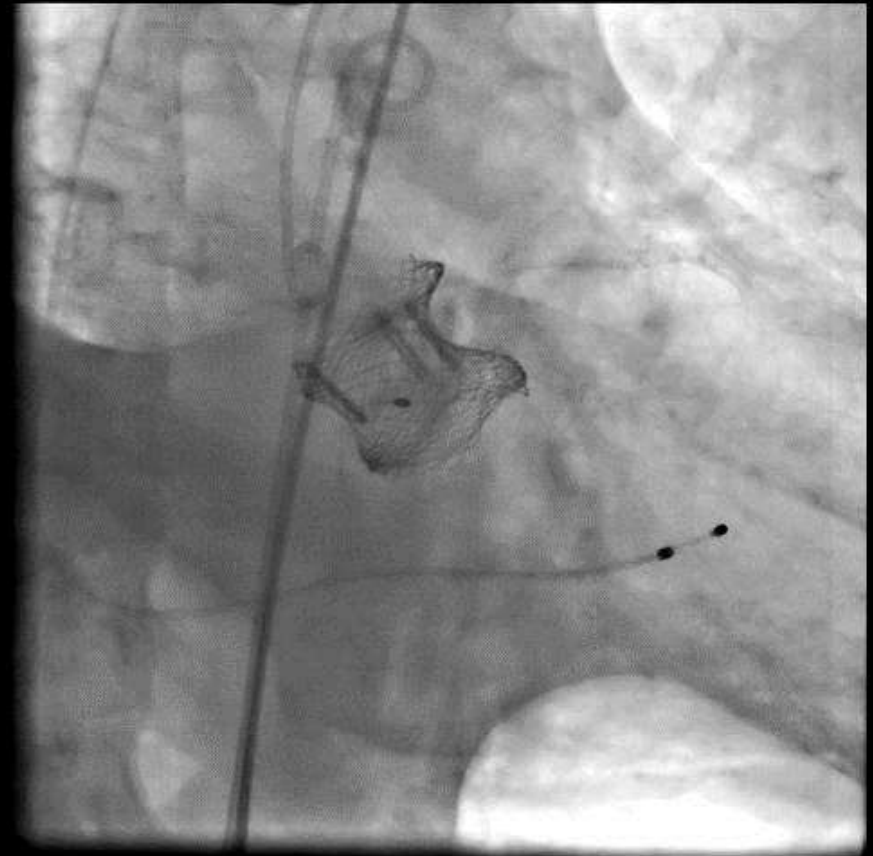


Final Ao. LAO 38 CRA 12

TAVI (2015-09-09) : LotusValve final



Final Ao. RAO 21 CAU 35



Final Ao. RAO 25 CAU 30

TAVI procedure (2015-09-09) AR Index

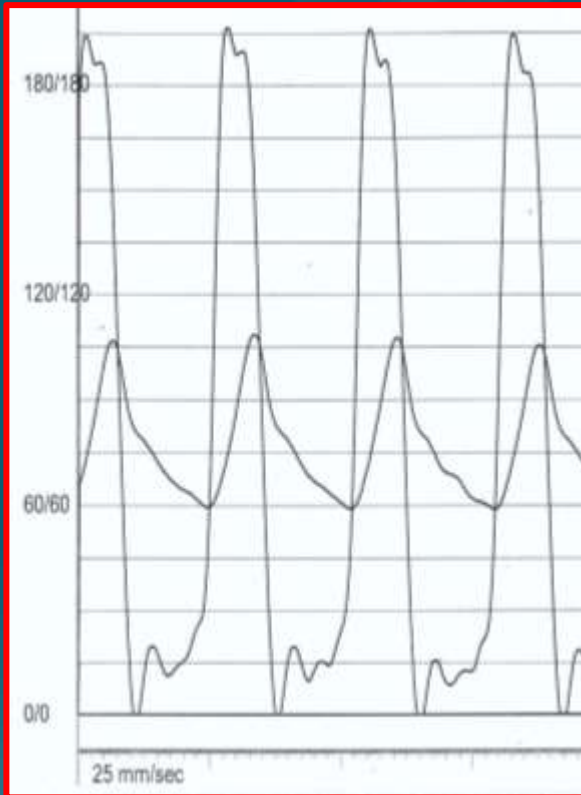
| | PRE TAVI | | | | POST TAVI | | | |
|----------|-----------|-----|-----|----|-----------|-----|-----|----|
| Ao. | SP | 108 | DP | 59 | SP | 127 | DP | 64 |
| LV. | SP | 196 | EDP | 26 | SP | 134 | EDP | 26 |
| Peak PG | 88 | | | | | | | |
| Mean PG | 80 | | | | | | | |
| AR Index | 31 | | | | 34 | | | |

$$\text{AR Index} = (\text{Ao.DP} - \text{LV.EDP} / \text{Ao.SP}) \times 100$$

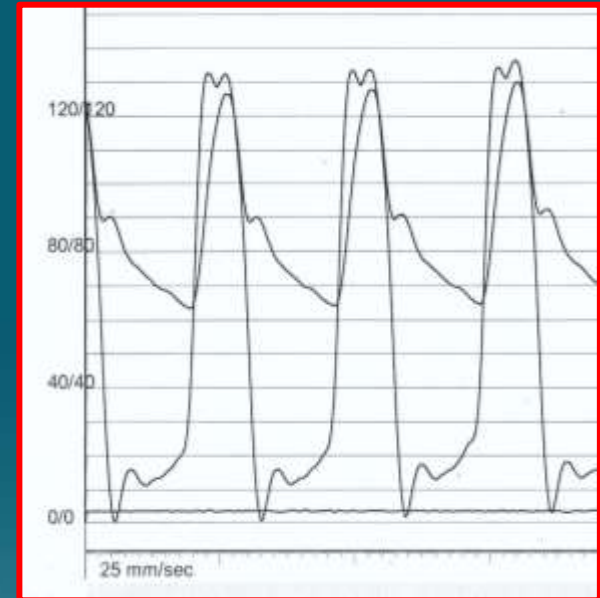
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- More than 30 = Good

TAVI procedure (2015-09-09)

27mm Lotus-VALVE

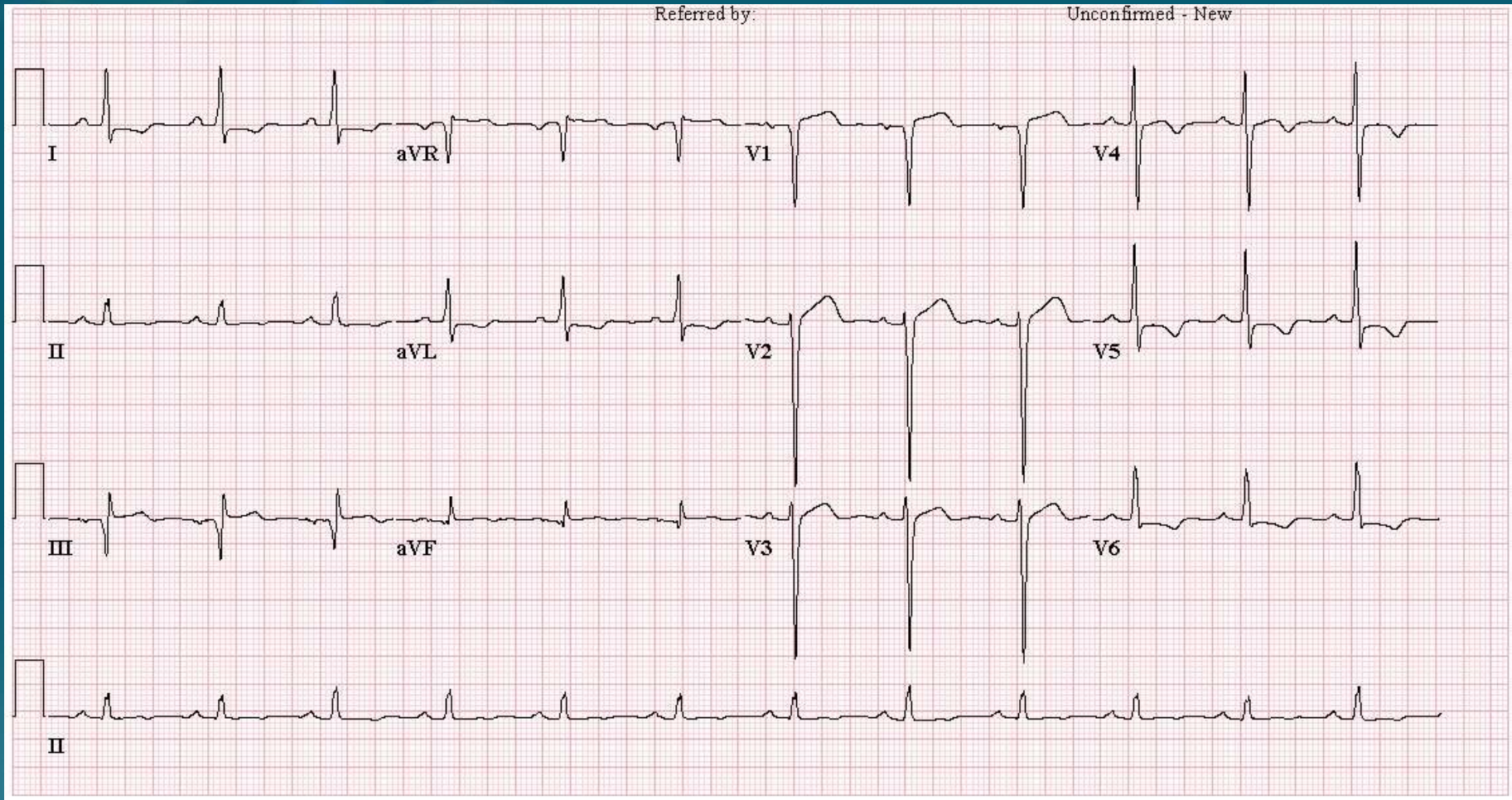


AV mean PG 80 mmHg



AV mean PG < 5 mmHg

No change in AV conduction 1 day after TAVI



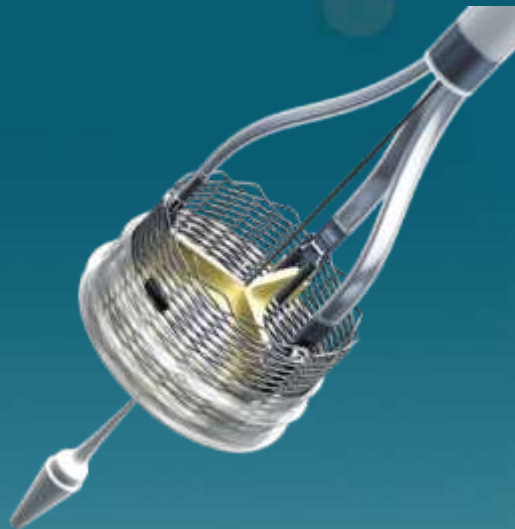
1 day after TAVI

Disadvantage of Lotus

- **Bulky system**
- **Lay-Over process**
 - ✓ **Damage on aorta**
- **Outside Fabric to reduce PVL**
 - ✓ **AV conduction disturbance**



Aortic Damage

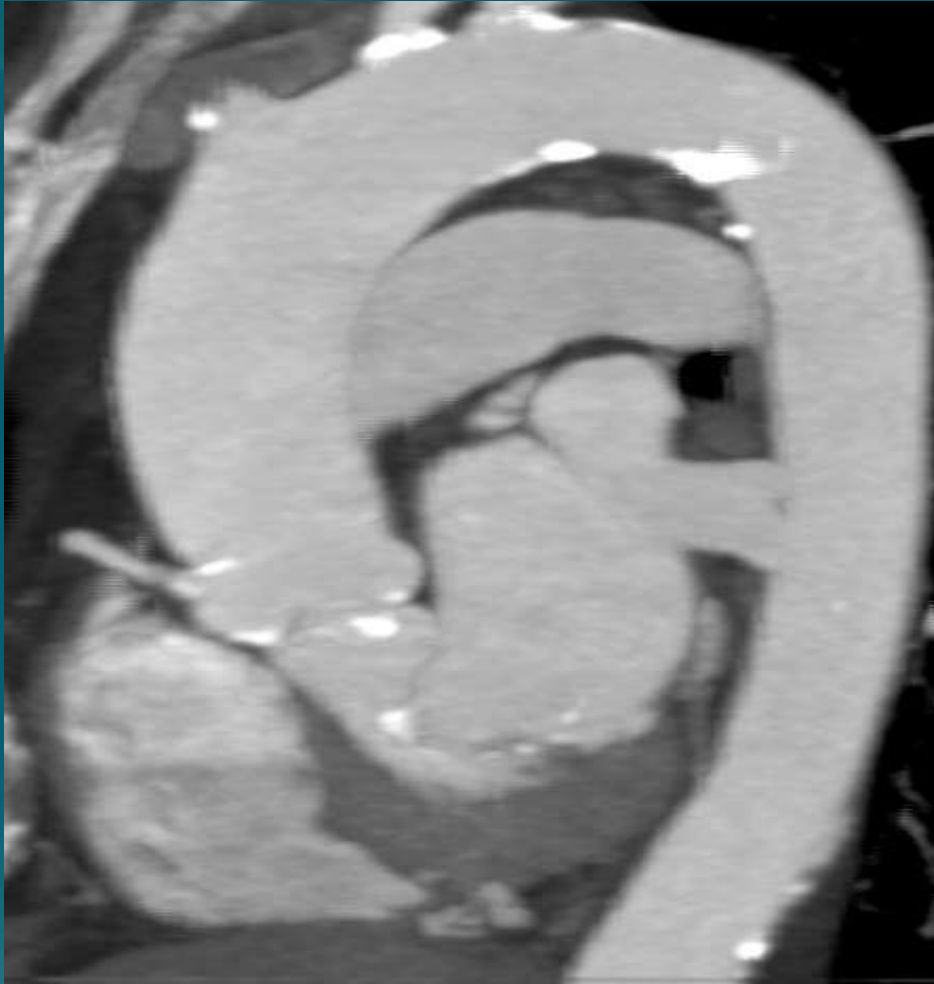


K O J F / 73 47108819

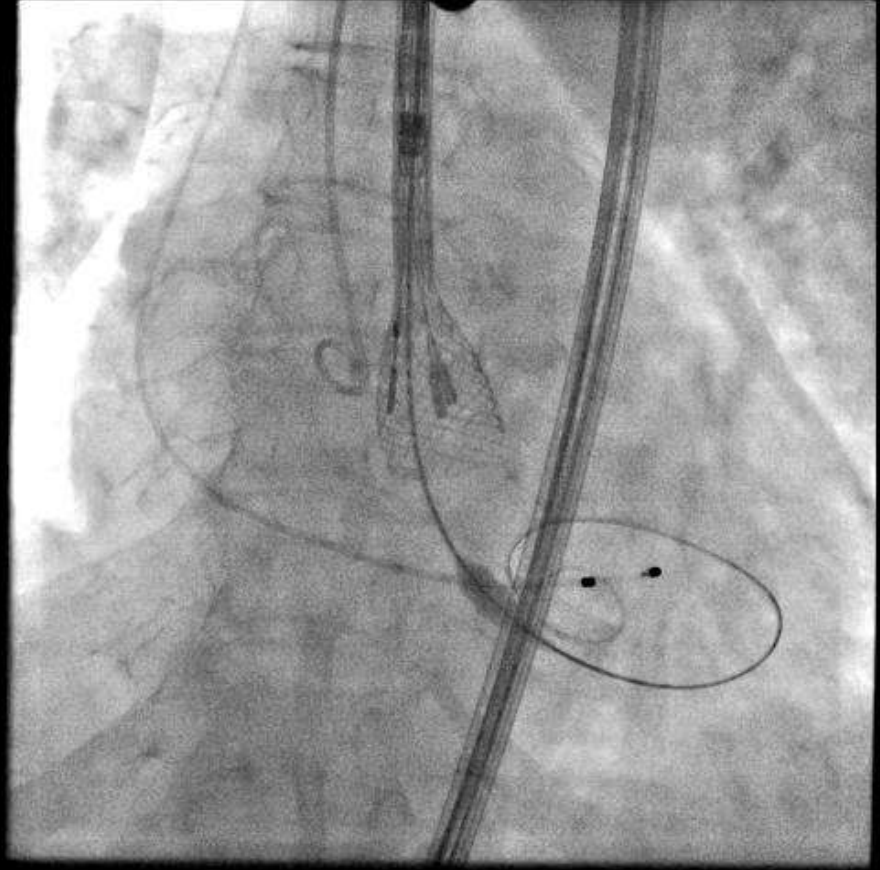
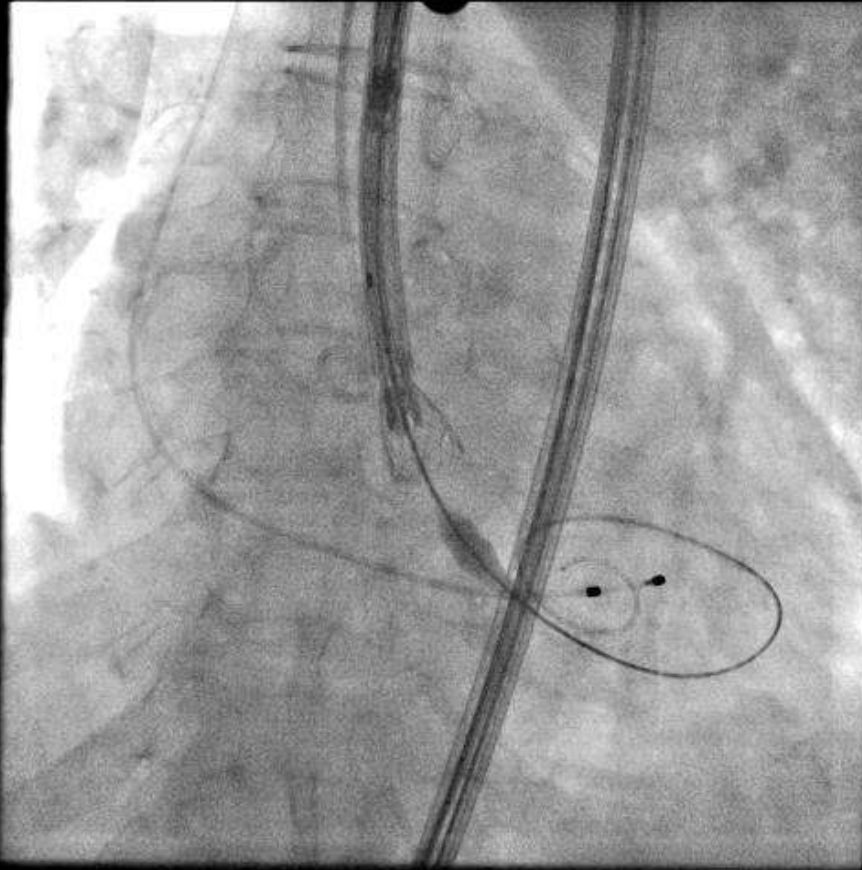
- 73/F, 155.4 Cm, 57.4 Kg, BMI : 23.77
- Past medical hx>
 - # HTN
 - # RA
 - # cerebral aneurysm
 - # severe AS (AVA 0.8cm²)
- Brief Hx>

Severe AS로 세종병원 f/u 중이었으며 수술권유 받고 TAVI 위해 본원으로 내원함

CT angiography (2016-06-02)

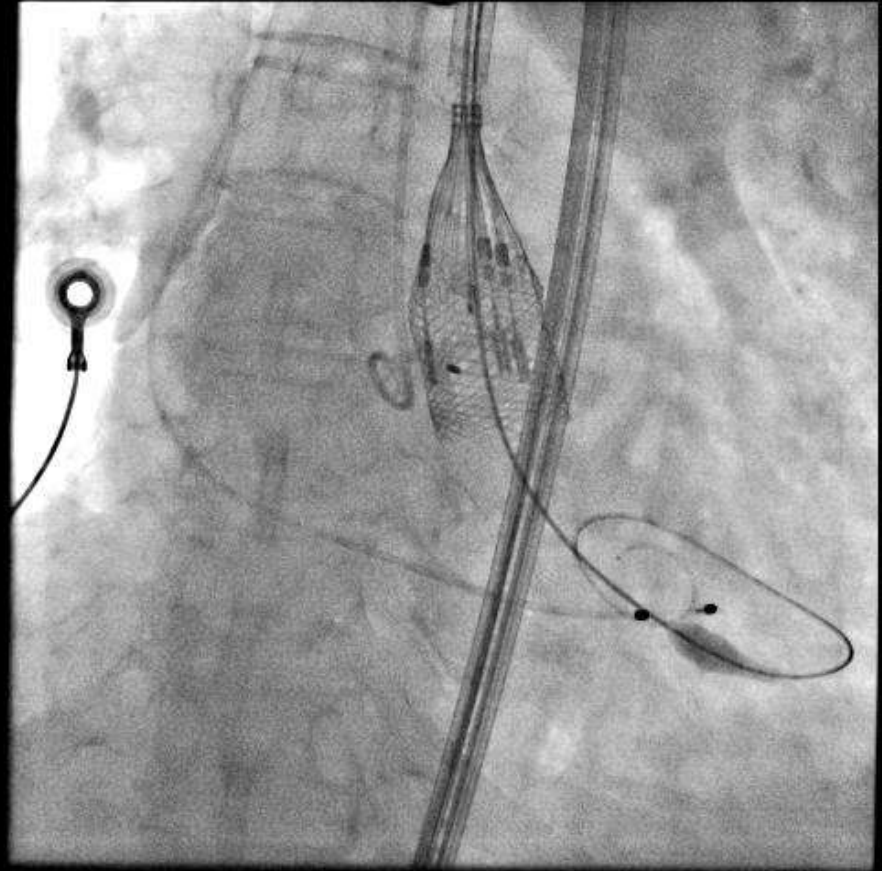
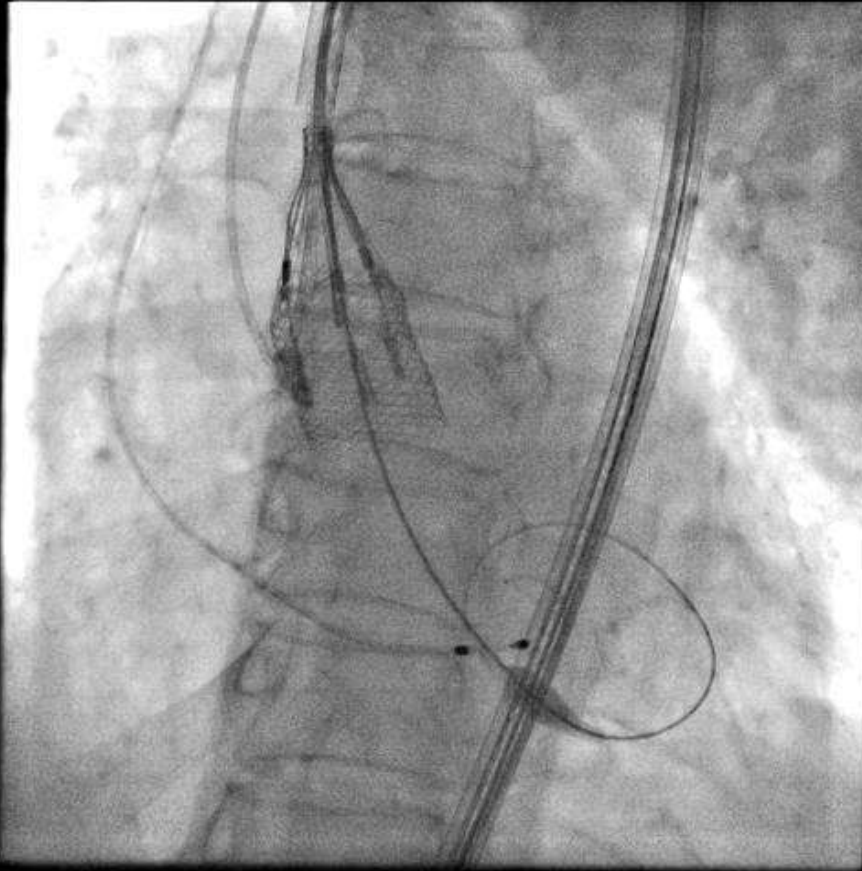


TAVI procedure (2016-06-13) - Unsheating

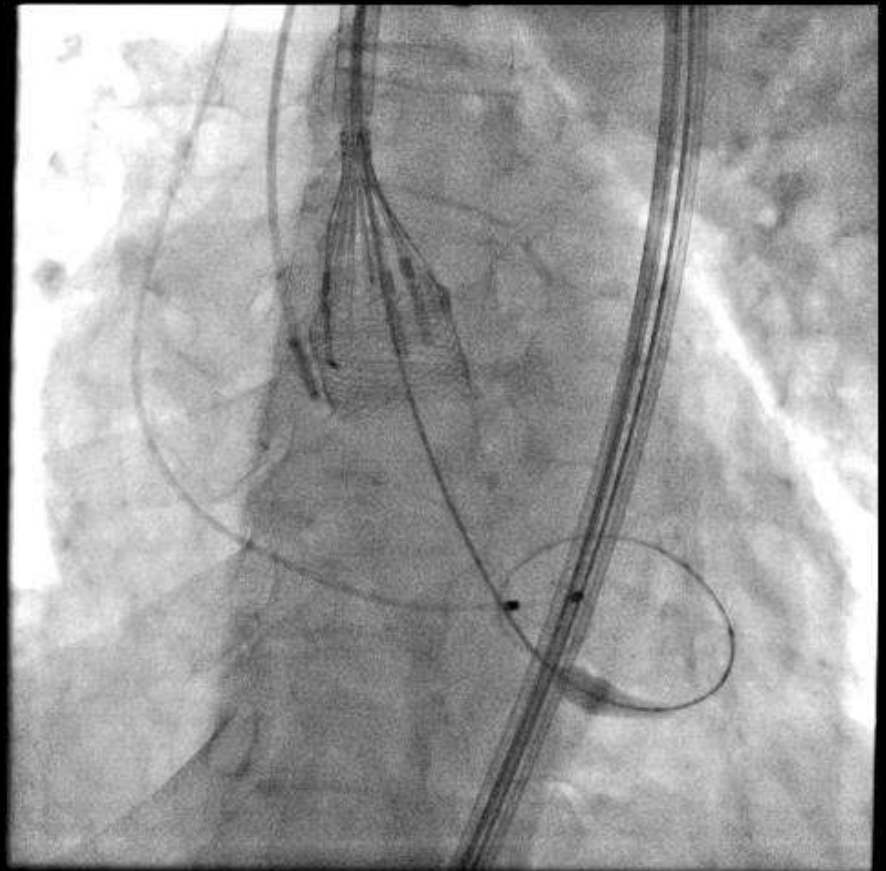
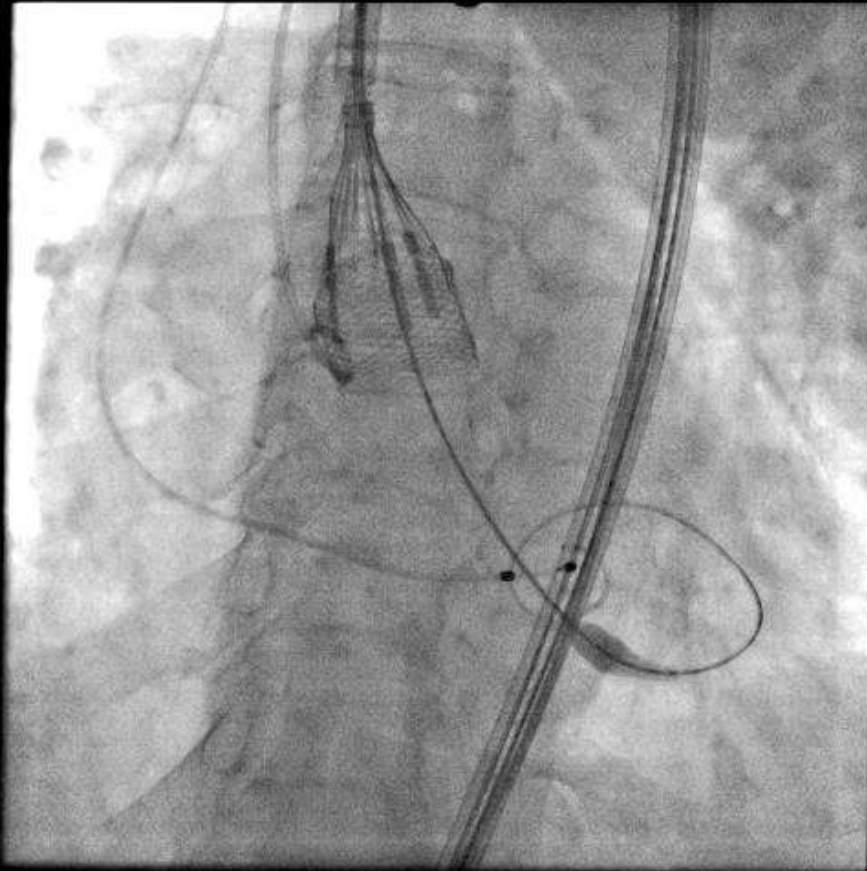


TAVI procedure (2016-06-13)

: Lay-over & Lead-in assessment

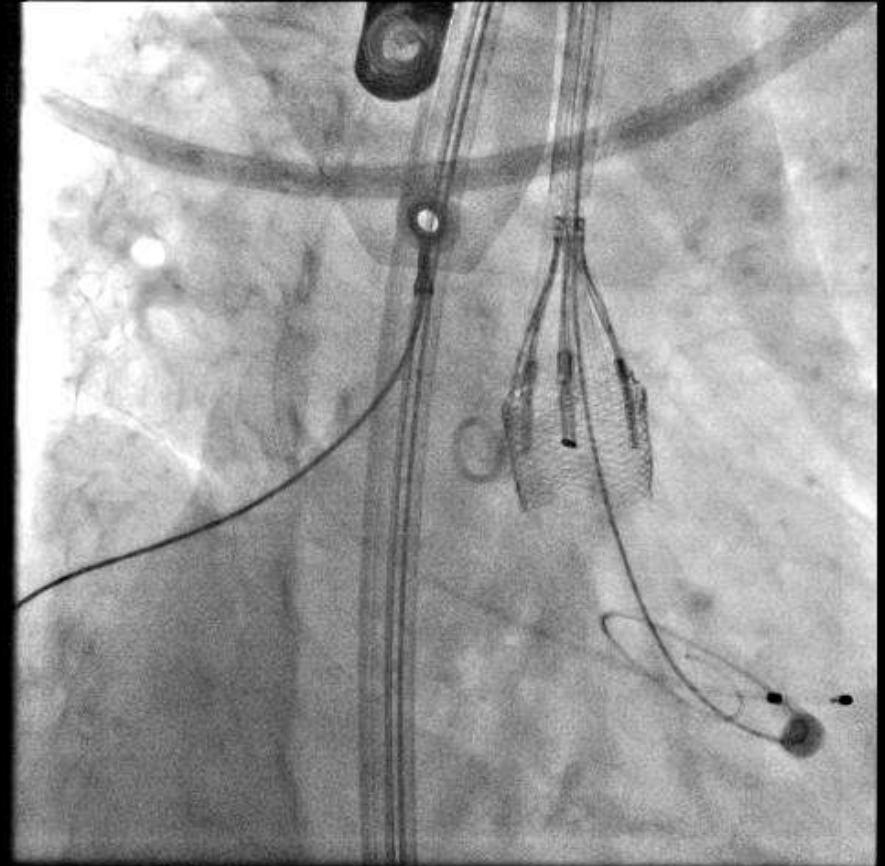
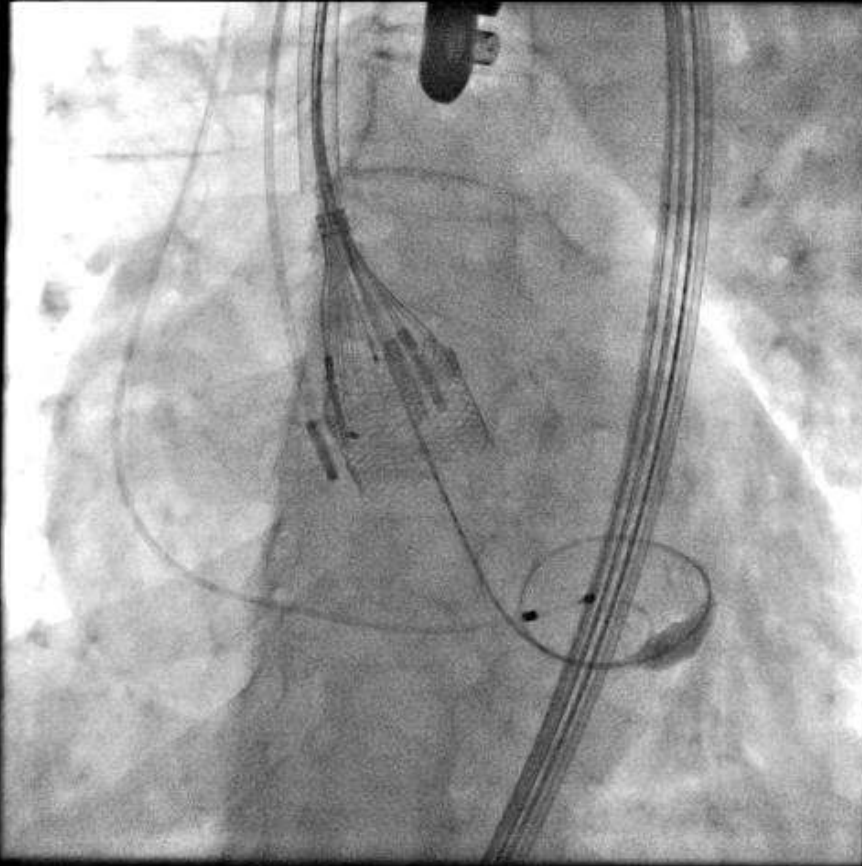


TAVI procedure (2016-06-13) – Lock

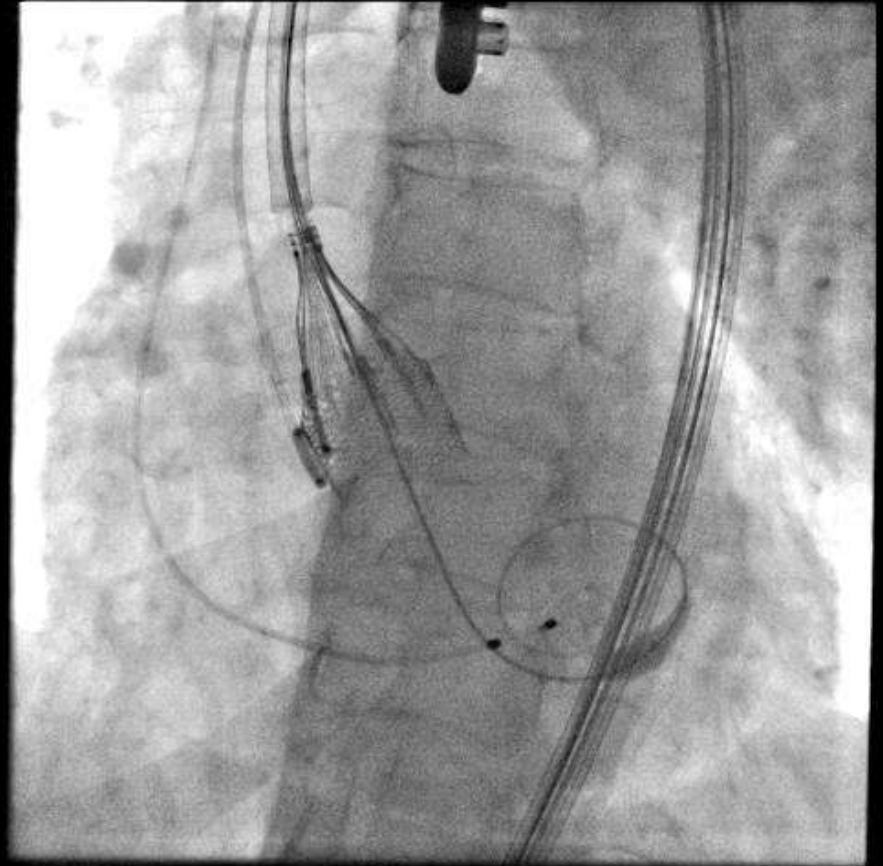
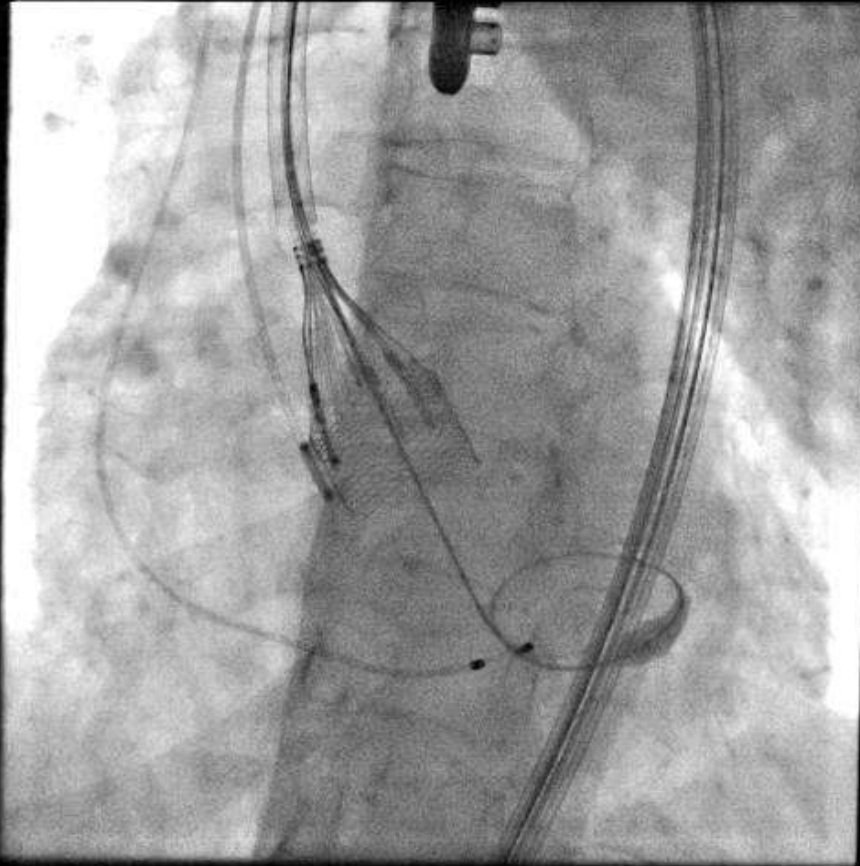


Locking – closing Gaps

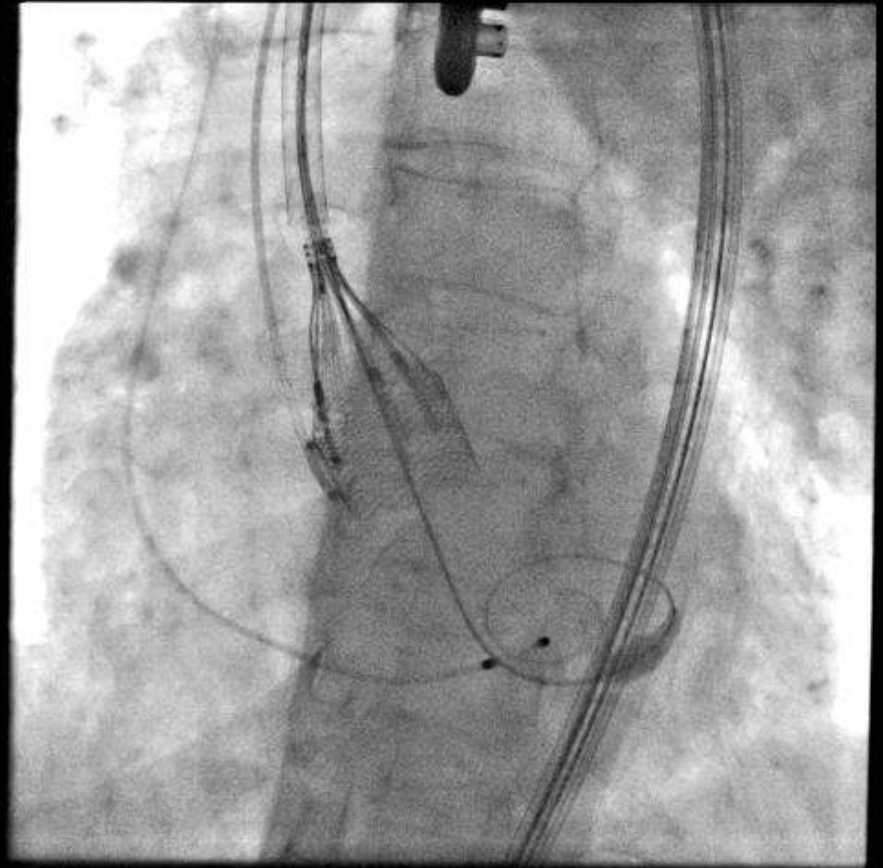
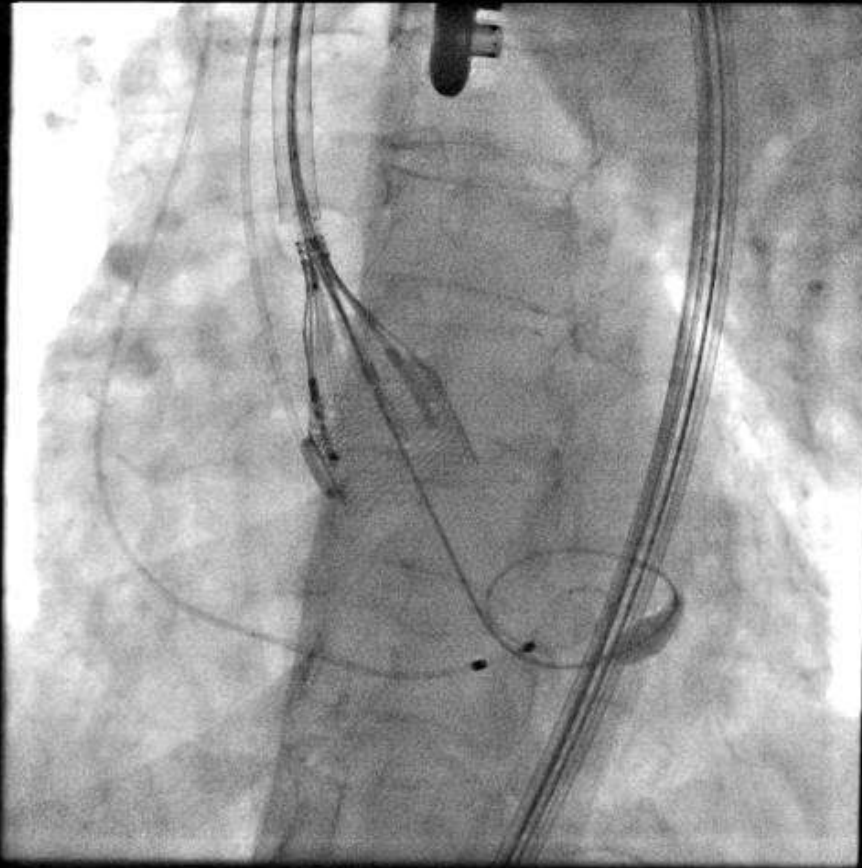
TAVI procedure (2016-06-13) – Checking valve depth at multiple projections



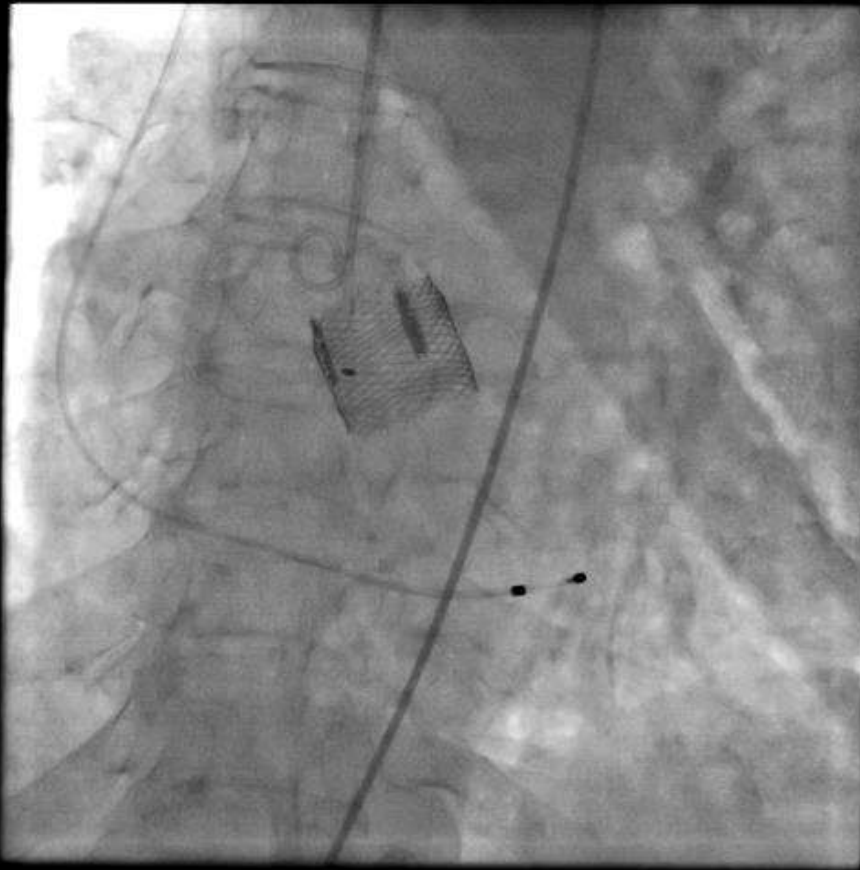
TAVI procedure (2016-06-13) – Final check of depth & Initiation of release phase1



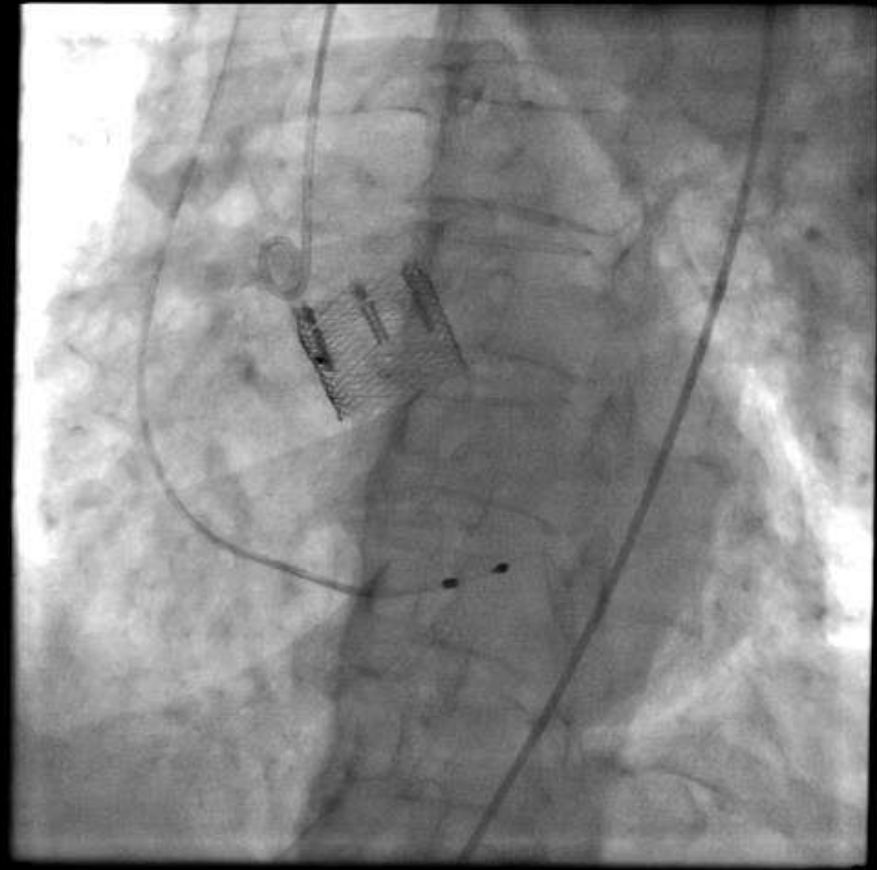
TAVI procedure (2016-06-13) – Release



TAVI procedure (2016-06-13)



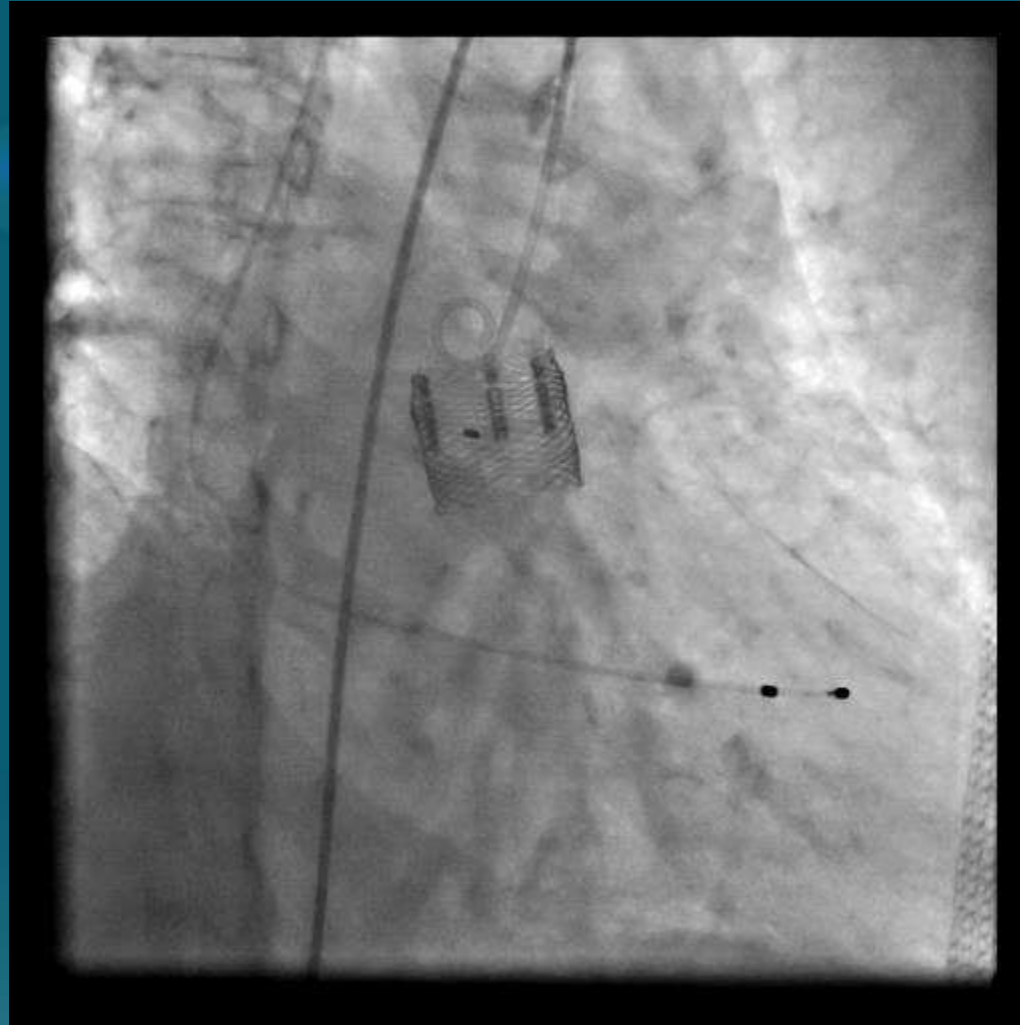
AP CAU 10



LAO 26 CAU 7

Final
Aortography

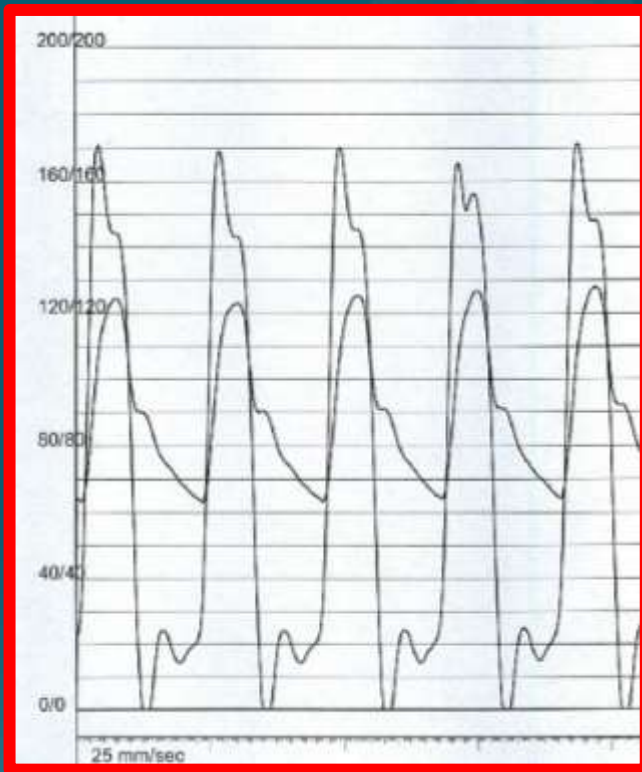
TAVI procedure (2016-06-13)



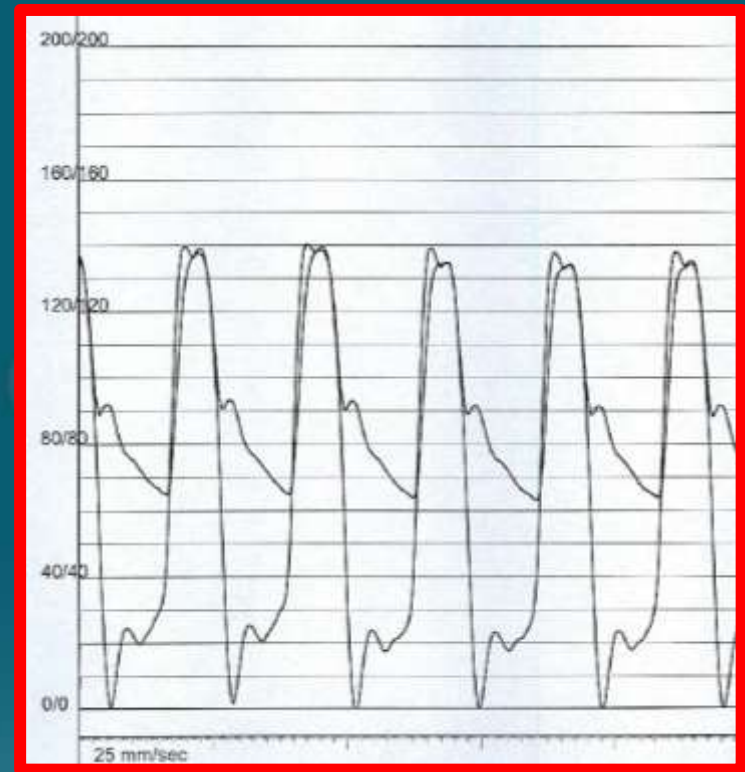
Final Aortography – RAO 30 CAU 20

TAVI Procedure (2016-06-13)

23 mm LOTUS Valve system



AV mean PG 33 mmHg



AV mean PG 5 mmHg

TAVI procedure (2016-01-25) AR Index

| | PRE TAVI | | | | POST TAVI | | | |
|----------|-----------|-----|-----|----|-----------|-----|-----|----|
| Ao. | SP | 125 | DP | 63 | SP | 134 | DP | 63 |
| LV. | SP | 170 | EDP | 25 | SP | 138 | EDP | 22 |
| Peak PG | 44 | | | | 5 | | | |
| Mean PG | 33 | | | | 9 | | | |
| AR Index | 30 | | | | 31 | | | |

$$\text{AR Index} = (\text{Ao.DP} - \text{LV.EDP} / \text{Ao.SP}) \times 100$$

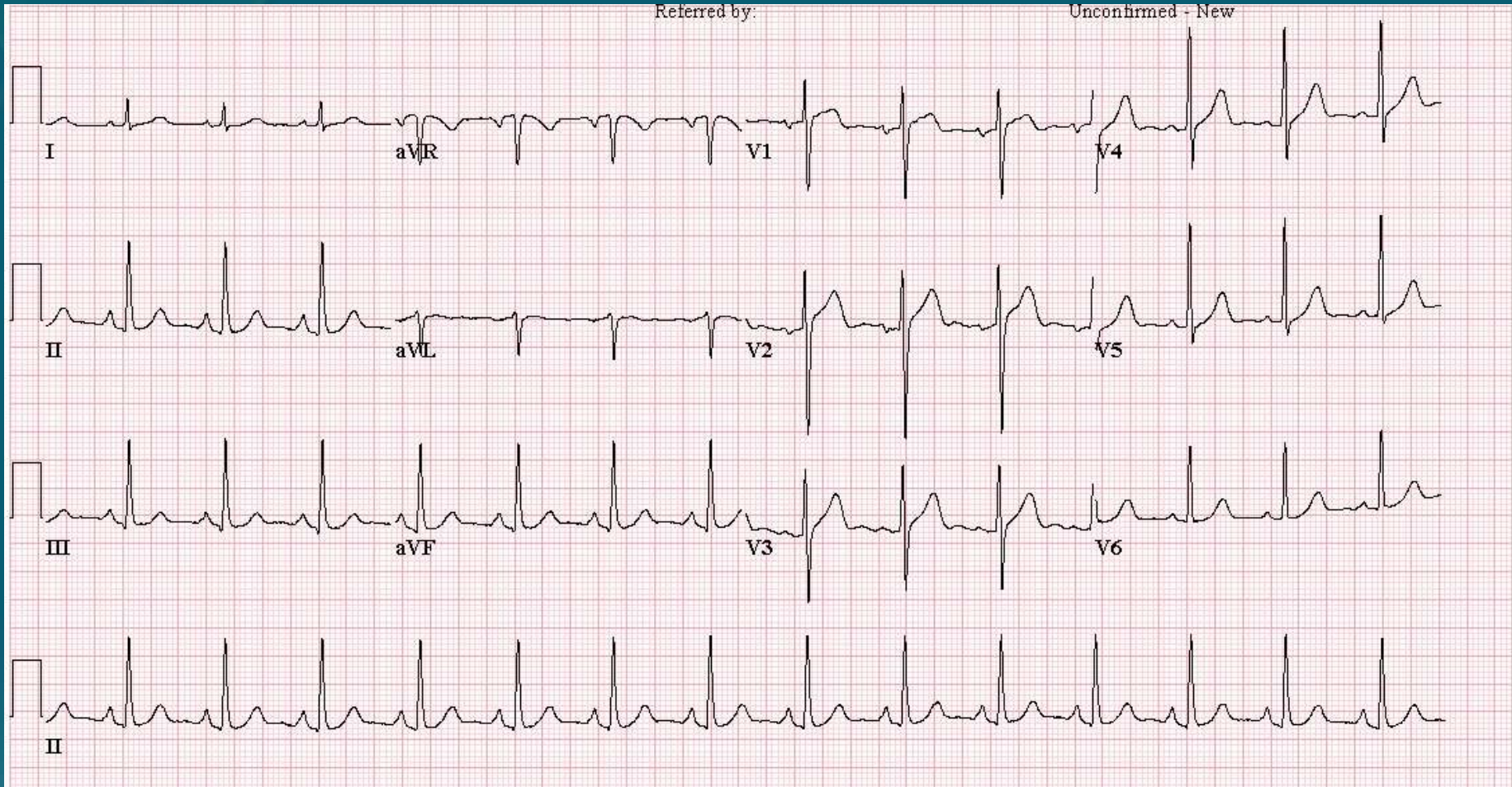
Around 10 = Severe

Around 20 = Moderate

Around 30 = Mild

More than 30 = Good

ECG changes – Before TAVI

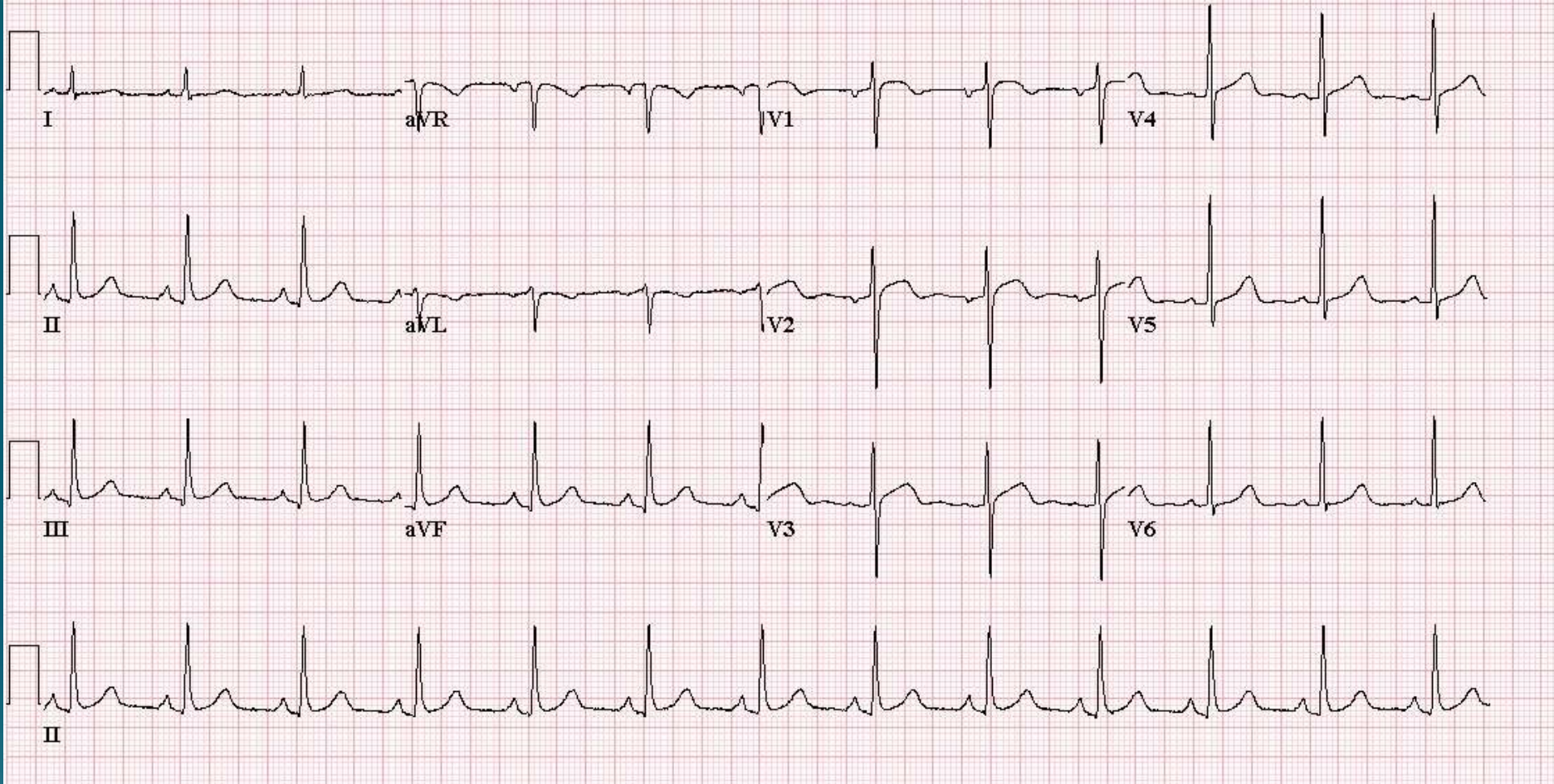


Before TAVI

ECG changes – immediately TAVI

Referred by:

Confirmed By: REPORT UNCONFIRMED



25mm/s 10mm/mV 40Hz 8.0.1 12SL 241 HDCID: 22

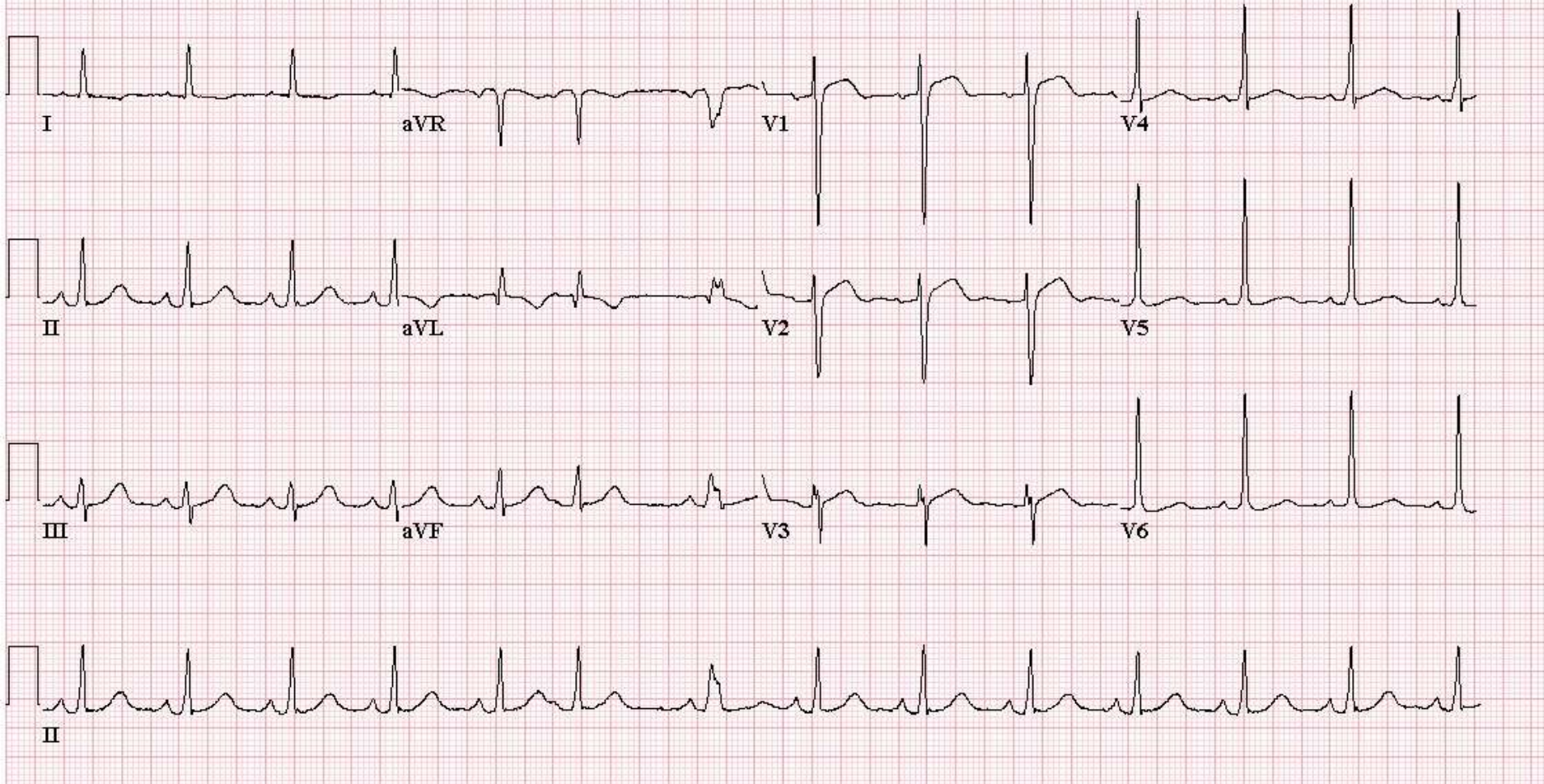
EID:11 EDT: 15:49 13-JUN-2016 ORDER:

immediately TAVI

ECG changes – 1 day after TAVI

Referred by:

Confirmed By: REPORT UNCONFIRMED



25mm/s 10mm/mV 40Hz 8.0.1 12SL 241 HDCID: 22

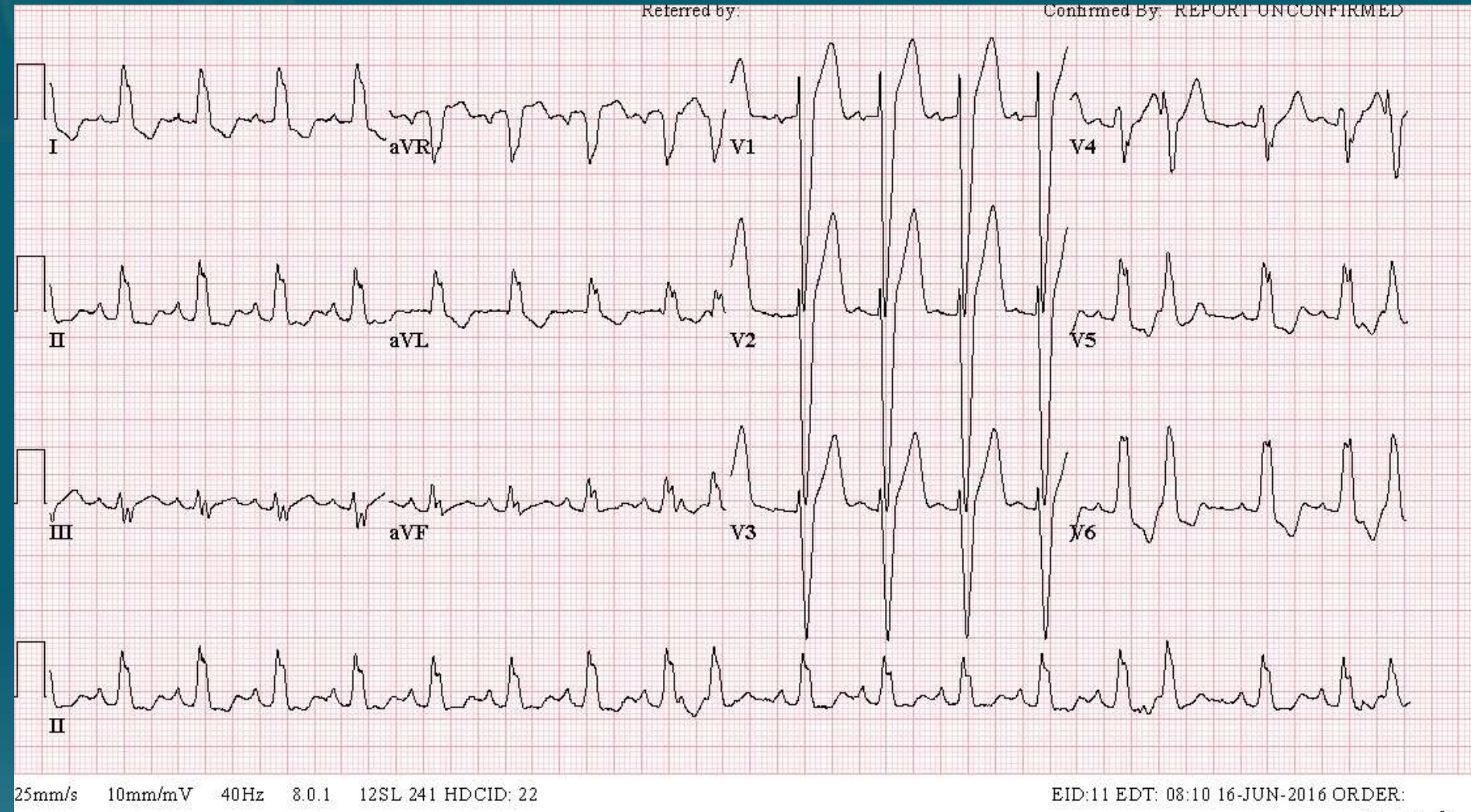
EID:11 EDT: 08:08 14-JUN-2016 ORDER:

1 day after TAVI

ECG changes – 2 days after TAVI

Referred by:

Confirmed By: REPORT UNCONFIRMED

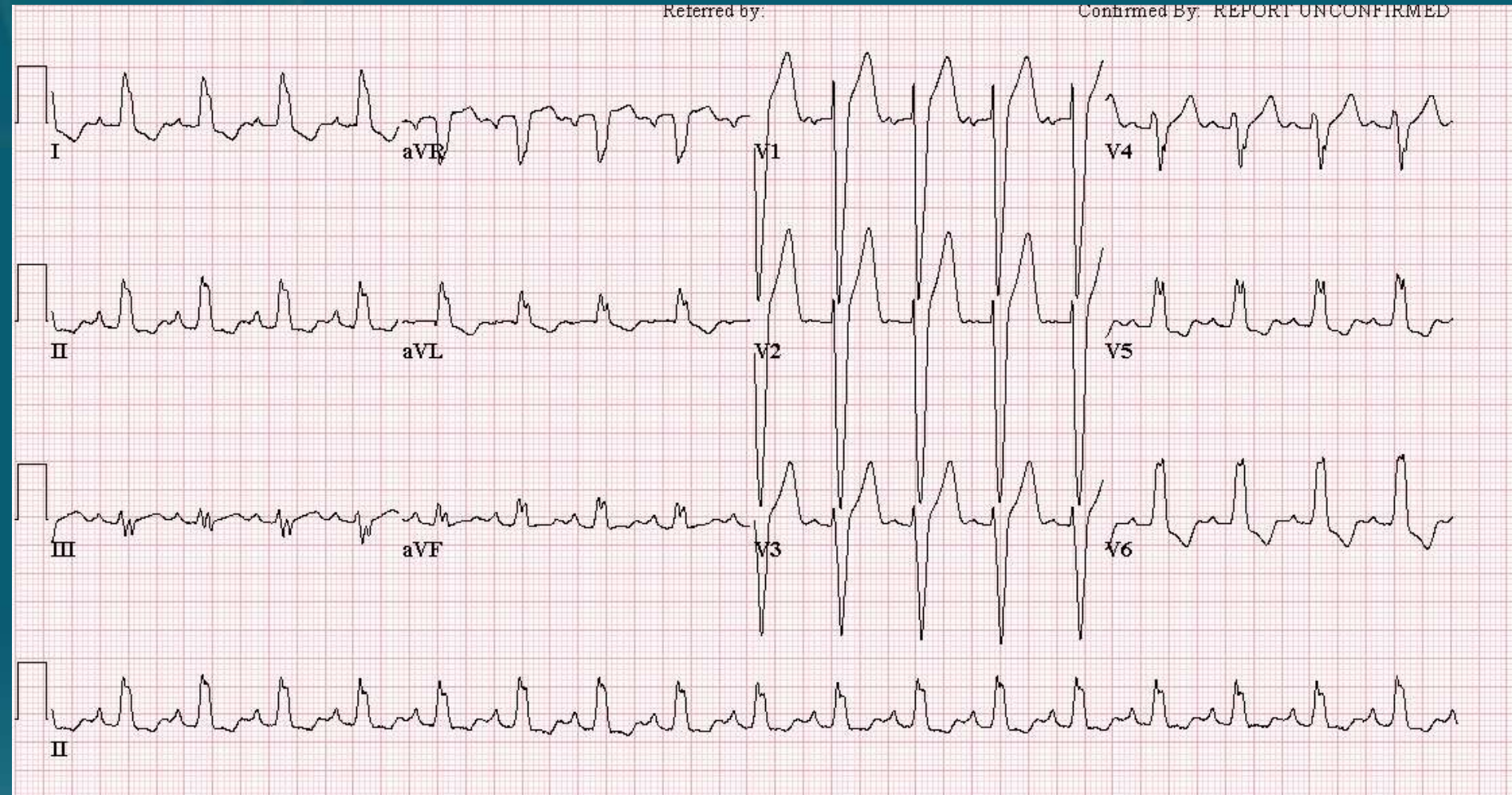


2 days after TAVI - LBBB

ECG changes – 3 days after TAVI

Referred by:

Confirmed By: REPORT UNCONFIRMED



25mm/s 10mm/mV 40Hz 8.0.1 12SL 241 HDCID: 22

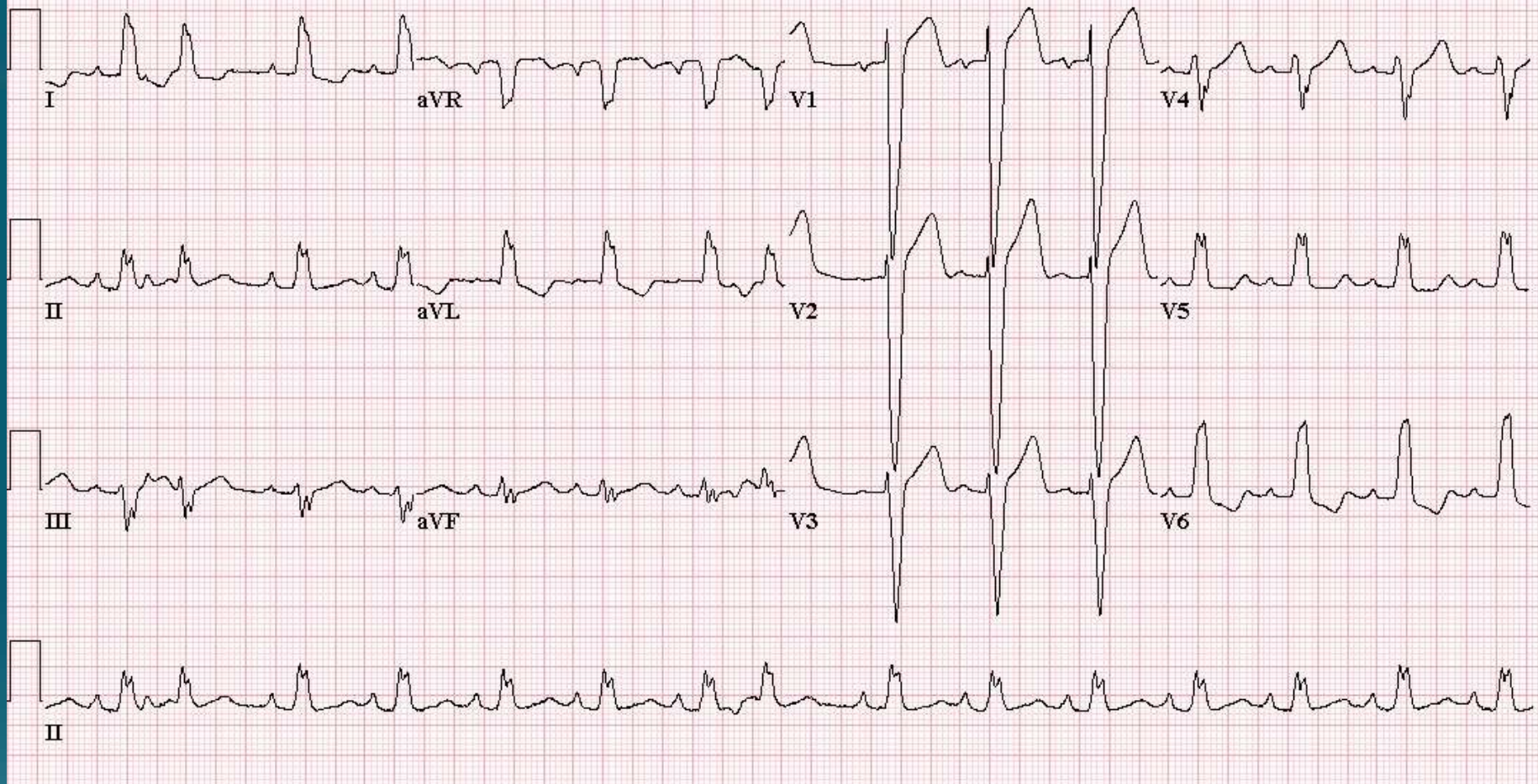
EID:11 EDT: 08:13 17-JUN-2016 ORDER:

3 days after TAVI - LBBB

ECG changes – 4 days after TAVI

Referred by:

Confirmed By: REPORT UNCONFIRMED



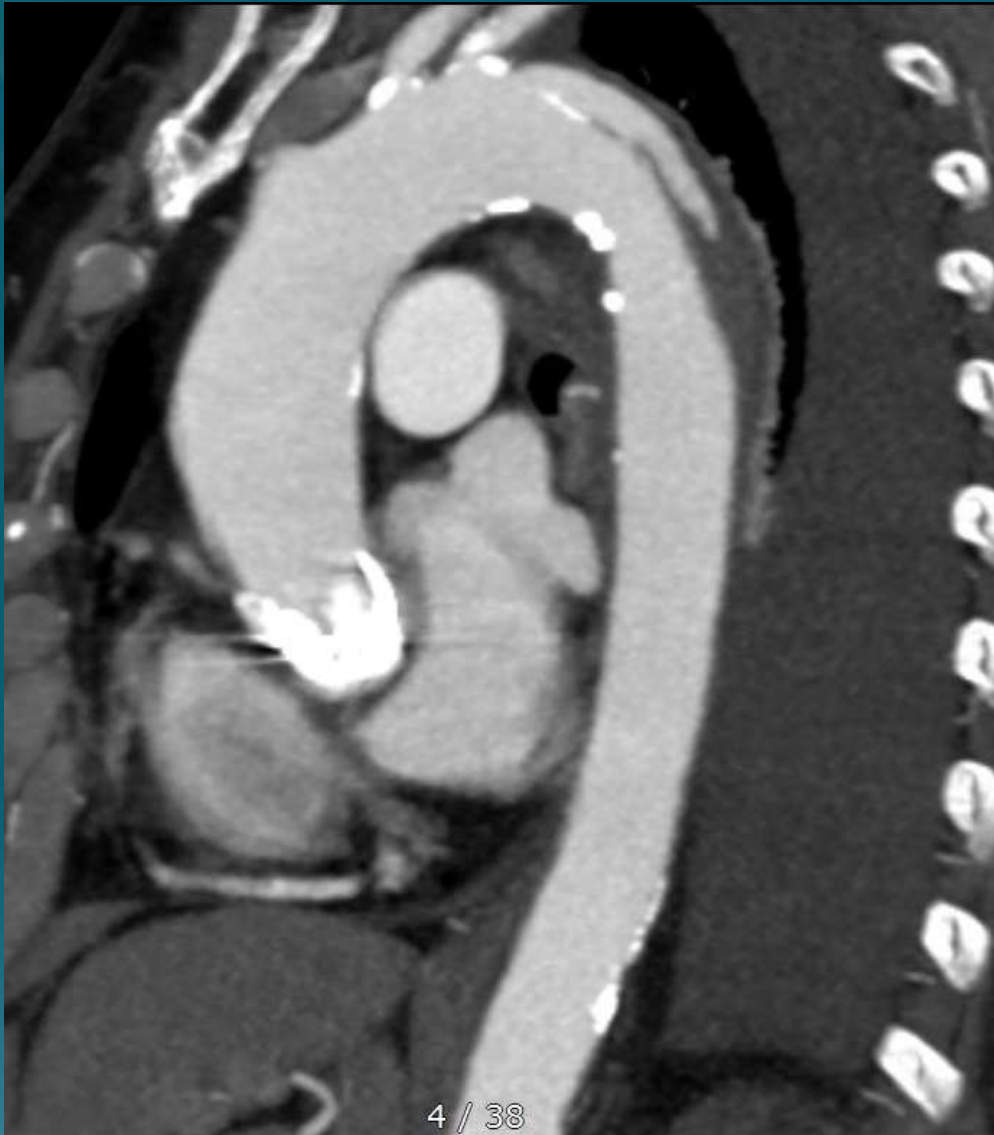
25mm/s 10mm/mV 40Hz 8.0.1 12SL 241 HDCID: 22

EID:11 EDT: 13:34 20-JUN-2016 ORDER:

4 days after TAVI - LBBB

complication – 4 days after TAVI

Aortic dissection type B



Aortic dissection, type B

- proximal to mid descending thoracic aorta
- no major branching a. from false lumen

Bilateral pleural and fissural effusion (Lt. > Rt.)

Subsegmental atelectasis at bilateral basal lung and LUL lingula

No significant size change of ascending aorta diameter

(2016-06-02) 36.32mm

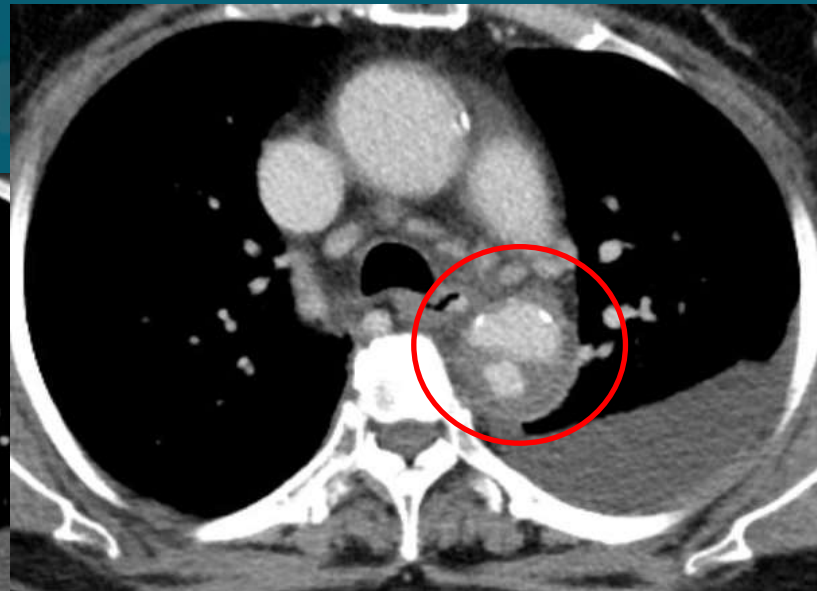
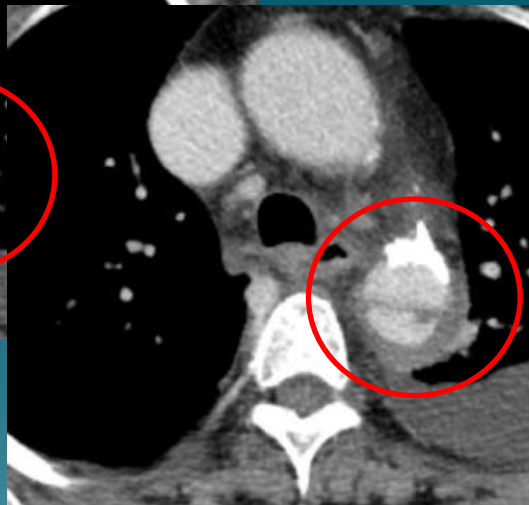
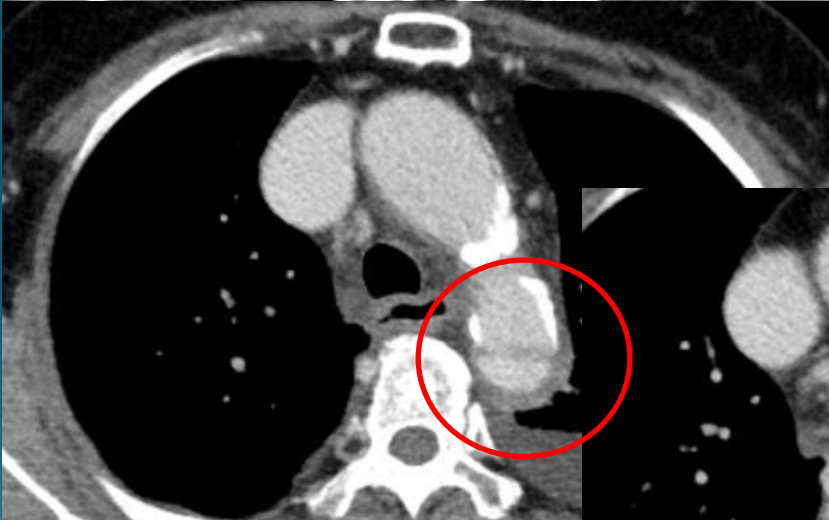
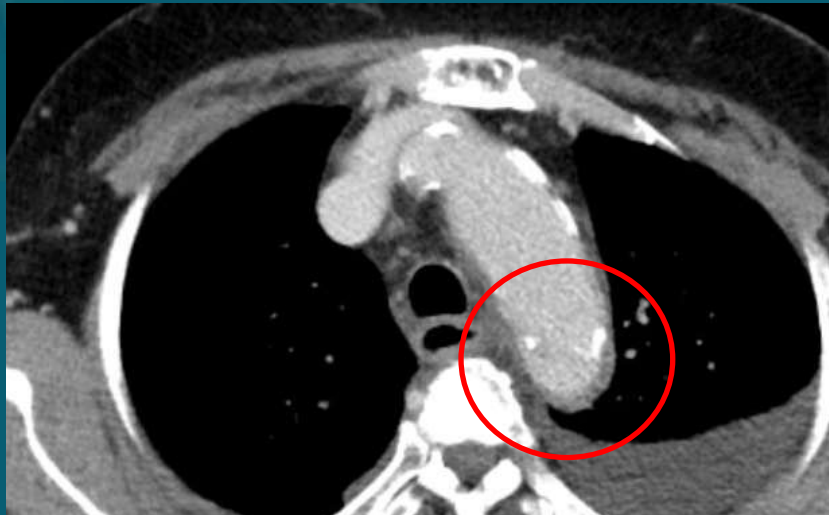
(2016-06-18) 36.35mm

No interval change of atherosclerosis with calcification of abdominal aorta and both CIA.

No significant abnormality in the myocardium.

complication – 4 days after TAVI

Aortic dissection type B



complication – 5 days after TAVI

Aortic dissection type B - f/u CT

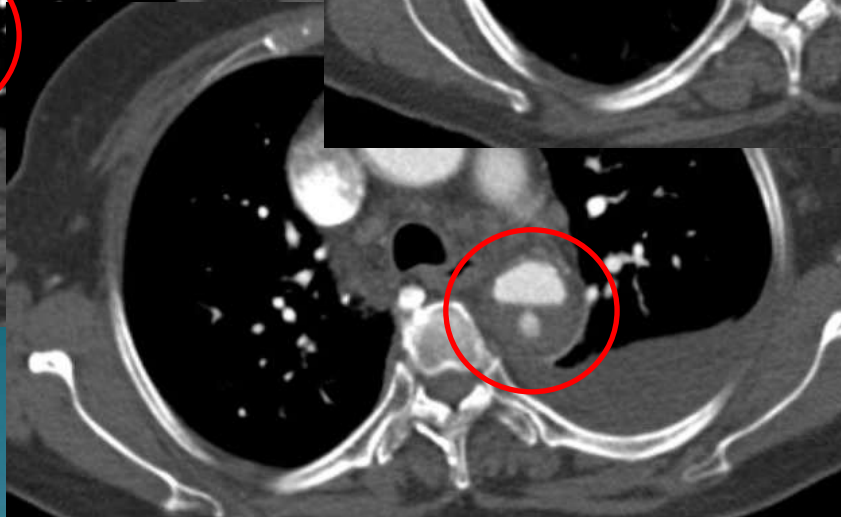
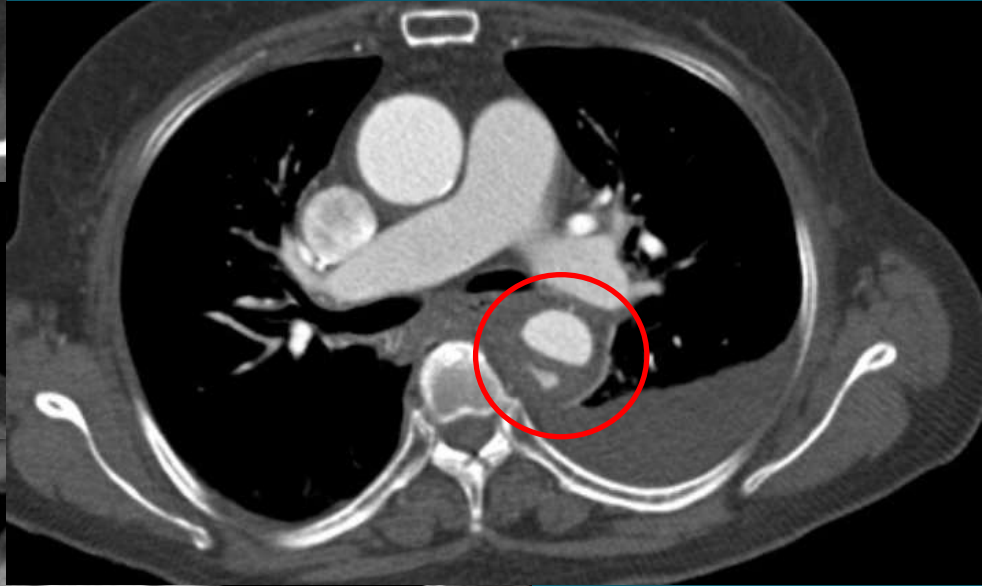
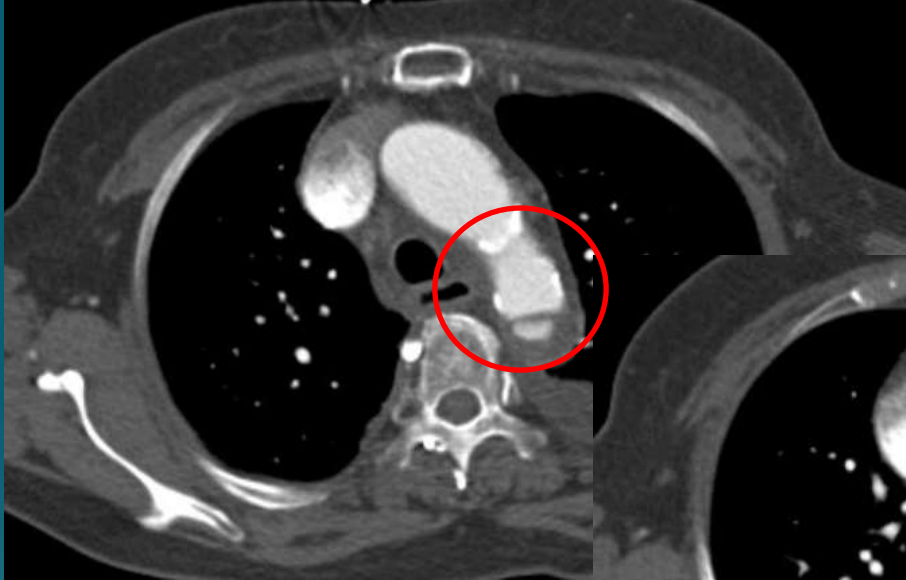
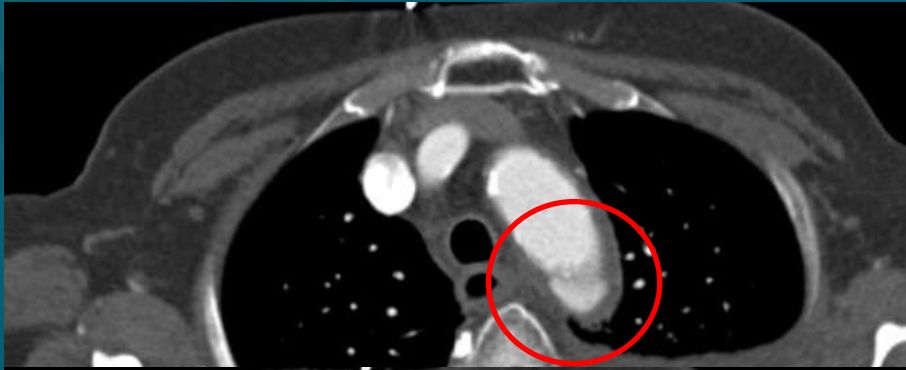


No significant interval change of extent of aortic dissection, type B

- proximal to mid descending thoracic aorta
- no major branching a. from false lumen

complication – 5 days after TAVI

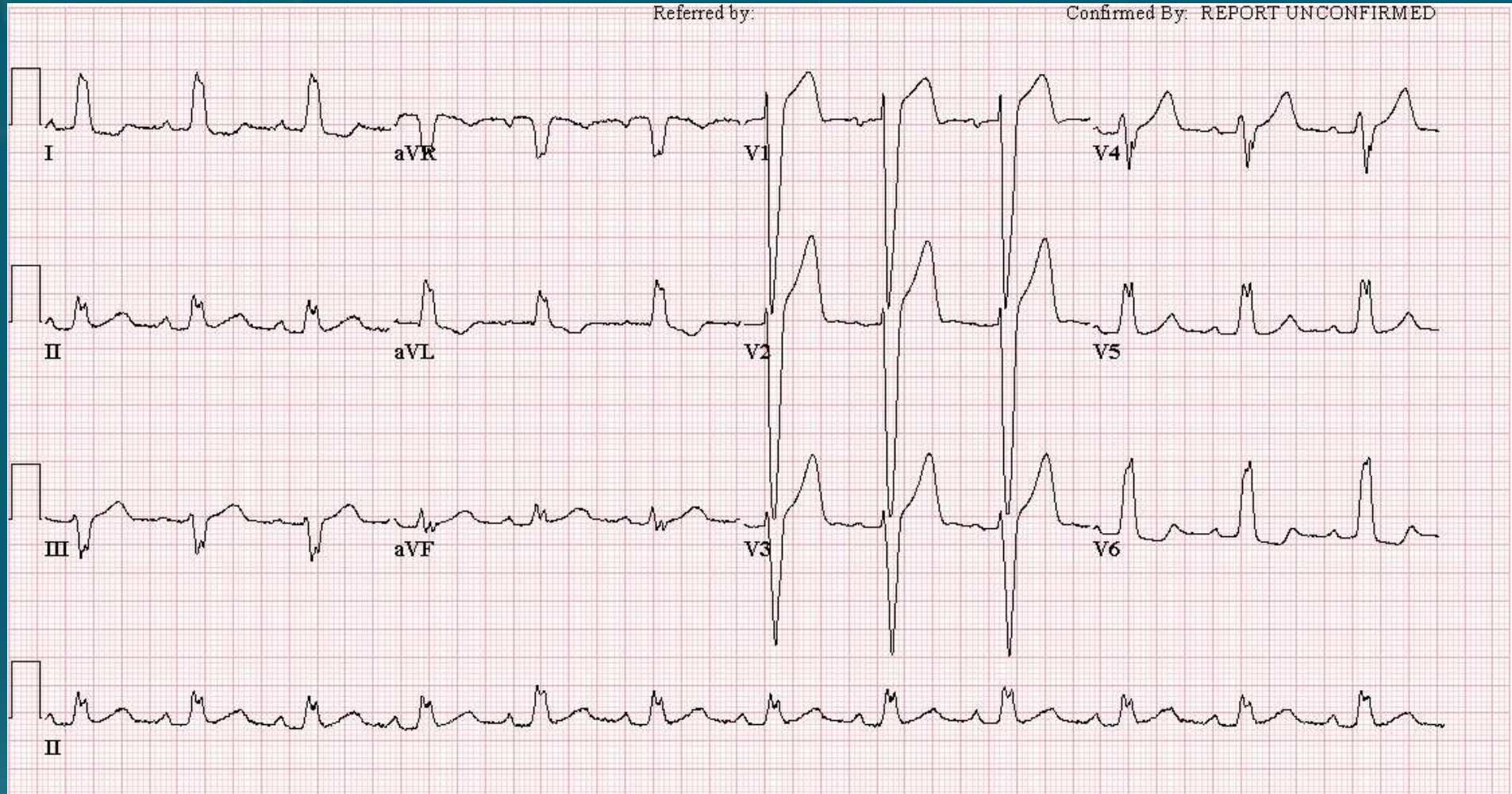
Aortic dissection type B - f/u CT



ECG changes – 8 days after TAVI

Referred by:

Confirmed By: REPORT UNCONFIRMED



25mm/s 10mm/mV 40Hz 8.0.1 12SL 241 HDCID: 22

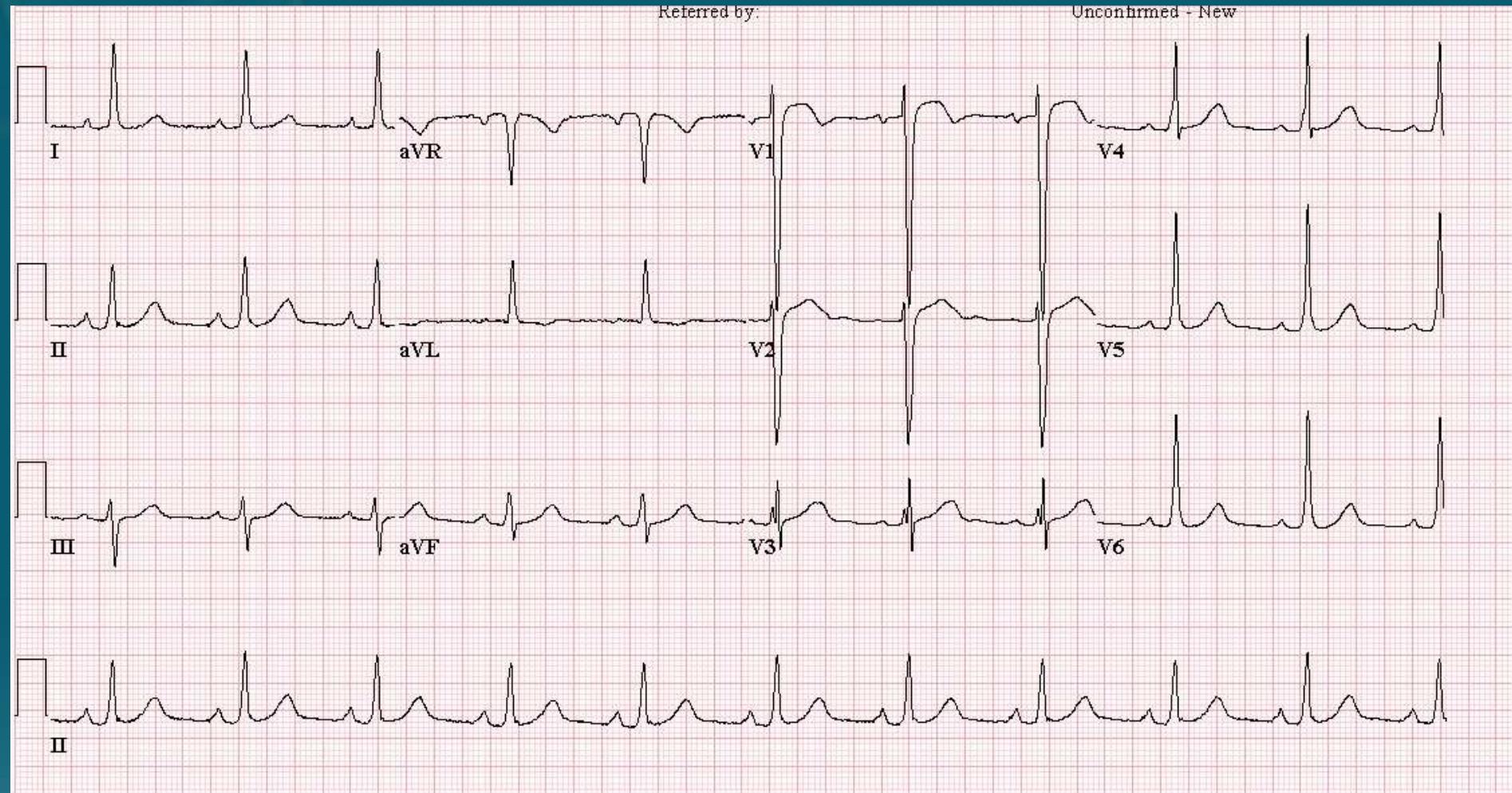
EID:11 EDT: 08:17 23-JUN-2016 ORDER:

8 days after TAVI - LBBB

ECG changes – 11 days after TAVI

Referred by:

Unconfirmed - New



25mm/s 10mm/mV 40Hz 8.0.1 12SL 241 HDCID: 22

EID: EDT: ORDER:

11 days after TAVI – normal sinus

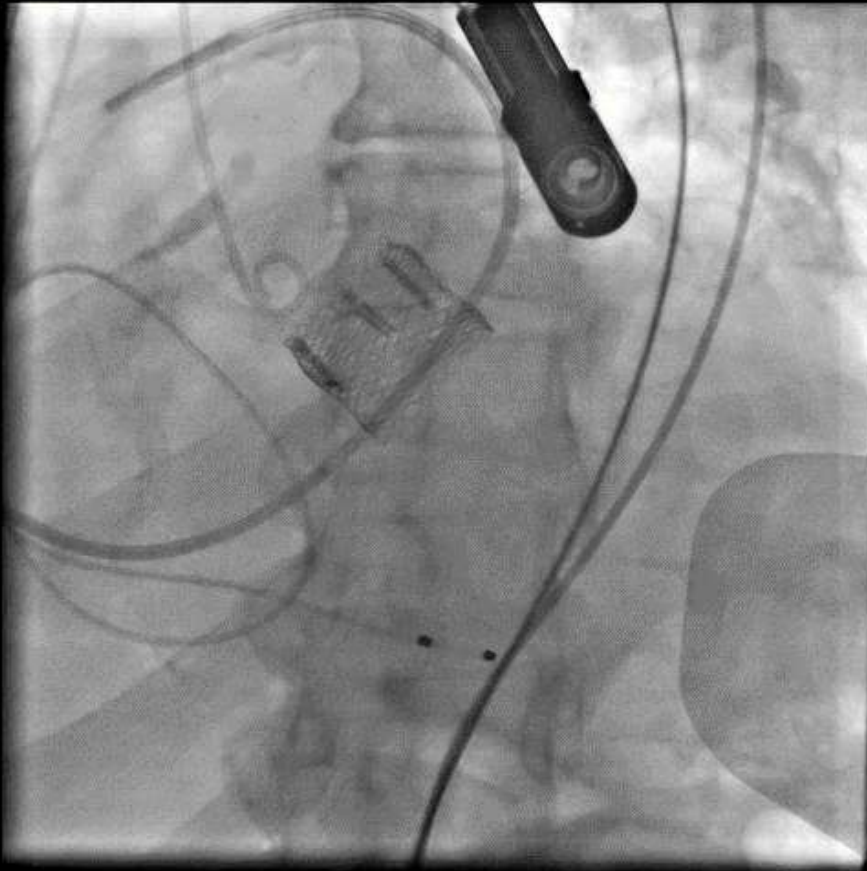
AV Conduction Disturbance



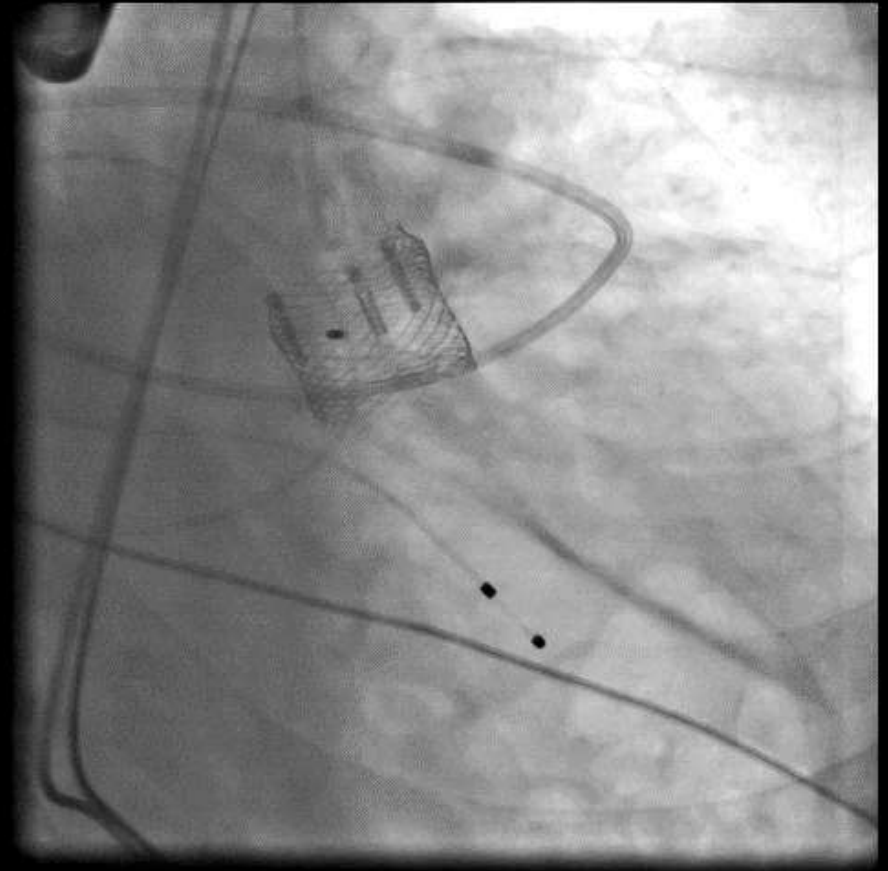


- **Severe degenerative AS with trivial AR**
AV mean PG 66 mmHg, AV Vmax 4.4m/s
- **AVA = 0.66cm² by CE**
- **Moderate resting pulmonary hypertension**
estimated PASP 65 mmHg
- **Normal LV cavity size and low normal systolic function**
LVEDD/ESD 51/35mm, LV EF 53%
- **Increased LV wall thickness & RVH**
IVSd/LVPWd 15/14mm
- **Small amount of pericardial effusion**

TAVI procedure (2015-11-04) - Final

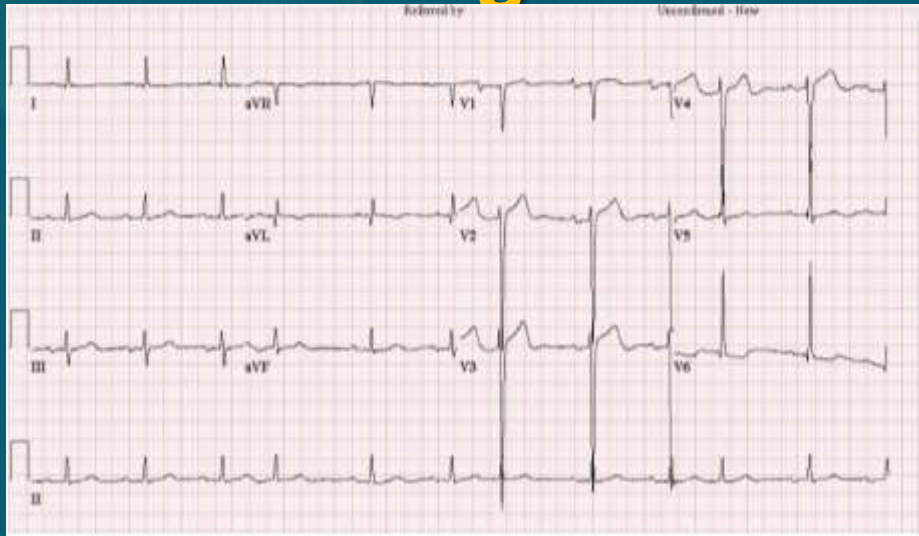


Final Ao. LAO 20 CAU 13

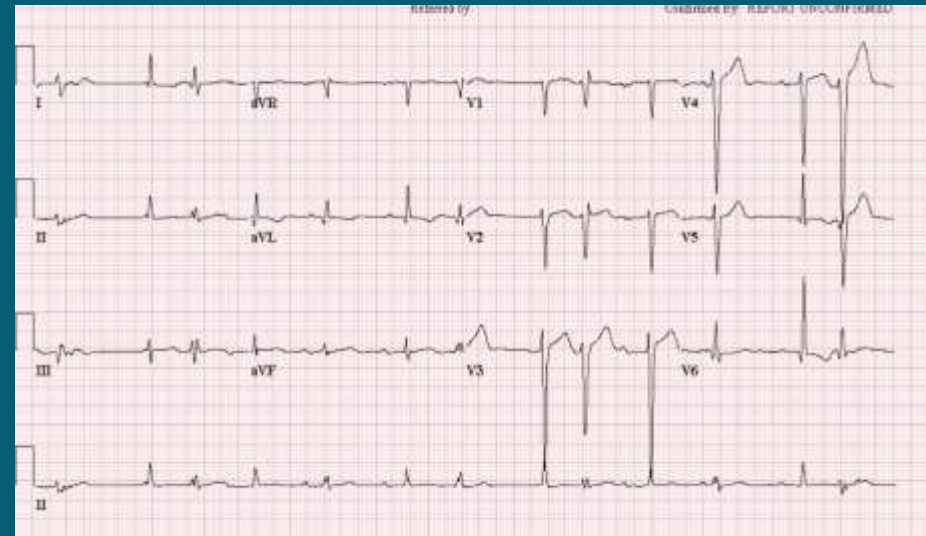


Final Ao. RAO 28 CAU 45

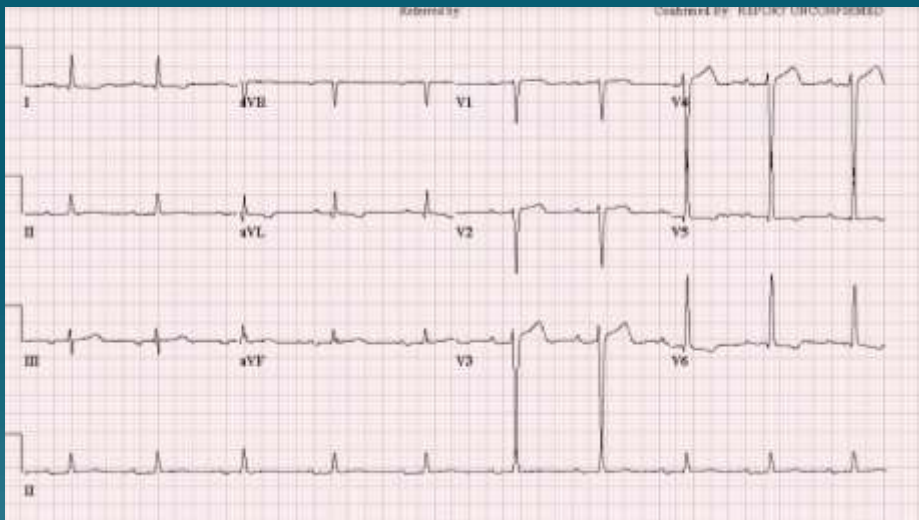
ECG changes



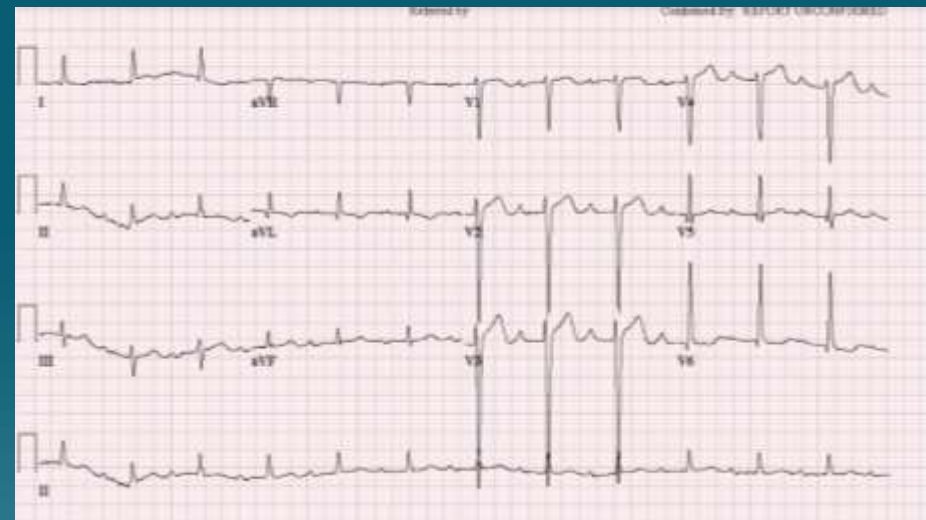
Before TAVI



1 day after TAVI



3 days after TAVI



7 days after TAVI

Technical tips for perfect result of LOTUS valve

To prevent AVB

- Avoid deep insertion of device into LV even before unsheathing
 - irritation causes AVB
- Achieve high implantation of valve
 - Adjust the **distal edge of POST** at the annulus level from the start
 - **Gentle push of wire into LV** to prevent deep-dive of valve
 - Find the **optimal projection angle** with 3 POSTs on single plane
- Monitoring LBBB or AVB
 - It may happen several days after TAVI

To prevent PVL & to fix securely during lay-over

- Optimal oversizing is important :
 - less than 8% (perimeter), 16% (area)
- Subtle~mild indentation at mid-part of valve frame

SNUH-LOTUS COHORT

SNUH LOTUS cohorts : 24 patients

- **just two cases of PPM insertion (8.3% incidence)**
 - = 1st case ; CAVB immediately after Pre-BVP
 - = 2nd case ; bicuspid AS with heavy calcification

SNU-H protocol to prevent AVB

- **Distal edge of POST at the annulus level**
- **Gentle push of wire into LV to prevent deep-dive of valve**
- **Optimal projection angle with 3 POSTs on single plane**

ENdovascular & COronary REvascularization in Seoul

ENCORE SEOUL 2017

SEPTEMBER 20(WED) ~ 22(FRI), 2017

GRAND INTERCONTINENTAL SEOUL PARNAS, SEOUL, KOREA

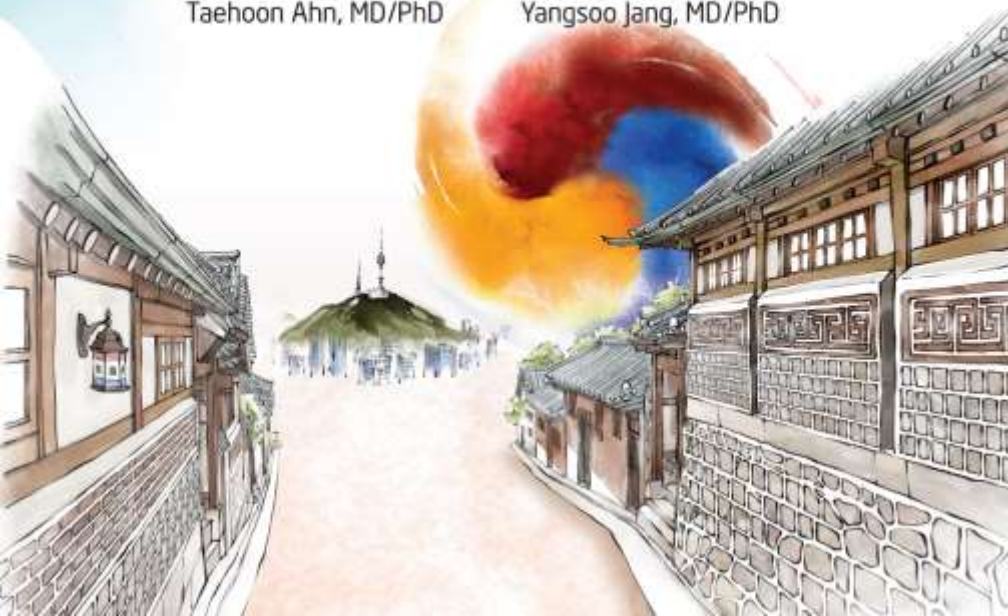
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Yangsoo Jang, MD/PhD



Save the Date!

**September 20 ~ 22
(3rd Wed ~ Fri)
2017**