

# Minimally Invasive Cardiac Surgery; Overview and Interesting Case

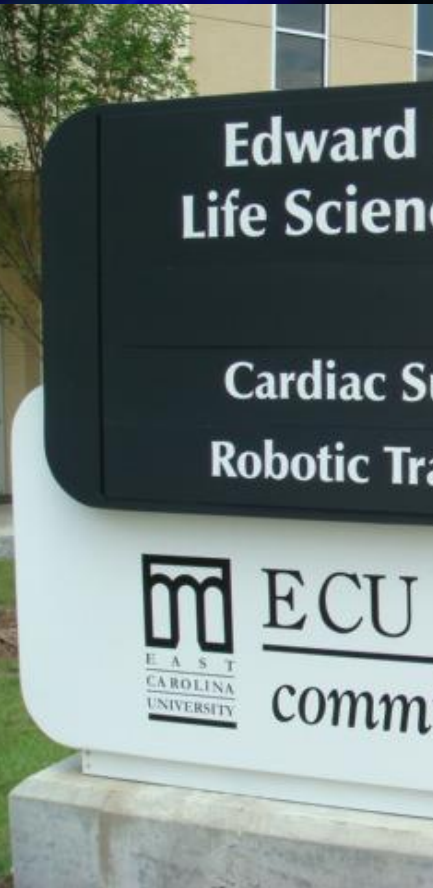
Hyung Gon Je, MD, PhD.

Dept. of Thoracic and Cardiovascular surgery

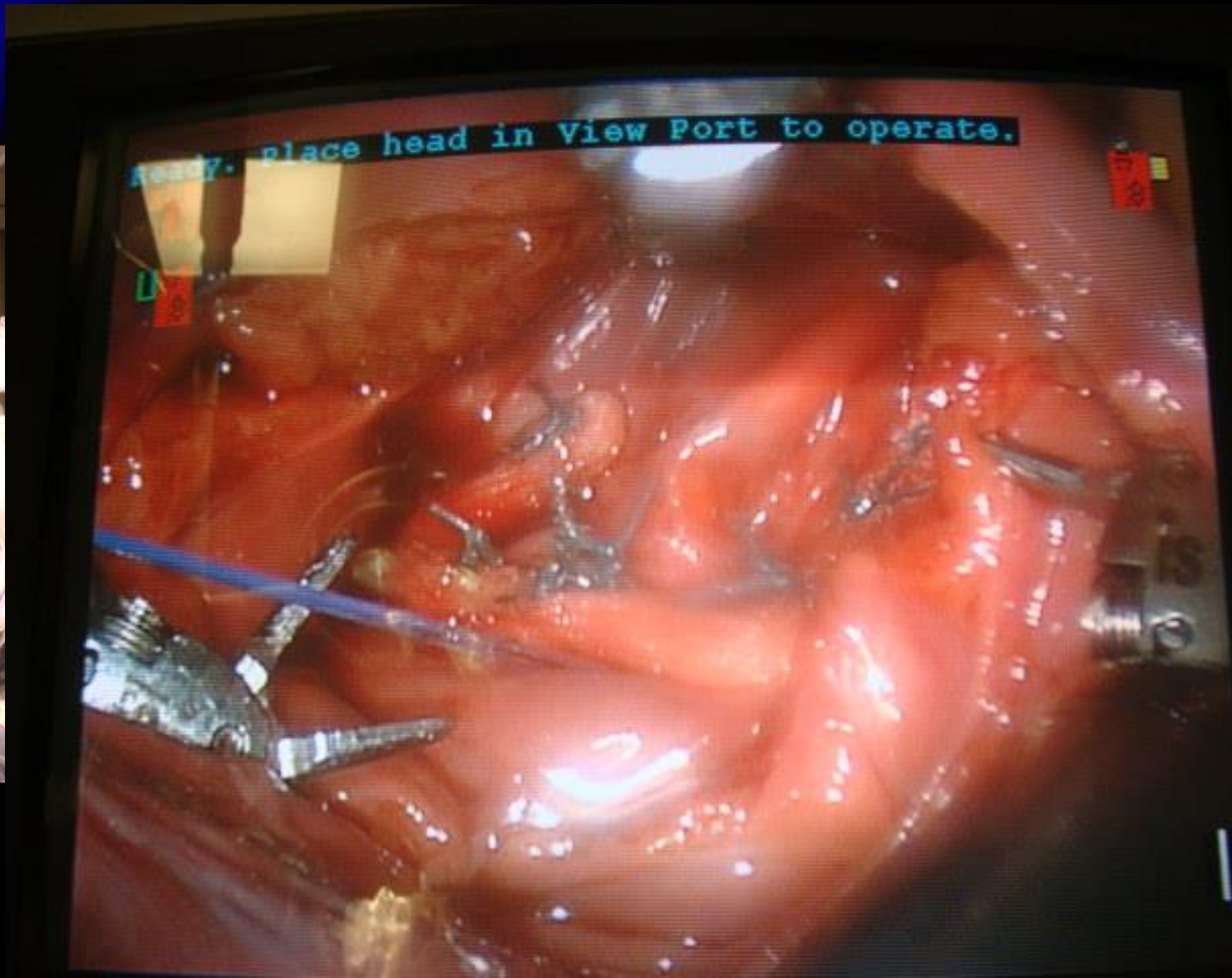
Pusan National University Yangsan Hospital

Yangsan, Korea

# Robotic and MICS train at ECU



# Robotic and MICS train at ECU



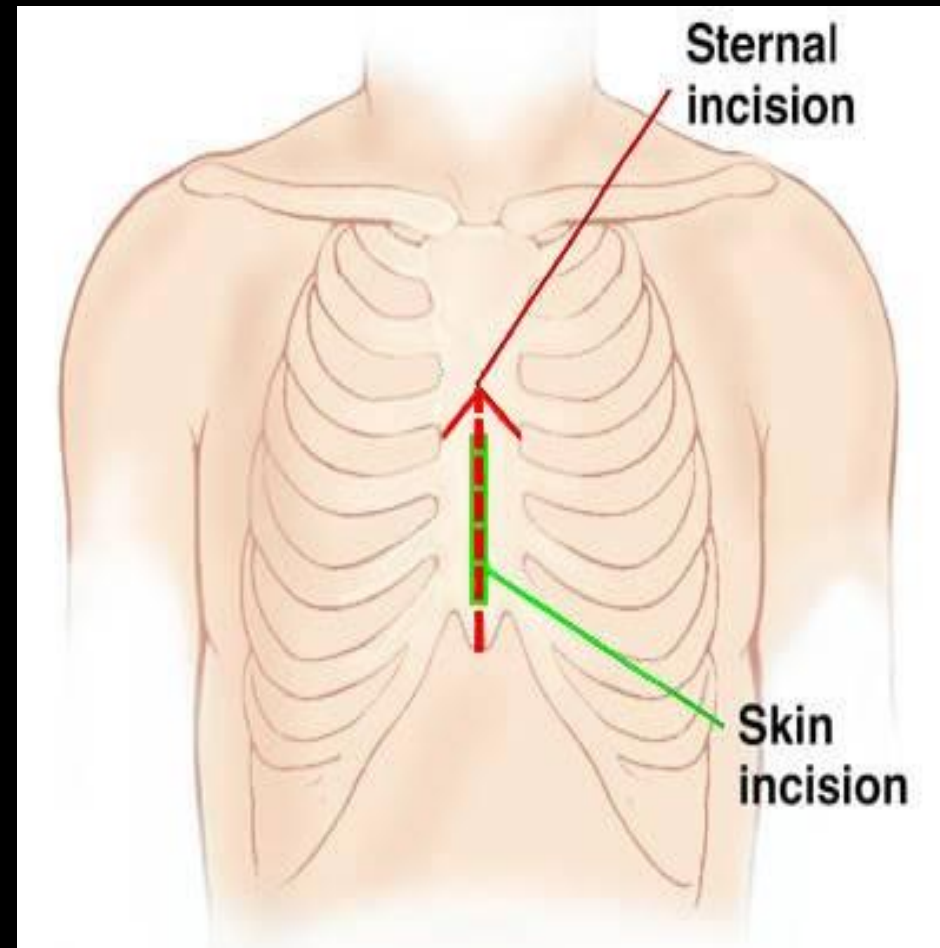
# Minimal; How small is?

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- Avoiding Sternotomy
- Less than 8cm skin incision
- Peripheral cannulation

# Lower Sternotomy

- Lower midline skin incision  
10 cm
- Midsternal & extension to  
Rt. 2<sup>nd</sup> ICS
- Cannulation & Cardioplegia ;  
Conventional way

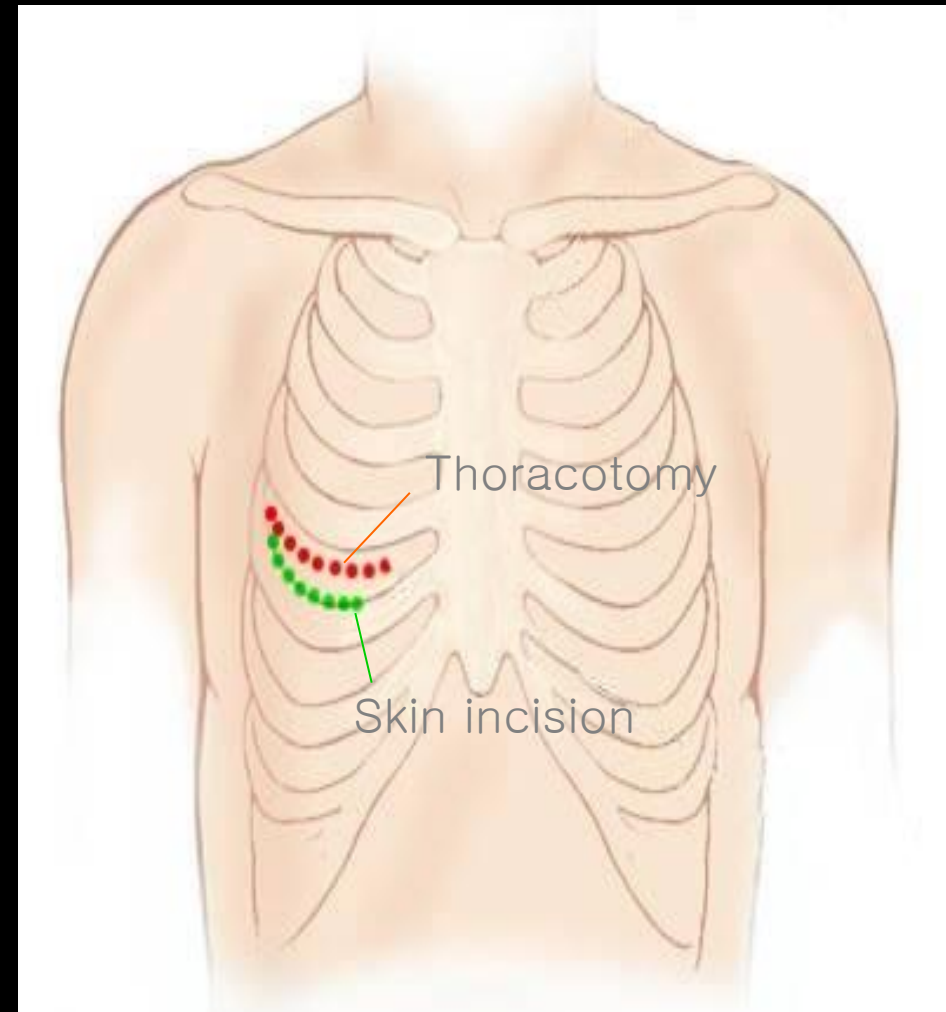


# Lower Sternotomy



# Right submammary incision

- Right submammary fold
  - Nipple to ant. axillary line
  - 4<sup>th</sup> ICS
  - Cannulation & Cardioplegia
- ; Conventional way

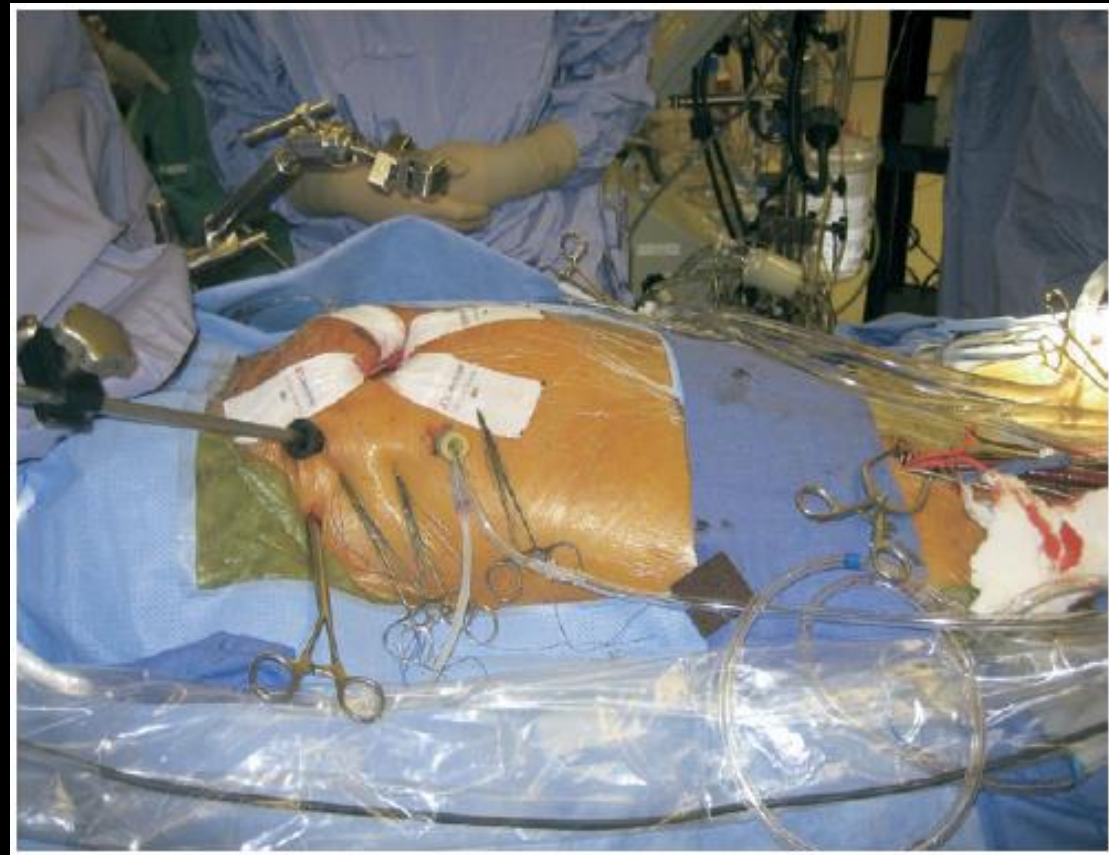


# Right submammary incision

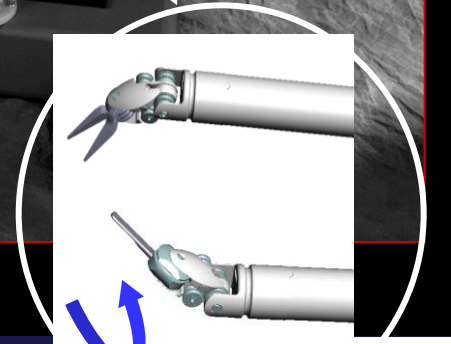
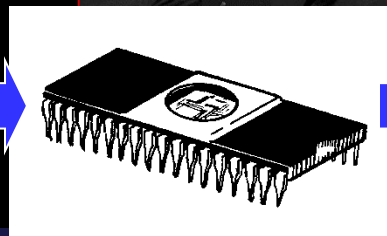
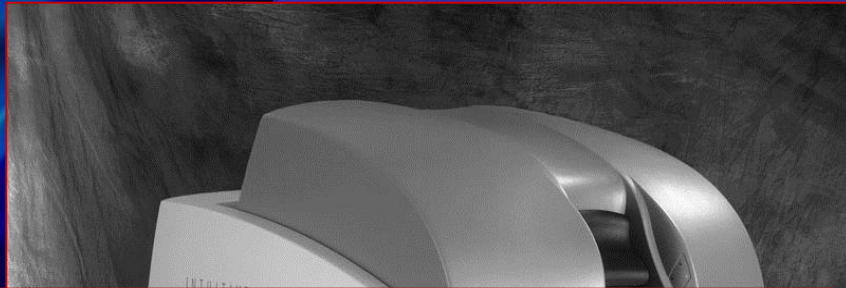




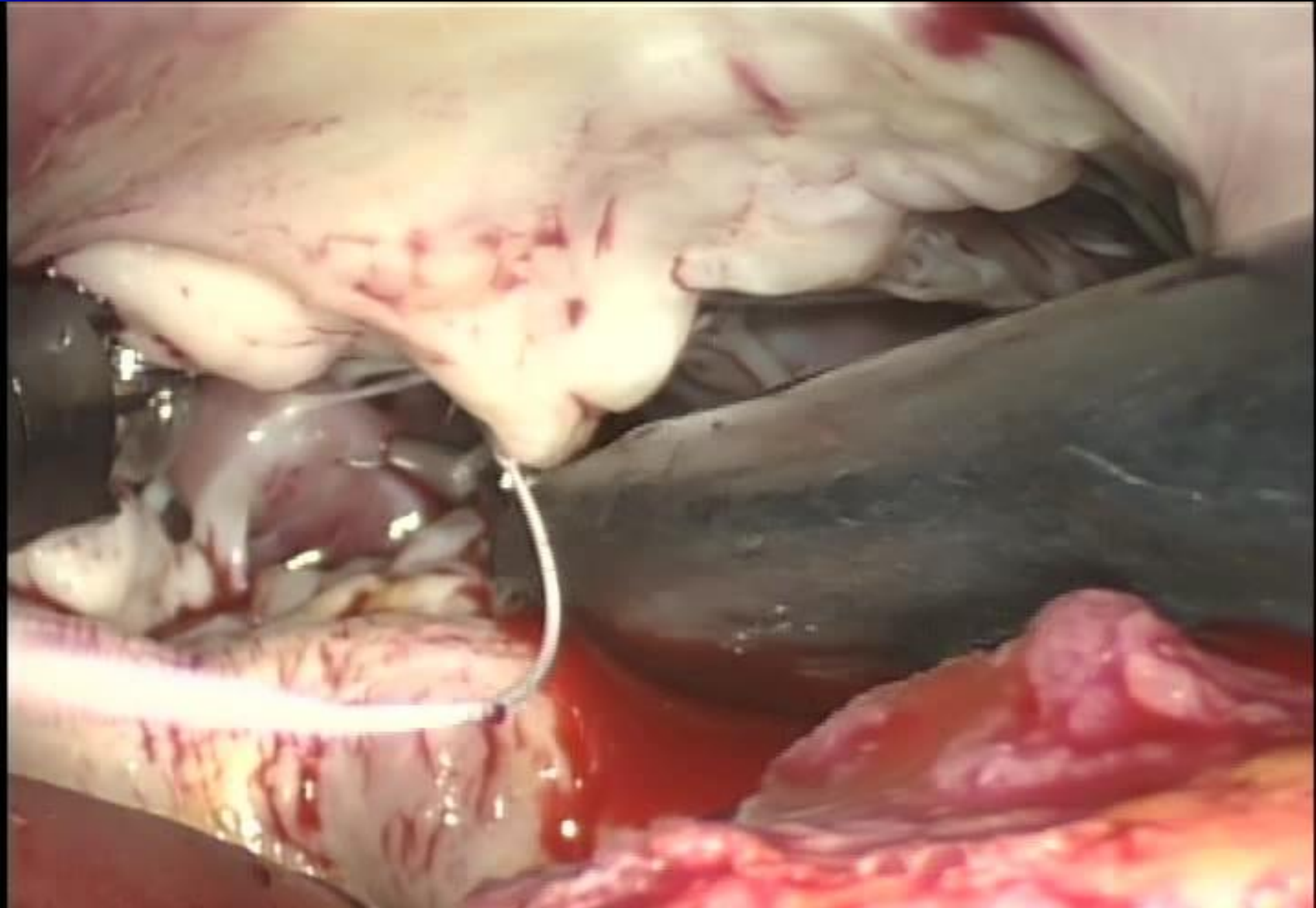
# AESOP vs da Vinci



# AESOP vs da Vinci



# Robotic MVP using daVinci



# Comparison of wound



# Ix of MICS

- All MV, TV surgery; MVP, MVR, TVP, TVR
- Maze
- Cardiac tumor; eg> LA myxoma, LV mass
- Adult congenital cardiac defect
  - ASD, Partial AVSD,
  - VSD; SA and PM type
  - Coronary artery fistula
- Coronary bypass

# Robotic CABG

Hyung Gon Je, MD, PhD.

Dept. of Thoracic and Cardiovascular surgery

Pusan National University Yangsan Hospital

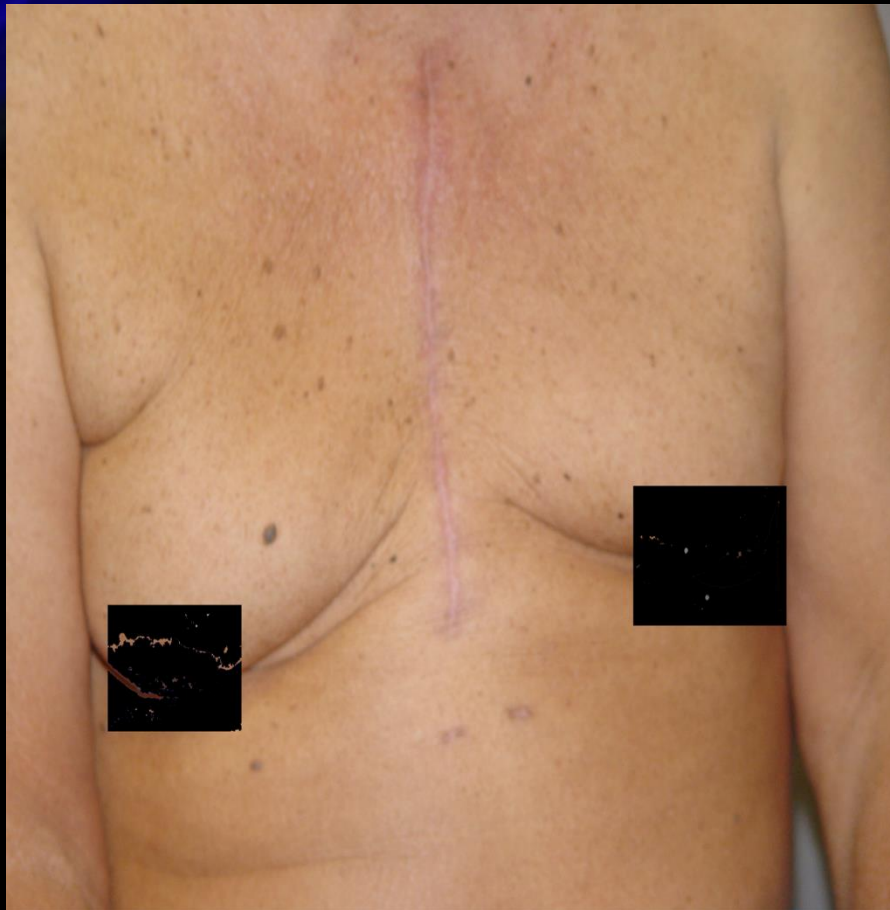
Yangsan, Korea

# CABG; Recent innovations

- Complete arterial revascularization ; BITA, RA, RGEA
- OPCAB ; off pump CABG
- MIDCAB ; minimally invasive direct CABG
- Port access surgery in CABG ; not in Korea
- Robot assisted CABG

# Options

Median Sternotomy



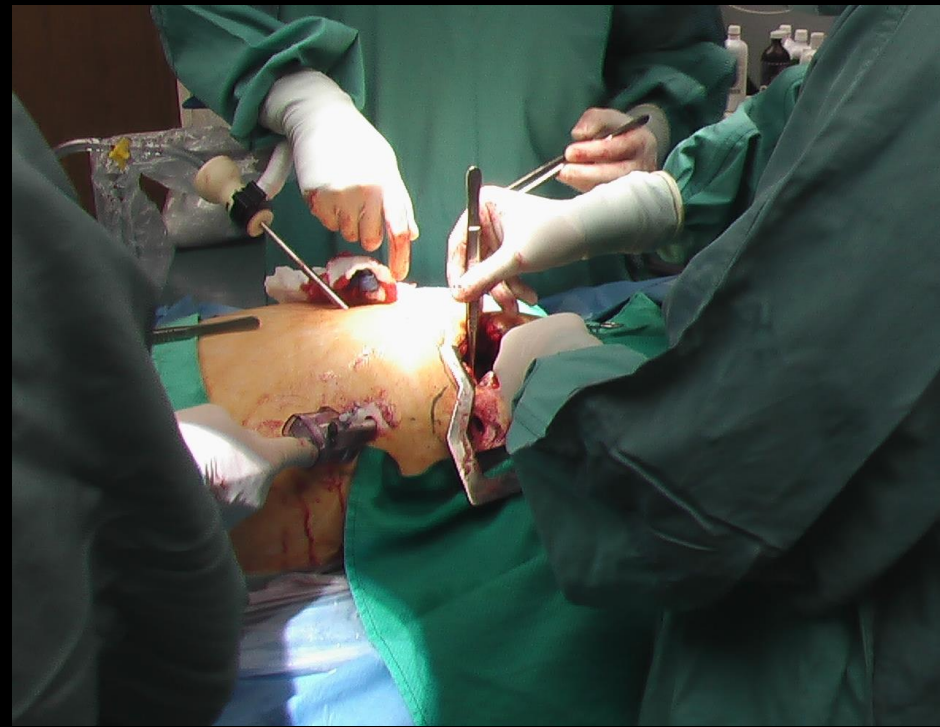
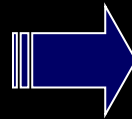
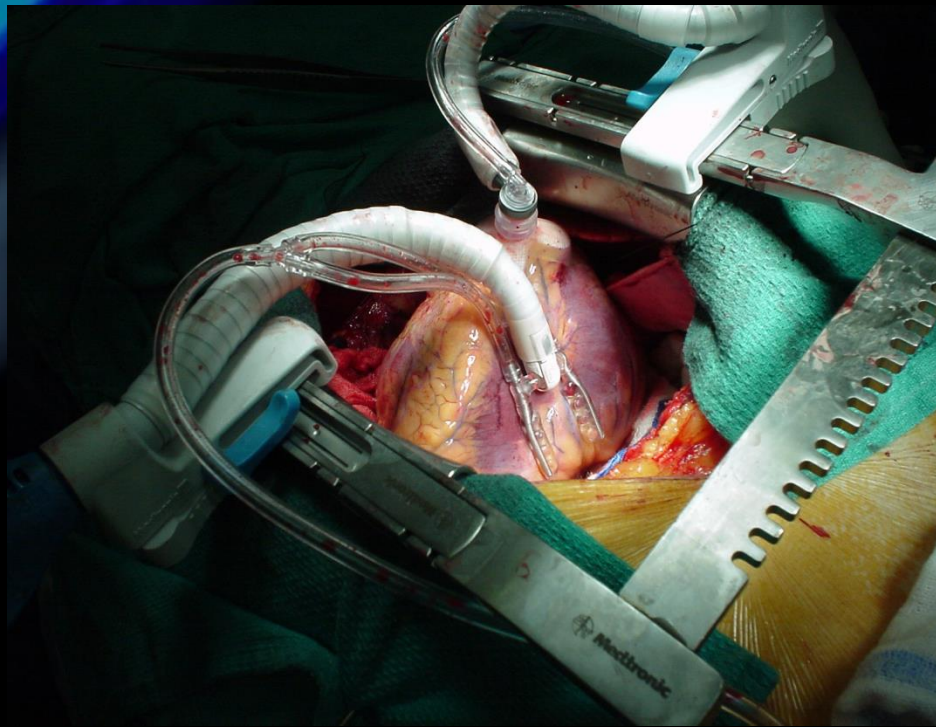
Anterolateral Thoracotomy



Port Incision



# MIDCAB using AESOP® 3000 & Starfish® Heart Positioner



*Making CABG Less-invasive*

# MIDCAB

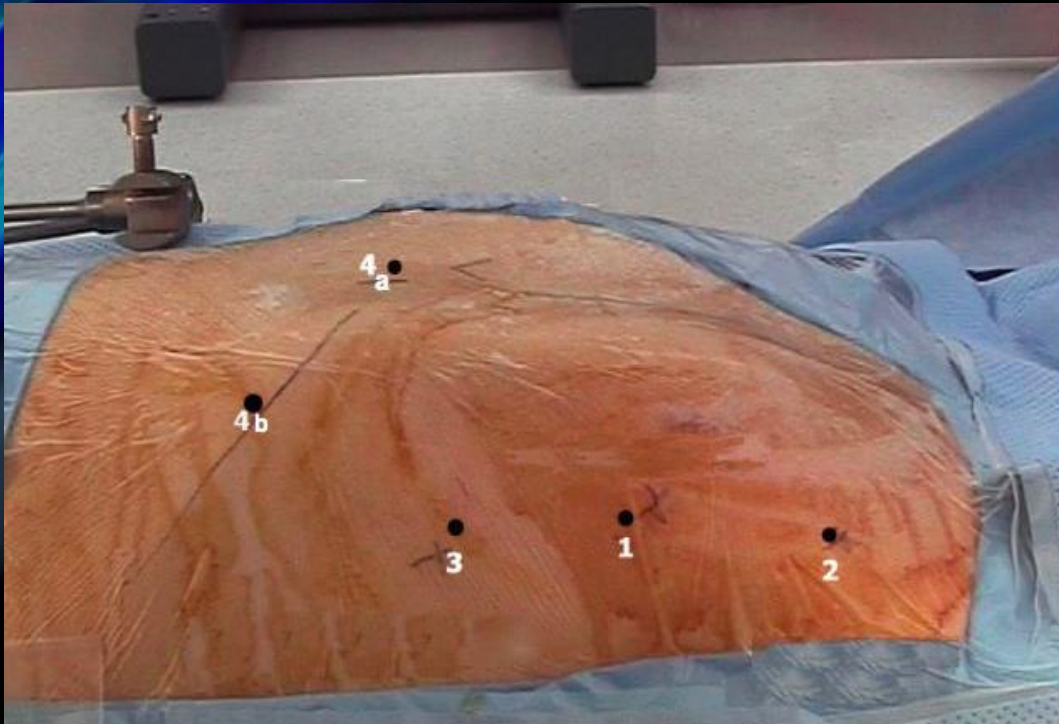


LIMA to LAD Anastomosis with  
Octopus<sup>®</sup> 4 Tissue Stabilizer

# Robotic CAB; IMA harvesting



# Port set up for TECAB



1 Camera

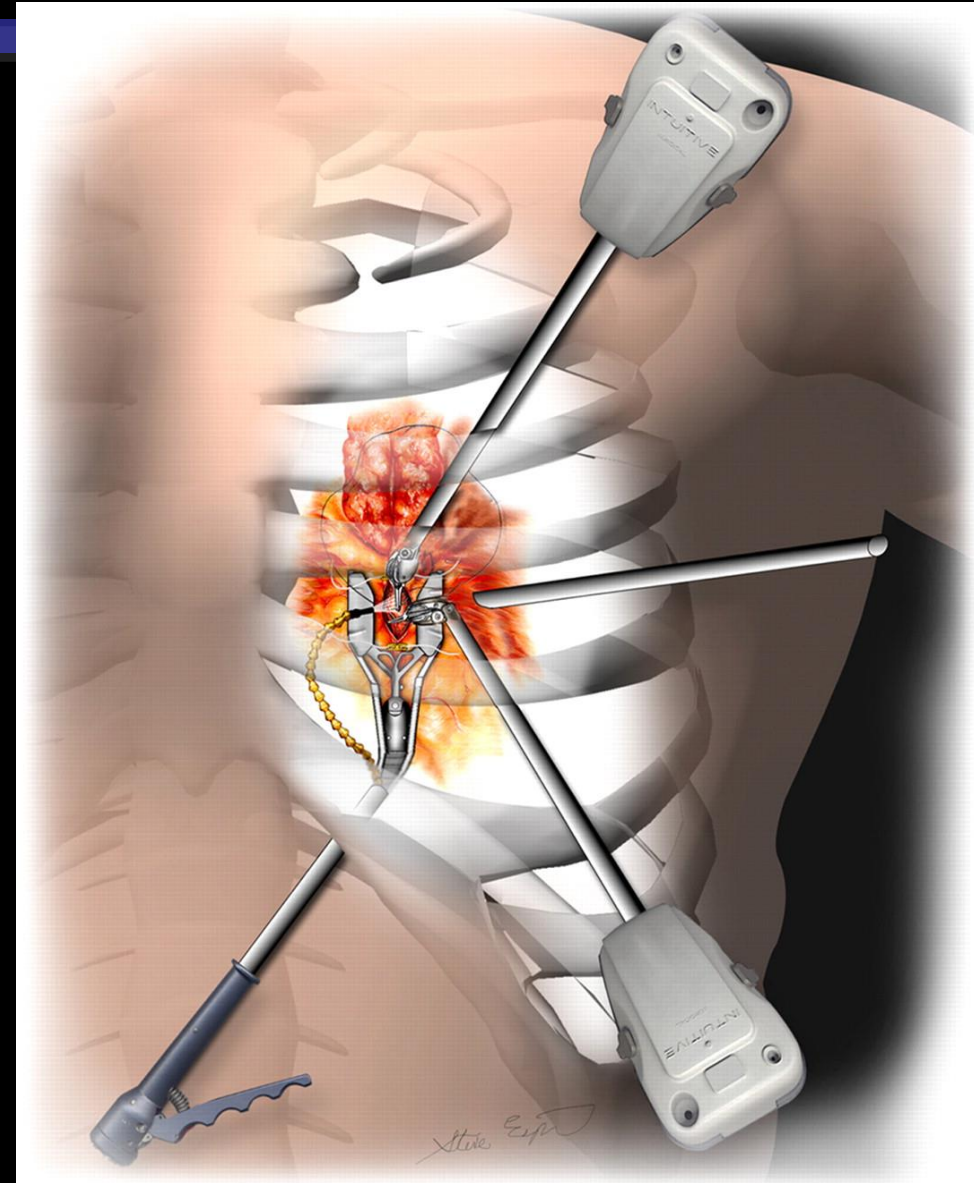
2 Right instrument

3 Left instrument

4a Endoscopic stabilizer (LAD, DX)

4b Endoscopic stabilizer (LAD, DX, RAMUS, OM)

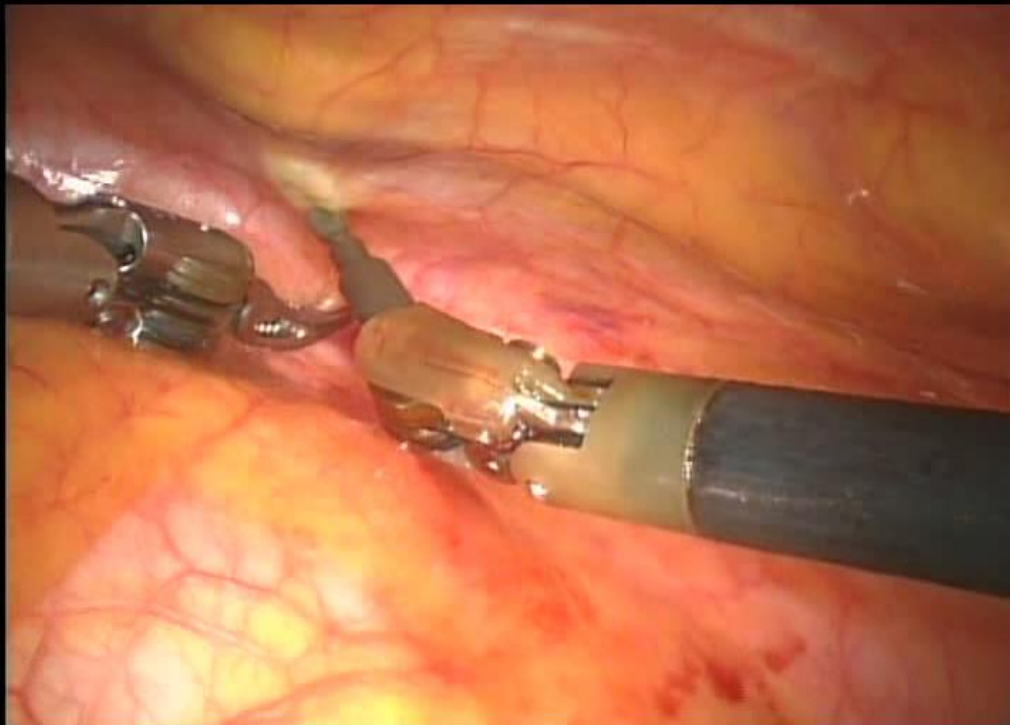
▪ Courtesy of Dr. Sudhir P. Srivastava M.D.



▪ Courtesy of Intuitive Surgical

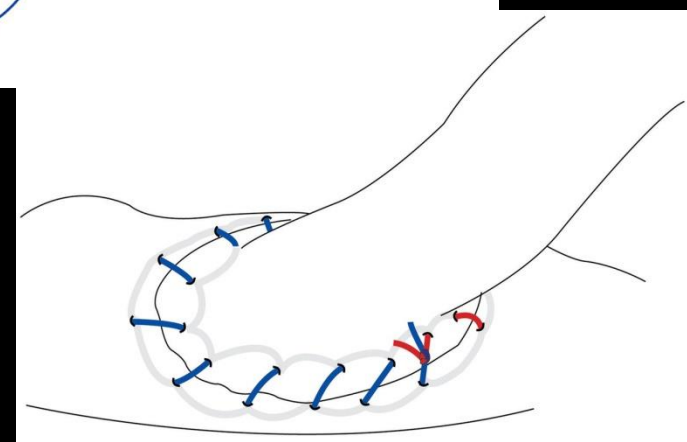
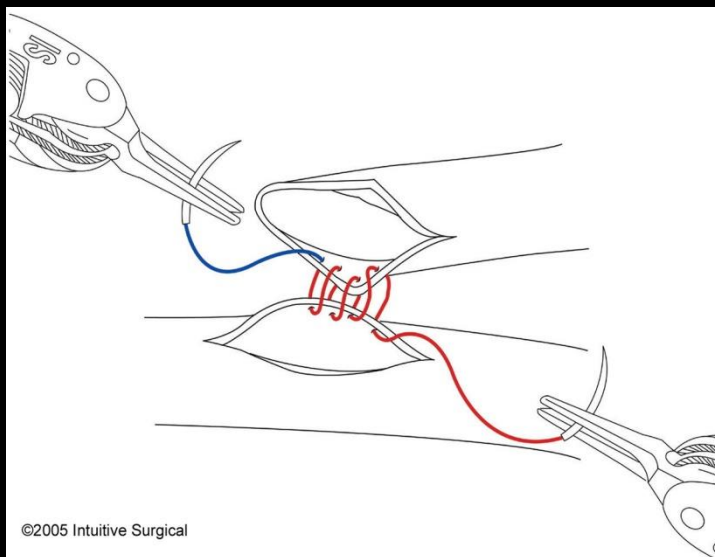
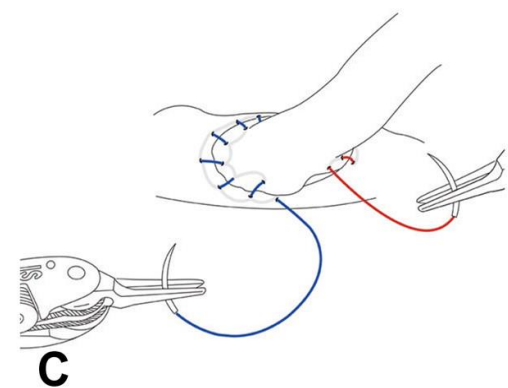
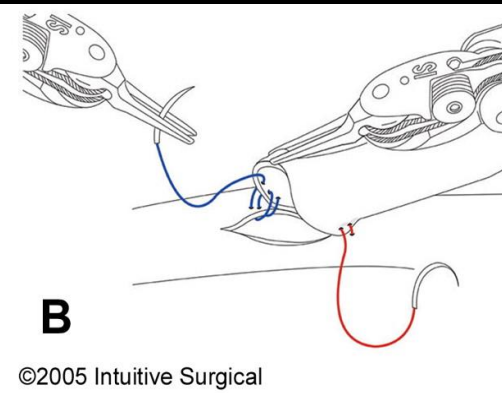
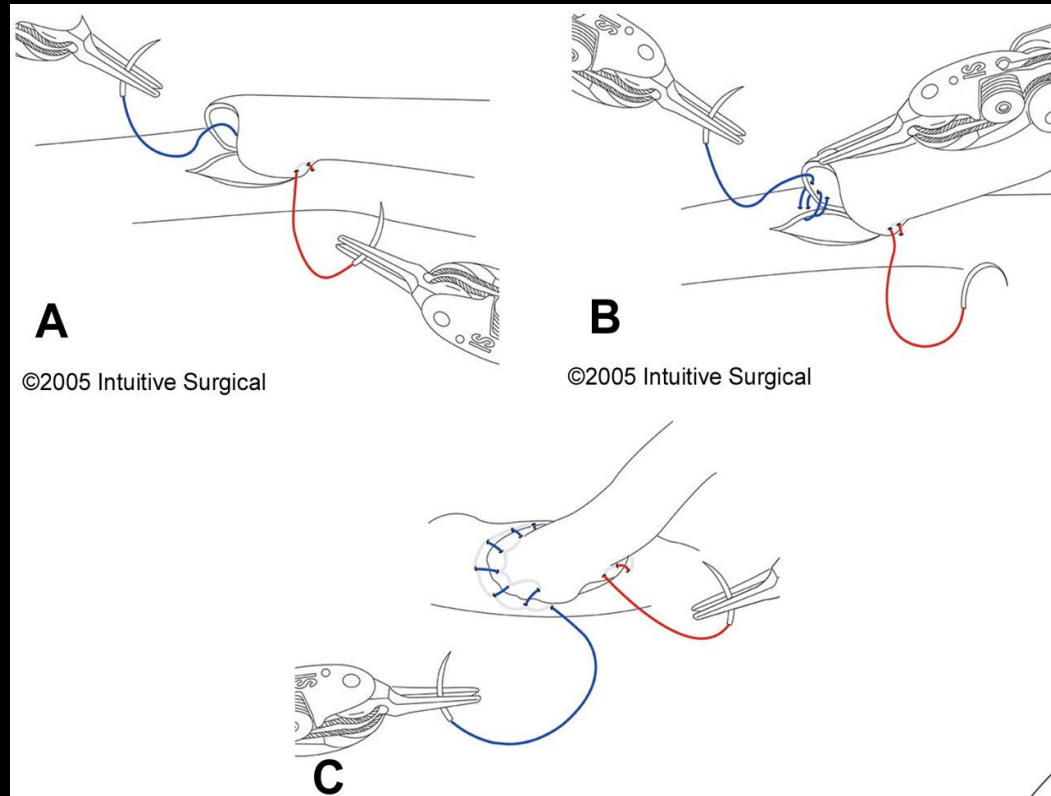
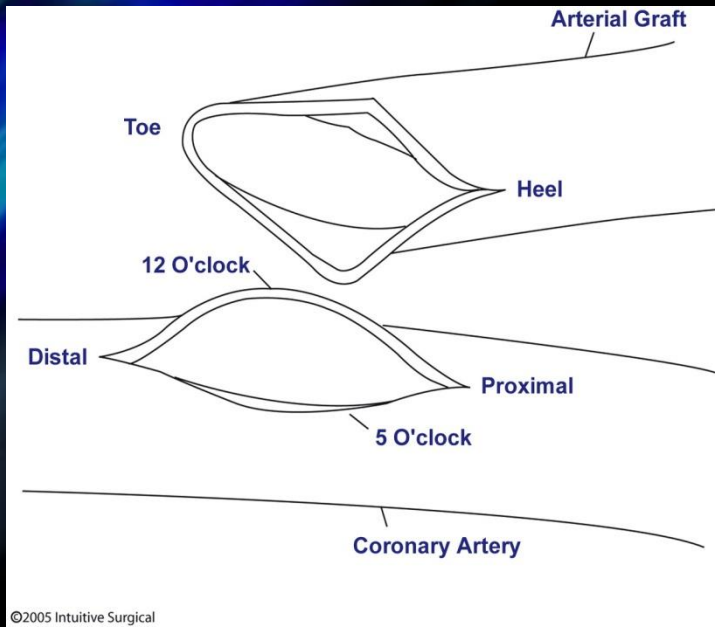
# ITA Harvest with da Vinci

- Pedicle; with veins
  - Rt. arm; spatula cautery
  - Lt. arm; bipolar cautery forceps
- Skeletonized; without veins
  - Rt. arm; spatula cautery + endo-clip applier
  - Lt. arm; micro-forceps



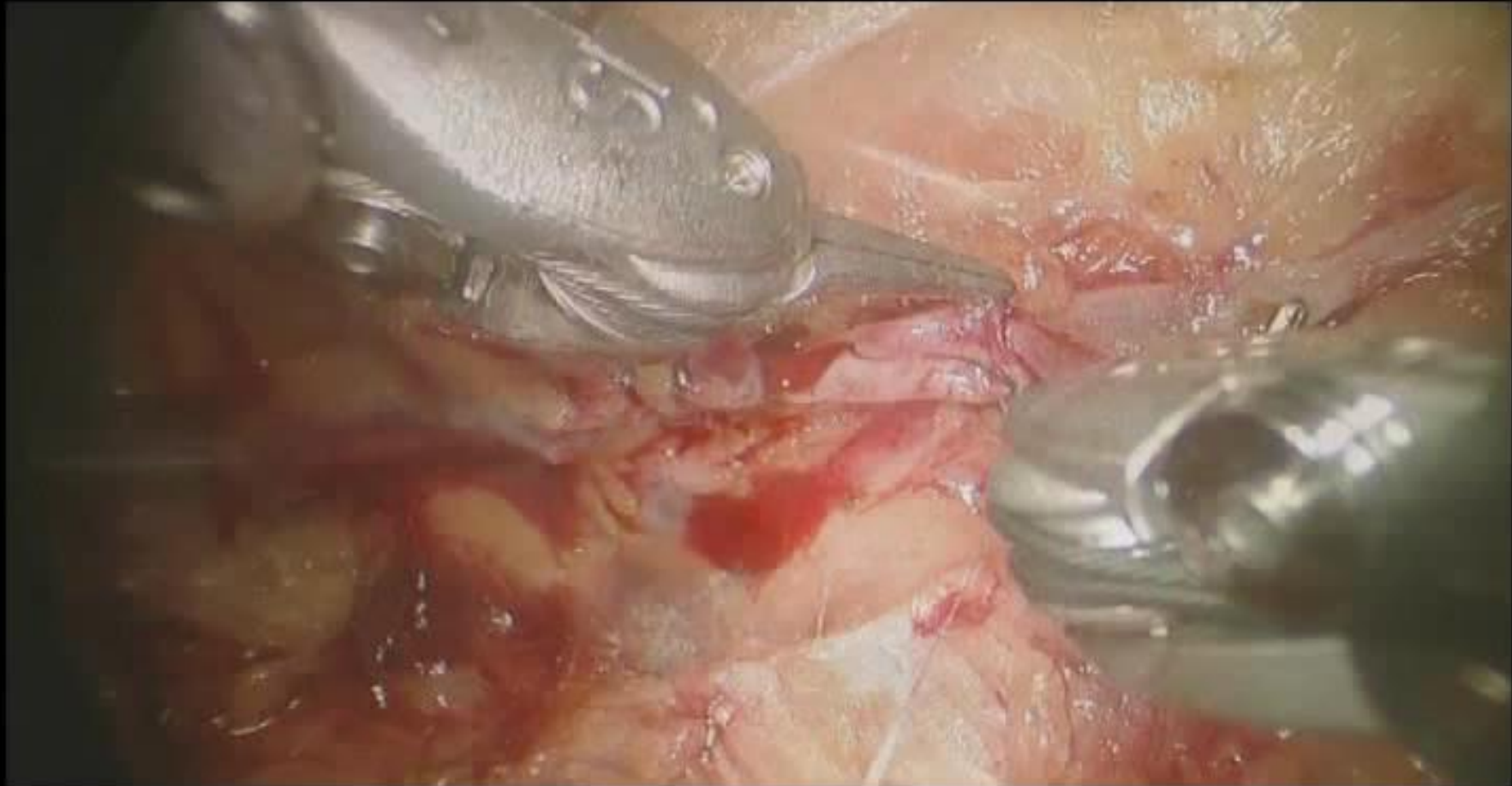
# Anastomosis of Robotic TECAB

-Continuous suture with Gore-Tex 7-0



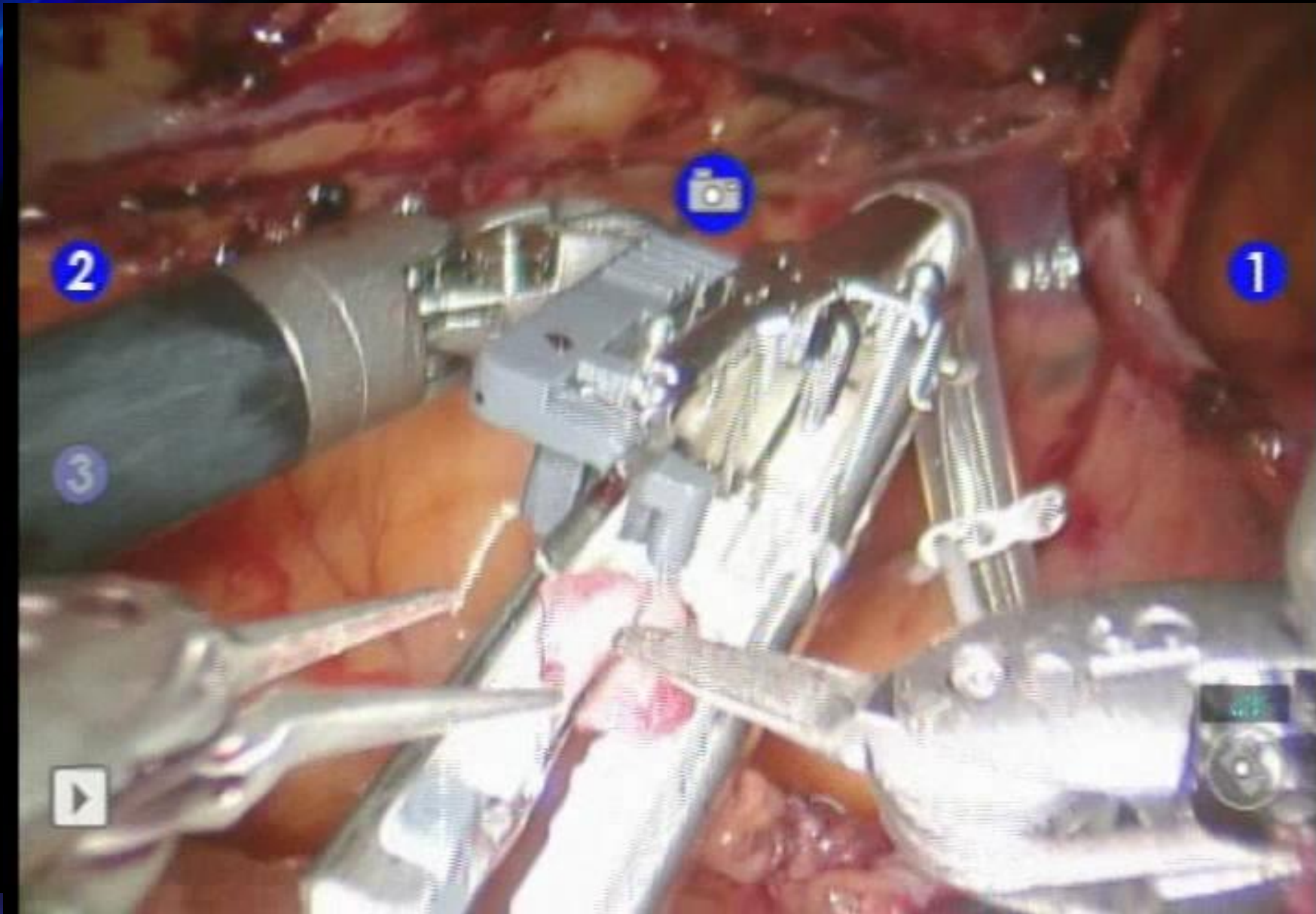
# Anastomosis of Robotic TECAB

-Interrupted suture with U-clip (S-18)



# Anastomosis of Robotic TECAB

-Using device; Cardica Flex A





A large, abstract blue graphic element consisting of several overlapping, curved, ribbon-like shapes that sweep across the slide from the top left towards the bottom right. The background is black.

# Minimally Invasive Mitral Valve Repair for Marfan's Syndrome Patient

Hyung Gon Je, MD, PhD.

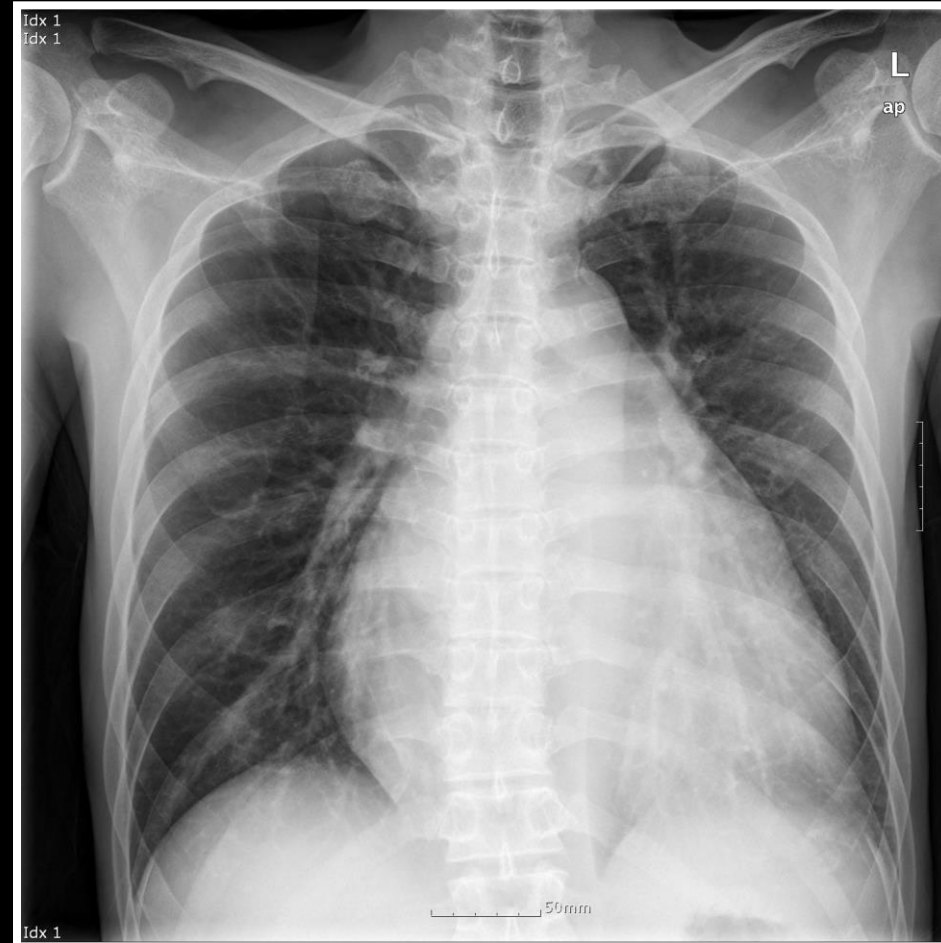
Dept. of Thoracic and Cardiovascular surgery

Pusan National University Yangsan Hospital

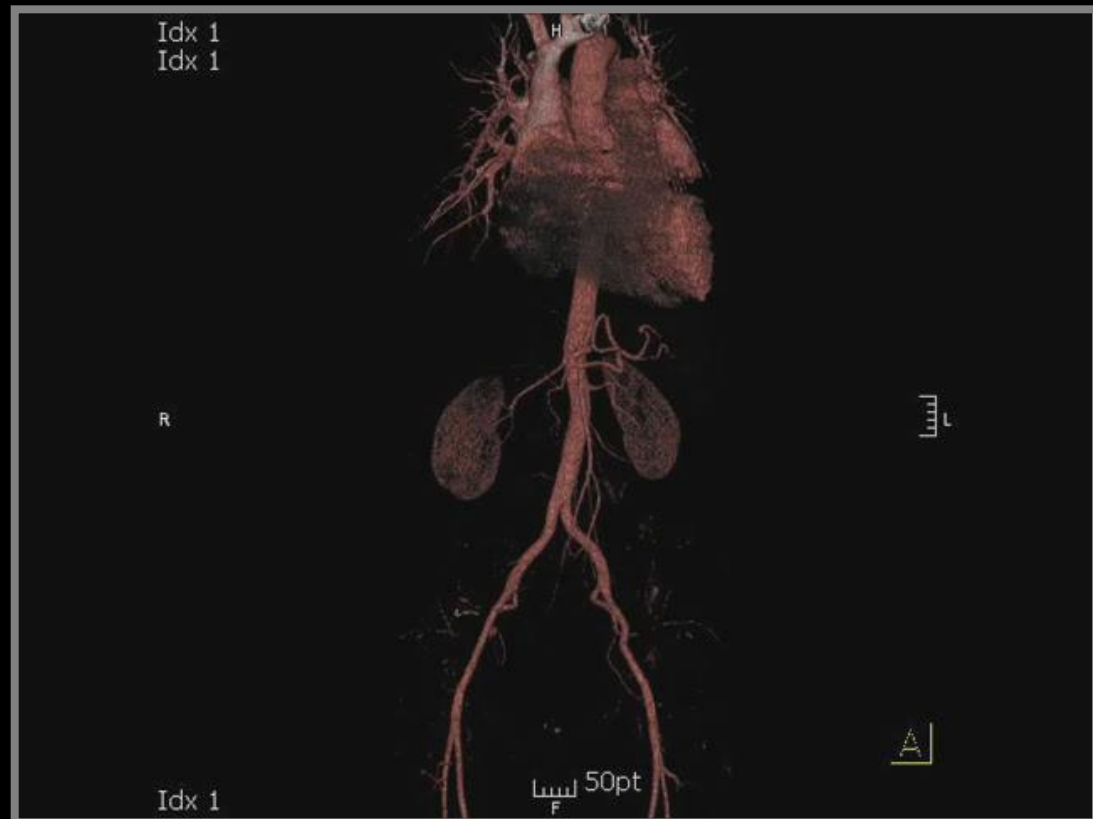
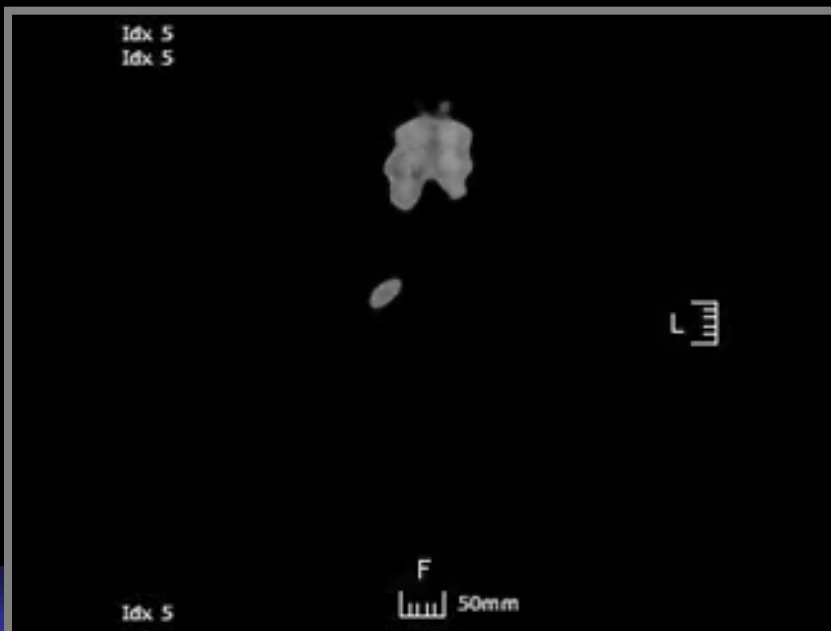
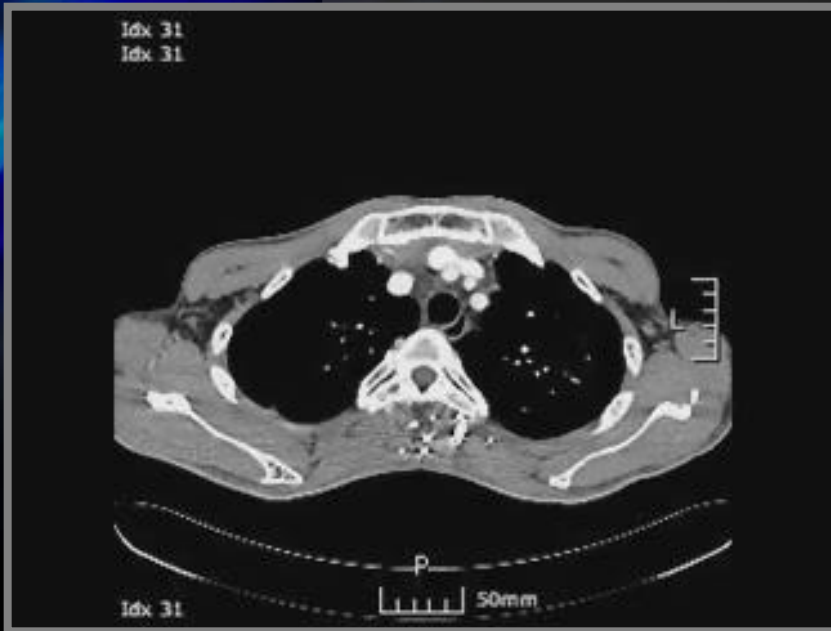
Yangsan, Korea

# Case Presentation

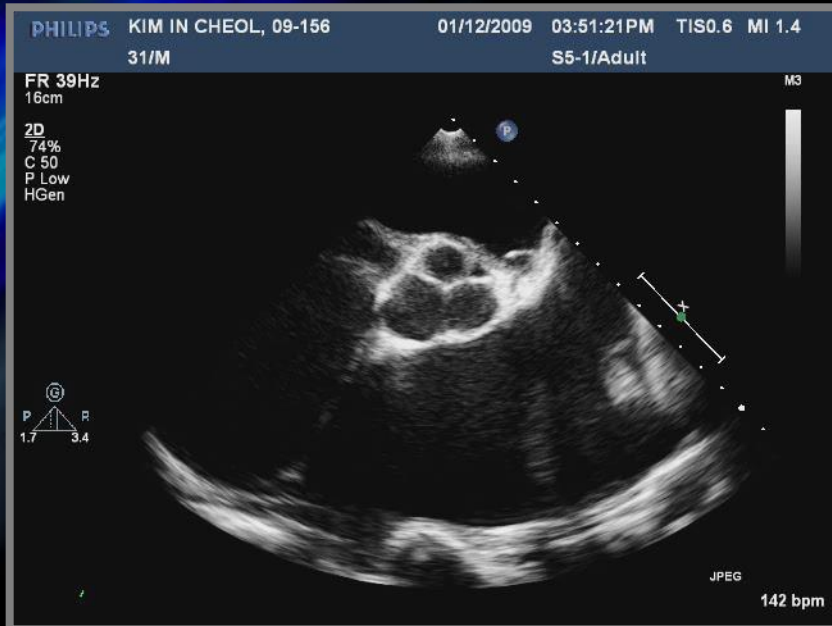
- 31/M, Office worker
  - C.C.: Dyspnea (NYHA II~III)
  - Diagnosis of Marfan's syndrome :
    - Ocular: lens dislocation, high myopia
    - Skeletal: 193cm / 82Kg, mild scoliosis
  - Brief Hx;
    - 06' MR +3 detect, annual echo f/u
    - Recent aggravation of DOE d/t AF
- with RVR, MR aggravation



# Radiological findings



# Preoperative Echo



- AF with RVR
- EF: 35%, LVIDs/d; 59/70
- Giant LA(67mm), no thrombi
- LVOT/sinus/Asc ao; 24/36/36
- AV; n'l, no AR
- TR: I-II TR Vmax; 2.7m/s

# Preoperative Echo



- Severe MR
- Bileaflet prolapse
- PMVL >> AMVL
- Diffuse prolapse
- Annulus dilatation
- Multiple MR jet at P2, P3



# OP Findings

- Huge LA and no thrombus at LAA
- Aorta: 35mm size mild enlarged, thin wall
- MV Severe annular dilatation
- Thickened and elongated chordae at all area
- PMVL; 3.5cm height, flail at P2, P3 scallop
- AMVL; 4cm height, diffuse prolapse A1, A2, A3

# Sliding annuloplasty

말판 중후군 환자에서 승모판막 역류의 교정을 위해 시행된  
슬라이드 판막륜 성형술 및 판막륜 주름 성형술

제 형 곤\* · 이 재 원\*

## Annular Plication Techn in a Mar

Hyung-Gon Je, M.D

Sliding annuloplasty has been used for mitral resection to avoid systolic anterior motion of the leaflet. In this case, in addition to successful mitral valve repair with using the sliding annuloplasty, an extensive quadrangular resection was also done to reduce the redundant leaflet and a severely dilated annulus.

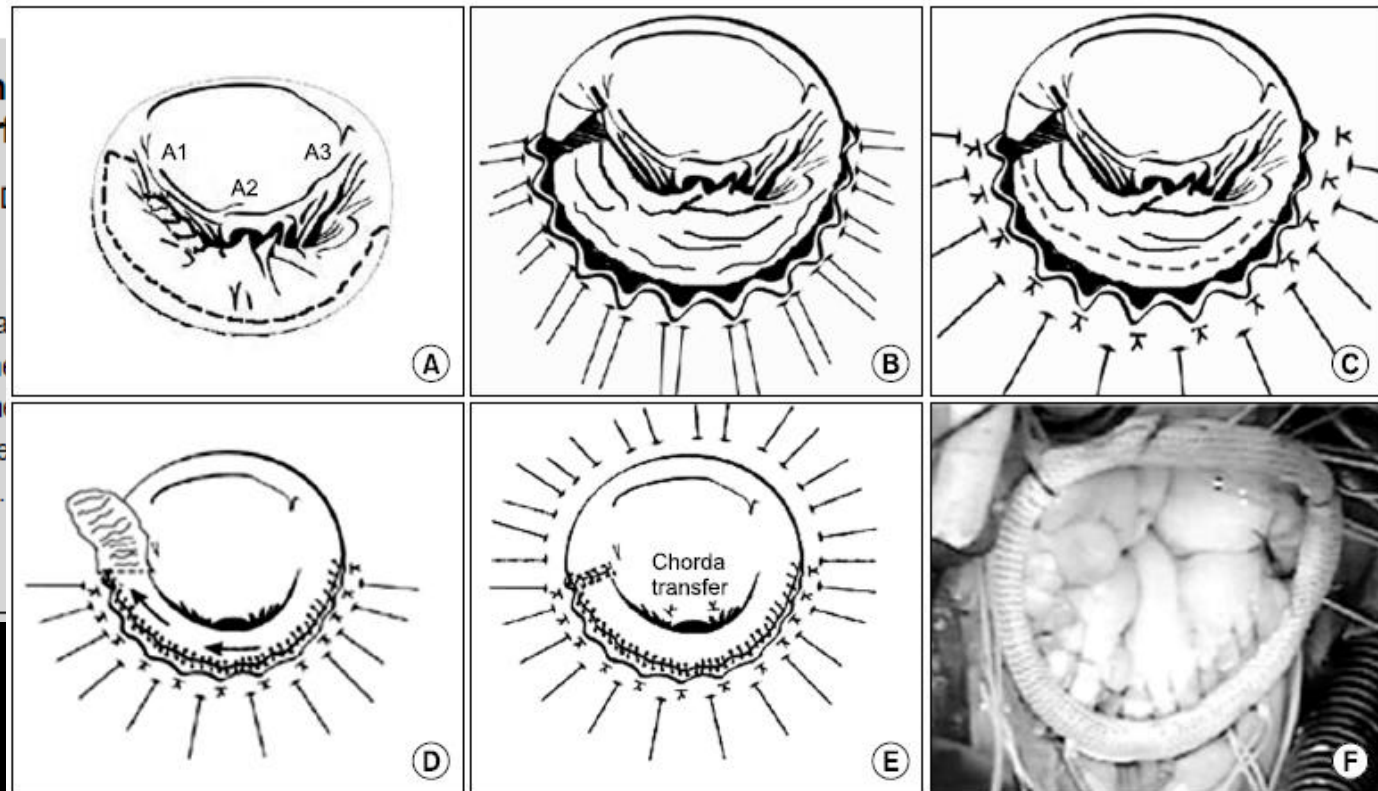
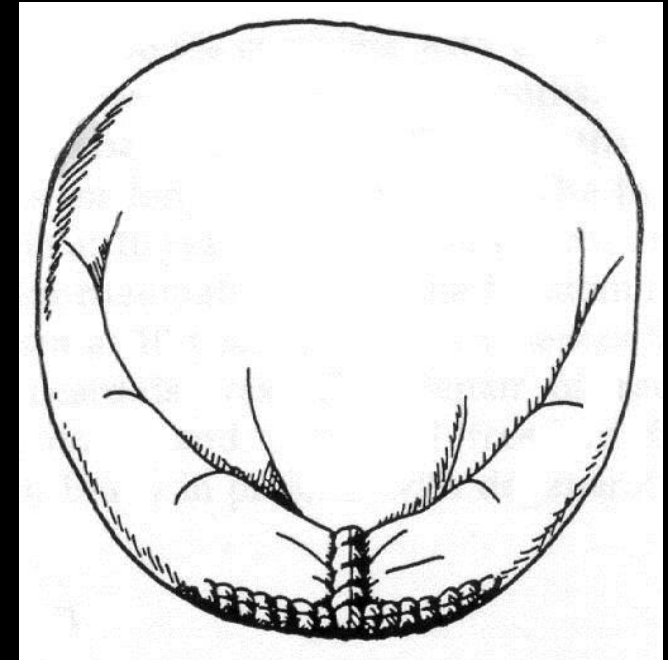
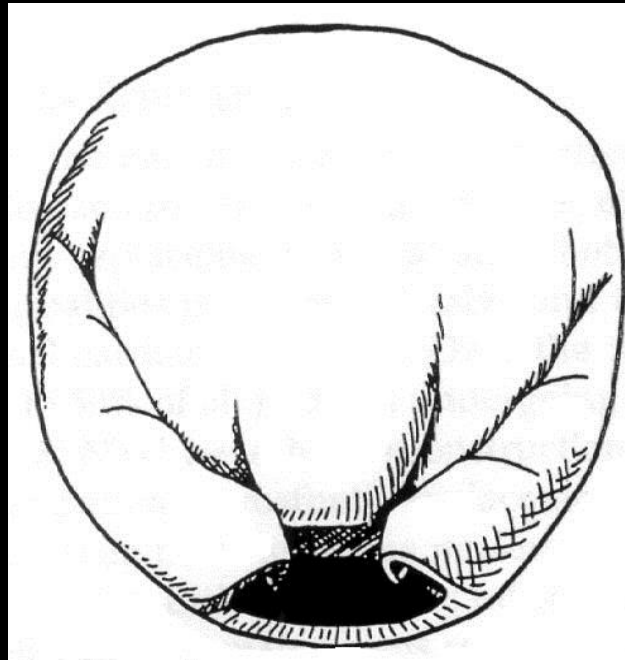
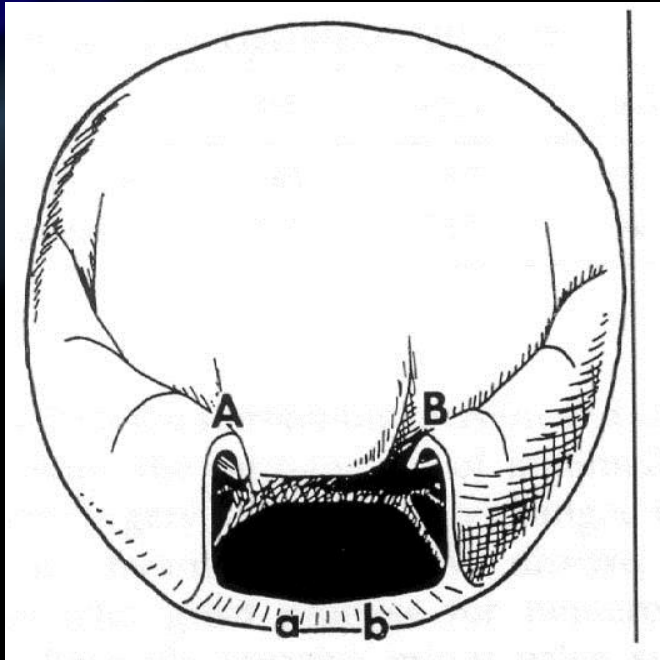


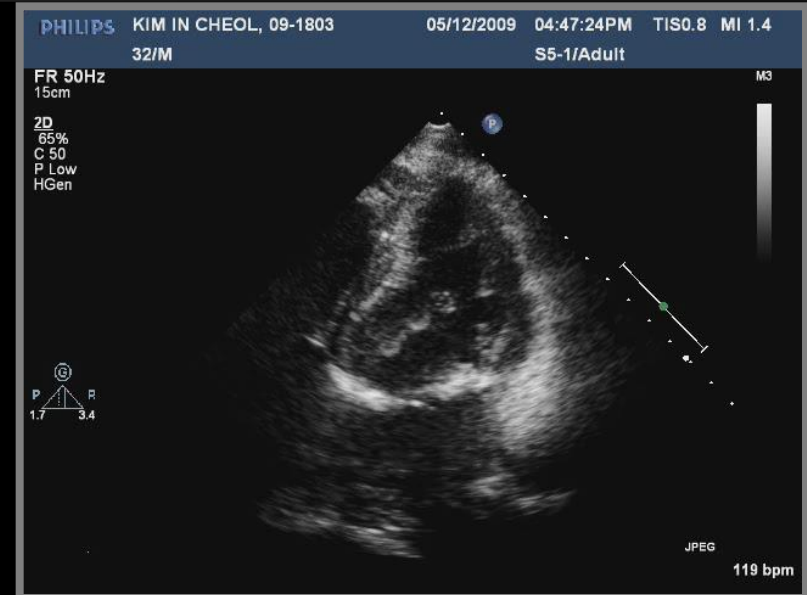
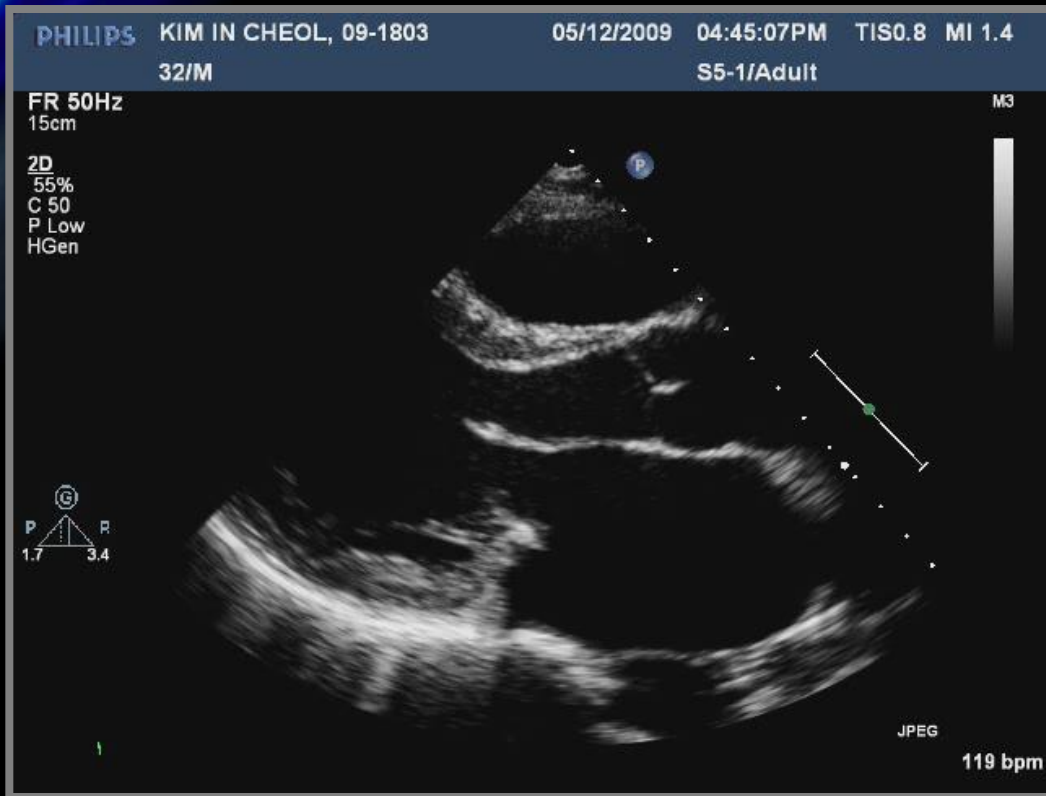
Fig. 1. (A) Extensive undercutting of PMVL. (B) Annulus plicating suture and tie down. (C) 2<sup>nd</sup>-line sutures for ring annuloplasty and height reduction of PMVL. (D) Reattach PMVL to posterior annulus and extensive Q-resection of lateral and middle scallop of PMVL. (E) Lateral commissural repair and chorda transfer from PMVL to AMVL. (F) Operative finding after ring annuloplasty with physio-ring.

# P2 Folding plasty

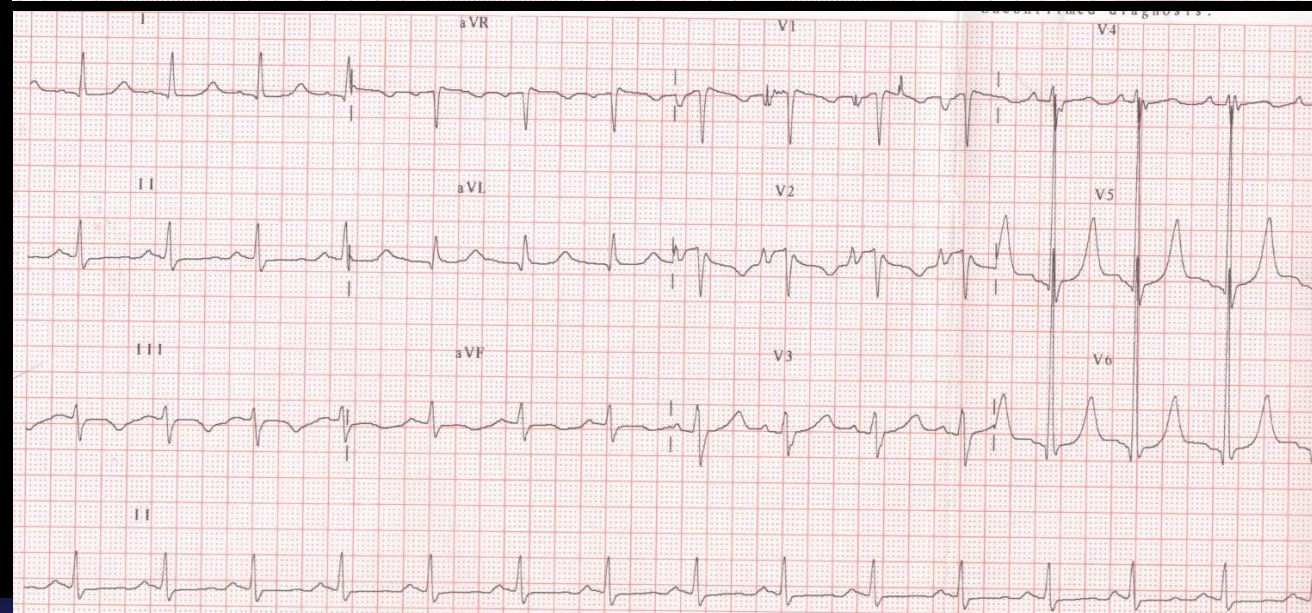
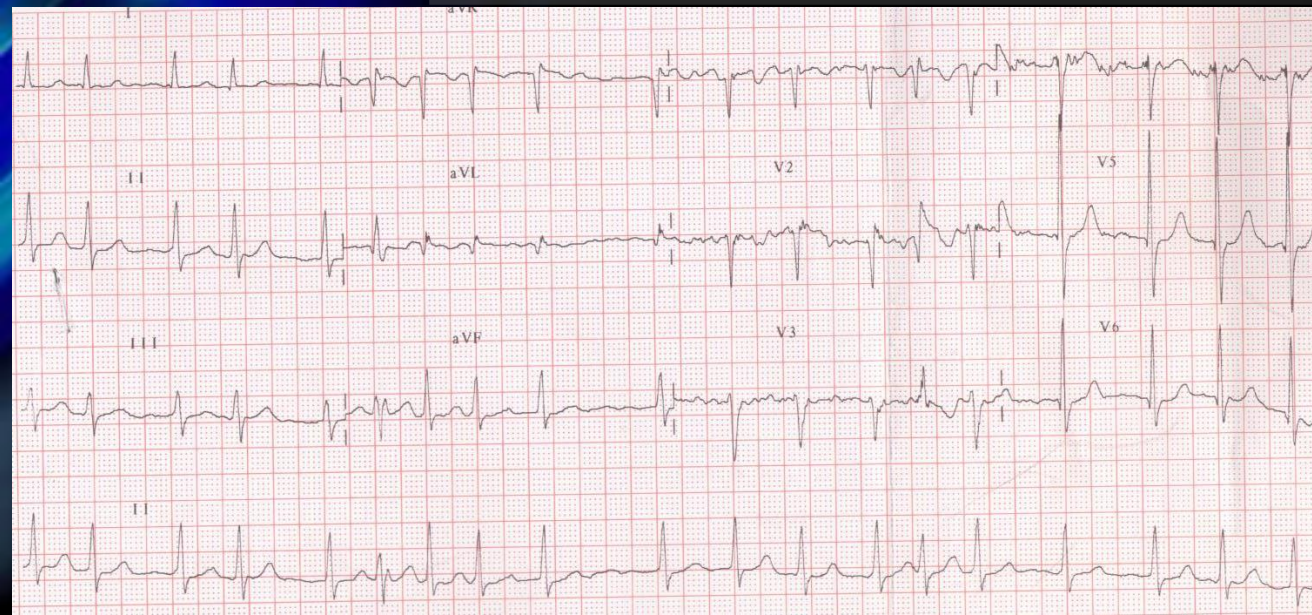




# Postoperative Echo



# ECG; before and after Maze



- ORNSR
- LA contraction at MV inflow and TDI
  - E/A: 73/56 cm/s
- No AF recur during postop 6m

# Postoperative Course

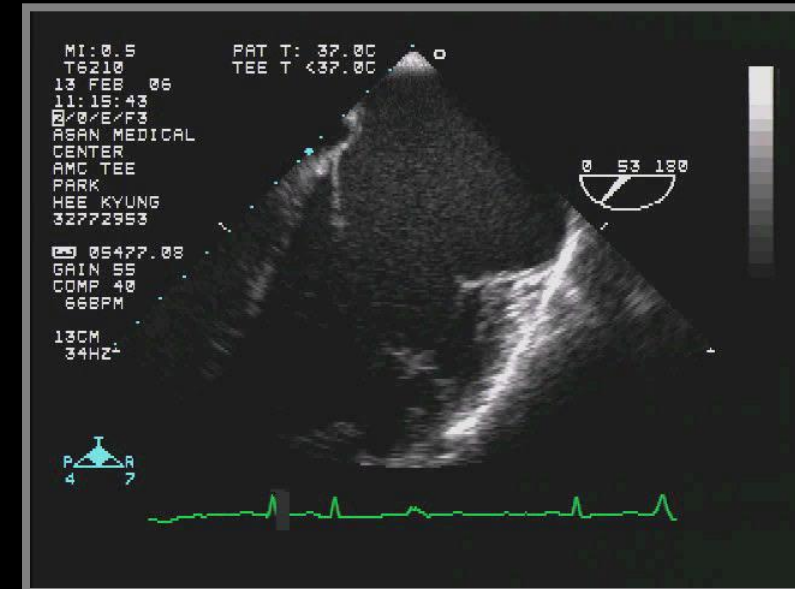
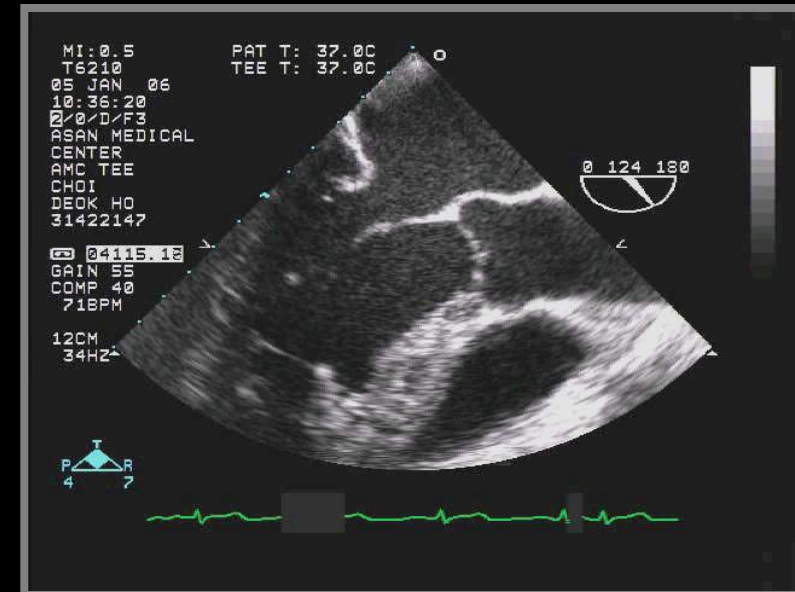
- Post op TTE
  - EF: 50%, NSR
  - LA: 46, LVIDs/d: 48/65
  - MR: trivial, mean PG: 1.5mmHg
- Discharge at POD#8
- Good condition up to 6m

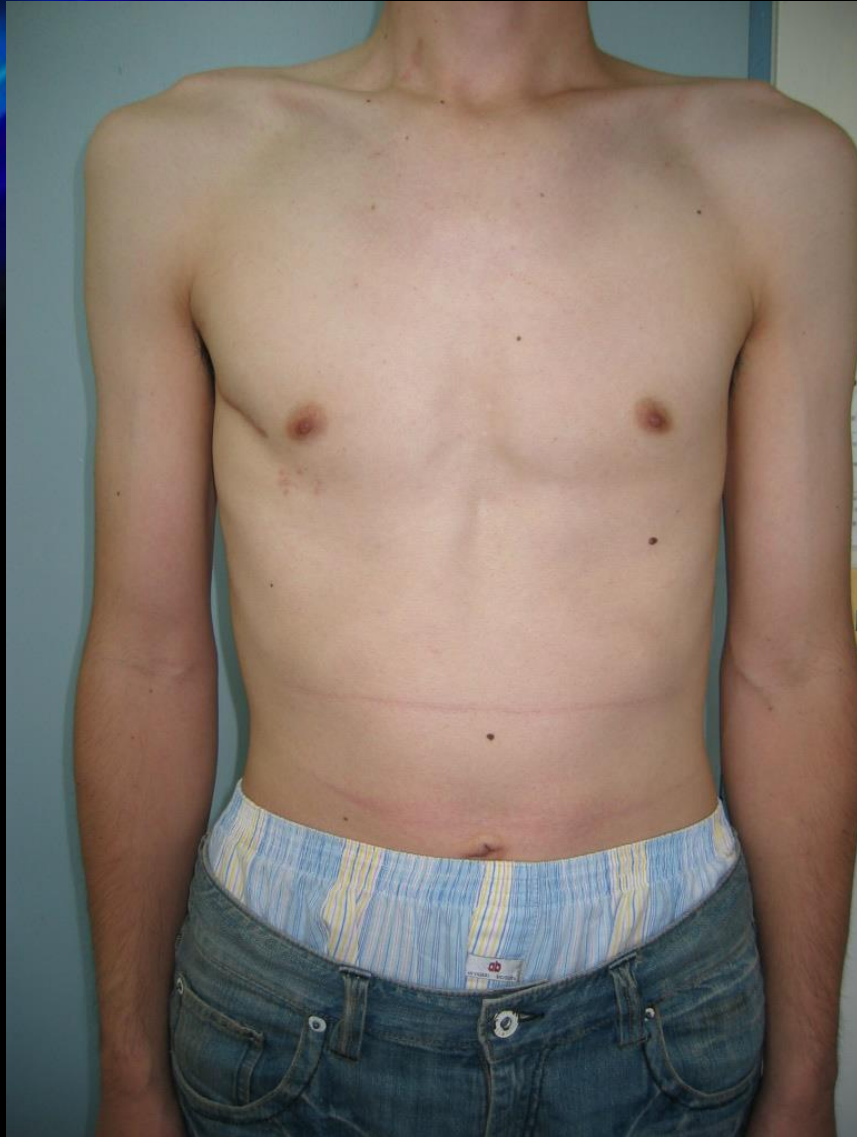


# MR of Marfan's synd

-Adams et. al. JTCS 2003 -Bhudia et. al. ATS 2006

- MR; 60-80% incidence
- MR often precedes AR
- 3+ ~ 4+ MR; 12.5% at 30Yr
- Anatomical feature;
  - Excess tissue, longer leaflet
  - Thickened leaflets
  - Severe annulus dilation
  - Frequent bileaflet pathology







# Both coronary artery to pulmonary artery fistula

Hyung Gon Je, MD, PhD.

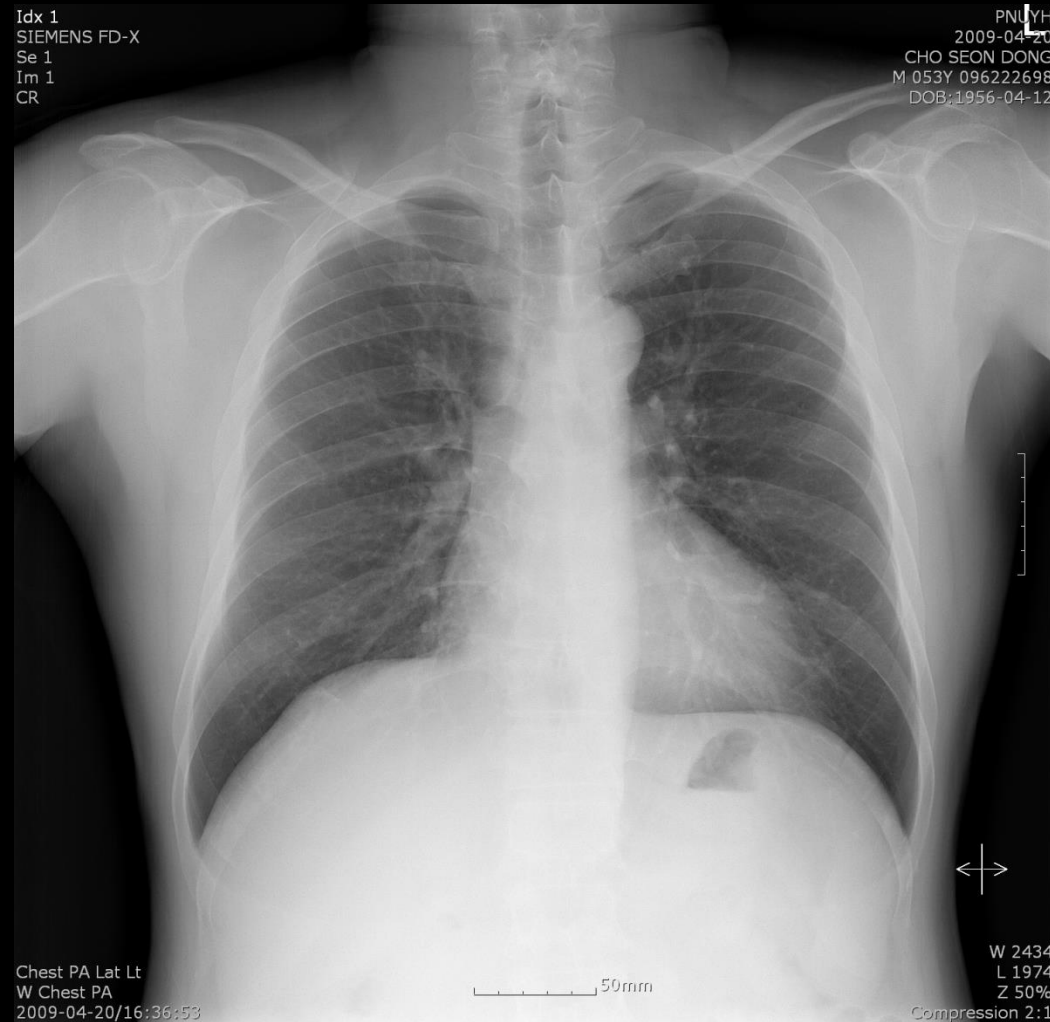
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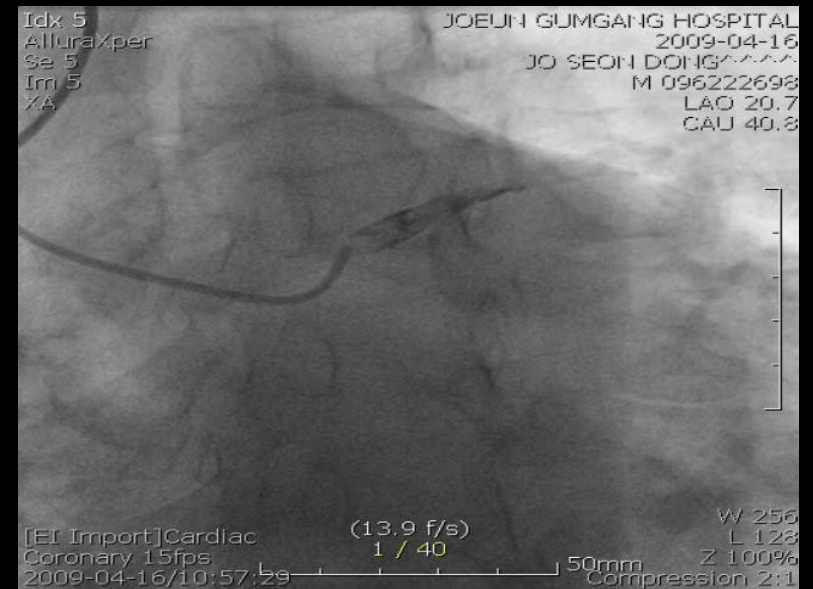
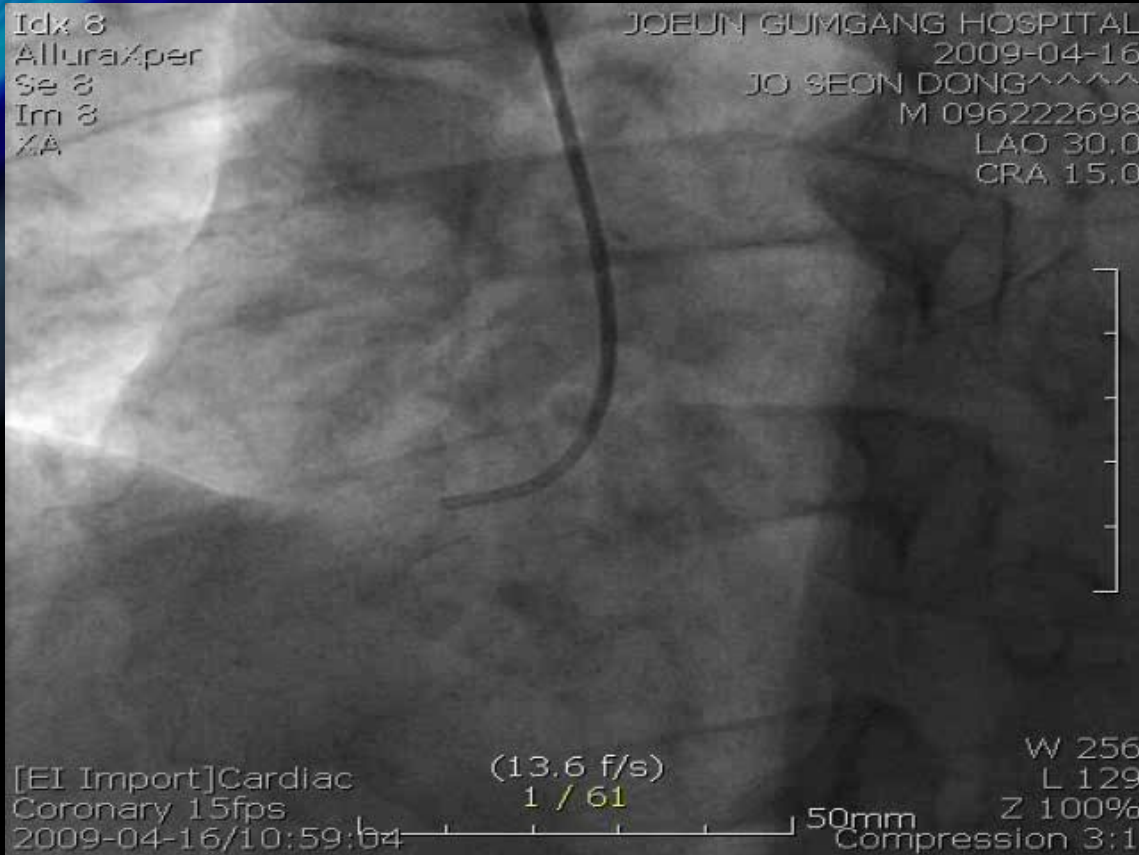
Yangsan, Korea

# Case Presentation

- 53/M, Government officer
- C.C.; Cardiac murmur LSB
- CAG at local hospital
- Pre op evaluation
  - Echo: normal
  - Qp/Qs: 1.33



# Pre op CAG



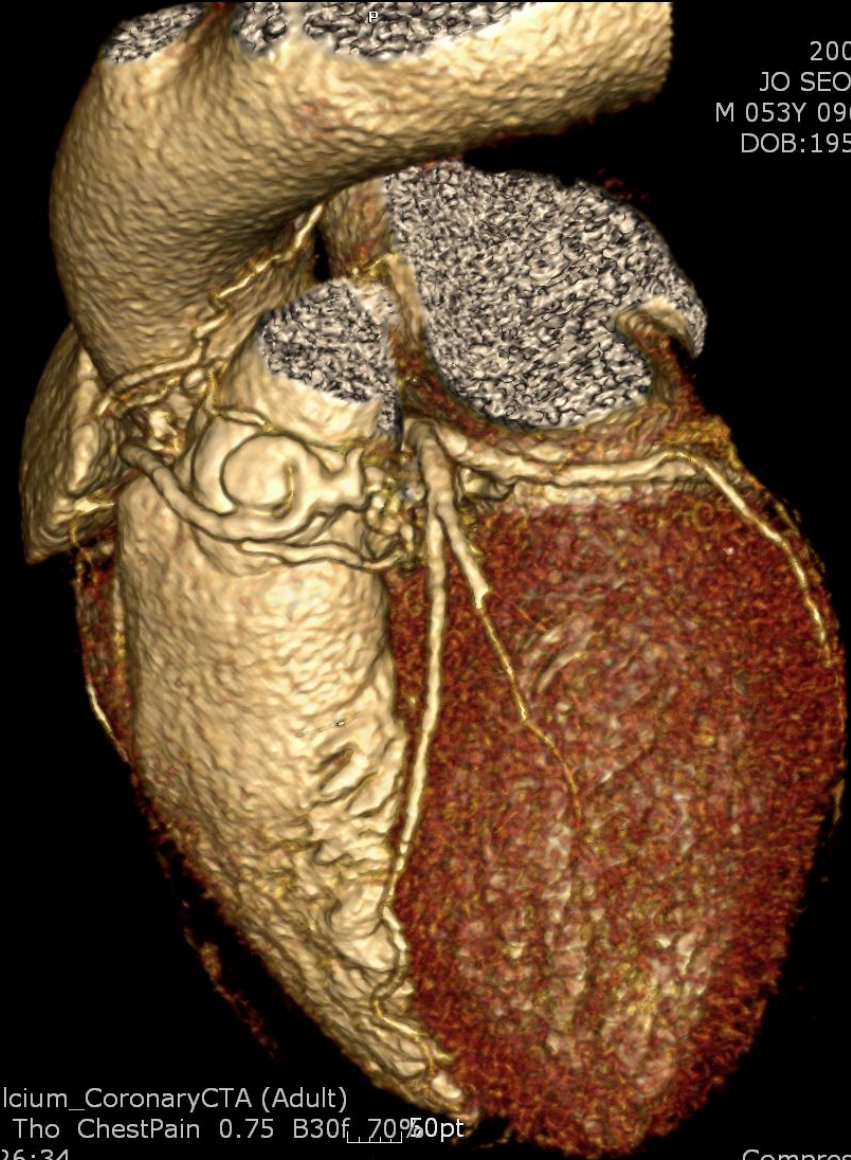
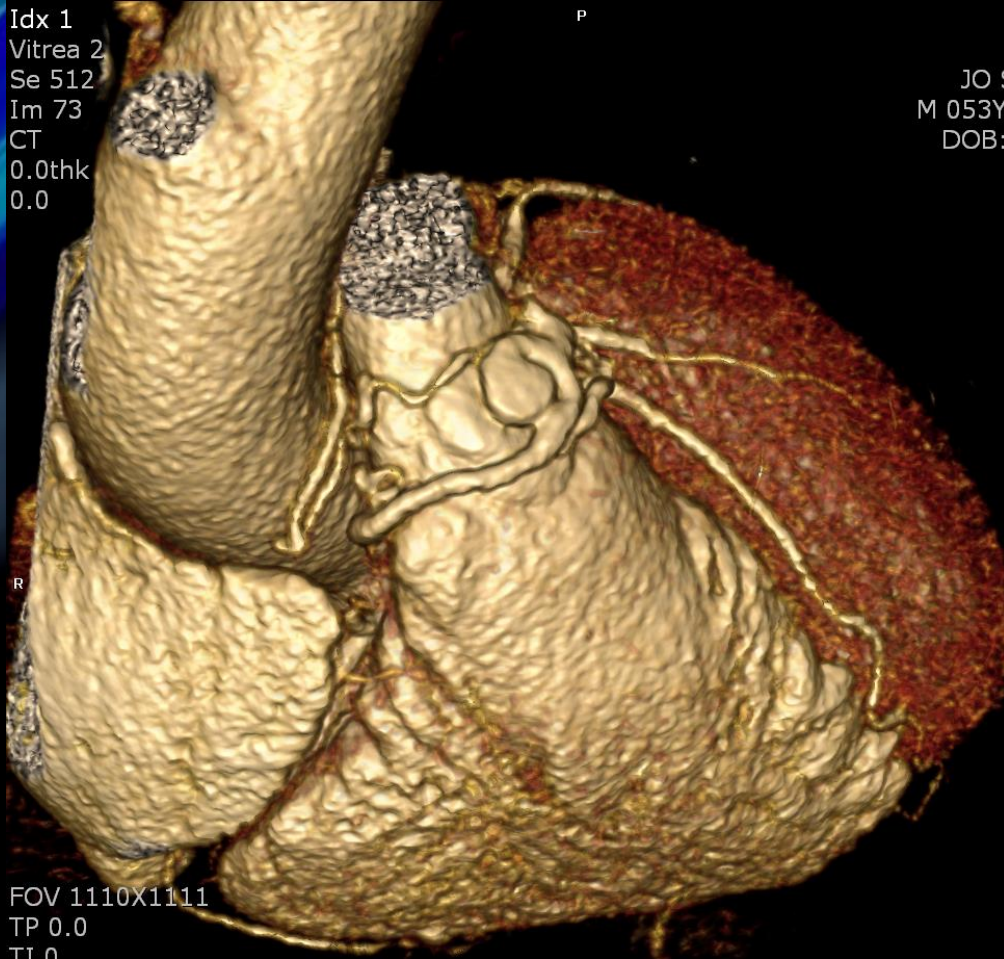


# Pre op CT scan

Idx 1  
Vitrea 2  
Se 512  
Im 73  
CT  
0.0thk  
0.0

JO S  
M 053Y  
DOB:

PNUYH  
2009-04-21  
JO SEON DONG  
M 053Y 096222698  
DOB:1956-04-12

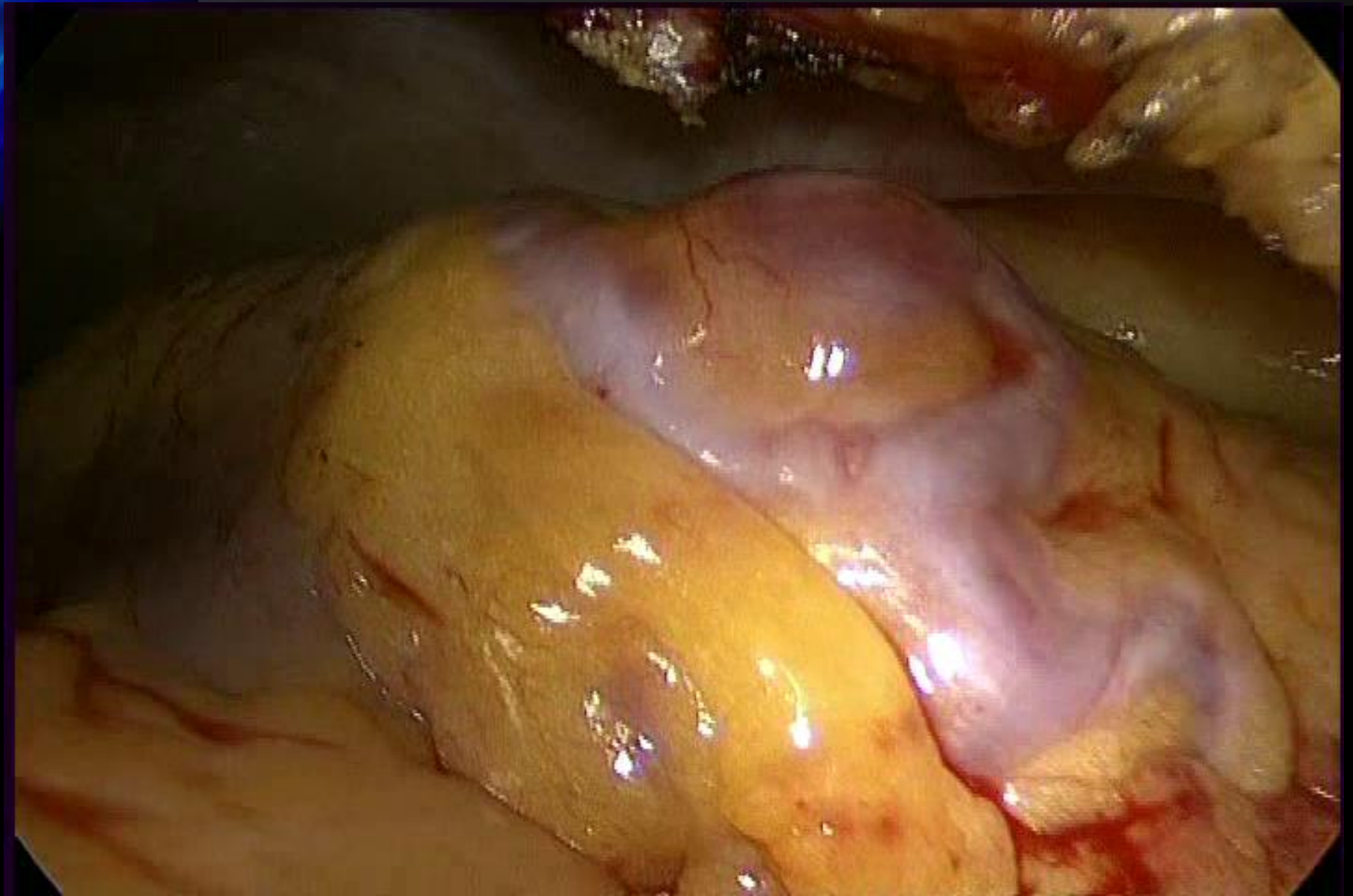


FOV 1110X1111  
TP 0.0  
TI 0

Icium\_CoronaryCTA (Adult)  
Tho ChestPain 0.75 B30f\_70%50pt  
26:34

W 256  
H 128  
Phase 4:19  
20090421  
Segmented  
Compression 4:1

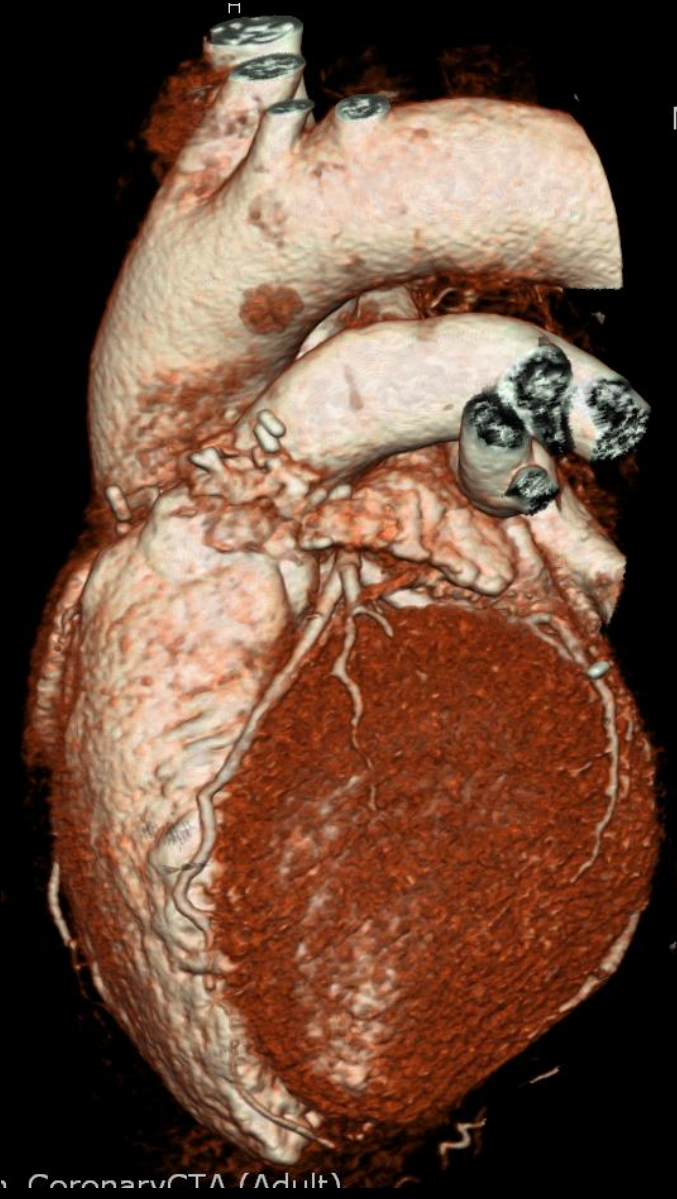
# Intraoperative findings



# Post op CT scan

M 053Y 1  
DOB:1

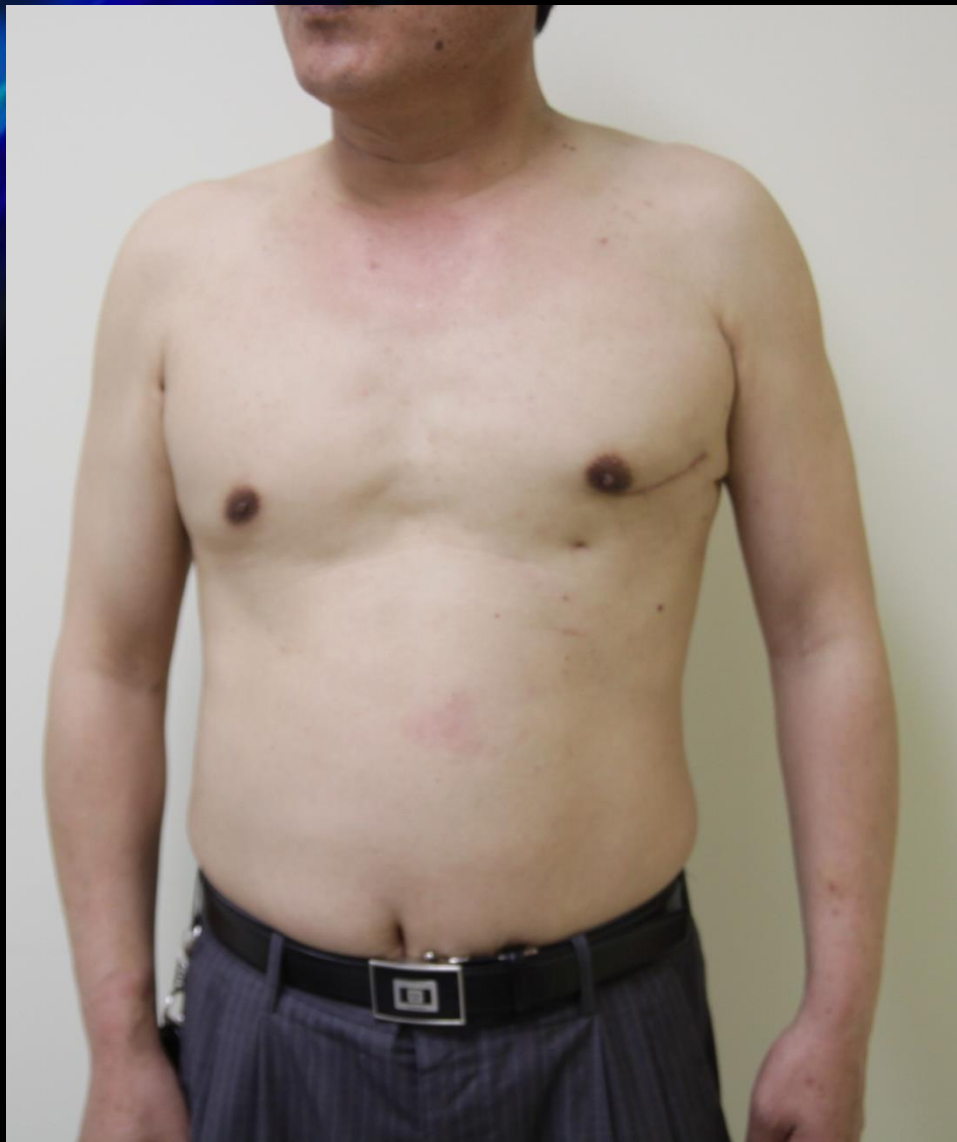
C  
M



124

CoronaryCTA (Adult)

# Post 3M OPD F/U



# VSD(SA type) pericardial patch closure with MICS

Hyung Gon Je, MD, PhD.

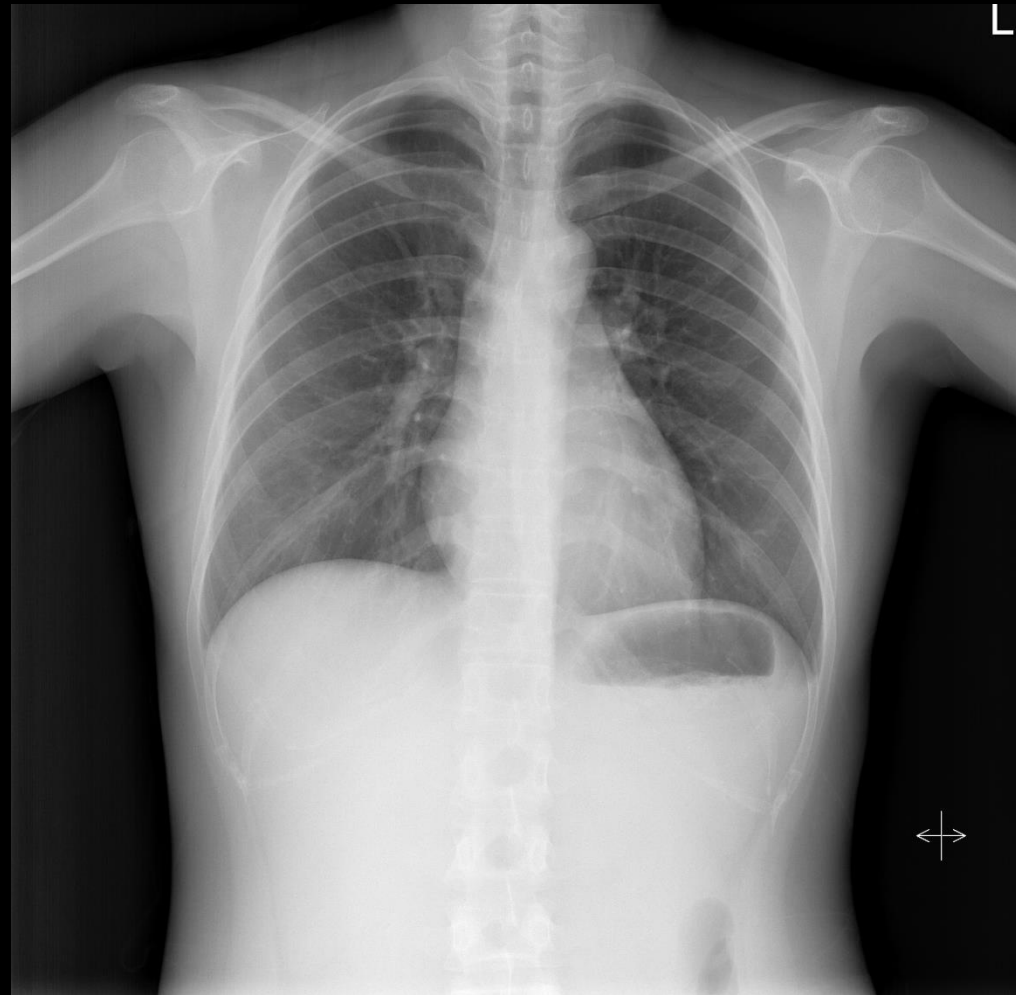
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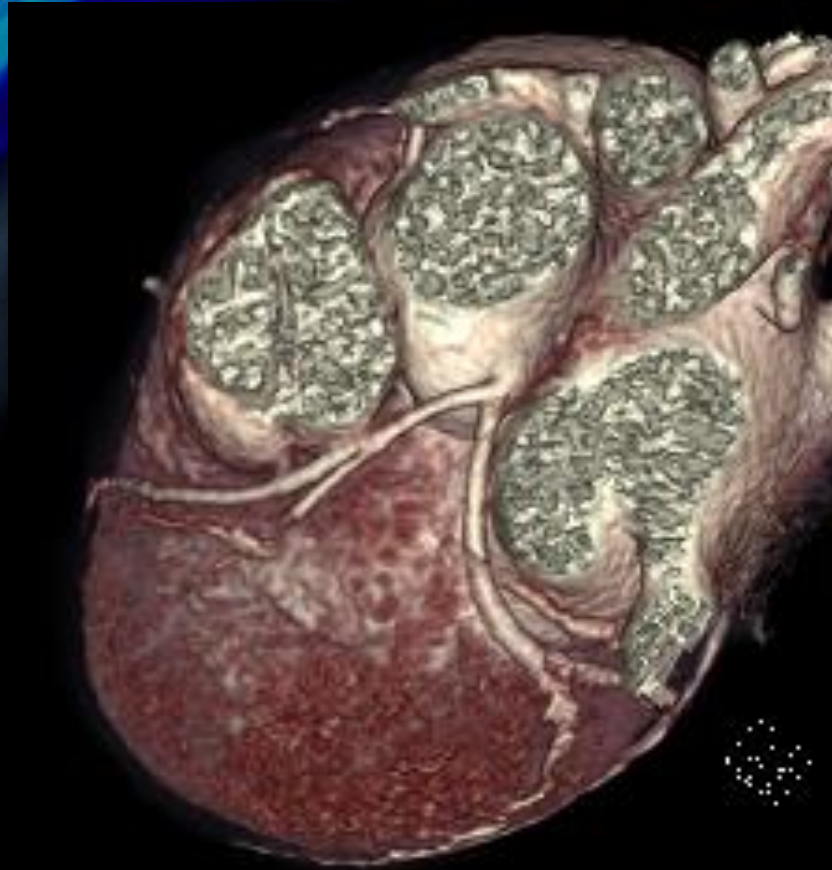
Yangsan, Korea

# Case Presentation

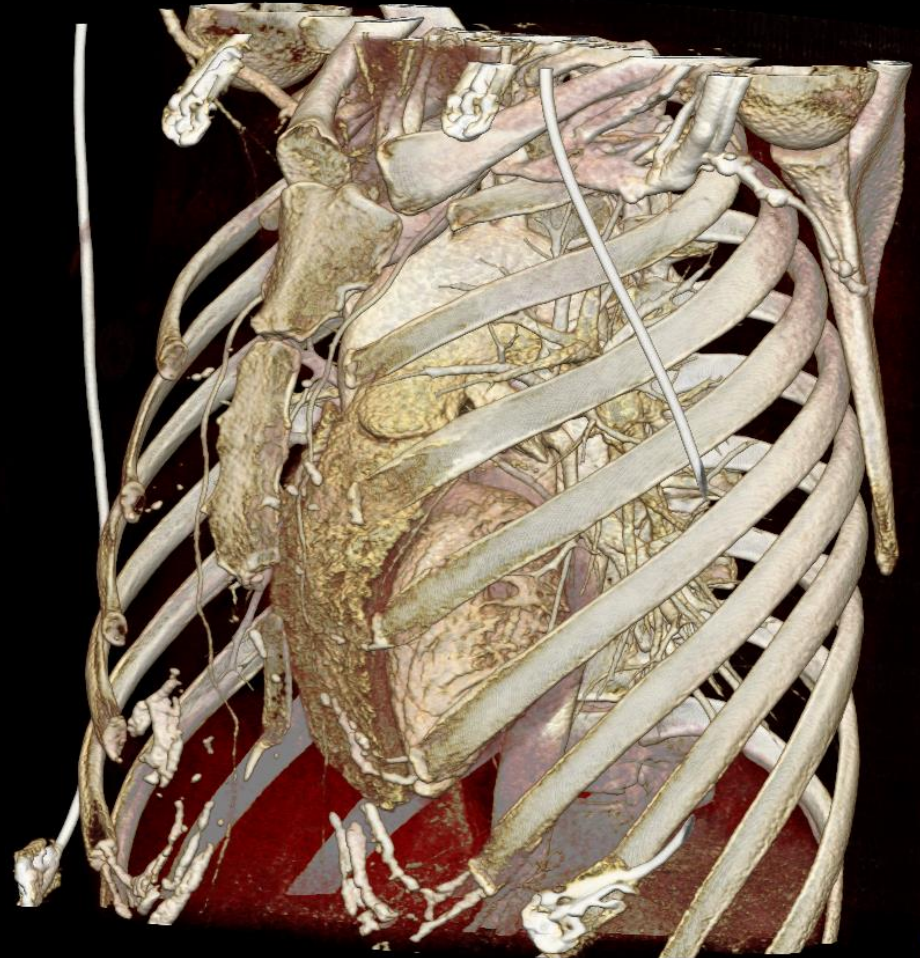
- 25/F, nurse at local H'
- C.C.: Cardiac murmur LSB
- Pre op TTE
  - Subarterial VSD; 11mm
  - Mild AR
  - No other abnormality



# Pre op CT scan



A



H

LAO/RAO 57  
CRAN/CAUD 4

P

F



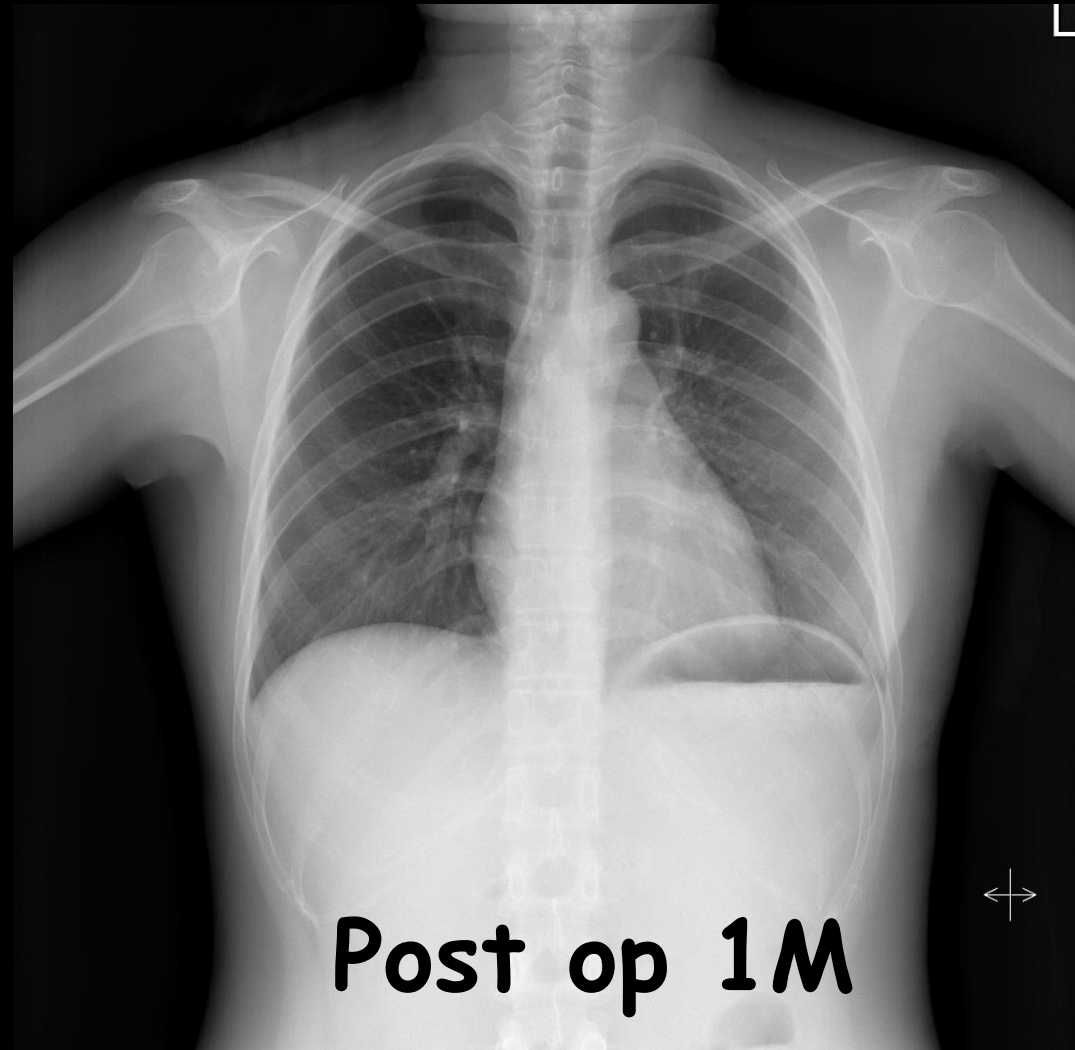
# Intraoperative findings





# Postoperative Course

- CPB/ACC; 108/49min
- Extubation at OR
- ICU stay: 1d, no transfusion
- Post op TTE at POD #2
  - No residual shunt, Mild AR
- Discharge at POD#2
- Good condition up to 3m



# LV hemangioma excision with MICS

Hyung Gon Je, MD, PhD.

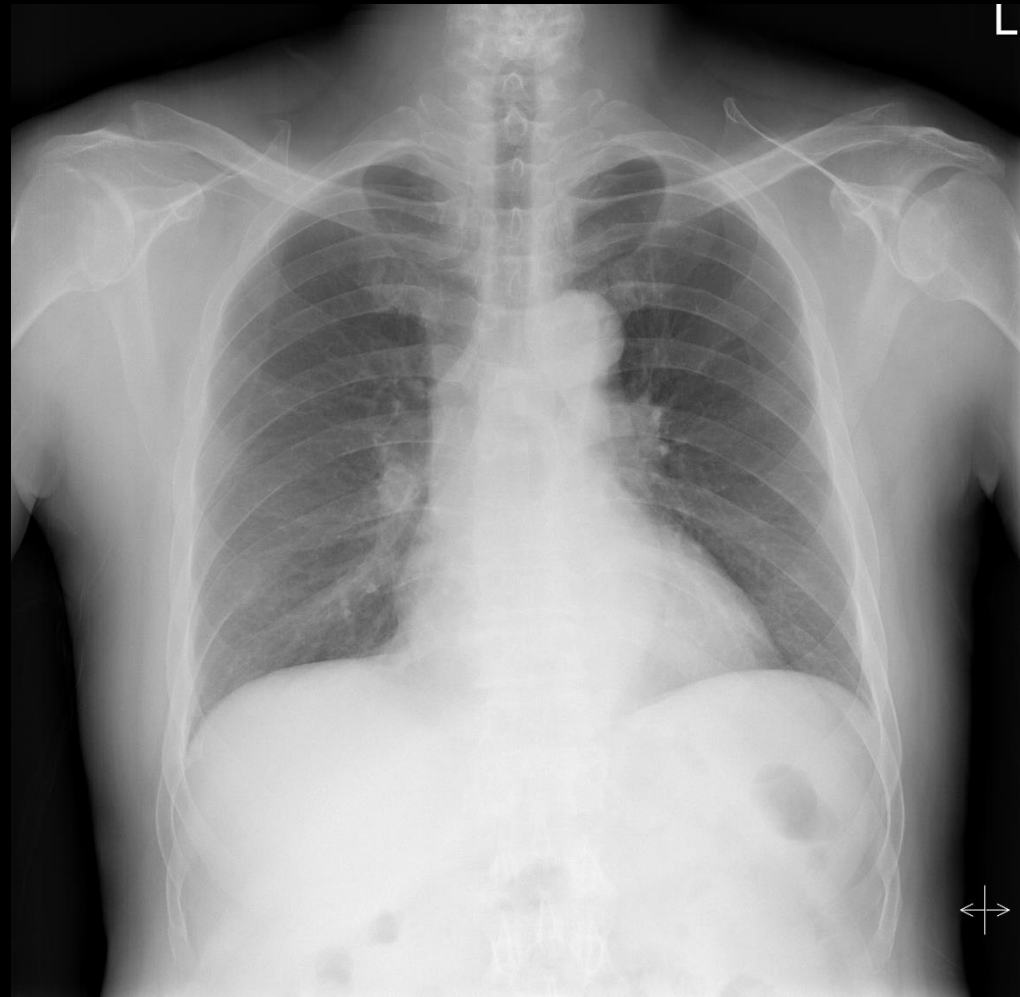
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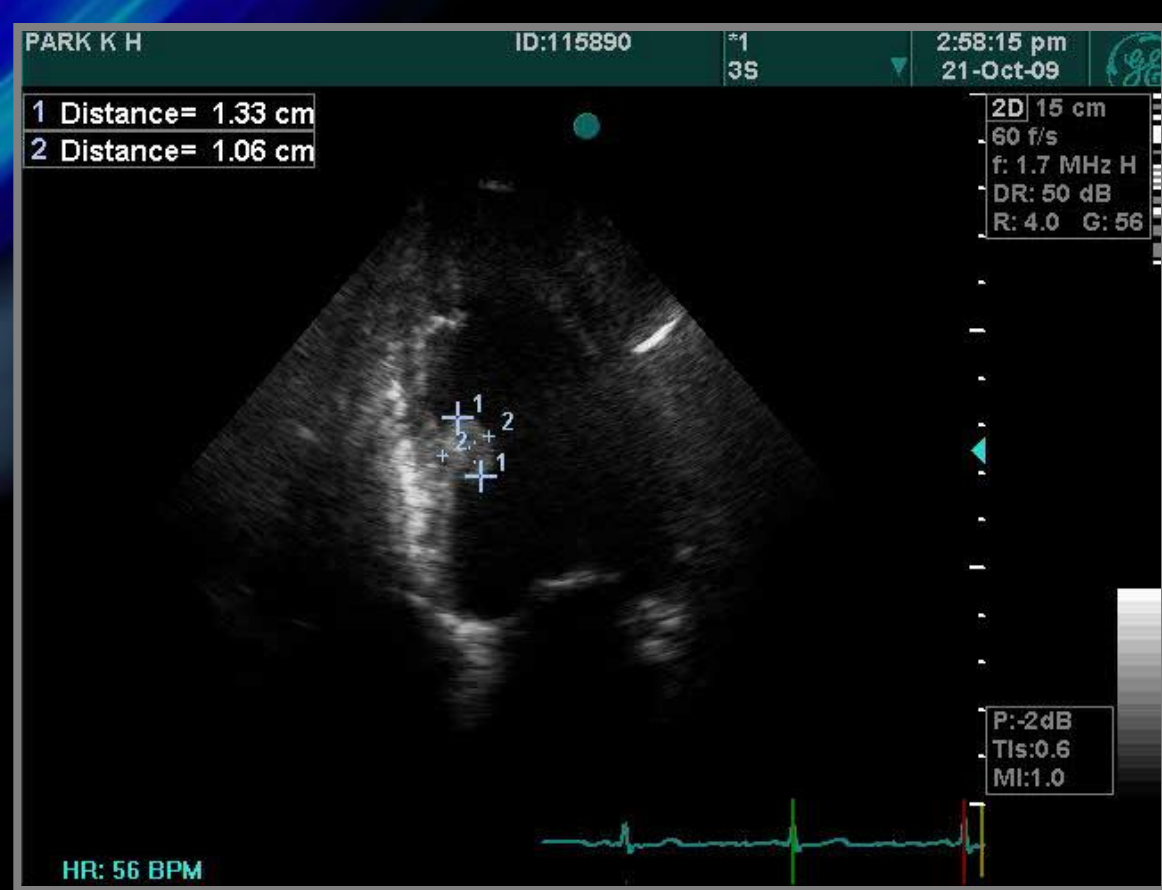
Yangsan, Korea

# Case Presentation

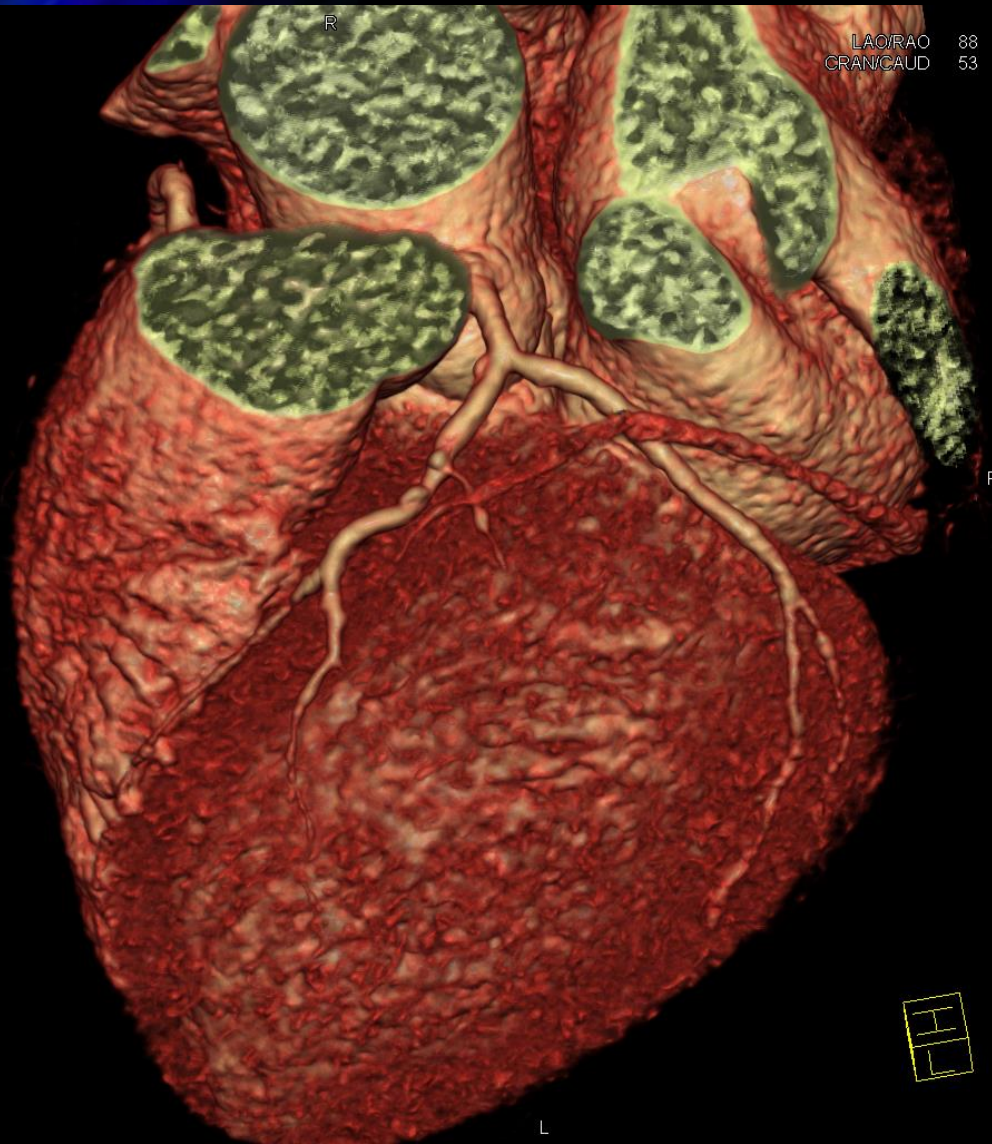
- 60/M, Incidental LV mass
- Previous healthy
- Pre op CAG
  - Normal coronary artery
  - delayed staining LV mass  
(feeding v. ; RCA RV branch)



# Pre op TTE & CT



# Pre op CT angio



- Moderate stenosis at proximal LAD (54%)
- R/O Benign mass in LV

# Pre op CAG

Idx 12  
AXIOM-Artis  
Se 9  
Im 1  
XA

PNUYH  
2009-11-10  
PARK GEUN HO  
M 060Y 096650707  
DOB:1949-11-10  
PAO 2.5  
CAU 7.3

C.K.J  
Coro log  
2009-11-10/15:20:17

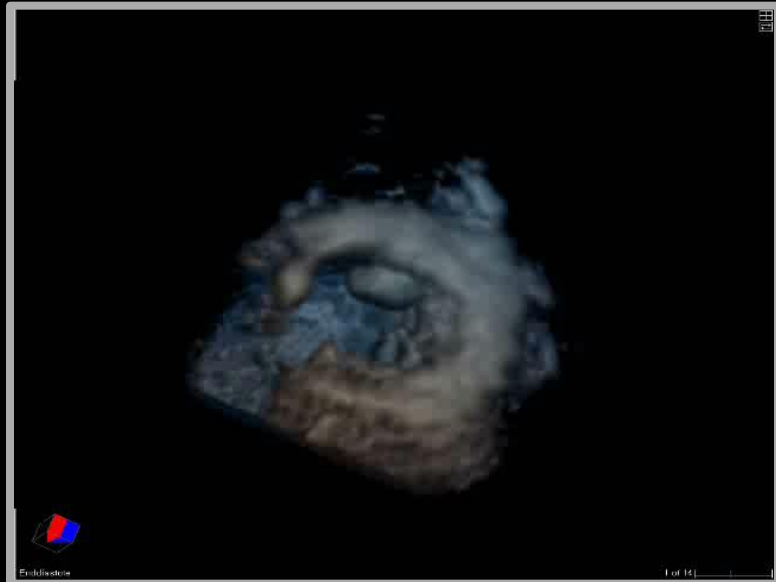
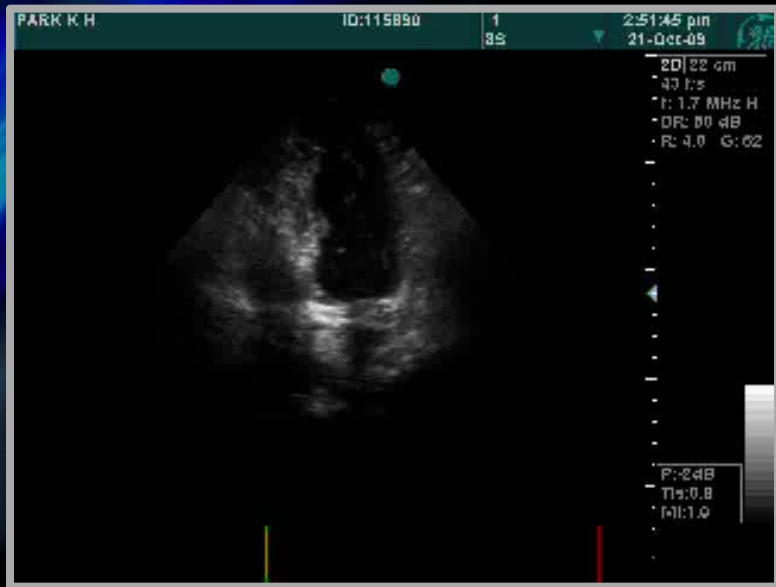
(6.8 f/s)  
1 / 190

50mm

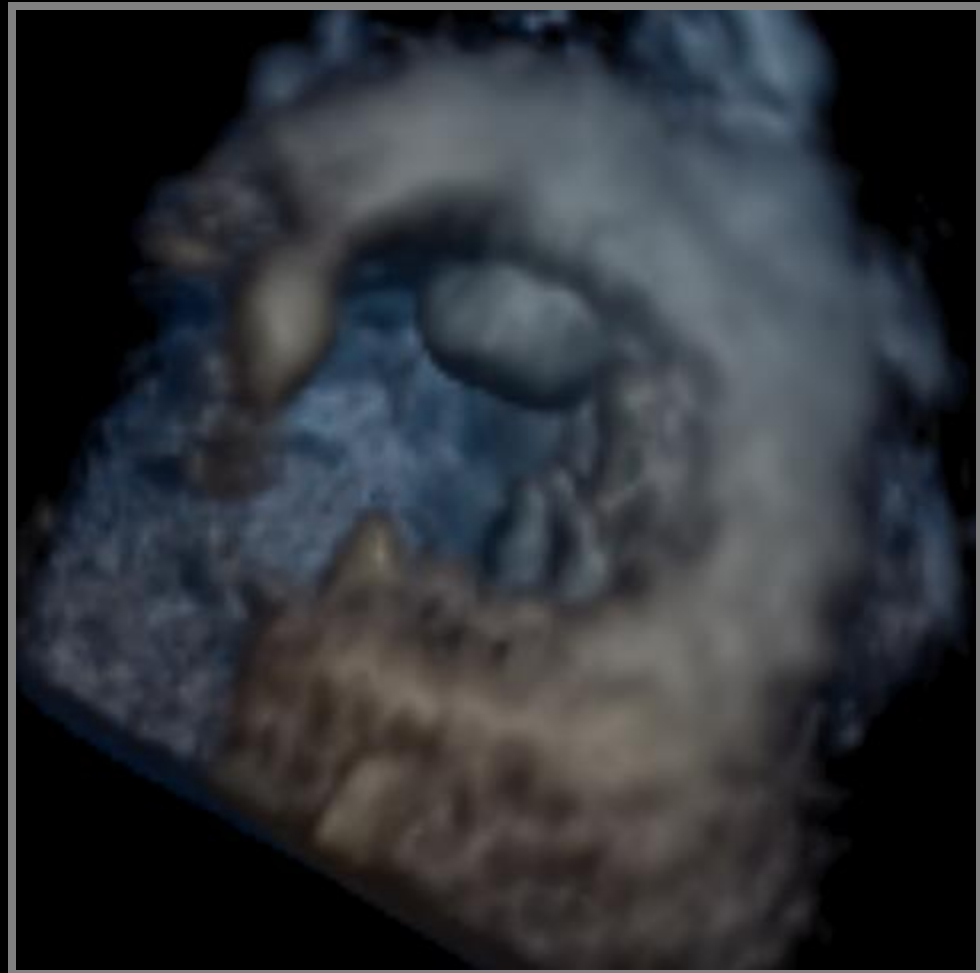
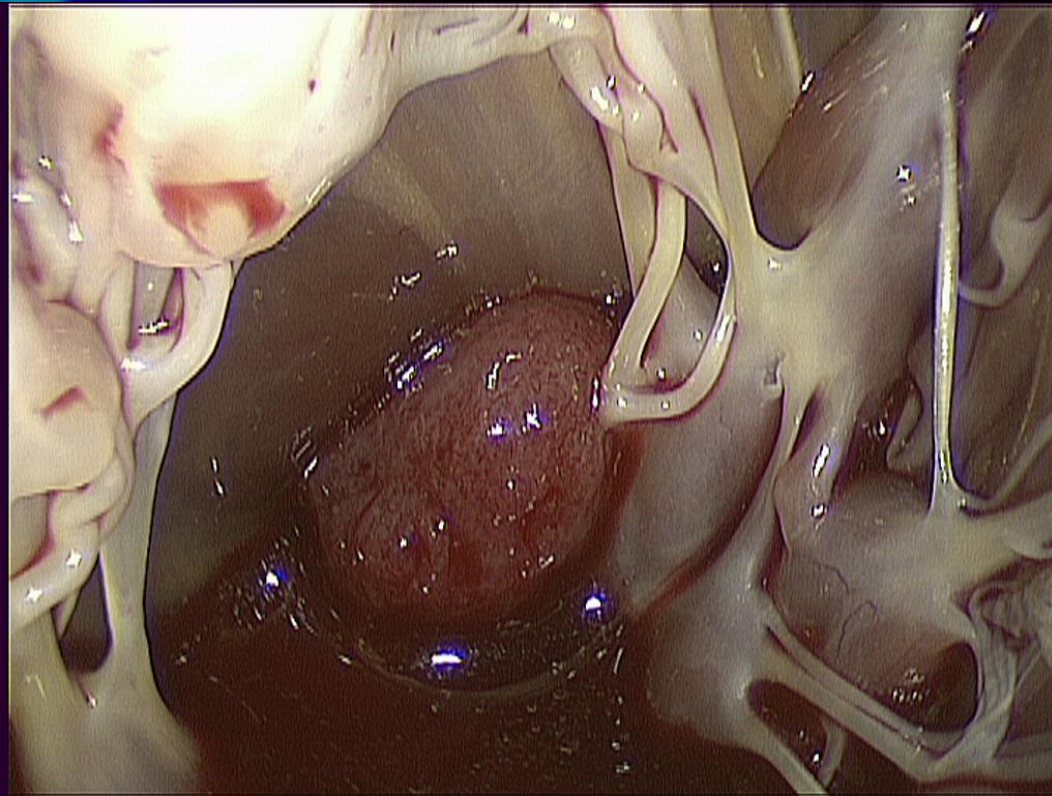
W 106  
L 116  
Z 100%

Compression 2:1

# 3D TEE vs. OP finding

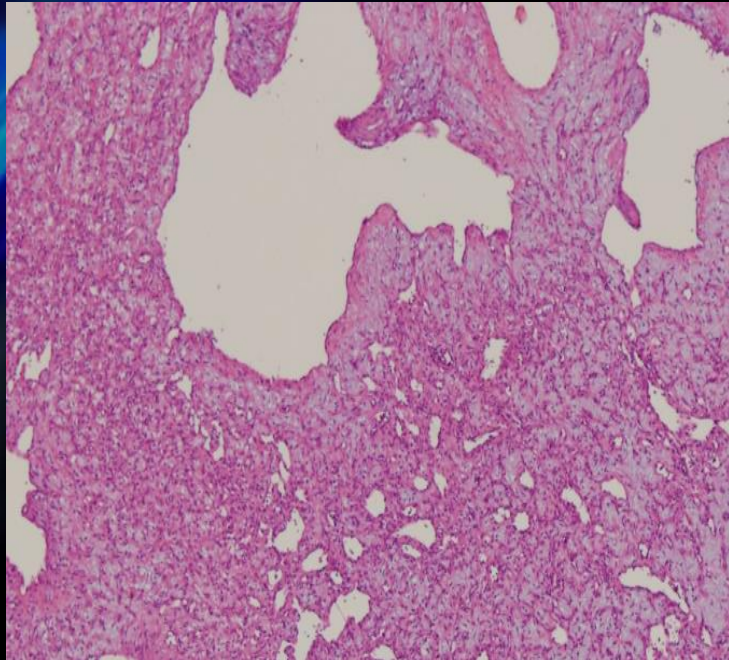


# Op findings vs TEE 3D image

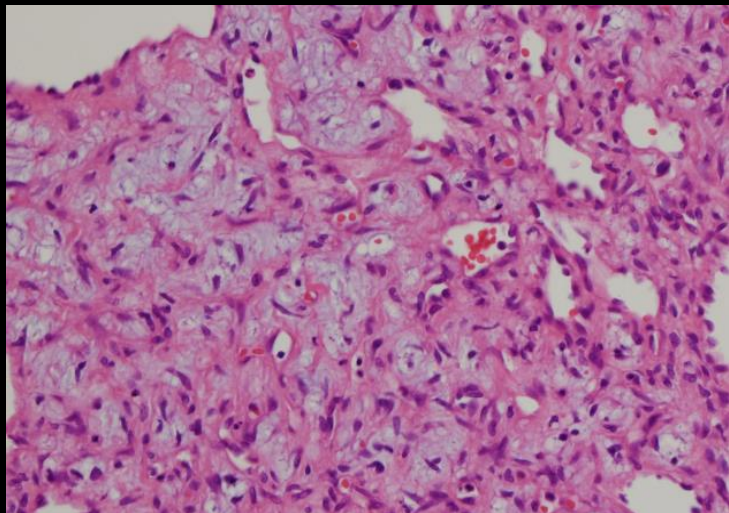




# Pathologic findings



- Large ectatic, endothelial-lined, vascular channels (H&E,  $\times 40$ )



- Connective tissue & lining endothelial cells (H&E,  $\times 200$ )

# Postoperative Course

- CPB/ACC; 71/30min
- Extubation at OR
- ICU stay: 1d, no transfusion
- Post op TTE at POD #2
  - No residual mass
- Discharge; POD#6 d/t money
- Good condition up to 2mo.

