

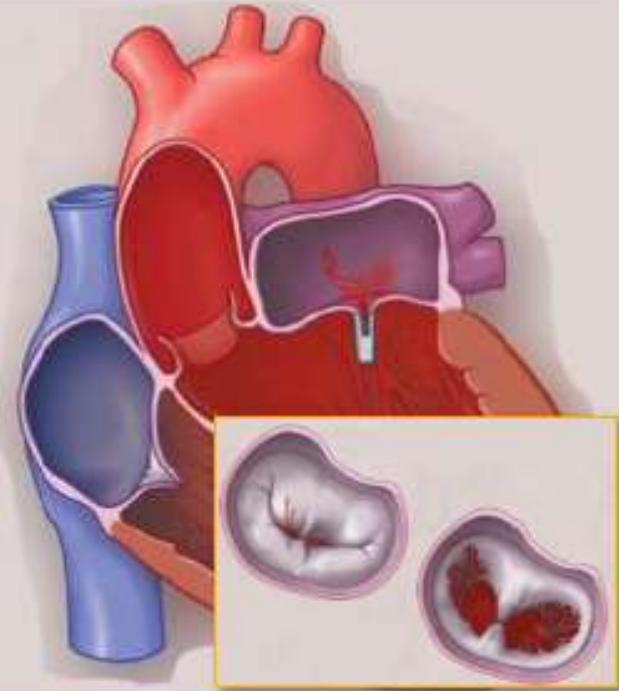
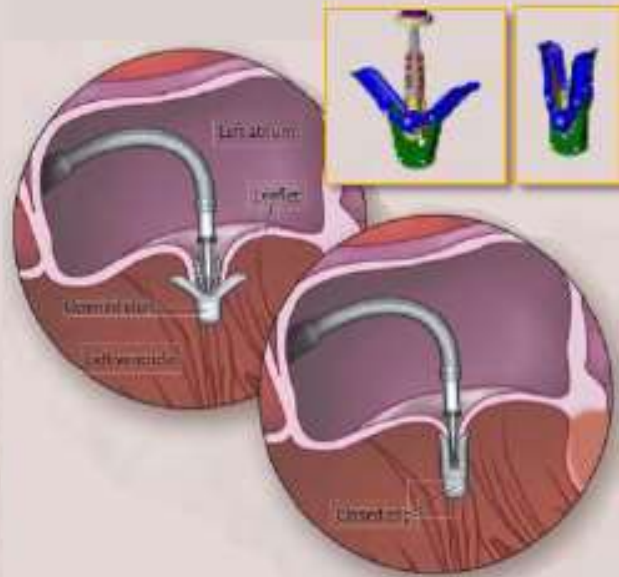
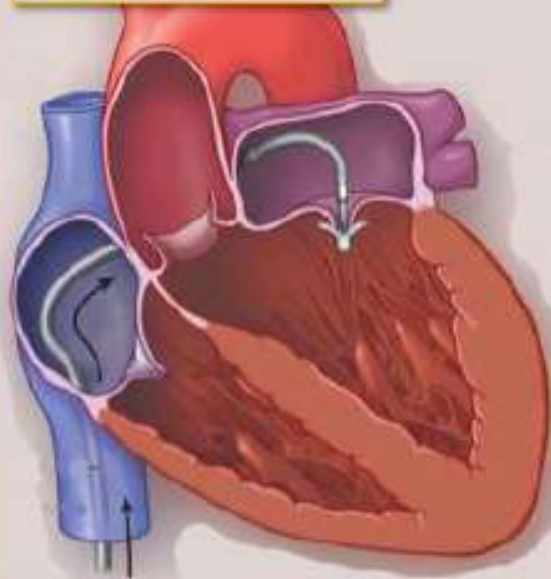
TTE Assisted MitraClip Procedure in a Patient with Difficult TEE

Dr. Boron CW Cheng

Founding President, HKCASH

Catheter-Based Mitral Valve Repair

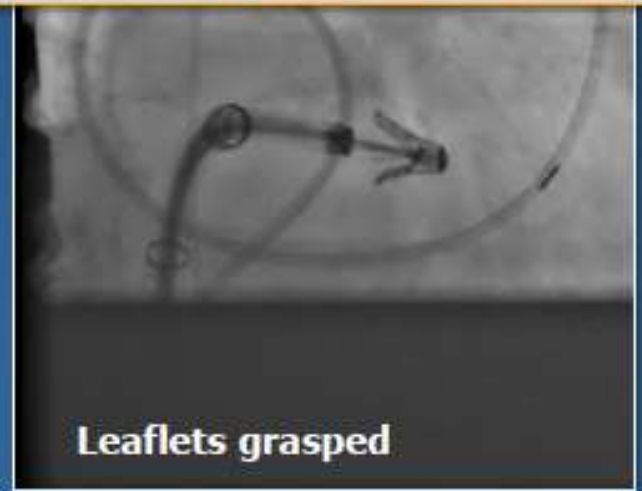
MitraClip System



Clip toward MV



Clip across MV



Leaflets grasped

ROLE OF 2D/3D TEE IN PROCEDURE GUIDANCE:

- Because we could not visualize the mitral valve leaflets, mitraClip implantation is heavily dependent on 2D/3D TEE.
- Step 1: Transseptal puncture
- Step 2: Introduction of the delivery sheath/ clip delivery system into LA
- Step 3: Check trajectory of the clip (A-P; M-L)
- Step 4: Check perpendicularity
- Step 5: Grasping of the leaflets
- Step 6: Leaflet insertion
- Others: hemodynamic, residual MR, complications

CASE HISTORY:

- LKC; Male/ 82 y.o
- Presented with sudden onset SOB in Jan 2014, required intubation & mechanical ventilation
- Weaned off from ventilator successfully
- Echocardiogram (TTE/ TEE- fair to satisfactory image) –
 - normal left ventricle size (LVD 5.2cm.3.6cm)
 - LVEF – 60-65%, no RWMA
 - Severe eccentric mitral regurgitation, prolapse+ Flail A2-A1
 - Mild to moderate TR
- Coronary angiogram: no significant coronary artery disease
- Treated with medical therapy... repeated admission 2x in Feb 2014
- Comorbidities: Early dementia, DM, HT, s/p PPM, Lipid, Hx of minor stroke, chronic renal insufficiency...

CASE HISTORY:

- Option 1: Open mitral valve repair
 - EuroSCORE II : 9.7%
 - STS Risk score : 17%
- Option 2: MitraClip
 - Patient inclusion criteria : acceptable
 - Anatomical criteria : Main Jet A2-1/ P2-1, (Poor quality TEE)

PRE-PROCEDURE TEE: 4 CHAMBERS VIEW

PHILIPS

25/04/2014

18:23:24

TIS0.1

JPEG CR 13:1
MI U.S

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CX7-21/TTE

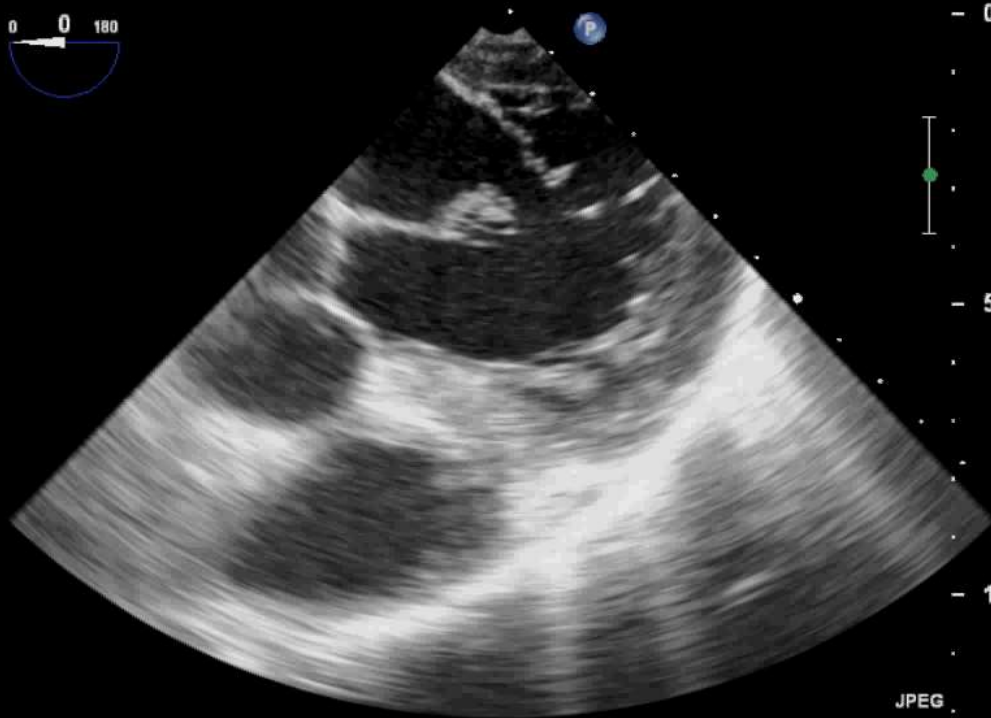
FR 50Hz
12cm

M4

2D
76%
C 50
P Off
Gen



only superior 4C view available



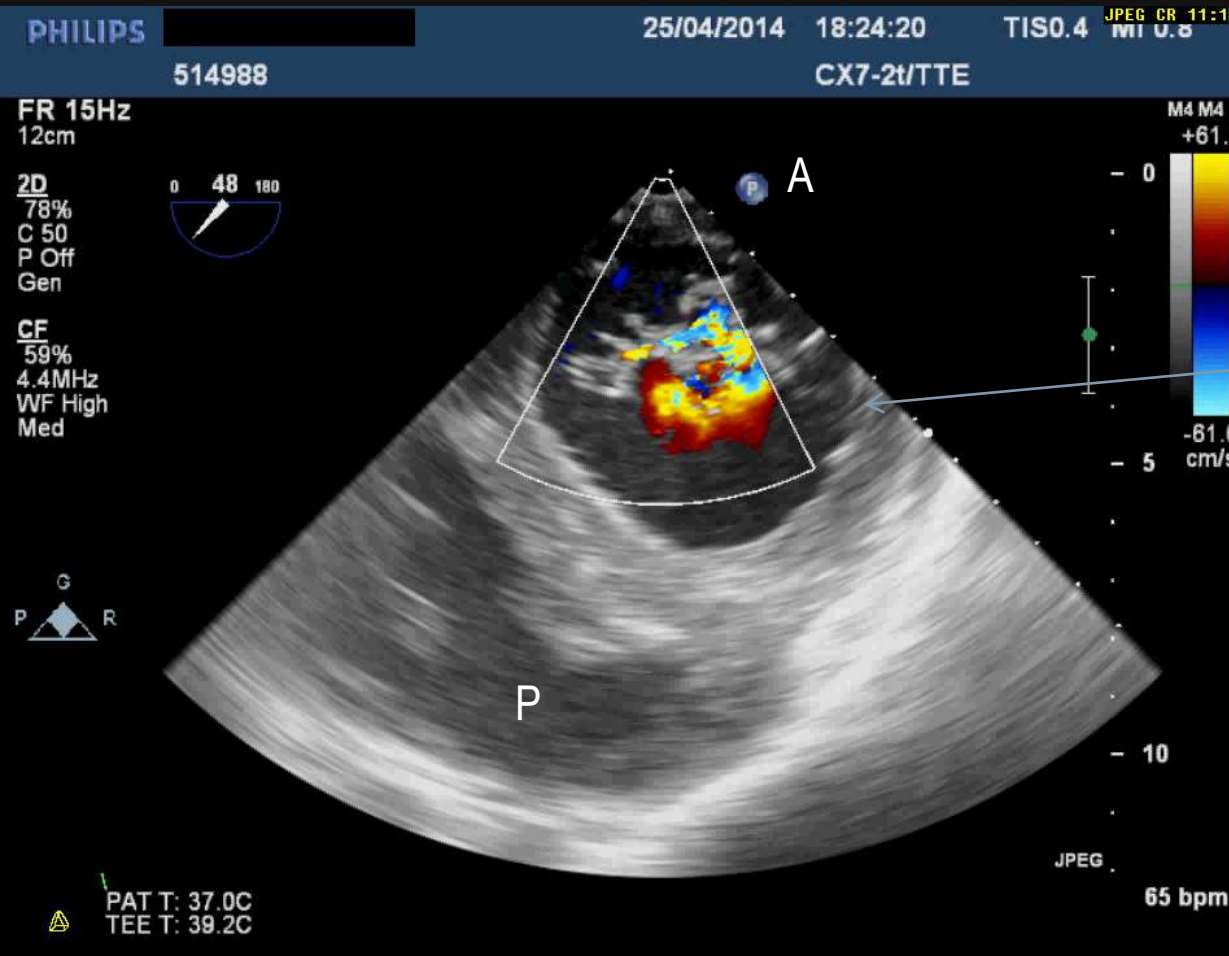
JPEG

67 bpm



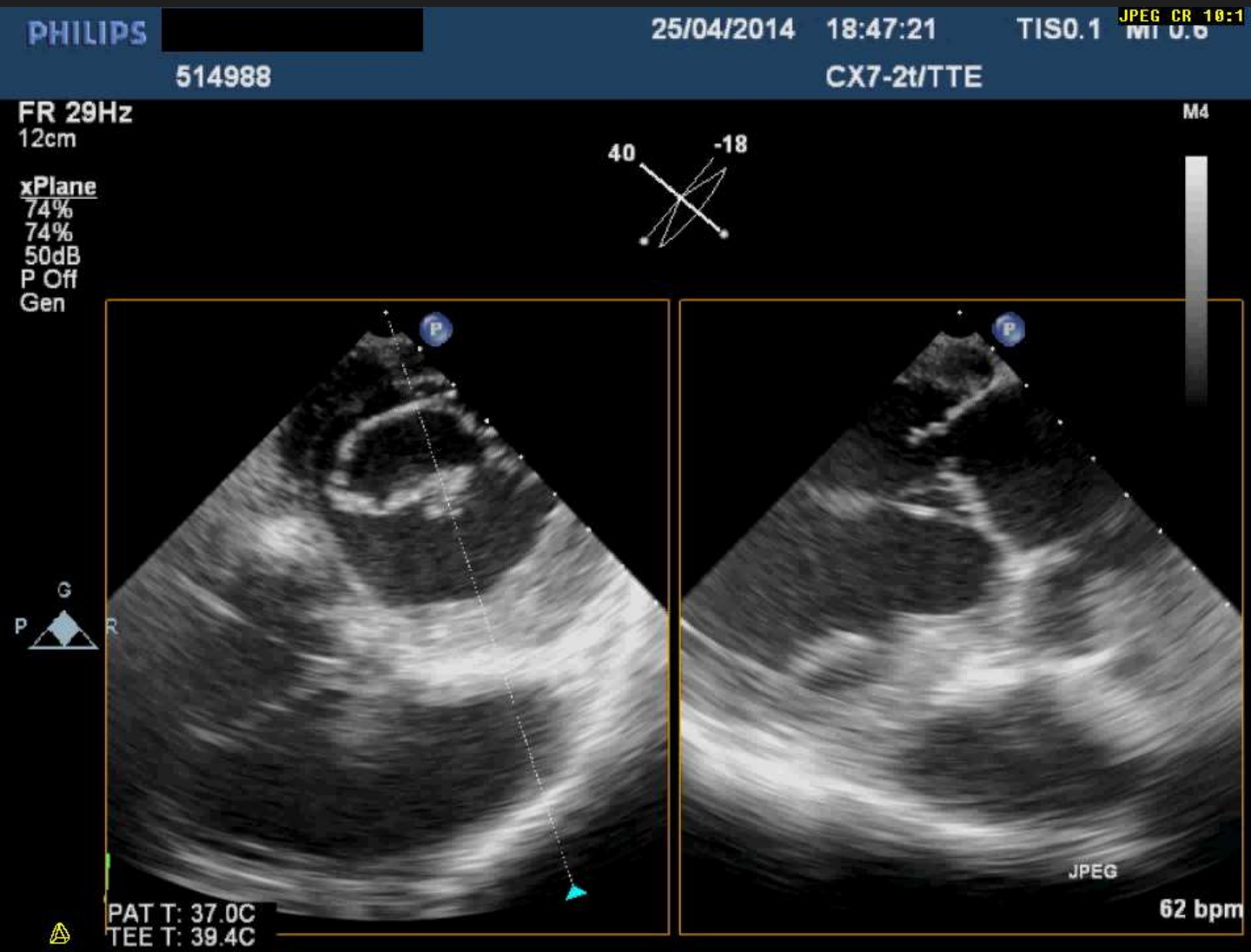
PAT T: 37.0C
TEE T: 38.8C

PRE-PROCEDURE TEE: TRANSGASTRIC VIEW (TG)



Main MR jet between A2A3

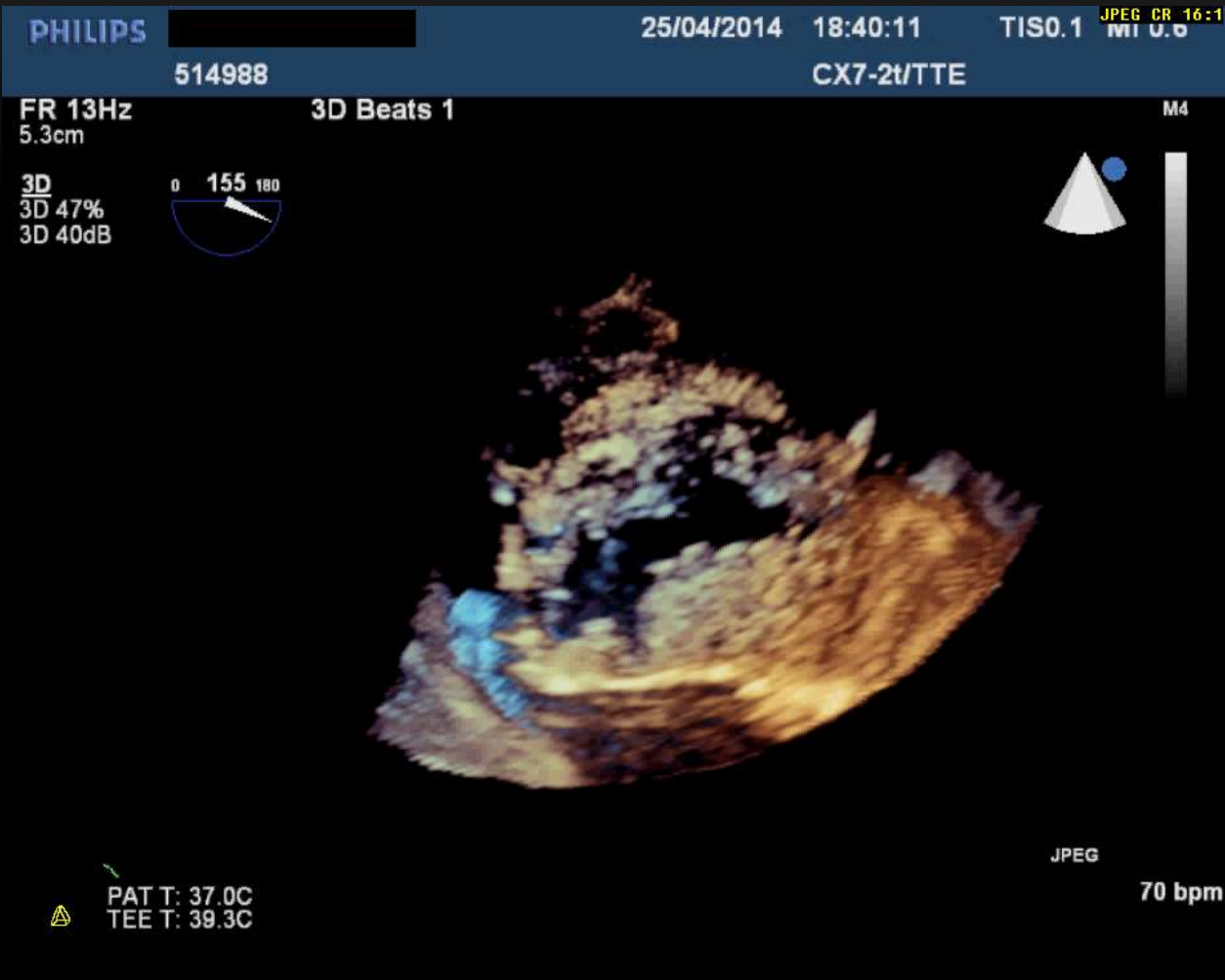
PRE-PROCEDURE TEE: X-PLANE , LVOT



With the aid of X-plane,
We could find the LVOT
With some difficult.

A prolapsed +
Flail segment

PRE-PROCEDURE TEE: 3D –ENFACE VIEW

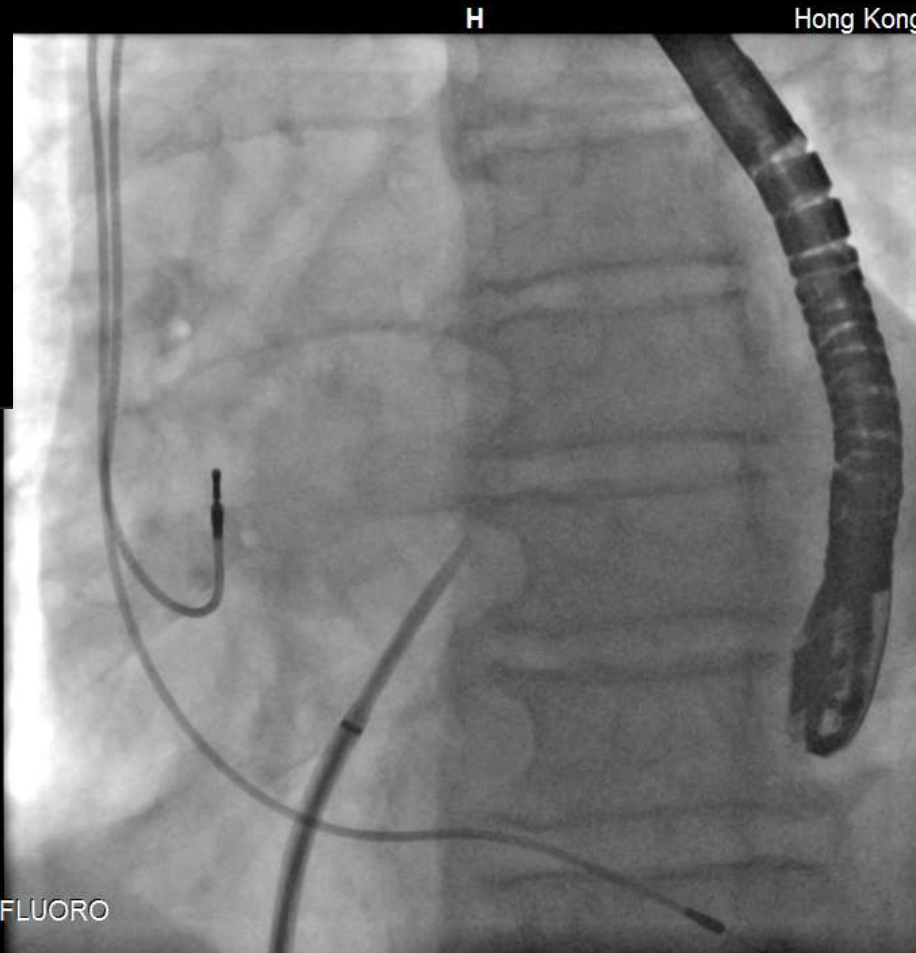
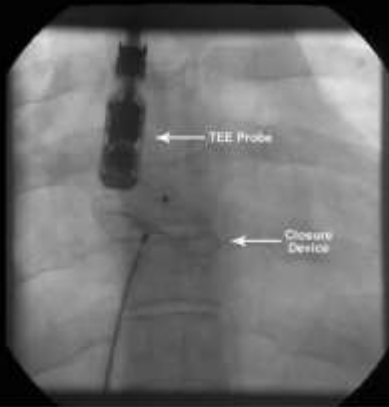


Poor quality...

WHAT HAPPEN?

- 2D-TEE:
 - 4 chambers view (4C) : only superior 4C view available
 - Intercommissural views (IC) : Impossible
 - LVOT views: Barely Ok with the aid of X-plane
 - Transeptal views : Bicaval view –OK, Short-axis at the base +/-
- 3D En-face view: Poor quality

REASON OF DIFFICULT TEE: ROTATED HEART+ ROTATED ESOPHAGUS



Hong Kong Adventist Hospital
AXIOM-Artis
HFS

AP projection

R

FL CARDn
FL CARDn
SINGLE PLANE/SINGLE A/STORE FLUORO
CRA 0
LAO 0

W: 118
C: 121



CAN YOU IMAGINE WORKING WITHOUT TEE
IN A MITRACLIP PROCEDURE?

CAN YOU IMAGINE WORKING WITHOUT TEE
IN A MITRACLIP PROCEDURE?
LIKE LIVING IN A WORLD WITHOUT LIGHT...

Steps	TEE	Purpose	Our patient		
1. Transeptal puncture	SA-b Caval	To determine the site of puncture	X √		
	4C		Height of puncture	X	
2. Introduction of the delivery sheath/ clip delivery system into LA	SA-b	To determine length of DS Help to steer down the CDS	X		
3. Trajectory of the CDS	LVOT	Anterior –posterior orientation	√		
	BC	Medial-lateral orientation	X		
4. Perpendicularity	LVOT + BC	check the perpendicularity along the line of coaptation	√ X		
	TG 3D-EF		√ X		
5. Grasping of leaflets	LVOT	clip and gripper arms relative to the MV leaflets	√		
6. Leaflets insertion	4C LVOT BC	A + P leaflets insertion	X √ X		
	TG		Confirm double orifice	√	

SA-b Short Axis at the base; BC-Bicommissure view; 4C- 4 chambers view; TG- Transgastric view; 3D-EF 3D Enface View; LVOT- left ventricular outflow view

Steps	TEE	Purpose	Our patient		
1. Transeptal puncture	SA-b Caval	} → To determine the site of puncture	X √		
	4C →		Height of puncture	X	
2. Introduction of the delivery sheath/ clip delivery system into LA	SA-b	To determine length of DS Help to steer down the CDS	X		
3. Trajectory of the CDS	LVOT	Anterior –posterior orientation	√		
	BC	Medial-lateral orientation	X		
4. Perpendicularity	LVOT + SA-b	} check the perpendicularity along the line of coaptation	√ X		
	TG		√		
	3D-EF		X		
5. Grasping of leaflets	LVOT	clip and gripper arms relative to the MV leaflets	√		
6. Leaflets insertion	4C	} → A + P leaflets insertion	X		
	LVOT		√		
	BC		X		
	TG →	Confirm double orifice	√		

Difficulty Index = 8/15=0.533

SA-b Short Axis at the base; BC-Bicommissure view; 4C- 4 chambers view; TG- Transgastric view; 3D-EF 3D Enface View; LVOT- left ventricular outflow view

45 MINUTES AFTER REPEATED TEE MANIPULATION.....

- 1 pillow behind right shoulder
- 1 pillow behind left shoulder
- 2 pillow behind right shoulder
- Pillows behind both shoulders.....



45 MINUTES AFTER REPEATED TEE MANIPULATION.....

- 1 pillow behind right shoulder
- 1 pillow behind left shoulder
- 2 pillow behind right shoulder
- Pillows behind both shoulders.....



Abandon the procedure?

45 MINUTES AFTER REPEATED TEE MANIPULATION.....

- 1 pillow behind right shoulder
- 1 pillow behind left shoulder
- 2 pillow behind right shoulder
- Pillows behind both shoulders.....



An old portable transthoracic echo. machine,
was sitting quietly at a small corner in our lab....



TEE VS TTE

- TEE: 0 degree , 4 chamber view



- TTE: Apical 4/5 chamber view

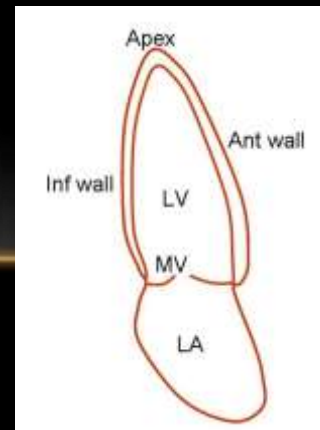
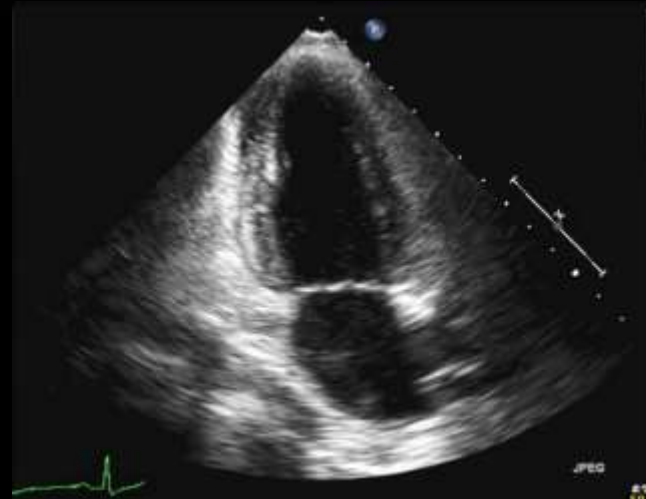


TEE VS TTE

- TEE: 60-90 ; Intercommissural views



- TTE : Apical 2 Chambers view

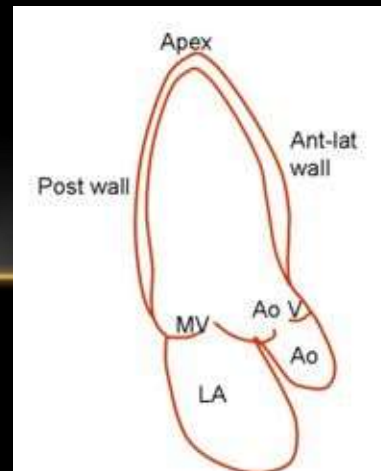
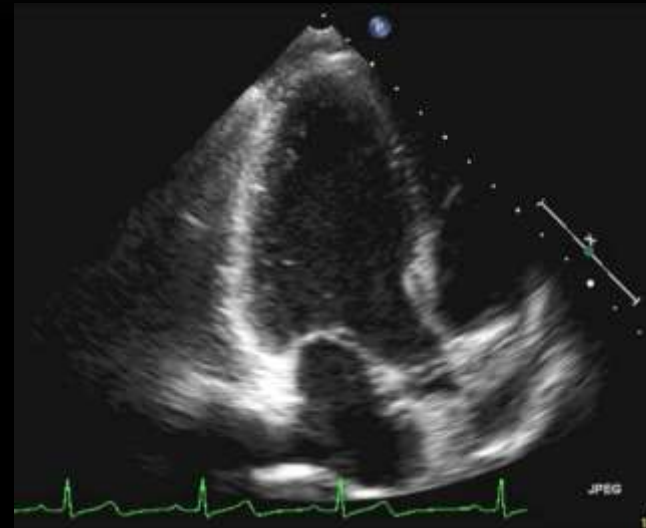


TEE VS TTE

- TEE: 110-130 LVOT views



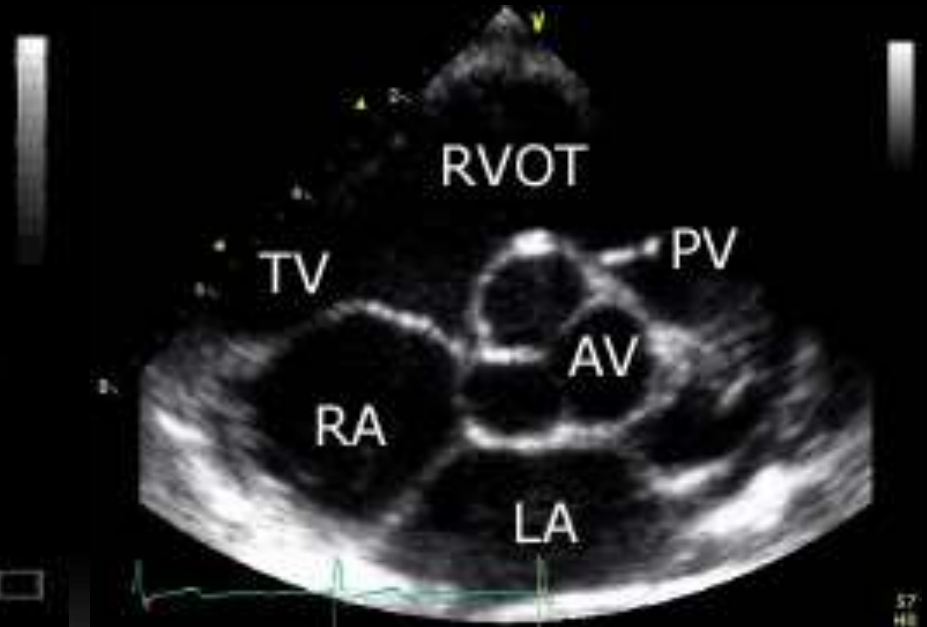
- TTE: Apical Long Axis View



- TEE: 40-50; Short Axis at the base



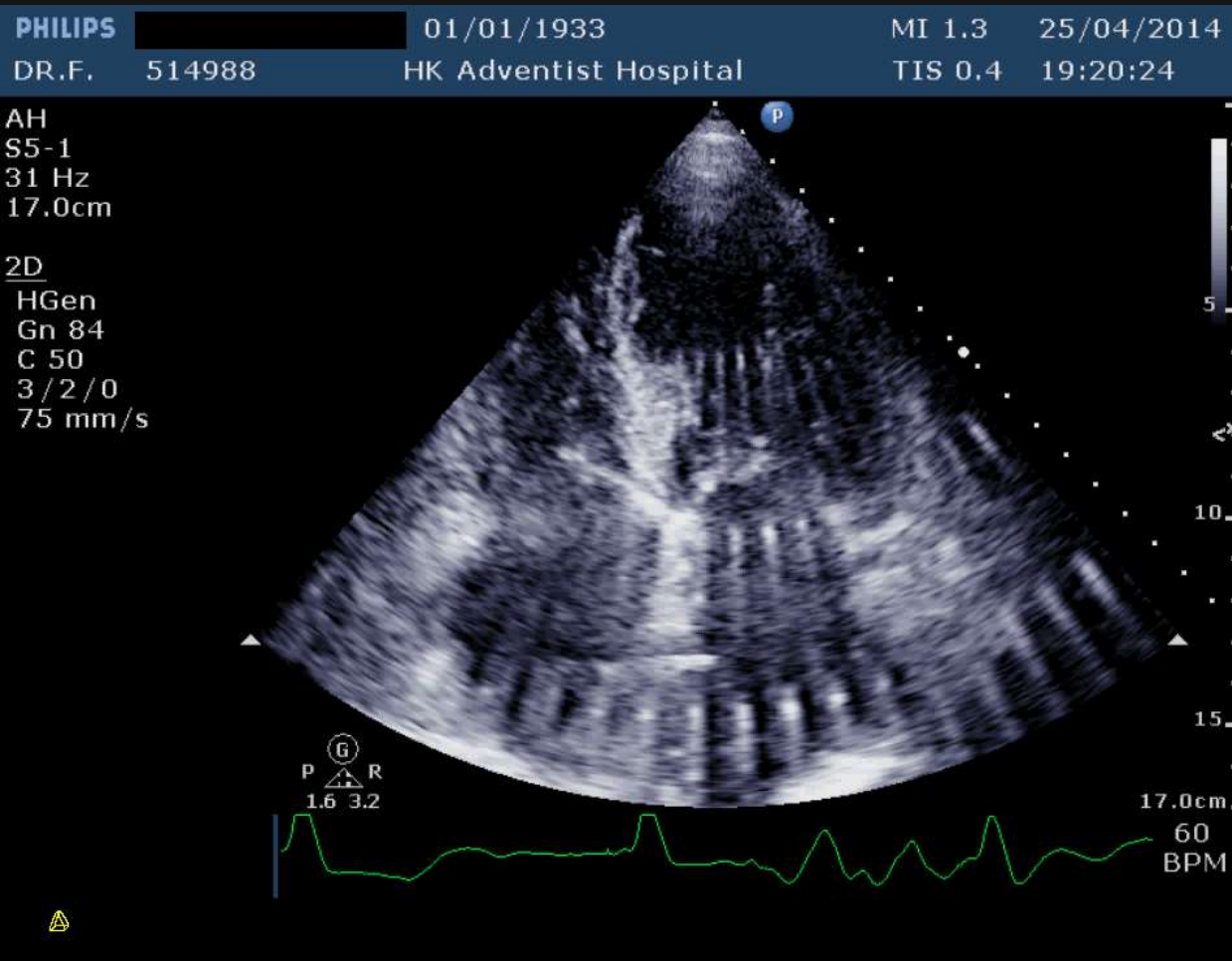
- TTE: Parasternal Short Axis View



Steps	TEE	Purpose	Our patient	TTE	
1. Transeptal puncture	SA-b Caval	} → To determine the site of puncture	X √	√	
	4C →		Height of puncture	X	√
2. Introduction of the delivery sheath/ clip delivery system into LA	SA-b	To determine length of DS Help to steer down the CDS	X	√	
3. Trajectory of the CDS	LVOT	Anterior –posterior orientation	√		
	BC	Medial-lateral orientation	X	√	
4. Perpendicularity	LVOT + BC	} check the perpendicularity along the line of coaptation	√ X	√	
	TG 3D-EF		√ X		
5. Grasping of leaflets	LVOT	clip and gripper arms relative to the MV leaflets	√		
6. Leaflets insertion	4C LVOT BC	} → A + P leaflets insertion	X √ X	√ √	
	TG →		Confirm double orifice	√	

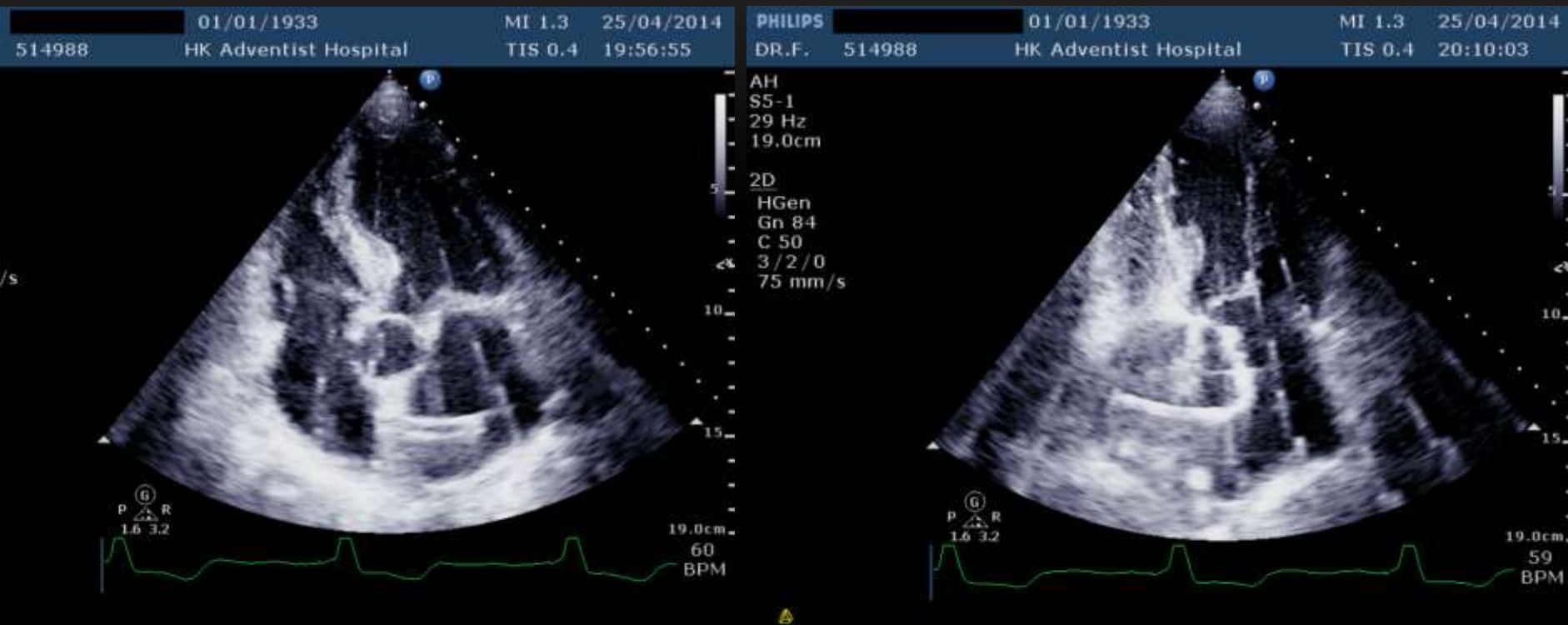
SA-b Short Axis at the base; BC-Bicommissure view; 4C- 4 chambers view; TG- Transgastric view; 3D-EF 3D Enface View; LVOT- left ventricular outflow view

1. TRANSEPTAL PUNCTURE:

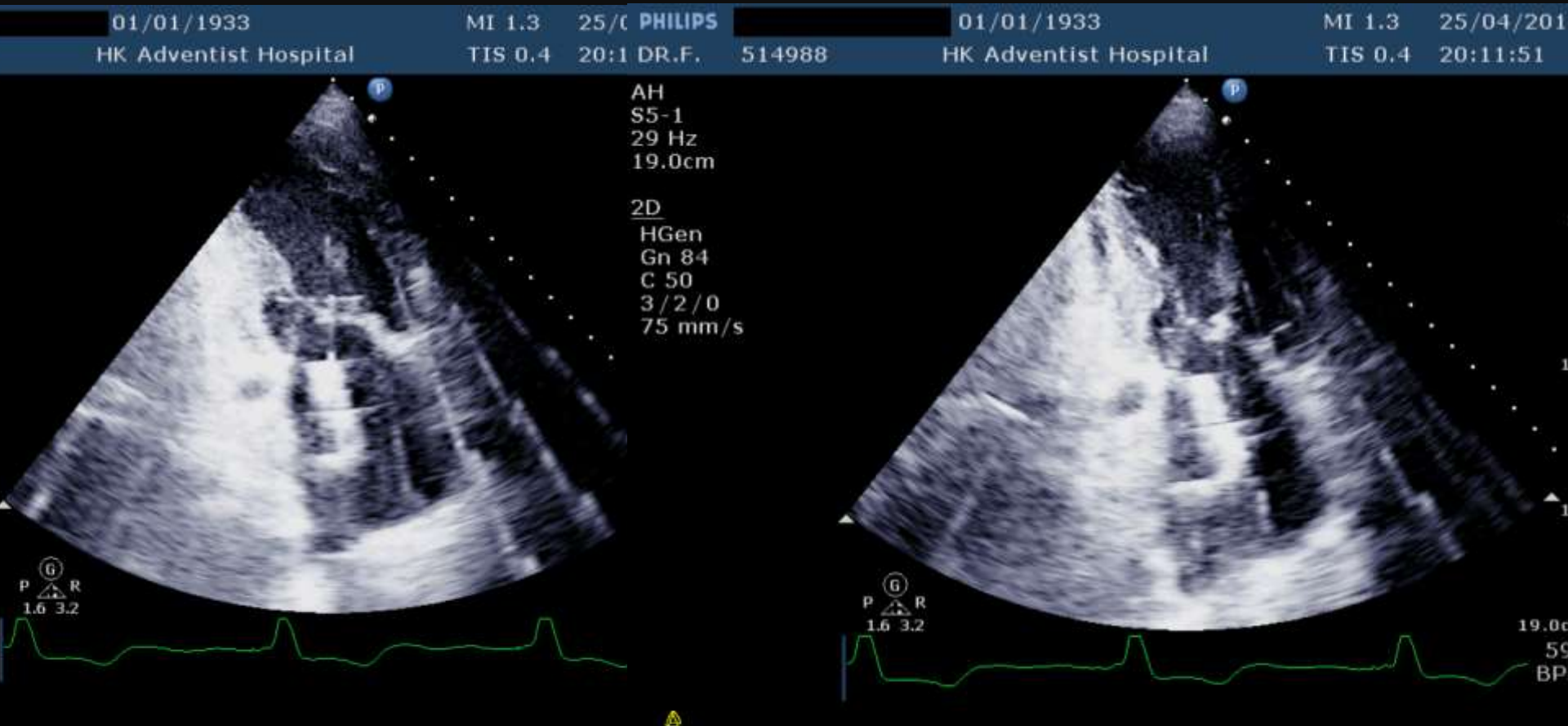


Puncture height: 3.8cm
(from annulus to puncture site)

2. . INTRODUCTION OF THE DELIVERY SHEATH/ CLIP DELIVERY SYSTEM INTO L.A.

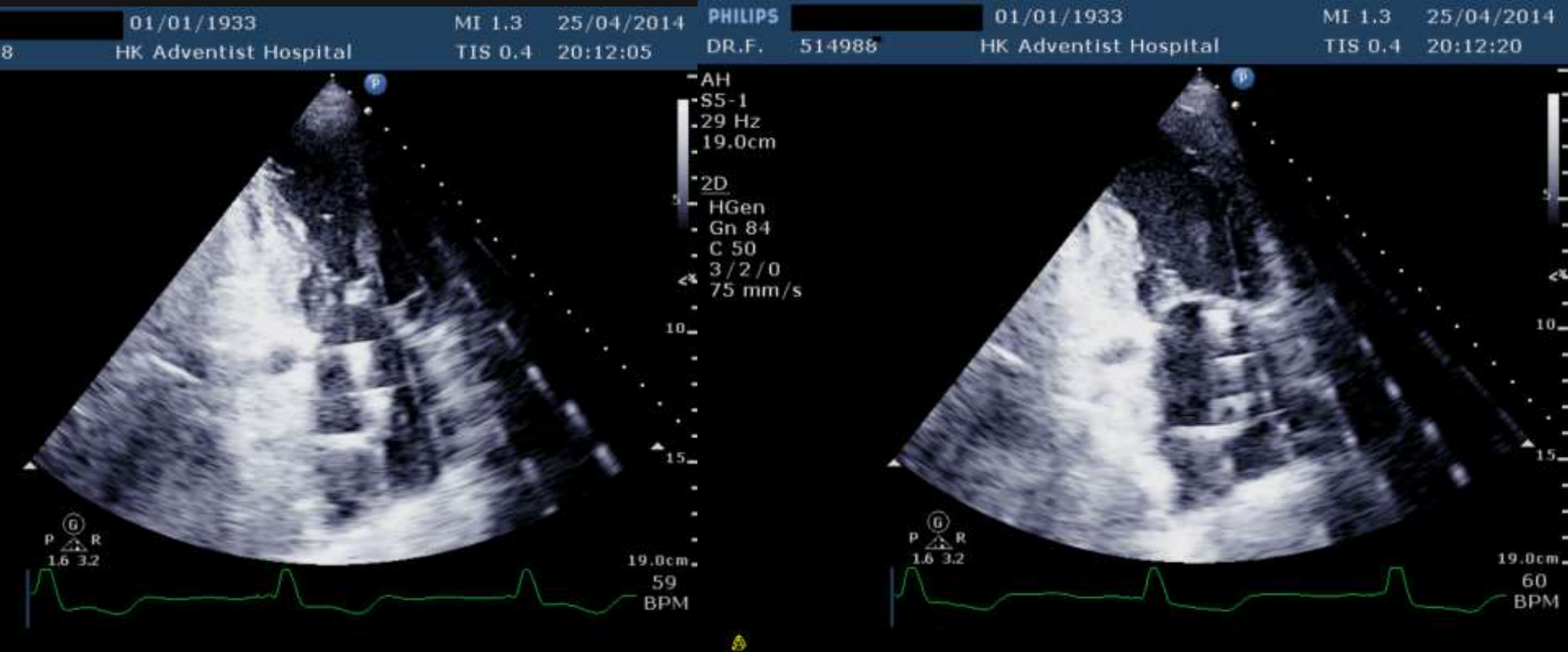


3. TRAJECTORY OF THE CDS (MEDIAL –LATERAL)



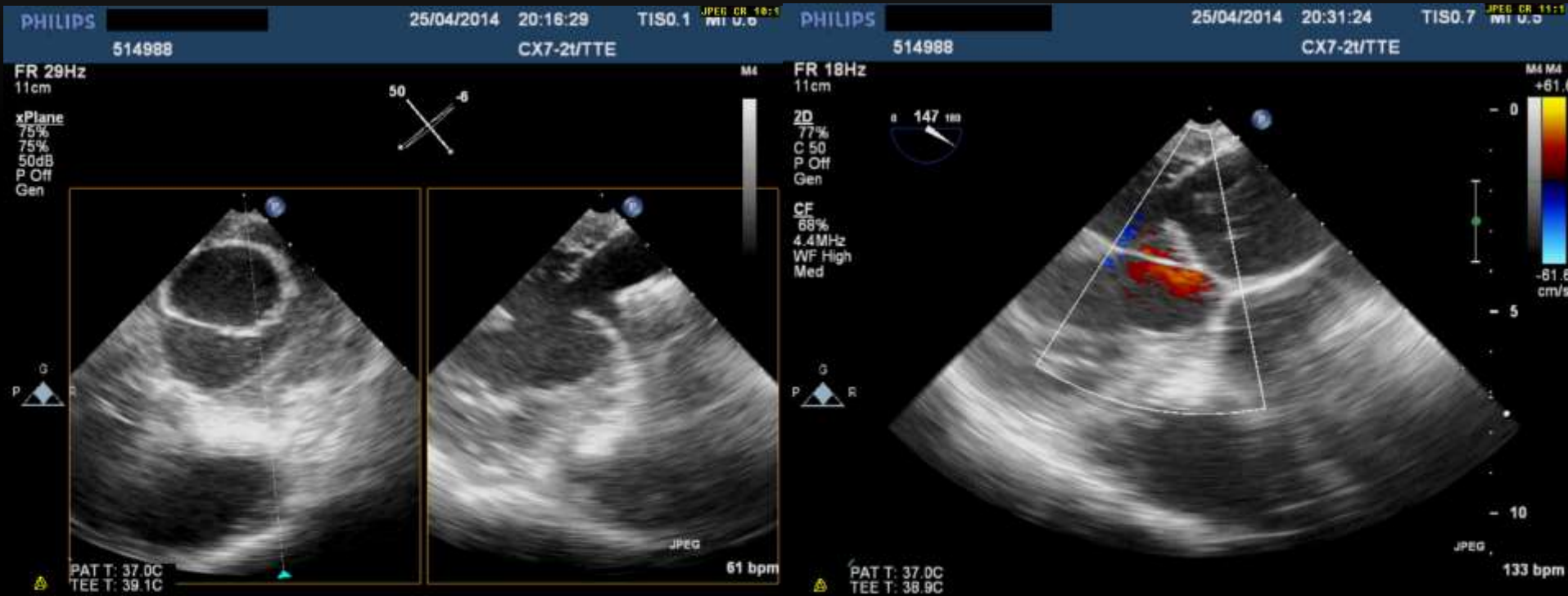
TEE Apical 2 Chambers View

3. TRAJECTORY OF THE CDS (MEDIAL-LATERAL)

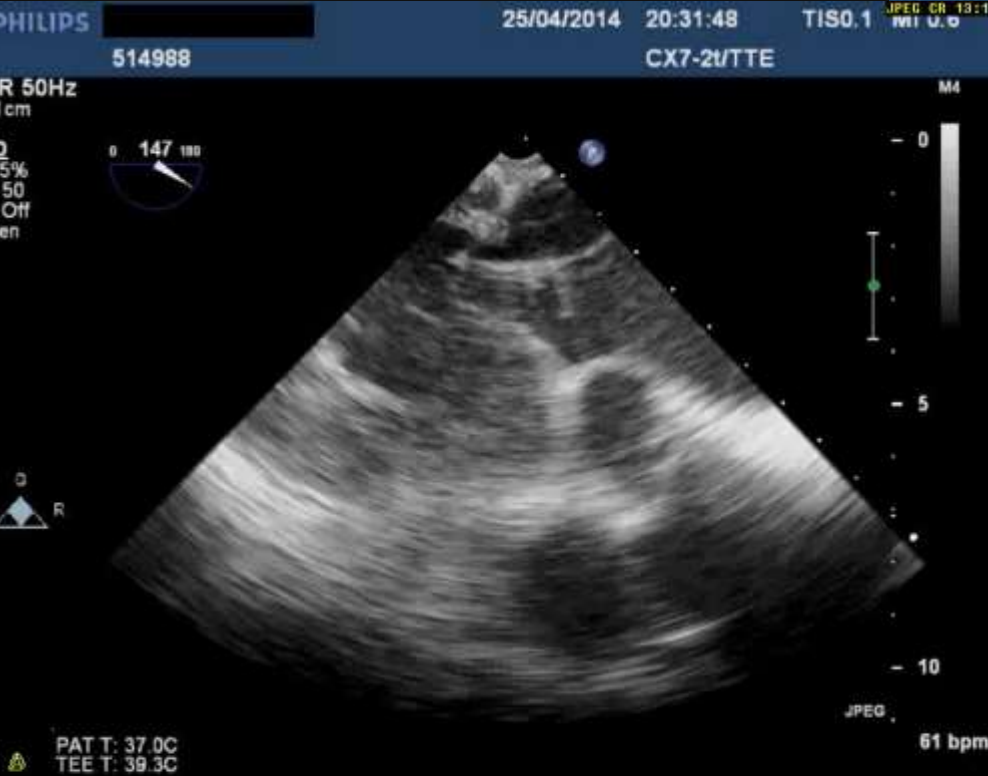


TEE Apical 2 Chambers View

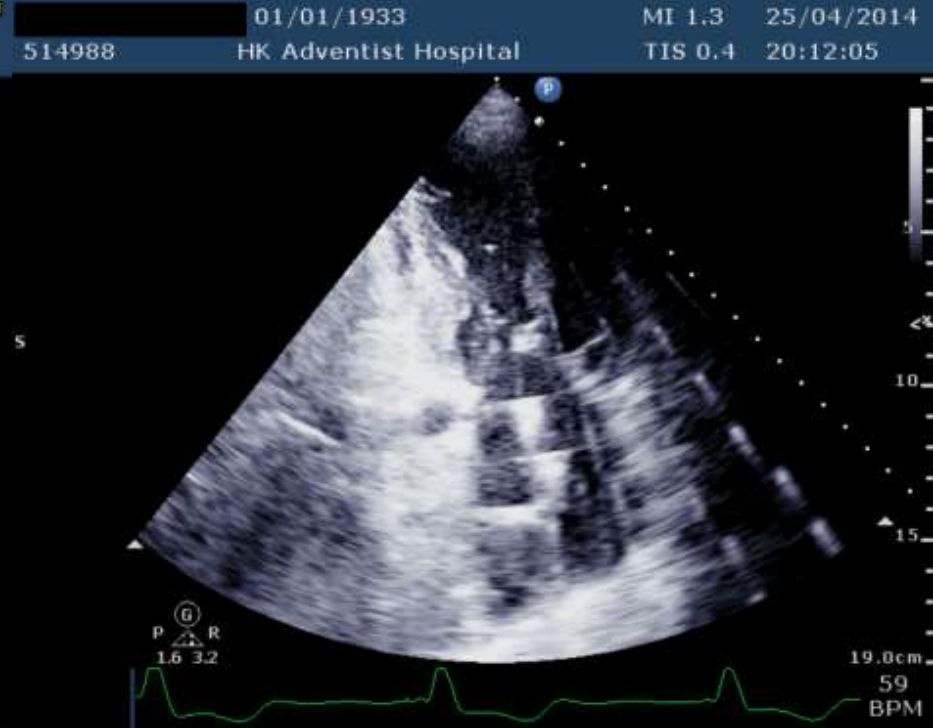
3. TRAJECTORY OF THE CDS (ANT-POST)



4. PERPENDICULARITY

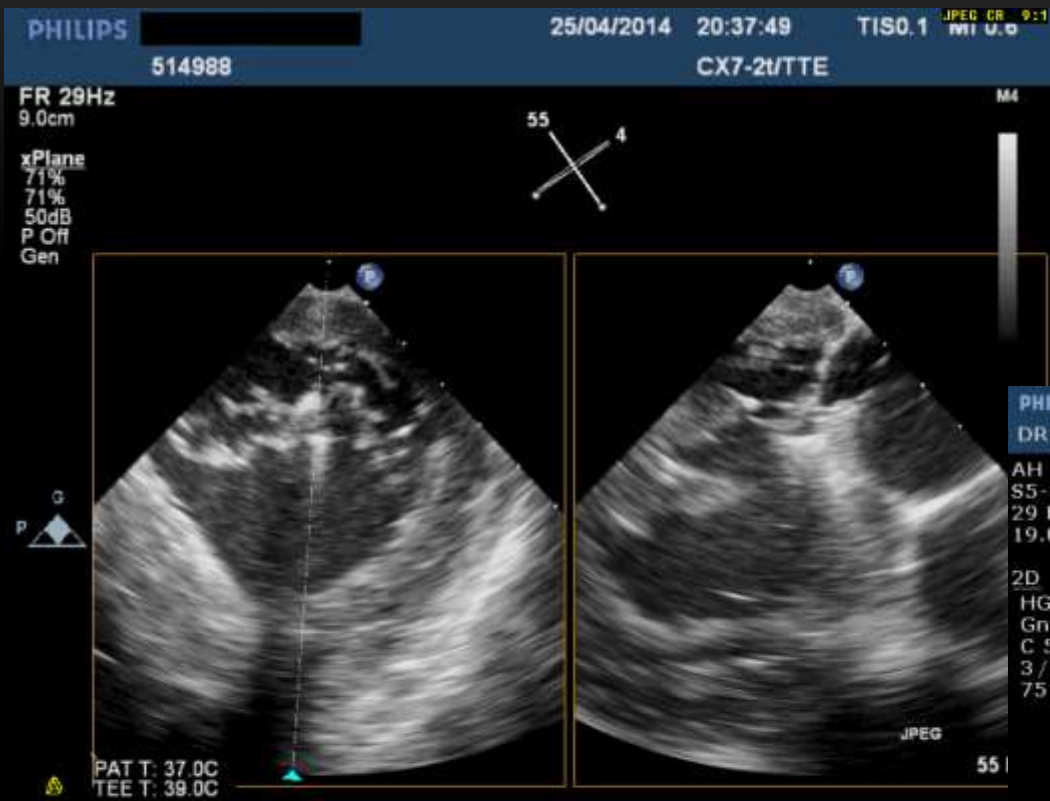


Ant- Post plane.
TEE-LVOT



Medial-lateral plane.
TTE-A2C view

5. GRASPING OF LEAFLETS & 6. LEAFLETS INSERTION

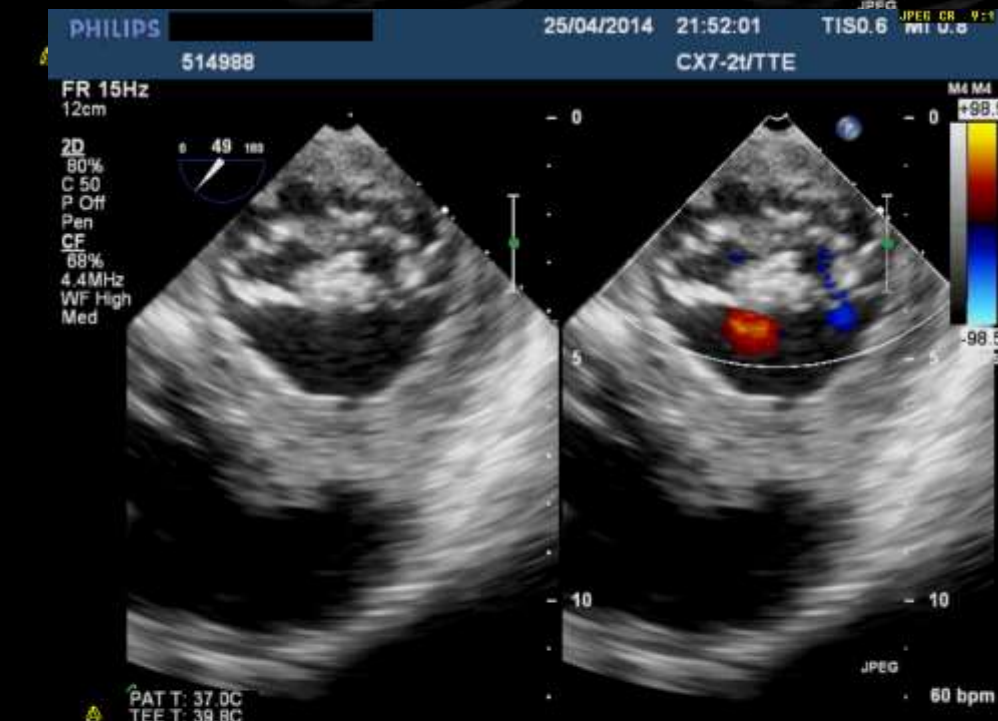
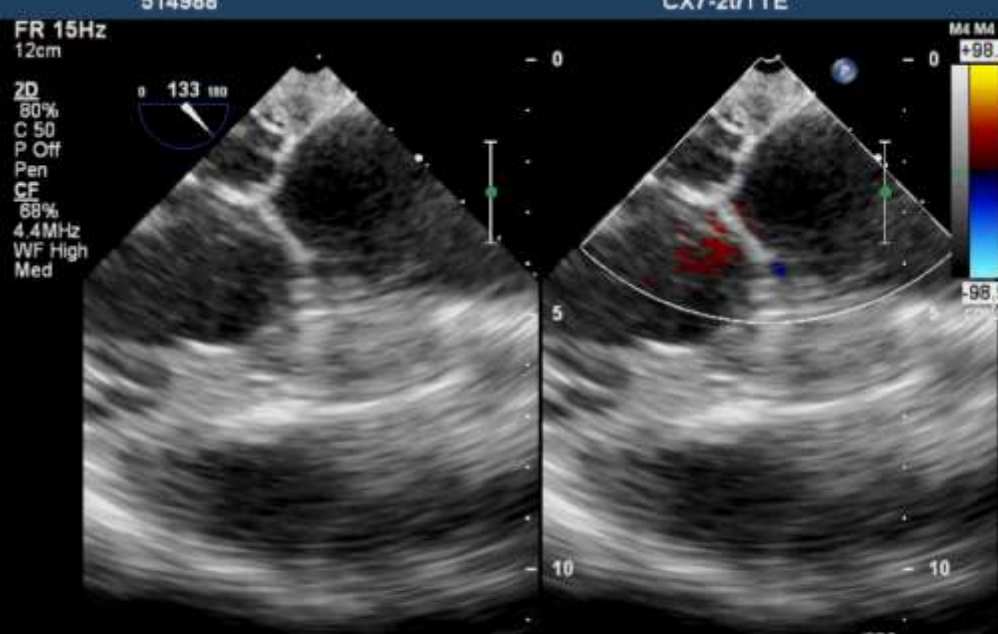


TEE- TG, LVOT

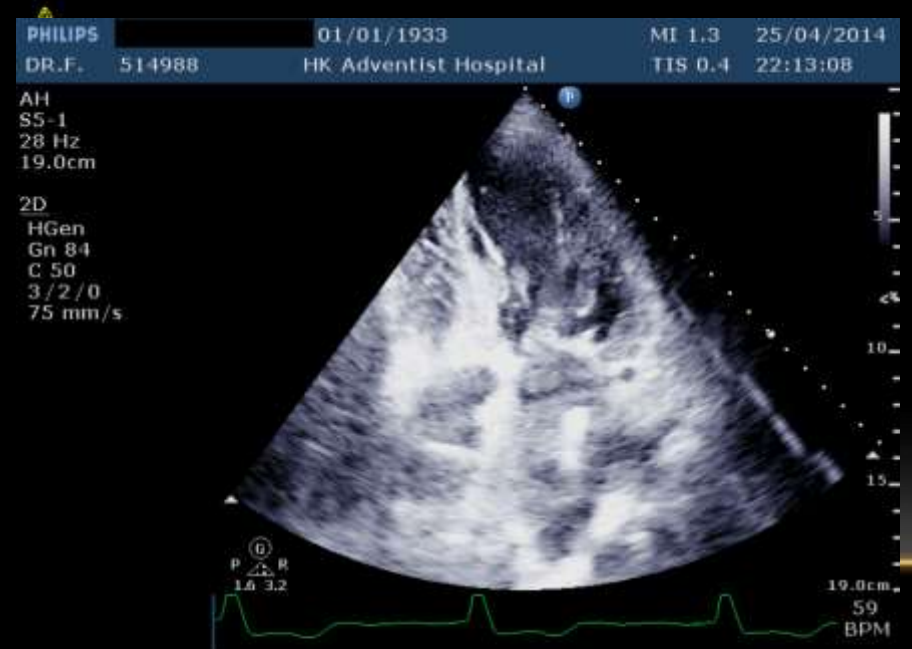
TTE-A4C view



AFTER THE FIRST CLIP..



2ND CLIP



TTE-A2C view

PHILIPS 514988

25/04/2014 23:17:25 TIS0.5

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01/01/1933 HK Adventist Hospital

MI 1.0 25/04/2014

514988

CX7-2t/TTE

DR.F. 514988

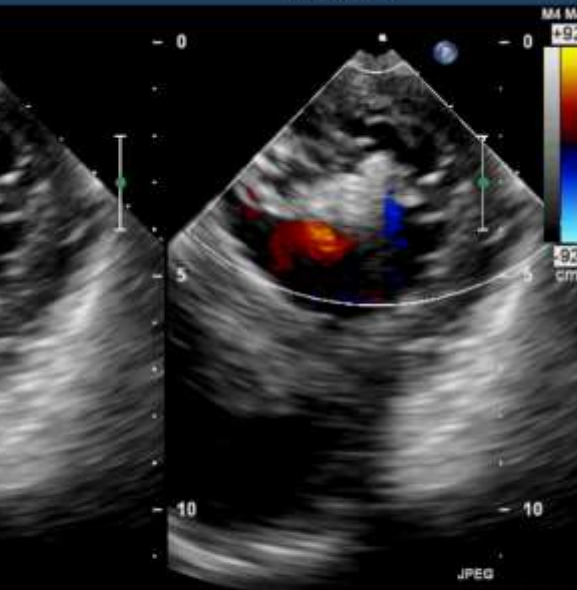
HK Adventist Hospital

TIS 1.4 23:30:22

FR 14Hz
12cm
76%
C 50
P Off
Pen
CE
88%
4.4MHz
WF High
Med



PAT T: 37.0C
TEE T: 39.7C



JPEG 60 bpm

AH
S5-1
22 Hz
18.0cm
2D
HGen
Gn 84
C 50
3/2/0
75 mm/s
Color
2.5 MHz
Gn 35
4/5/0
Fltr High



18.0cm
59 BPM

PROGRESS:

- After a 7 hours 2 clips procedure, satisfactory MR reduction from grade 4/4 → grade 1-1.5/4
- Discharged on day 3
- FC 3-4 → FC 1-2
- No unplanned hospital admission in the past 2 years.

CONCLUSIONS:

Steps	TEE 2D/3D	TTE
1. Transeptal puncture	+++	++
2. Introduction of the delivery sheath/ clip delivery system into LA	+++	+++
3. Trajectory of the CDS	+++	+++
4. Perpendicularity	+++	+
5. Grasping of leaflets	+++	+/-
6. Leaflets insertion	+++	+

- (1) TTE guidance during MitraClip implantation is invaluable esp. in difficult TEE pt.
- (2) Both techniques are complementary
- (3) Don't forget your old friend
- (4) Successful factors : good TTE echogenicity, & TEE LVOT + TG view is still usable

IN A WORLD WITHOUT LIGHT.....



IN A WORLD WITHOUT LIGHT.....
REMEMBER YOUR OLD FRIEND WILL GUIDE YOU
THROUGH

