

A VALVE IN VALVE CASE
A Disaster Management Team I
would never want to test again

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MEMBER - Medical council of India and Academic Sub committee

PRESIDENT ELECT – Asian Pacific Society of Interventional Cardiology

PAST PRESIDENT - Cardiological Society of India

PAST VICE PRESIDENT - Asia Pacific Society of Cardiology

Case Summary and Planning

66 years lady

Degenerated 21mm Perimount Bioprosthetic Heart Valve with predominantly stenotic lesion EOA-0.3cm²

STS score of 5%

LVEF <50%

Post Spine surgery

Under Psychiatric treatment

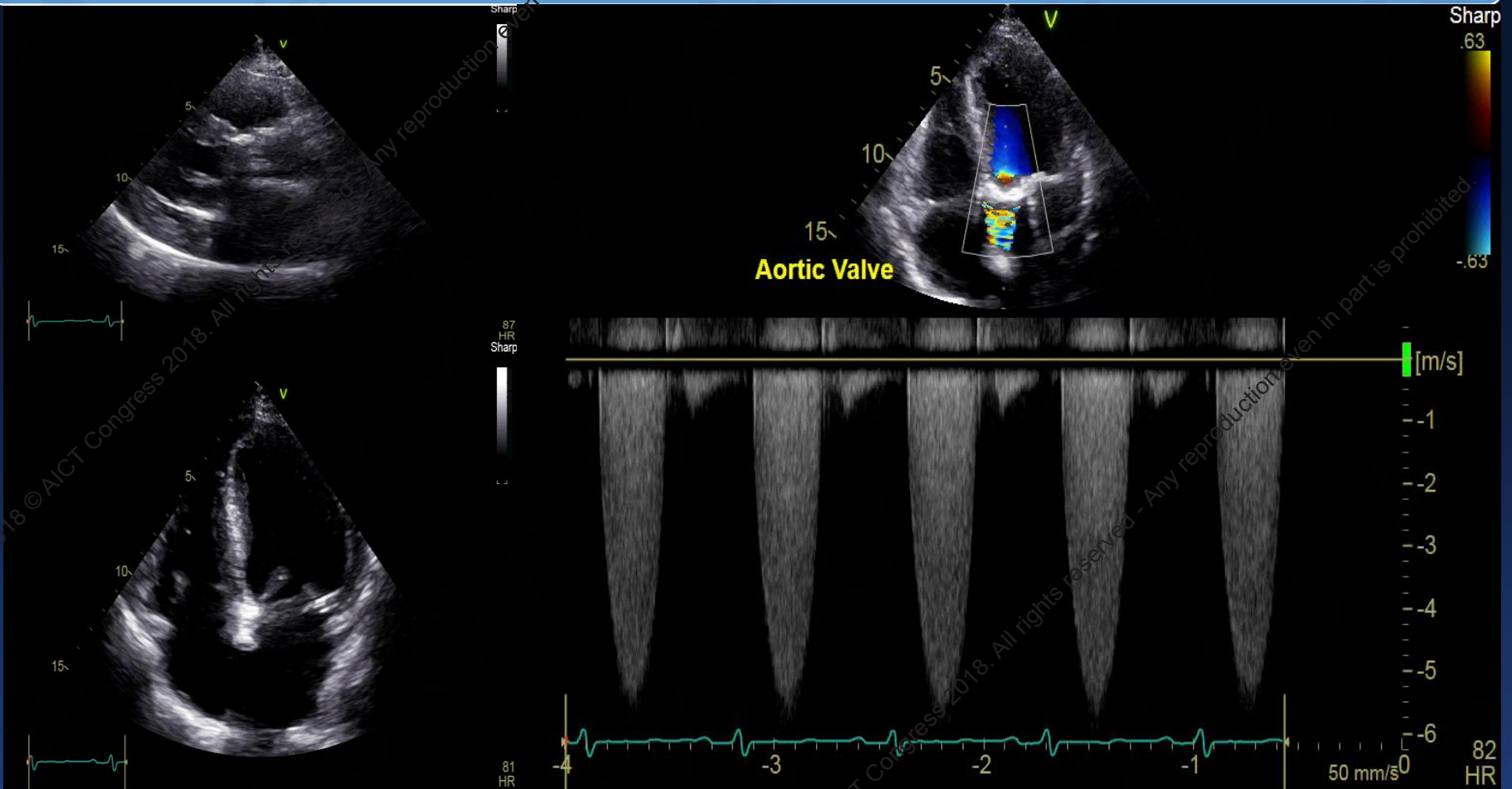
Planned for TAVR under General anaesthesia

Complications more common during VIV

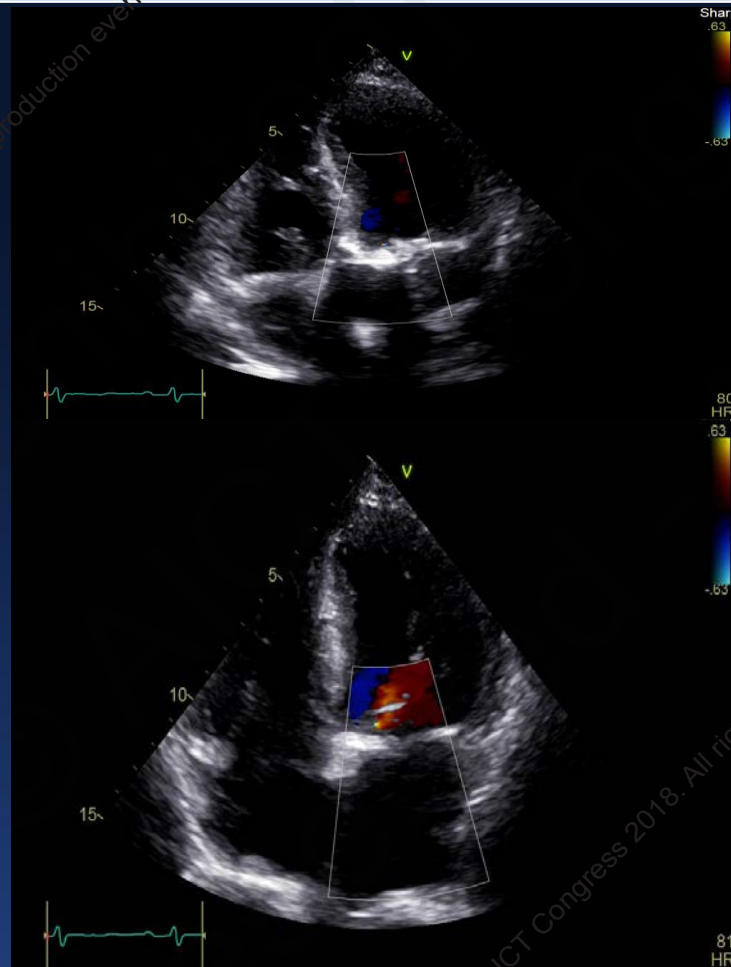
Planned for Valve in Valve TAVR

- **Malpositioning**
- **High post viv trans thv gradient -severe PPM (defined as an effective orifice area <0.65 cm²/m²)**
- **Coronary ostia occlusion**

Echo images :Severe Aortic Stenosis, Trivial AR , LV dysfunction EOA-0.3cm2

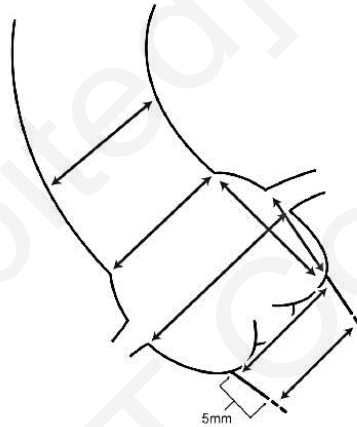


Echo images :Severe Aortic Stenosis, Trivial AR , LV dysfunction



Summary of MSCT Aortic root complex and ascending aorta

Max Ascending Aorta Diameter (mm)	30.0	
Sinotubular Junction Diameter (mm)	26.3	28.1
	Min	Max
ANNULUS		
Diameter (mm)	17.5 x 19.0	18.3
	Min	Max
Perimeter (mm)	57.4	18.3
	Derived Diameter	
Area	259.8 mm ²	18.2 mm
	Derived Diameter	



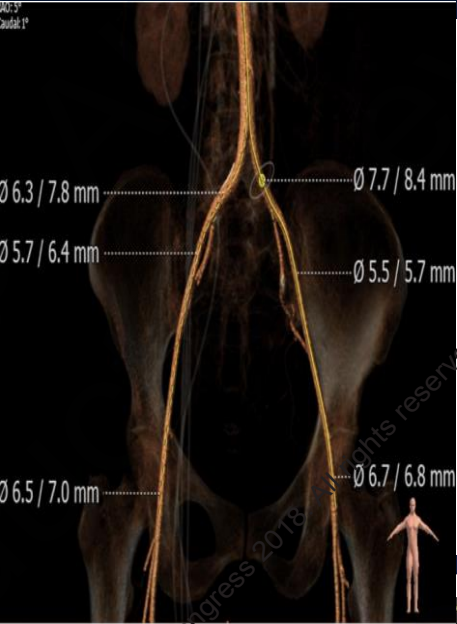
Sinus of Valsalva Diameter (mm)	26.5	23.7	25.8
	LCC	RCC	NCC
Sinus of Valsalva Height (mm)	15.7	18.3	14.5
	LCC	RCC	NCC
Coronary Ostia Height (mm)	10.9	15.2	
	Left	Right	
LVOT Diameter (mm)	20.8 x 26.6	23.7	
	Min	Max	Mean

Valve Size Selection

CoreValve® Evolut® R

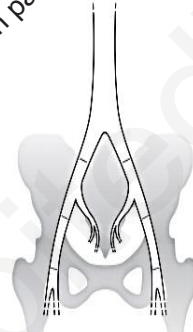
Size	23 mm	26 mm	29 mm	34 mm
Annulus Diameter	18-20 mm	20-23 mm	24-26 mm	26-30 mm
Annulus Perimeter†	56.5-62.8 mm	62.8-72.3 mm	72.3-81.7 mm	81.7-94.2 mm
Sinus of Valsalva Diameter (Mean)	≥ 25 mm	≥ 27 mm	≥ 29 mm	≥ 31 mm
Sinus of Valsalva Height (Mean)	≥ 15 mm	≥ 15 mm	≥ 15 mm	≥ 16 mm

†Annulus Perimeter = Annulus Diameter x π



RIGHT

CIA Min Diameter (mm)	6.3 x 7.8
EIA Min Diameter (mm)	5.7 x 6.4
Femoral Min Diameter (mm)	6.5 x 7.0



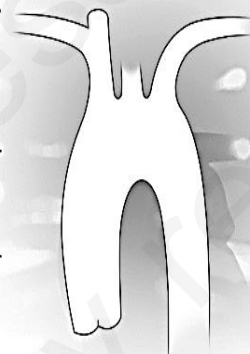
LEFT

CIA Min Diameter (mm)	7.7 x 8.4
EIA Min Diameter (mm)	5.5 x 5.7
Femoral Min Diameter (mm)	6.7 x 6.8

RIGHT

Subclavian Min Diameter (mm) _____ x _____

Annular Angulation _____ 46°



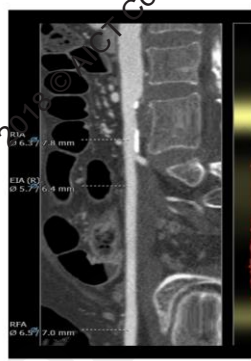
LEFT

Subclavian Min Diameter (mm) _____ x _____

Please review images for direct aortic evaluation.

Calcium: Mild Moderate Severe

Both sides Iliac and femoral artery dimensions by CT scan

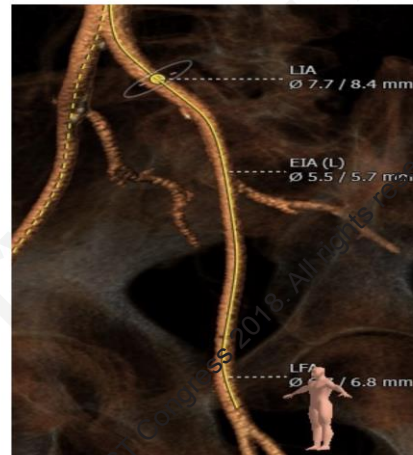


RAO: 49°
Cranial: 1°

RIA: \emptyset 6.3 / 7.8 mm

EIA (R)
Right External Iliac Diameter
Min: \emptyset 5.7 mm
Max: \emptyset 6.4 mm
Avg: \emptyset 6.1 mm

RFA
Right Femoral Diameter
Min: \emptyset 6.5 mm
Max: \emptyset 7.0 mm
Avg: \emptyset 6.8 mm

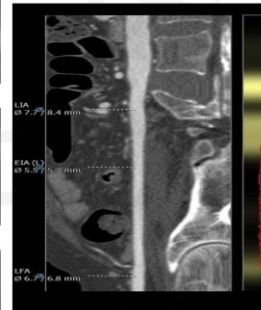


Femoral Access - Left

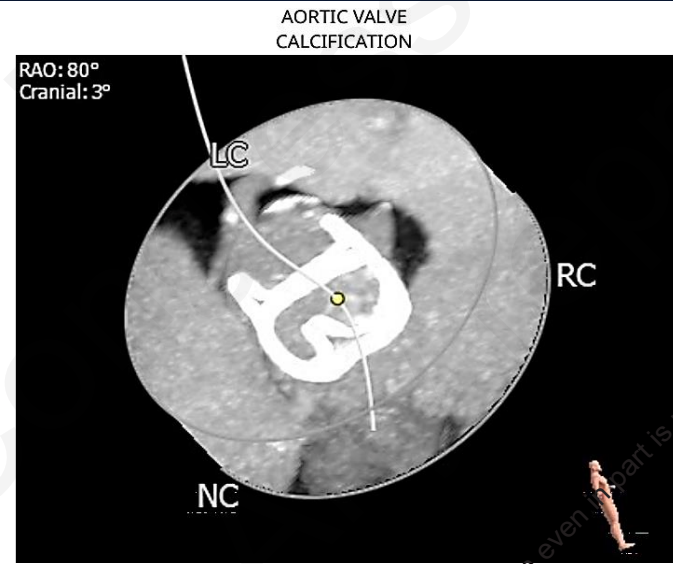
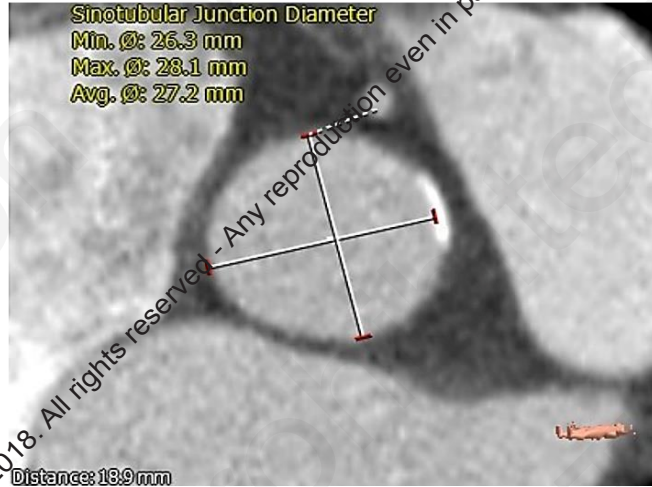
LIA
Left Common Iliac Diameter
Min: \emptyset 7.7 mm
Max: \emptyset 8.4 mm
Avg: \emptyset 8.0 mm

EIA (L)
Left External Iliac Diameter
Min: \emptyset 5.5 mm
Max: \emptyset 5.7 mm
Avg: \emptyset 5.6 mm

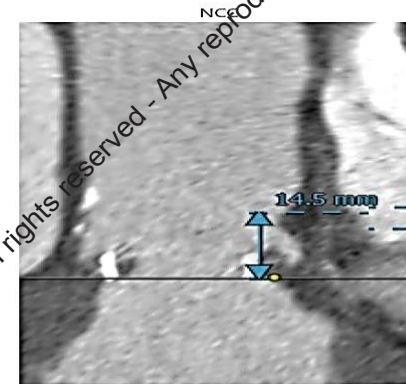
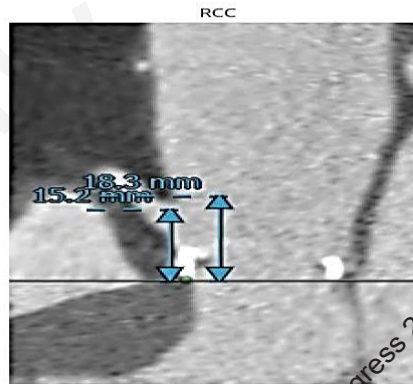
LFA
Left Femoral Diameter
Min: \emptyset 6.7 mm
Max: \emptyset 6.8 mm
Avg: \emptyset 6.7 mm



Coronary artery risk assessment



SINUS HEIGHT



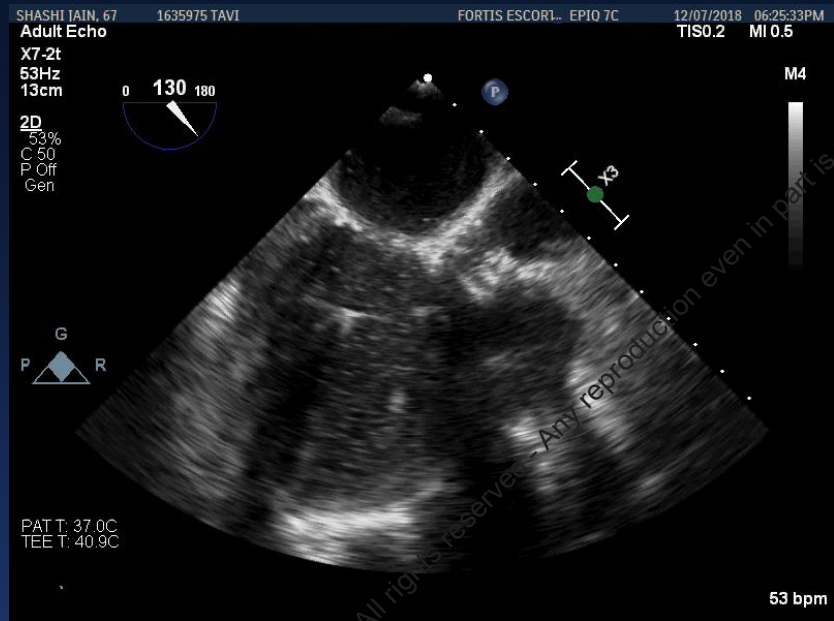
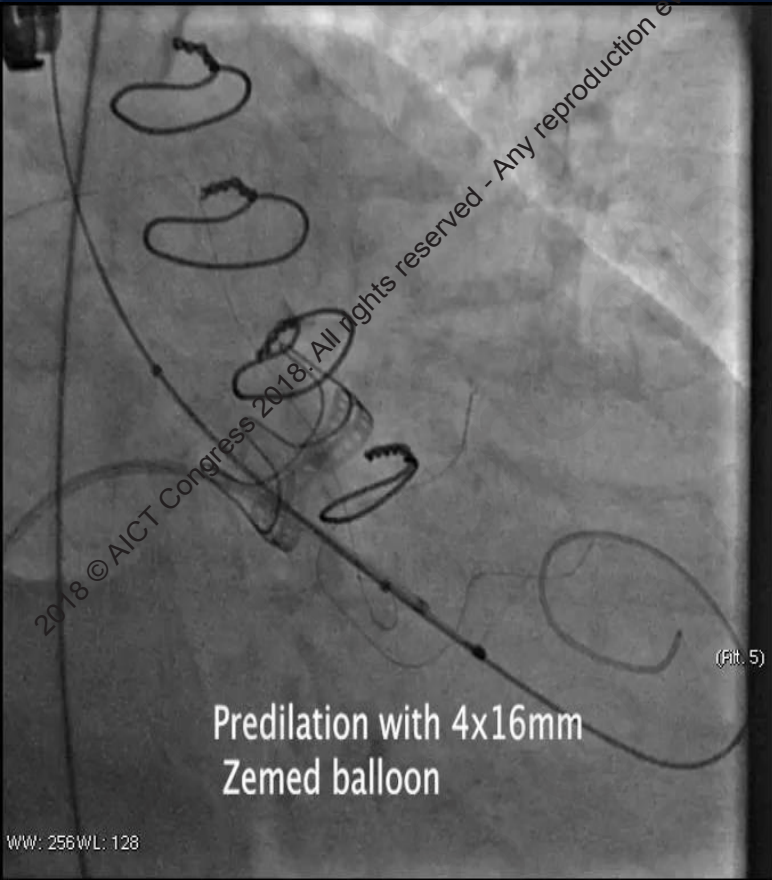
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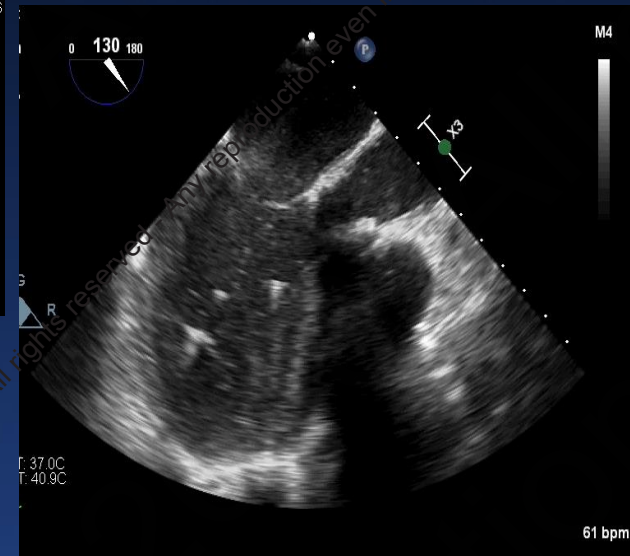
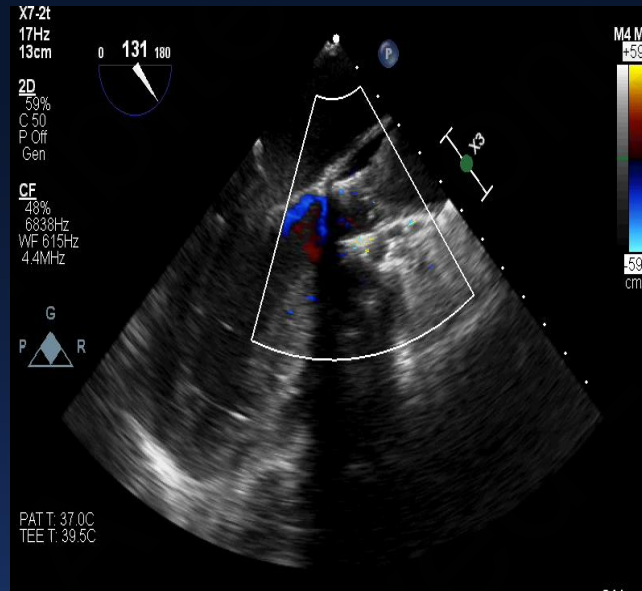
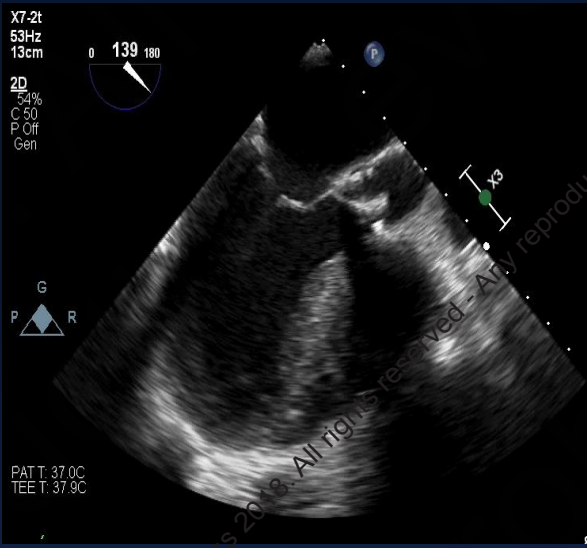
Aligning the BPV

WW: 256 WL: 128

(F)

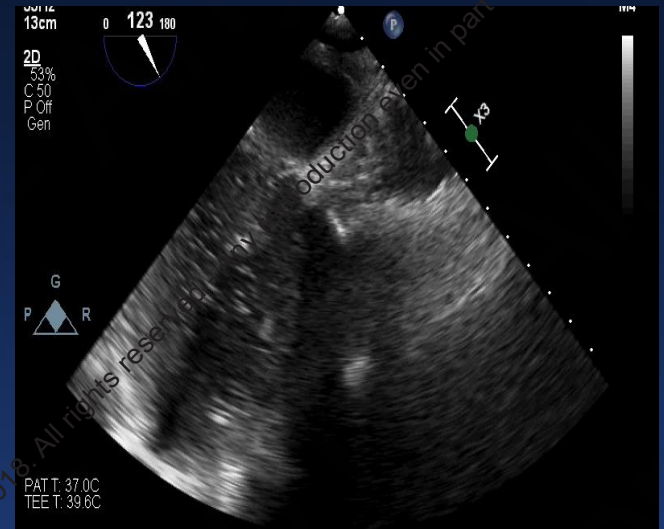
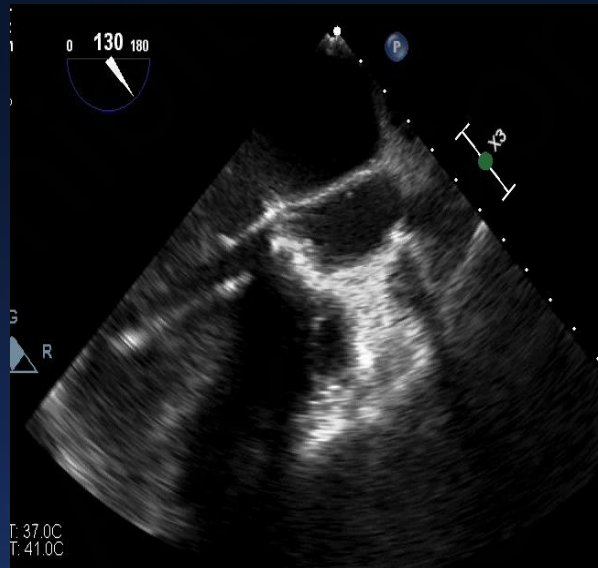
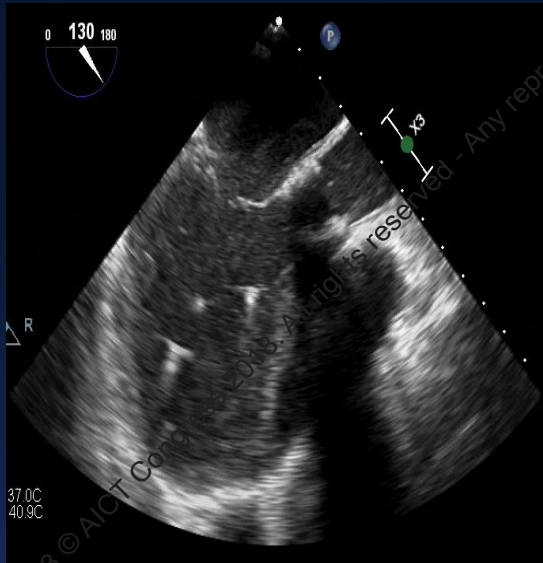


Perforation / Acute Severe Aortic regurgitation????
TEE did not show any color flow-zero cardiac output
Confusion : HAS TO BE SEVERE AR but PROBLEM IS
VT,VF STORM



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HEART STANDSTILL : CPR ON



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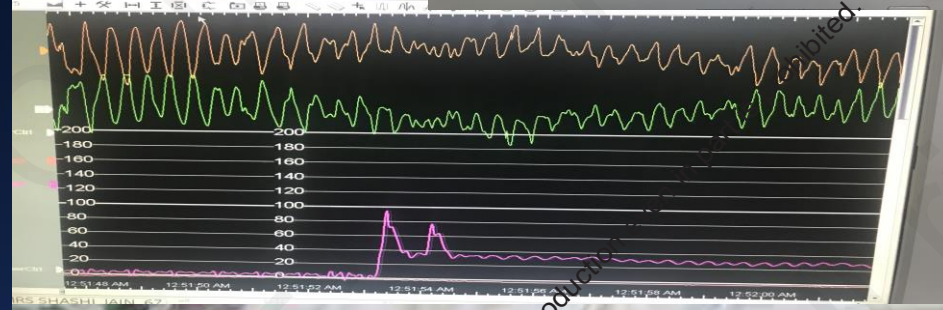
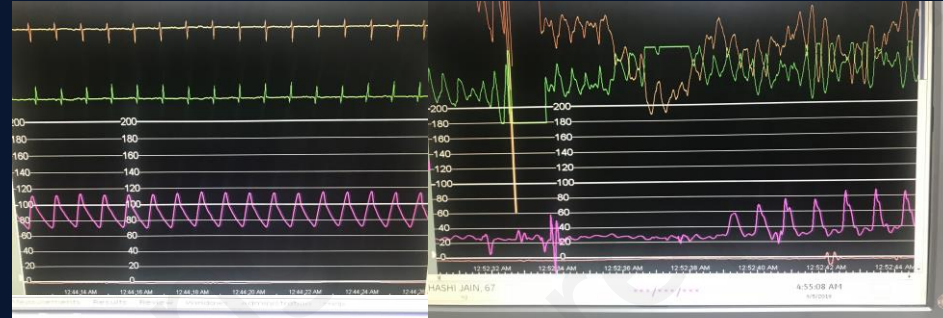
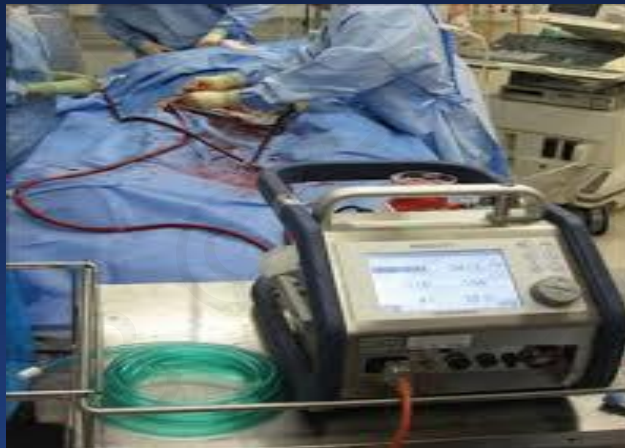
Incessant storm of ventricular tachycardia and fibrillation-

**10-15 DC shocks/ Over drive pacing/Amiodarone
Xylocard/correction of acidosis**

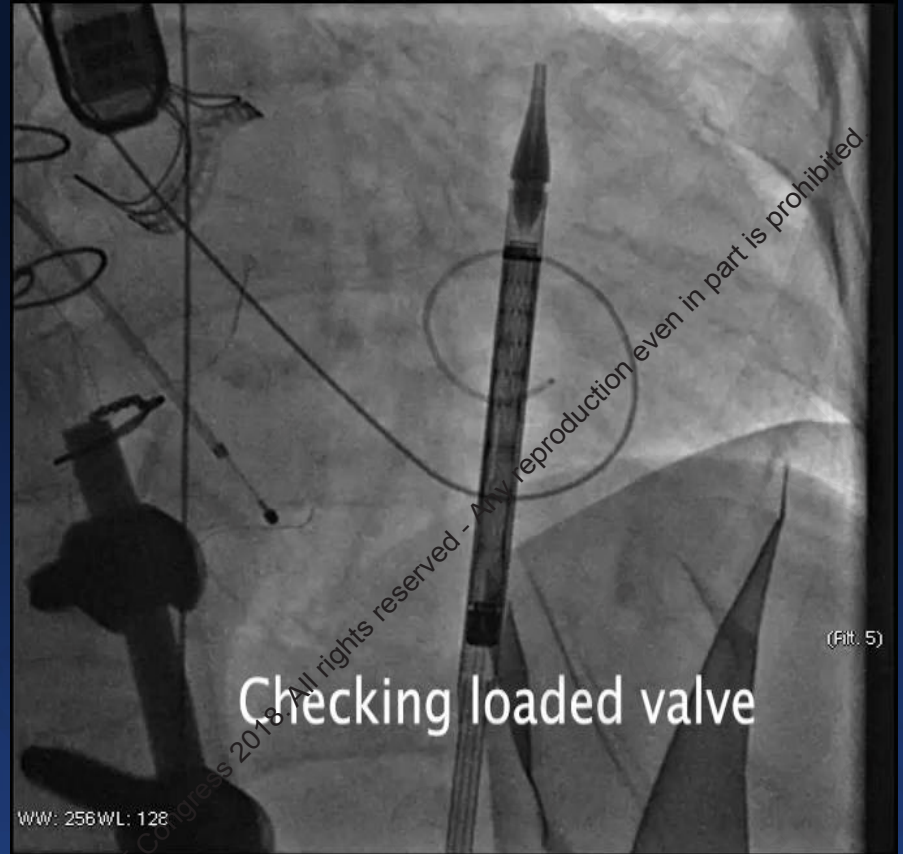
**STORM-NO CORONARY OSTIA
PINCHING**

**Nothing worked to stall the VT VF
CPR was Continuing/ECMO
insertion within 5 to 7 minutes/**

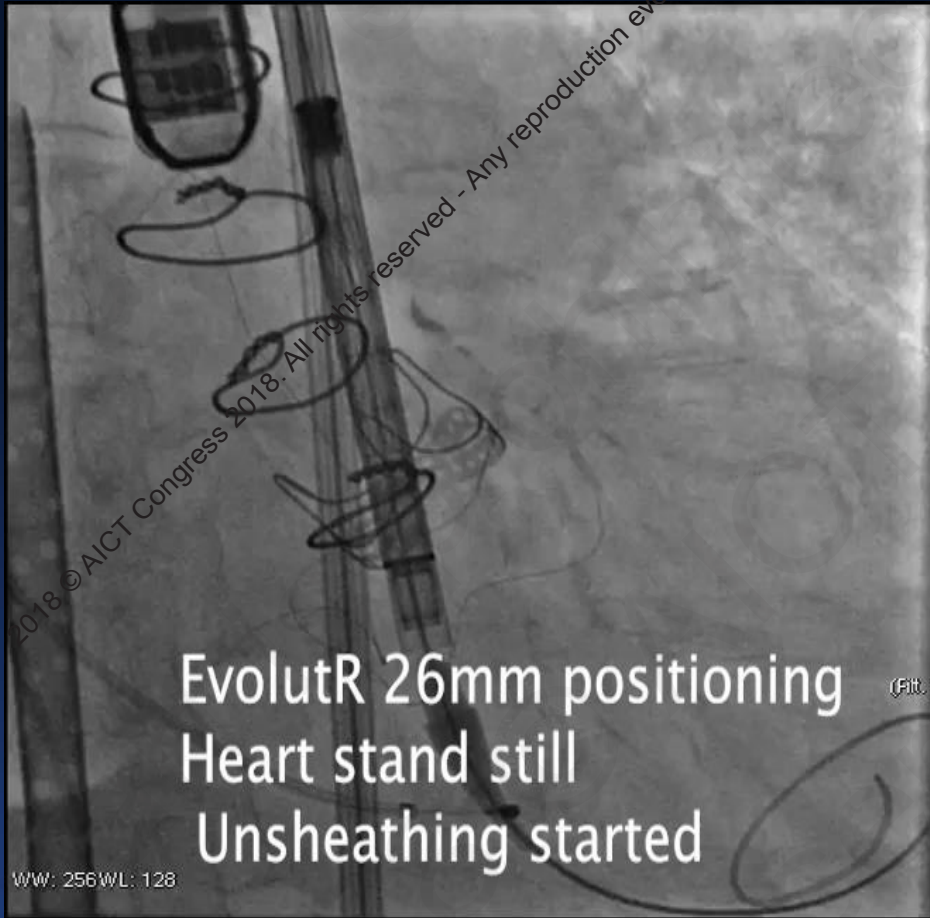
**Within 5-7
minutes VA ECMO
support provided**



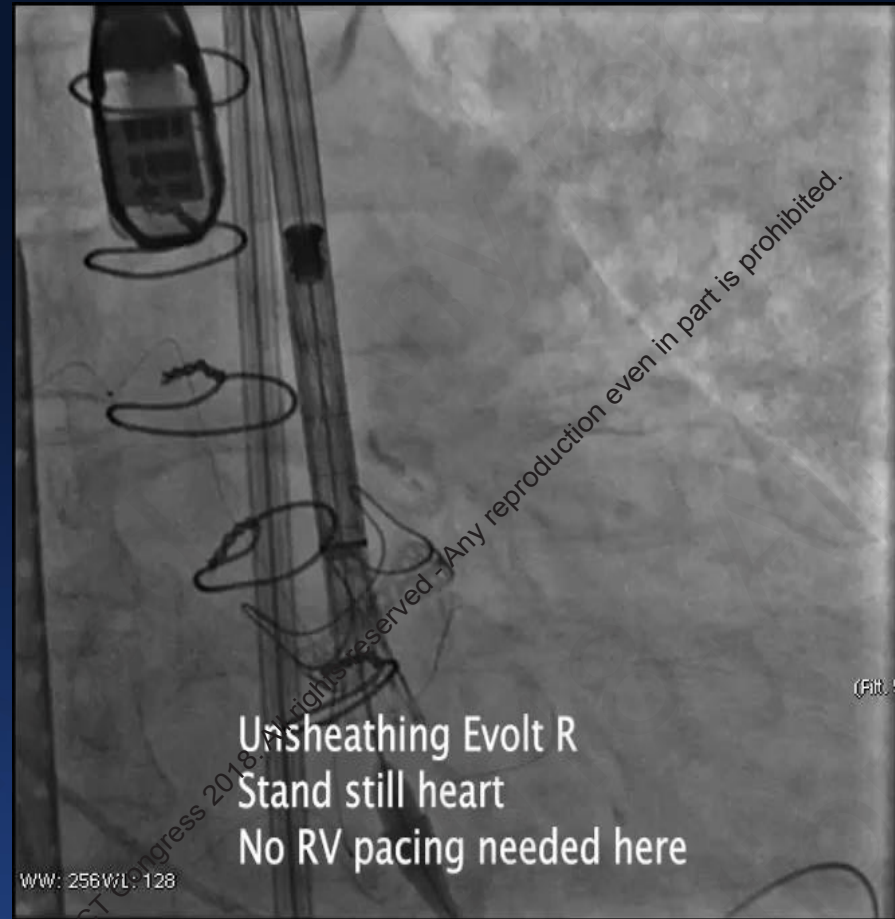
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Deploying Valve ECMO Function:

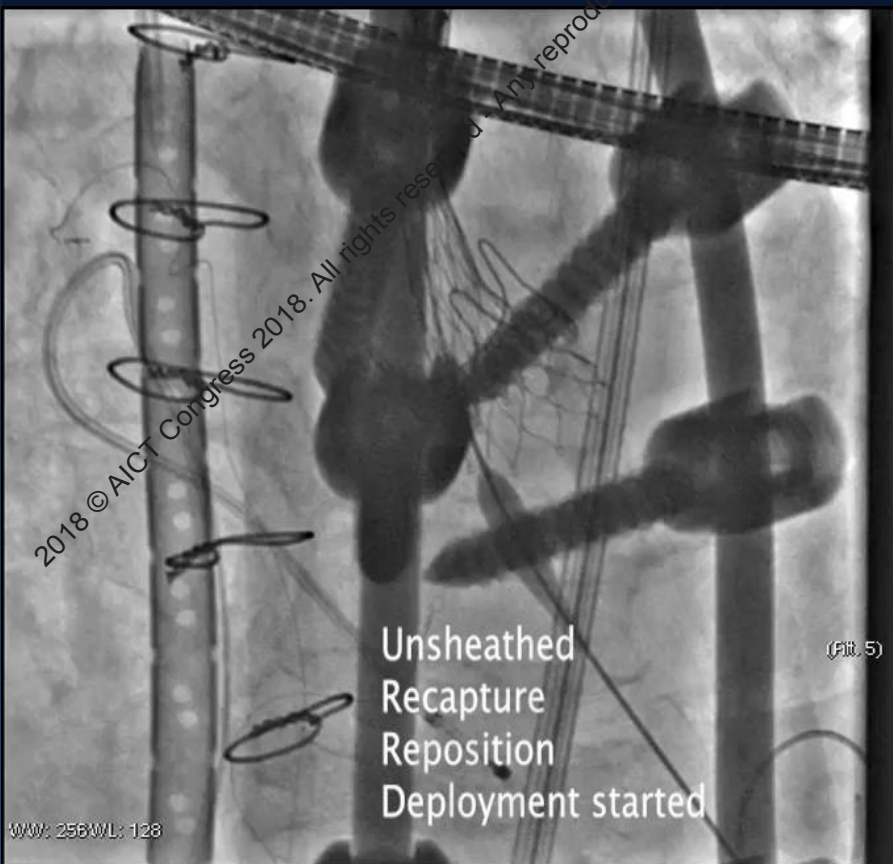


Valve deployment in a stand still Heart



Screws and plates of spine surgery
another problem for positioning

The THV was deployed, ECMO temporarily malfunctioned CPR
was on, Recapture was done once





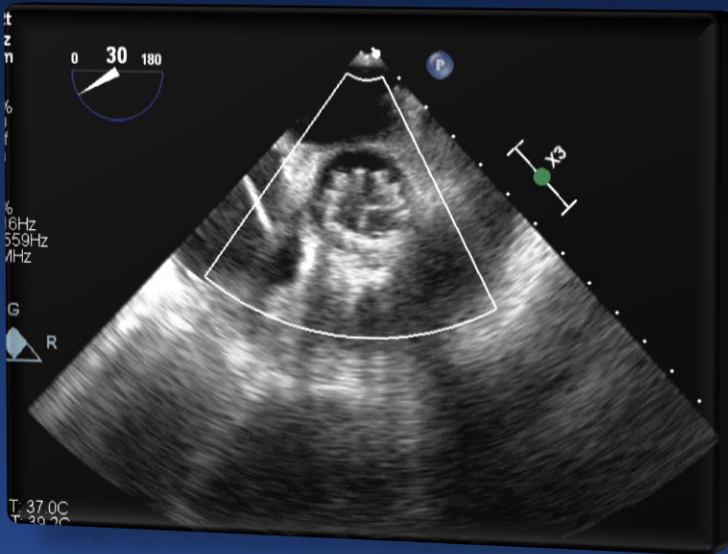
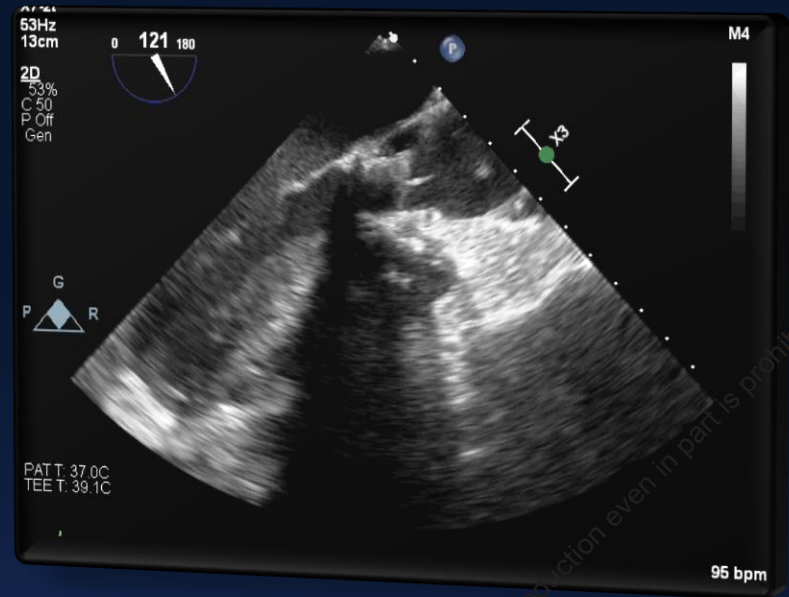
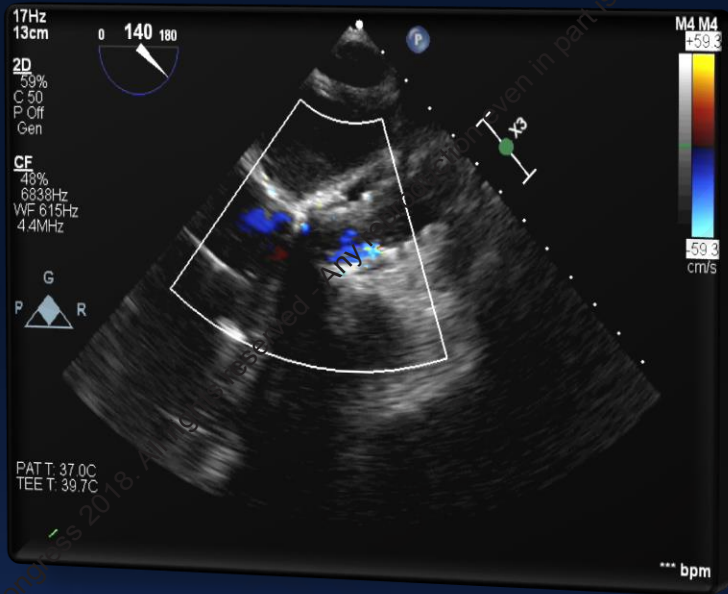
WW: 256 WL: 128

Aortogram after THV deployment
No pinching of LM ostium

(Fig. 5)

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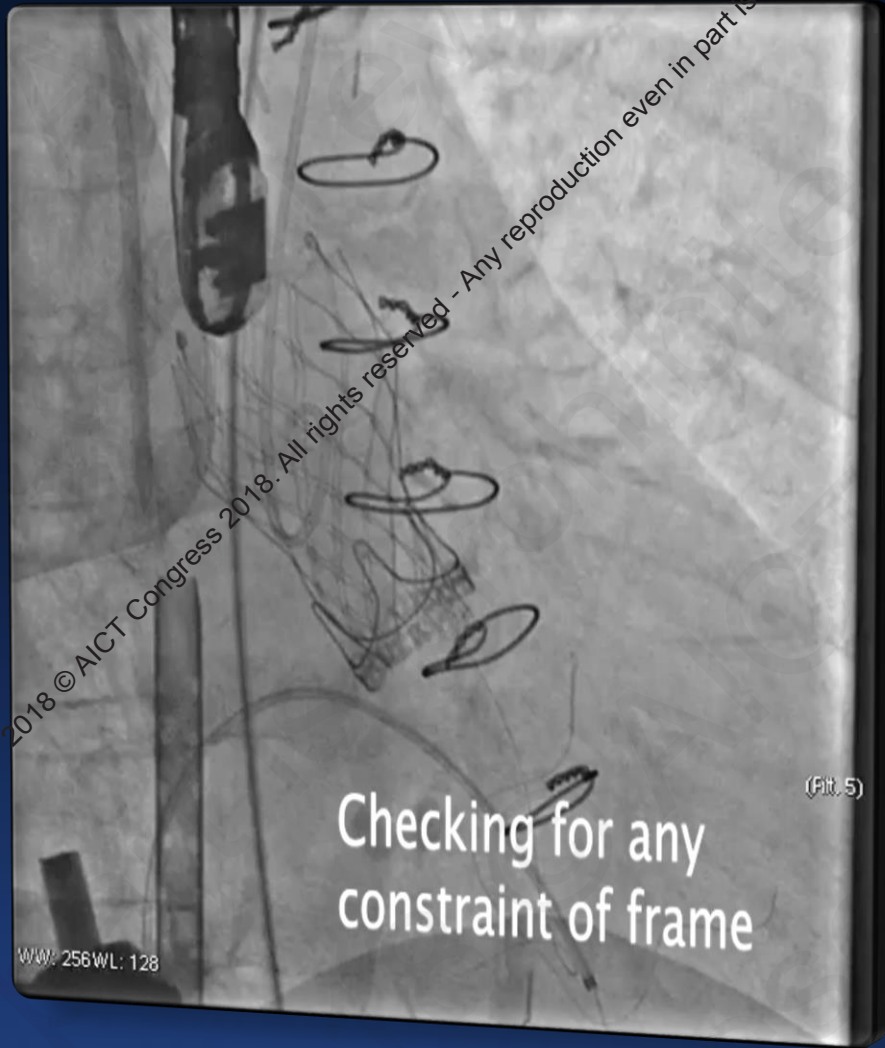
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THV deployed,
Over next 5 mts the
VT storm starts
abating
Rhythm stabilizes
MAP remains low
Total 25 mts Cardiac
arrest

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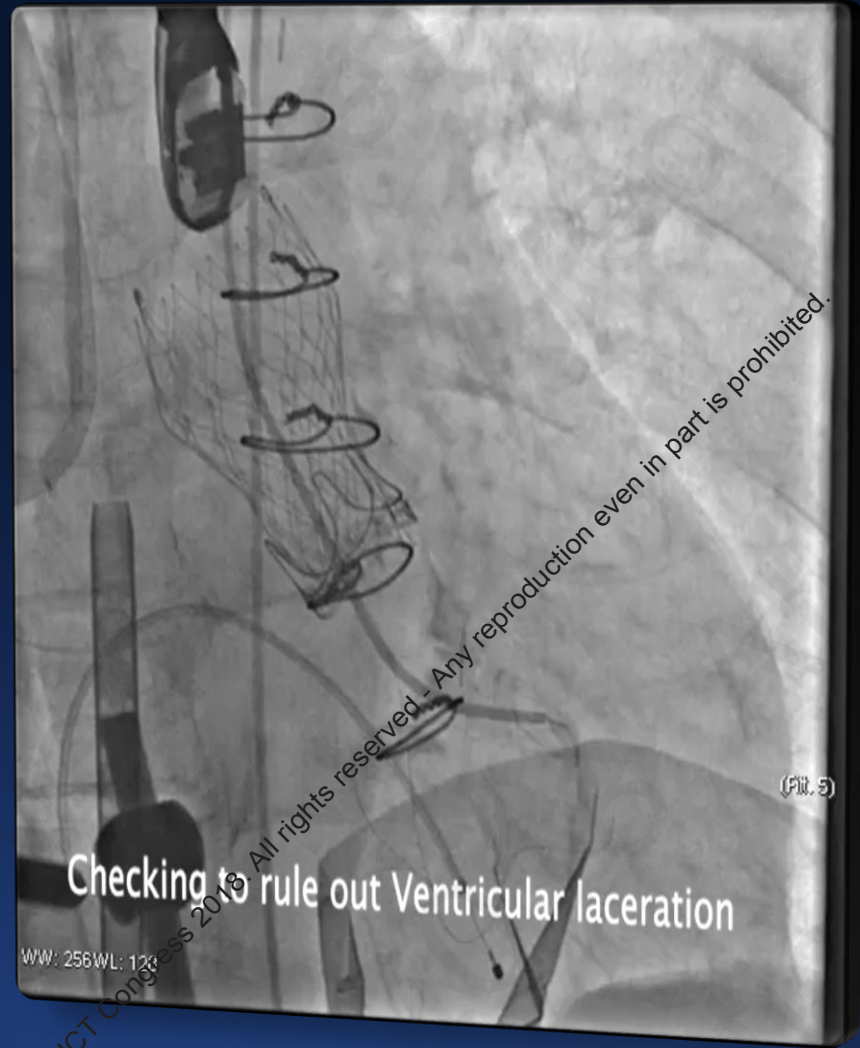
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Checking for any
constraint of frame

(Flt. 5)

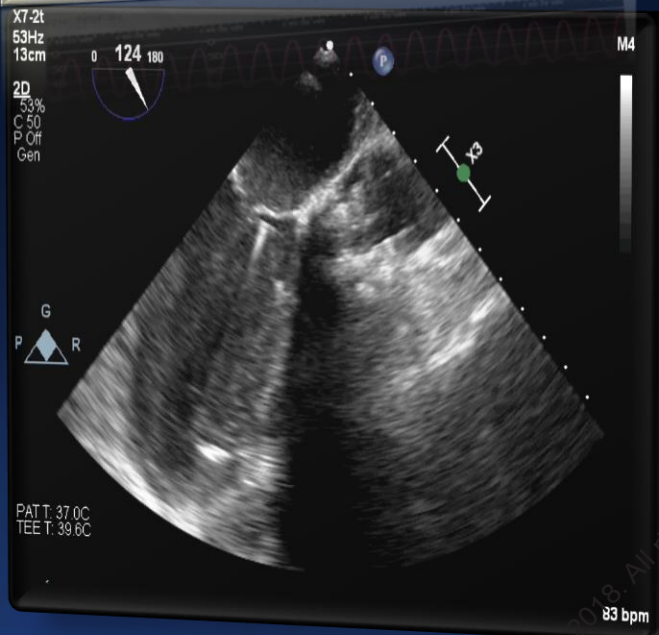
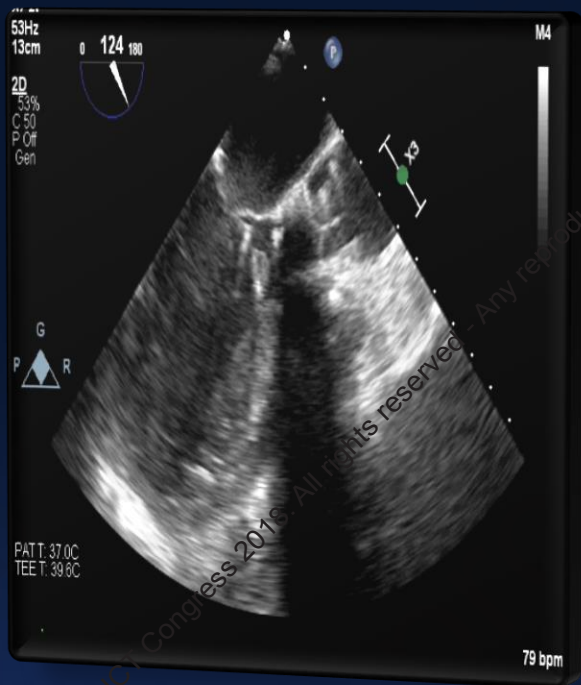
WW: 256WL: 128



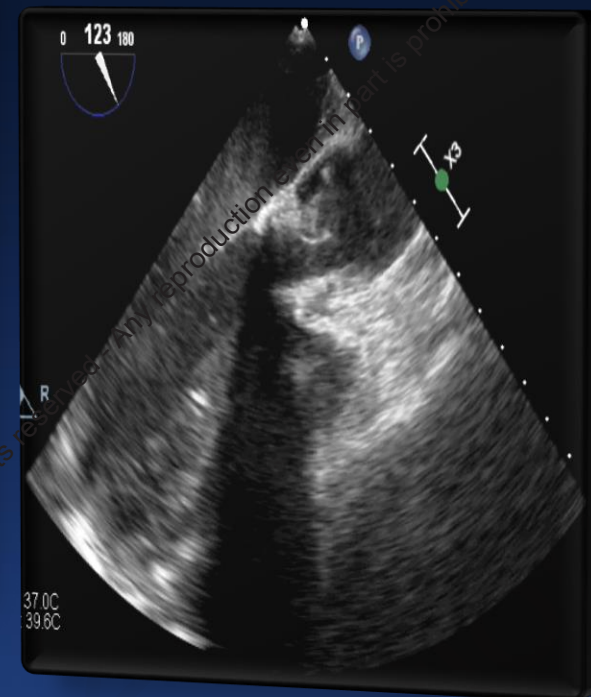
Checking to rule out Ventricular laceration

(Flt. 5)

WW: 256WL: 128

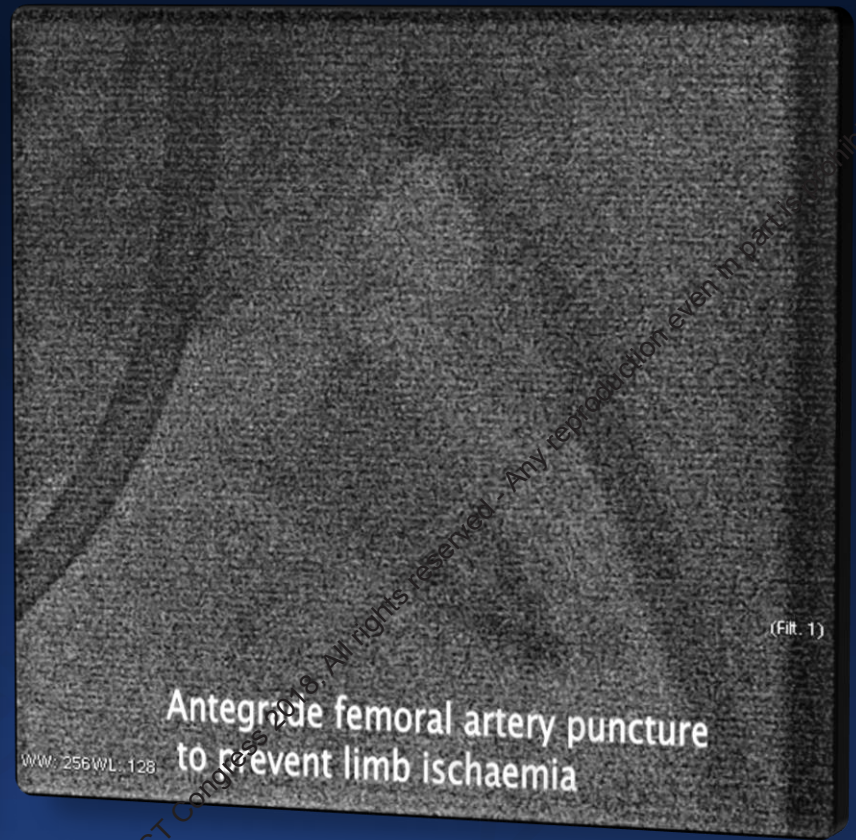


- THV DEPLOYED
- VALVE FUNCTION STARTS
- NO AI OR PVL
- VT STOPS
- STABILITY OF BLOOD PRESSURE
- LV STUNNED
- POOR CARDIAC CONTRACTILITY



Patient was shifted from cath lab to Recovery unit after TAVR

VA-ECMO support– Perfusing the vital organs Time for stunned Myocardium to recover



POST TAVR -THE NEXT CHALLENGE WAS TO HELP THE VITAL ORGANS FROM HYPOPERFUSION TILL THE STUNNED HEART RECOVERED

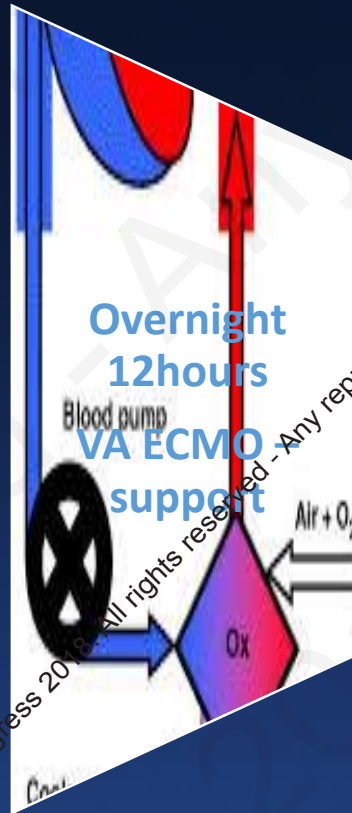
Doctors



Nurses



Perfusionists



9 units of Blood transfusion

12 FFPs

Several units of Colloids

Albumin infusions

2 platelet apheresis

AL INSTRUCTIONS
 Pressure 165/20 + limb perfusion EP 40L
 Prop S. Co 2.4 (Lasix - 100)
 BE -8, lactate 2.8.
 In TPI - lt Fem Venous thromb.
 4 PRBC in Cath Lab.
 rowing but resp to commands

LAB
 Hb 9% K+ 3.5 mol GL 100 mg INS IV
 EPI X 1
 NOREP X 2
 Vasopressin X 1
 DOBU X 5
 Isoflurane X
 LASK X
 HEPARIN X

TIME	PRE MEMBRANE PRESSURE	POST MEMBRANE PRESSURE	PO2	SAO2	ACT	SPM	CPM
9:00 AM	190	180	50	100	207	2600	1.7 Slugg
9:30 AM	160	148	70	1	08	231	2660 1.9 Slugg
10:00 AM	150	140	70	1	06	225	2660 2.1 Slugg
10:30 AM	160	140	70	1	04	226	2780 2.2 Slugg
11:00 AM	162	140	70	1	05	222	2780 2.2 Slugg
11:30 AM	166	142	70	1	04	227	2780 2.2 Slugg
12:00 PM	162	150	70	1	04	222	2850 2.3 Slugg
12:30 PM	160	142	70	1	04	206	2780 2.2 Slugg
1:00 PM	158	150	70	1	3	207	2780 2.1 Slugg
1:30 PM	160	150	70	1	3	196	2780 2.2 Slugg
2:00 PM	150	160	60	1	2	195	2600 2.2 Slugg
2:30 PM	147	158	60	1	2	202	2600 2.2 Slugg
3:00 PM	182	170	50	1	2	187	2600 2.2 Slugg
3:30 PM	180	160	50	1	2	145	2600 2.2 Slugg
4:00 PM	162	146	70	1	2	154	2600 2.2 Slugg

TIME	PRE MEMBRANE PRESSURE	POST MEMBRANE PRESSURE	PO2	SAO2	ACT	SPM	CPM
9:00 AM	2						
9:30 AM	2						
10:00 AM	2						
10:30 AM	2						
11:00 AM	2						
11:30 AM	2						
12:00 PM	2						
12:30 PM	2						
1:00 PM	2						
1:30 PM	2						
2:00 PM	2						
2:30 PM	2						
3:00 PM	2						
3:30 PM	2						
4:00 PM	2						
4:30 AM	2						
5:00 AM	2						
5:30 AM	2						
6:00 AM	2						
6:30 AM	2						
7:00 AM	2						

Rapid (1)

ARTERIAL SAMPLE
 12:00 PM 12/18/18 STAT LAB 1
 BE (ACT) ID 1268-16194
 PAT 8622 ID

ACID/BASE 37.0 °C
 pH 7.211
 PCO2 32.21 mmHg
 HCO3 act 12.8 mmol/L
 HCO3 std 13.0 mmol/L
 BE (act) -13.8 mmol/L
 BE (std) -13.0 mmol/L
 CTCO2 -13.8 mmol/L

CO-OXIMETRY
 Hct 34 %
 Hgb 11.84 g/dL
 SpO2 98.6 %
 FCOHb 0.3 %
 FMetHb 0.0 %
 FHHb 1.1 %

OXYGEN STATUS 37.0 °C
 PO2 150.0 mmHg
 pO2 (a) 16.1 mL/dL
 CT (a) 17.0 mL/dL

ELECTROLYTES
 Na 133.74 mmol/L
 K 4.21 mmol/L
 Ca (7.4) 0.97 mmol/L
 Mg 0.90 mmol/L
 InGap 19.5 mmol/L

METABOLITES
 Glu 108 mg/dL
 Lac 1.1 mg/dL
 LAC 1.1 mmol/L
 PAtm 16 mmHg

Rapid systems

ARTERIAL SAMPLE 20:11
 12/18/18 STAT LAB 1
 BE (ACT) ID 1268-16194
 PAT 8622 ID

ACID/BASE 37.0 °C
 pH 7.211
 PCO2 32.21 mmHg
 HCO3 act 12.8 mmol/L
 HCO3 std 13.0 mmol/L
 BE (act) -13.8 mmol/L
 BE (std) -13.0 mmol/L
 CTCO2 -13.8 mmol/L

CO-OXIMETRY
 Hct 34 %
 Hgb 11.84 g/dL
 SpO2 98.6 %
 FCOHb 0.3 %
 FMetHb 0.0 %
 FHHb 1.1 %

OXYGEN STATUS 37.0 °C
 PO2 150.0 mmHg
 pO2 (a) 16.1 mL/dL
 CT (a) 17.0 mL/dL

ELECTROLYTES
 Na 133.74 mmol/L
 K 4.21 mmol/L
 Ca (7.4) 0.97 mmol/L
 Mg 0.90 mmol/L
 InGap 19.5 mmol/L

METABOLITES
 Glu 108 mg/dL
 Lac 1.1 mg/dL
 LAC 1.1 mmol/L
 PAtm 16 mmHg

Severe acidosis To Normalisation of pH

ECMO DATA SHEET
 12-19-18 to 14/18

TIME	PRE MEMBRANE PRESSURE	POST MEMBRANE PRESSURE	PO2	SAO2	ACT	SPM	CPM
9:00 AM	190	180	50	100	207	2600	1.7 Slugg
9:30 AM	160	148	70	1	08	231	2660 1.9 Slugg
10:00 AM	150	140	70	1	06	225	2660 2.1 Slugg
10:30 AM	160	140	70	1	04	226	2780 2.2 Slugg
11:00 AM	162	140	70	1	05	222	2780 2.2 Slugg
11:30 AM	166	142	70	1	04	227	2780 2.2 Slugg
12:00 PM	162	150	70	1	04	222	2850 2.3 Slugg
12:30 PM	160	142	70	1	04	206	2780 2.2 Slugg
1:00 PM	158	150	70	1	3	207	2780 2.1 Slugg
1:30 PM	160	150	70	1	3	196	2780 2.2 Slugg
2:00 PM	150	160	60	1	2	195	2600 2.2 Slugg
2:30 PM	147	158	60	1	2	202	2600 2.2 Slugg
3:00 PM	182	170	50	1	2	187	2600 2.2 Slugg
3:30 PM	180	160	50	1	2	145	2600 2.2 Slugg
4:00 PM	162	146	70	1	2	154	2600 2.2 Slugg

MEMBRAN ISSUES

TIME	PRE MEMBRANE PRESSURE	POST MEMBRANE PRESSURE	PO2	SAO2	ACT	SPM	CPM
9:00 AM	2						
9:30 AM	2						
10:00 AM	2						
10:30 AM	2						
11:00 AM	2						
11:30 AM	2						
12:00 PM	2						
12:30 PM	2						
1:00 PM	2						
1:30 PM	2						
2:00 PM	2						
2:30 PM	2						
3:00 PM	2						
3:30 PM	2						
4:00 PM	2						
4:30 AM	2						
5:00 AM	2						
5:30 AM	2						
6:00 AM	2						
6:30 AM	2						
7:00 AM	2						

TIME	PRE MEMBRANE PRESSURE	POST MEMBRANE PRESSURE	PO2	SAO2	ACT	SPM	CPM
9:00 AM	170	160	50	100	24	321	3455 2.5 Lt
9:30 AM	200	173	50	100	154	295	3485 3.5 Lt
10:00 AM	200	171	50	100	154	225	3410 3.4 Lt
10:30 AM	195	157	50	100	154	204	3410 3.4 Lt
11:00 AM	189	150	50	100	154	212	3410 3.3 Lt
11:30 AM	180	168	50	100	154	202	3410 3.3 Lt
12:00 PM	180	154	50	100	154	202	3410 3.3 Lt
12:30 PM	189	148	50	100	154	194	3410 3.5 Lt
1:00 PM	183	170	50	100	154	194	3410 3.5 Lt
1:30 PM	175	155	50	100	154	195	3410 3.6 Lt
2:00 PM	175	155	50	100	154	195	3410 3.6 Lt
2:30 PM	183	153	50	100	154	199	3410 3.5
3:00 PM	200	185	70	100	154	167	3350 3.4
3:30 PM	205	190	85	100	154	164	3391 3.4
4:00 AM	172	162	85	100	154	191	3015 2.8
4:30 AM	169	158	80	100	154	194	2935 2.6
5:00 AM	170	161	90	100	154	212	2835 2.5
5:30 AM	158	147	80	100	154	180	2710 2.2
6:00 AM	156	146	80	100	154	205	2710 2.2
6:30 AM	163	152	80	100	154	161	2710 2.1
7:00 AM	166	154	80	100	154	161	2710 2.1

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Chief ECMO Programme



Going back home happily after a Stormy TAVR

Date of Admission:09/07/2018

TAVR:12/07/2018 VA ECMO removed:14/07/2018

Date of Discharge:26/07/2018

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LESSONS

“TEAM WORK” AND PREPAREDNESS FOR WORST

- **Loading the valve is a must before you predilate the native valve**
- **DO NOT PREDIALATE DEGENERATED BIOPROSTHETIC VALVE**
- **ACUTE SEVERE AR NOT JUST PRESENTS AS HAEMODYNAMIC COLLAPSE BUT ALSO AS INCESSANT VT**
- **PRIMED CPB and ECMO MUST FOR HIGH RISK CASES**
- **IF A CATASTROPHE DOES OCCUR DURING TAVR....IMPLANT THE VALVE FIRST AND THEN PROCEED FURTHER**

**Thanks and Kudos To The TAVR team
The Centre for Valve and
StructuralHeart therapies
Fortis Escorts Heart Institute**

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