



# *Transcatheter closure of VSD: Challenging case how can we deal with*

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# Challenging cases?

1. Multiple exit hole
2. Sub-Aortic w/o rim (type A)+ Aortic valve prolapse
3. Aortic valve regurgitation
4. Tricuspid regurgitation
5. Large VSD
6. VSD with arrhythmia

# Rules

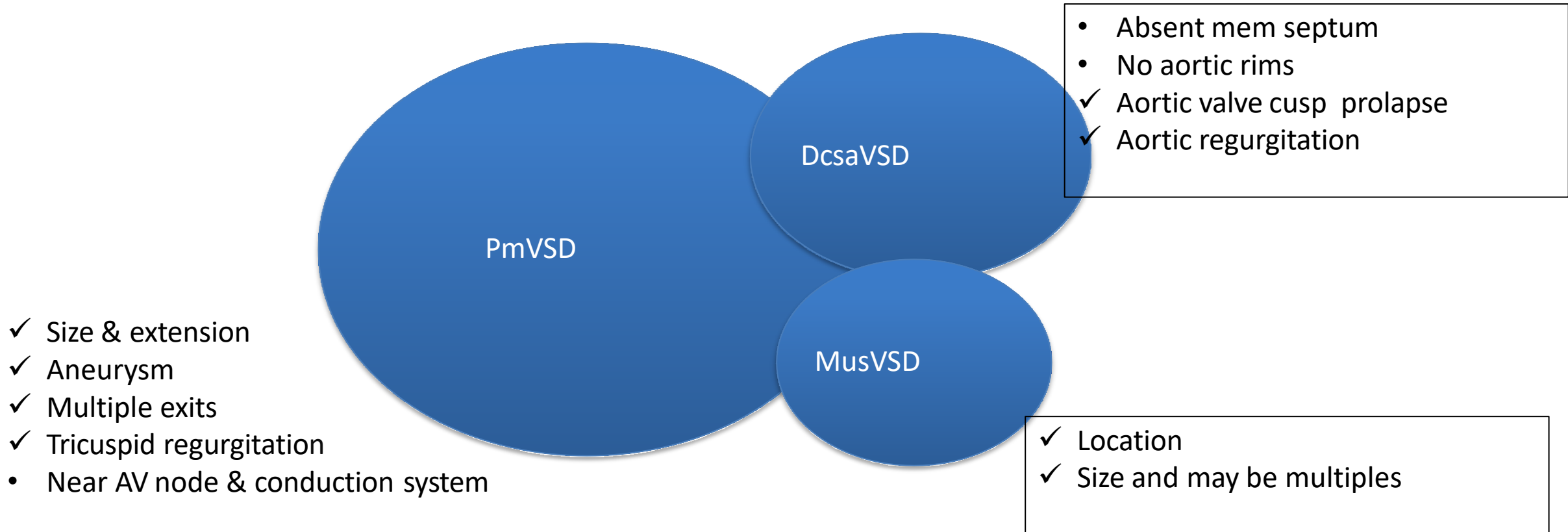
- No significant residual shunt
- No heart block
- No AR
- No TR
- No RVOT narrowing

# More W?

- Why we need to close it? Indication?
- What is the treatment? Device?
- Who is the target patient? Body weight?
- When is the optimal timing? Age?
- Which device is ideal or suitable?



# Defect assessments



Decision on: Approach and device selections

# Devices

## Nit-Occlud® Lê VSD

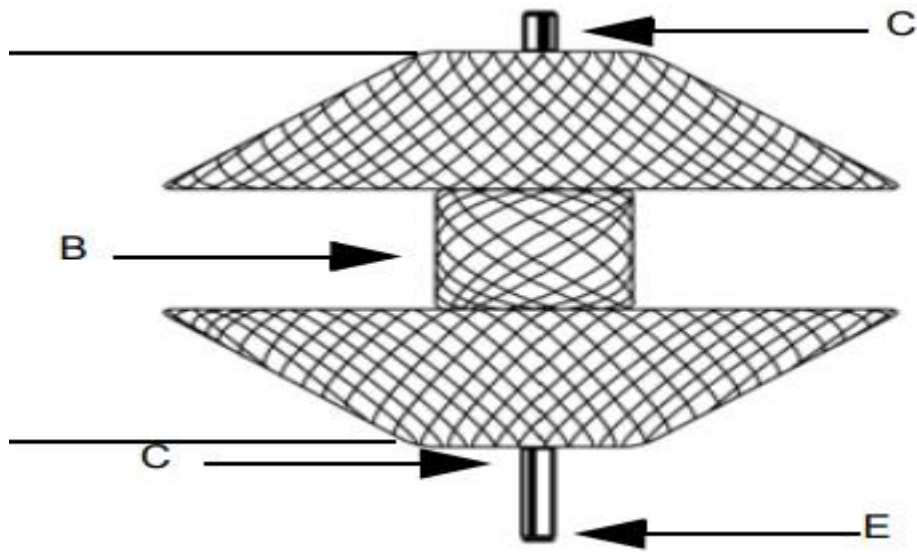
Permanent coil for the closure of perimembranous and muscular ventricular septal defects (VSD).

► *Content: coil, delivery system, implantation catheter*



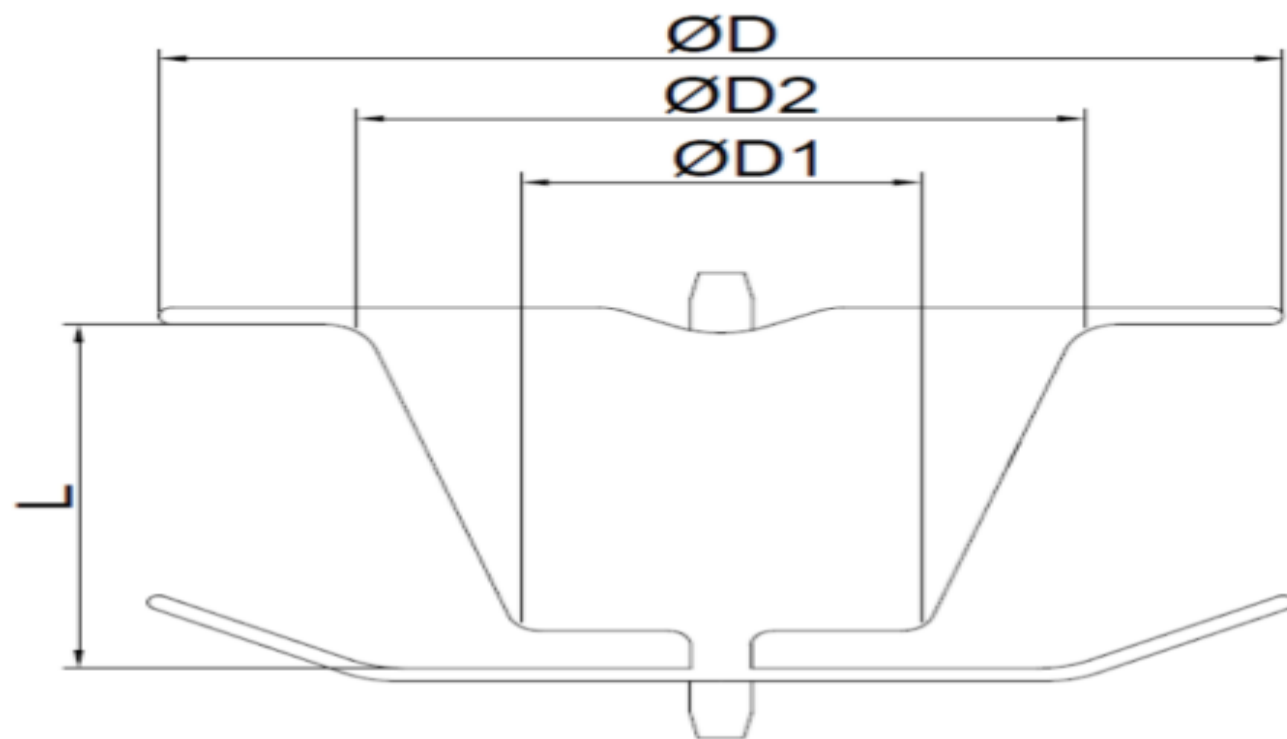
REF	Distal Coil Diameter (D)	Proximal Coil Diameter (P)	Recommended Implantation Sheath	Implantation Catheter Length
149086	8 mm	6 mm	6 F	105 cm
149106	10 mm	6 mm	6 F	105 cm
149126	12 mm	6 mm	6 F	105 cm
149128	12 mm	8 mm	7 F	105 cm
149148	14 mm	8 mm	7 F	105 cm
149168	16 mm	8 mm	7 F	105 cm

# ADO II



Order Number	Waist diameter [mm (in)]	Disc diameter [mm (in)]	Nominal length [mm (in)]	TorqVue™ LP (minimum ID)
9-PDA2-03-04	3 (0.12)	9 (0.35)	4.25 (0.17)	4 Fr (0.046 in)
9-PDA2-04-04	4 (0.16)	10 (0.39)	4.25 (0.17)	4 Fr (0.046 in)
9-PDA2-05-04	5 (0.20)	11 (0.43)	4.25 (0.17)	5 Fr (0.059 in)
9-PDA2-06-04	6 (0.24)	12 (0.47)	4.25 (0.17)	5 Fr (0.059 in)
9-PDA2-03-06	3 (0.12)	9 (0.35)	6.25 (0.25)	4 Fr (0.046 in)
9-PDA2-04-06	4 (0.16)	10 (0.39)	6.25 (0.25)	4 Fr (0.046 in)
9-PDA2-05-06	5 (0.20)	11 (0.43)	6.25 (0.25)	5 Fr (0.059 in)
9-PDA2-06-06	6 (0.24)	12 (0.47)	6.25 (0.25)	5 Fr (0.059 in)

# KONAR-MF™ VSD Occluder



Cat.No	D Disc Diameter(mm)	D1 Waist Diameter RV Side(mm)	D2 Waist Diameter LV Side(mm)	L Waist Length(mm)	Recommended Delivery Sheath(Fr.)
LT-MFO-5-3	10	3	5	4	4-5F
LT-MFO-6-4	10	4	6		4-5F
LT-MFO-7-5	12	5	7		4-5F
LT-MFO-8-6	12	6	8		4-5F
LT-MFO-9-7	14	7	9		6F
LT-MFO-10-8	14	8	10		6F
LT-MFO-12-10	16	10	12		7F
LT-MFO-14-12	18	12	14		7F



**D1** - Distal disc diameter  
**D2** - Minimum waist diameter  
**D3** - Maximum waist diameter  
**h** - Height

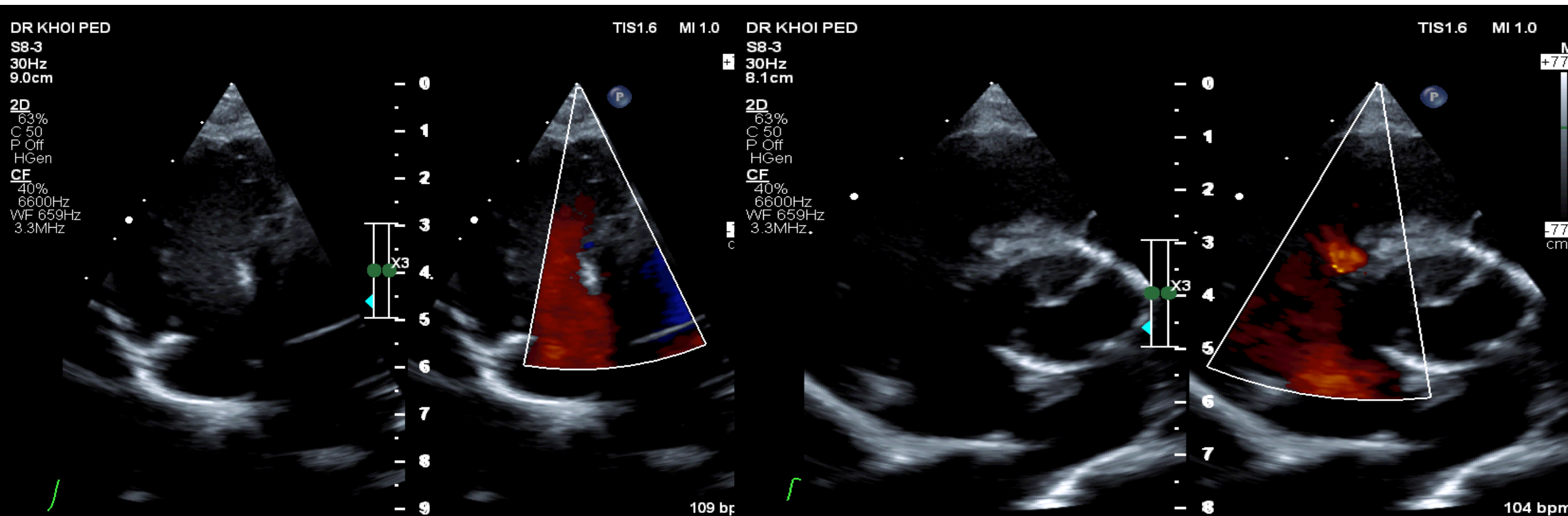
Article No.	Height [mm]	Ø D1 [mm]	Ø D2 [mm]	Ø D3 [mm]	Sheath Size* [F]	Pusher Article No. (color)**	
						Pistol Pusher	Flex Pusher II
<b>Small</b>							
89VSD04S	5	10	4	8	6	55PP090 <span style="color: green;">●</span>	51FP060 <span style="color: green;">●</span>
89VSD06S	5	12	6	10	6	55PP090 <span style="color: green;">●</span>	51FP060 <span style="color: green;">●</span>
89VSD08S	5	14	8	12	6	55PP125 <span style="color: blue;">●</span>	51FP100 <span style="color: blue;">●</span>
<b>Standard</b>							
84VSD04	5	12	4	8	6	55PP090 <span style="color: green;">●</span>	51FP060 <span style="color: green;">●</span>
84VSD06	5	14	6	10	6	55PP090 <span style="color: green;">●</span>	51FP060 <span style="color: green;">●</span>
84VSD08	5	16	8	12	6	55PP125 <span style="color: blue;">●</span>	51FP100 <span style="color: blue;">●</span>
84VSD10	5	18	10	14	7	55PP125 <span style="color: blue;">●</span>	51FP100 <span style="color: blue;">●</span>
84VSD12	5	20	12	16	7	55PP125 <span style="color: blue;">●</span>	51FP100 <span style="color: blue;">●</span>
<b>Long</b>							
90VSD06L	6	14	6	10	6	55PP090 <span style="color: green;">●</span>	51FP060 <span style="color: green;">●</span>
90VSD08L	6	16	8	12	6	55PP125 <span style="color: blue;">●</span>	51FP100 <span style="color: blue;">●</span>
90VSD10L	7	18	10	14	7	55PP125 <span style="color: blue;">●</span>	51FP100 <span style="color: blue;">●</span>
90VSD12L	7	20	12	16	7	55PP125 <span style="color: blue;">●</span>	51FP100 <span style="color: blue;">●</span>

# Morphology



# Multiple exit hole

1<sup>st</sup> case: 6 yo- boy; 25kg



**TRAN NGOC THAI**

N18-0404850

\*5/18/2013, M

# TBSP 19-035

STUDY TBSP 19-035

3/13/2019

10:48:10 AM

1 IMA 1 FRM 1

Benh Vien Dai Hoc Y Duoc, Ho Chi Minh

AlluraXper

Allura Xper, 8.2.17

R//////

Left Ventricle 15...

B

KV 64

mA 283

LAO 90° / 0°

512 X 512

EE 0%

DDO 0%

W 255

C 127

**TRAN NGOC THAI**

N18-0404850

\*5/18/2013, M

# TBSP 19-035

STUDY TBSP 19-035

3/13/2019

11:32:09 AM

12 IMA 12 FRM 1

Benh Vien Dai Hoc Y Duoc, Ho Chi Minh

AlluraXper

Allura Xper, 8.2.17

R//////

Left Ventricle 15...

B

KV 63

mA 247

LAO 90° / 0°

512 X 512

EE 0%

DDO 0%

W 255

C 127

# pmVSD Occluder 06



# 40 YO- MAN

**NGUYEN HUU THAI**  
N20-0017492  
1/1/1980 M  
2/7/2020  
1:05 PM  
Run 1B - Frame 1 / 90  
Lateral

Benh Vren Dai Hoc Y Duoc, Ho Chi Minh  
68kV, - mAs, 475mA, 5ms  
Zoom 100%

**NGUYEN HUU THAI**  
N20-0017492  
1/1/1980 M  
2/7/2020  
1:30 PM  
Run 3A - Frame 1 / 61  
Frontal

Benh Vren Dai Hoc Y Duoc, Ho Chi Minh  
79.8kV, - mAs, 638mA, 7ms  
Zoom 100%

LAO 90.5°  
Caudal -0.1°

L 128  
W 256

LAO 31.6°  
Cranial 30.0°

L 128  
W 256

# PmVSD Occluder 08

NGUYEN HUU THAI  
N20-0017492  
1/1/1980 M  
2/7/2020  
2:09 PM  
Run 13A - Frame 1 / 60  
Frontal

Benh Vien Dai Hoc Y Duoc, Ho Chi Minh  
87.7kV, - mAs, 582mA, 8ms  
Zoom 100%

NGUYEN HUU THAI  
N20-0017492  
1/1/1980 M  
2/7/2020  
2:09 PM  
Run 13B - Frame 1 / 60  
Lateral

Benh Vien Dai Hoc Y Duoc, Ho Chi Minh  
69.6kV, - mAs, 554mA, 5ms  
Zoom 100%

LAO 30.4°  
Cranial 29.7°

L 128  
W 256

LAO 90.5°  
Caudal -0.1°

L 128  
W 256

# ADO II 3/4



LAO 90.5°  
Caudal -0.1°  
L 128  
W 256



LAO 30.4°  
Cranial 29.7°  
L 128  
W 256



LAO 90.5°  
Caudal -0.1°  
L 128  
W 256



LAO 30.4°  
Cranial 29.7°  
L 128  
W 256

# Nit-Occlud Lê VSD 10/6

**DANG THANH THUY 41**

TBSP 18-072  
\*5/16/1977, F

# A201805161935260  
STUDY R:201805161935260  
5/16/2018  
9:01:58 PM  
11 IMA 11 FRM 1

Benh Vien Dai Hoc Y Duoc, Ho Chi Minh  
AlluraXper  
Allura Xper, 8.2.17

R//////

Fluoroscopy

B  
KV 74  
mA 14

LAO 90° / 0°

512 X 512

EE 0%

DDO 0%

W 255  
C 127

**DANG THANH THUY 41**

TBSP 18-072  
\*5/16/1977, F

# A201805161935260  
STUDY R:201805161935260  
5/16/2018  
9:05:53 PM  
12 IMA 12 FRM 1

Benh Vien Dai Hoc Y Duoc, Ho Chi Minh  
AlluraXper  
Allura Xper, 8.2.17

R//////

Left Ventricle 15...

B  
KV 69  
mA 508

LAO 90° / 0°

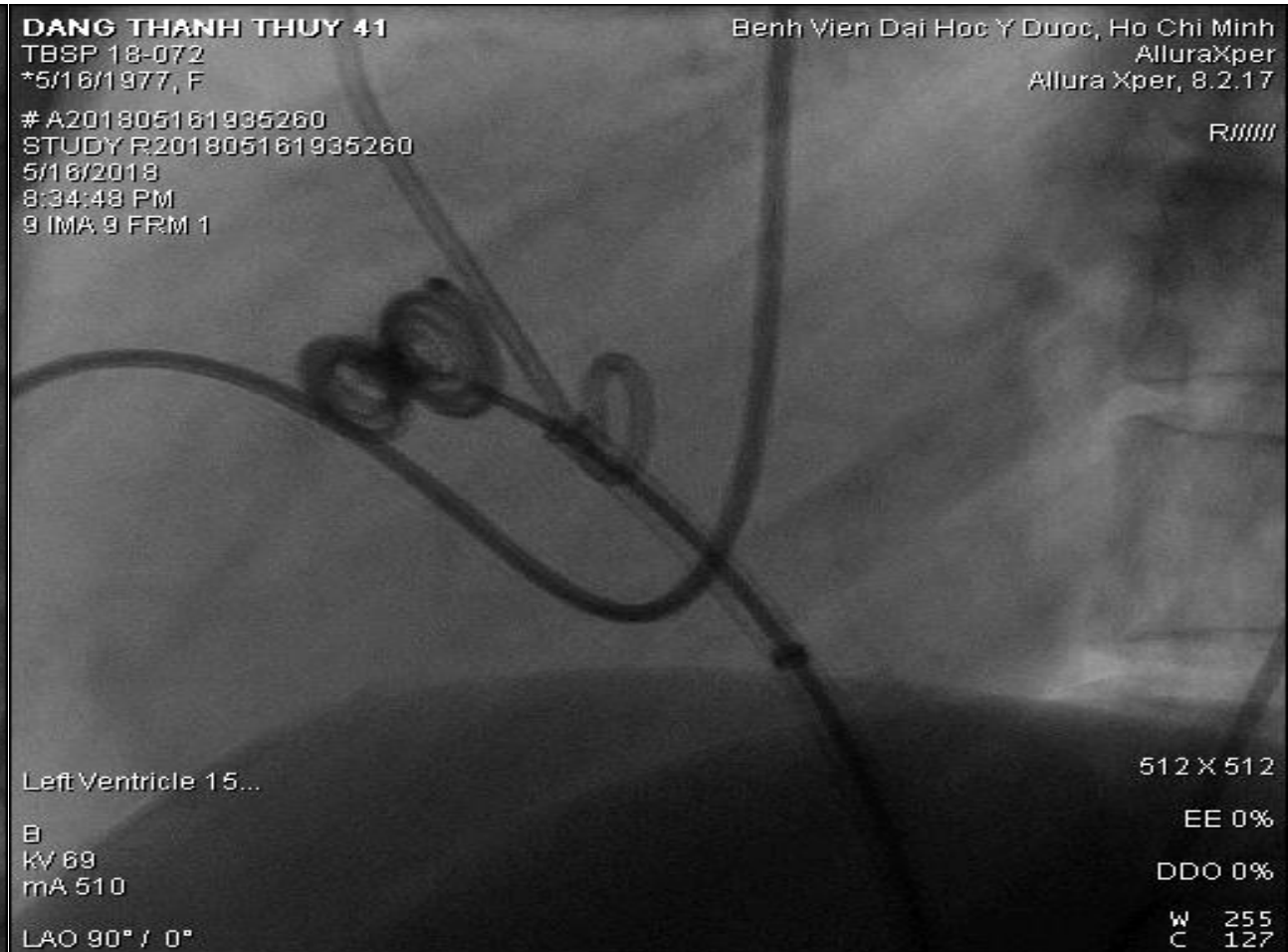
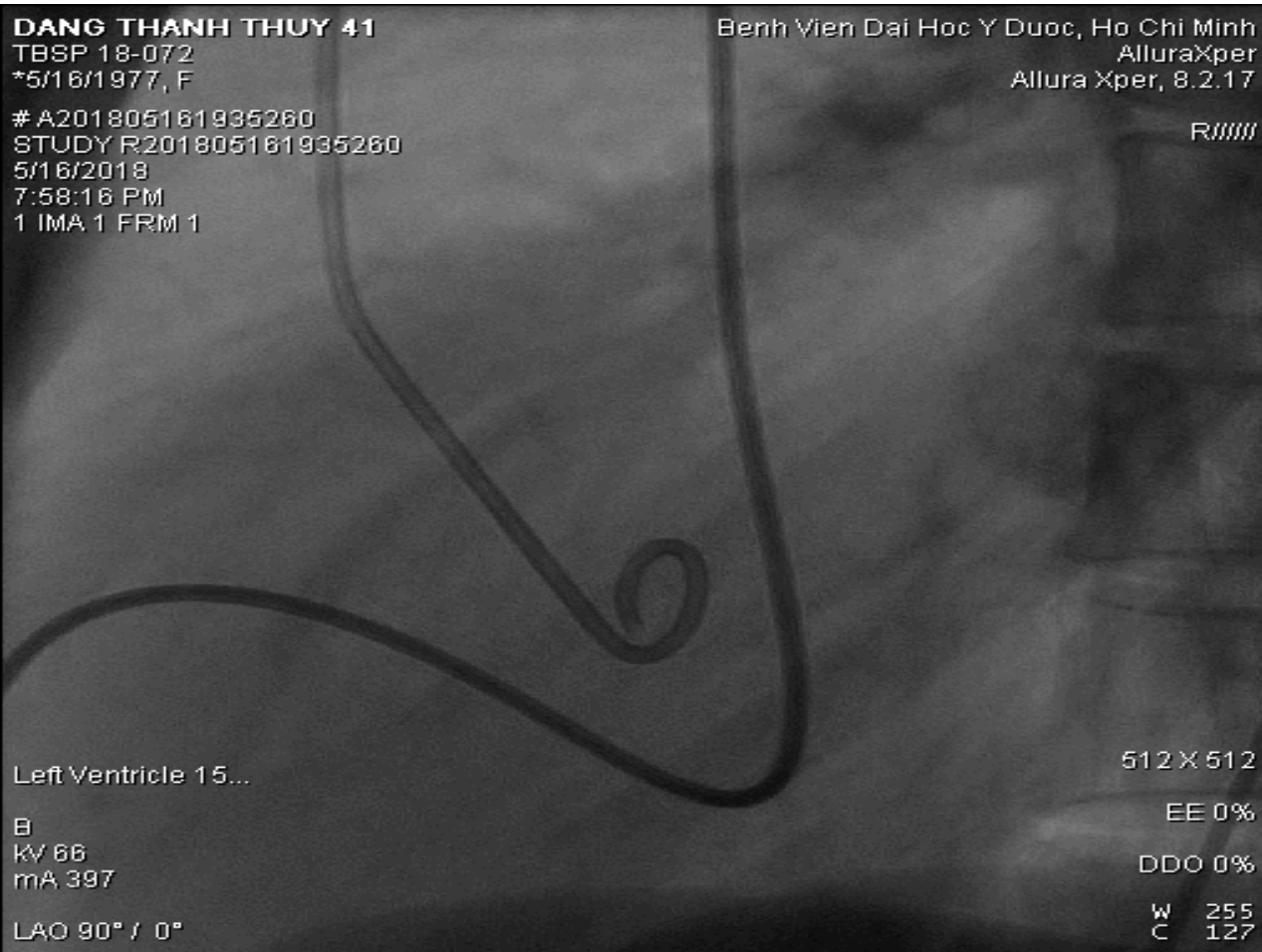
512 X 512

EE 0%

DDO 0%

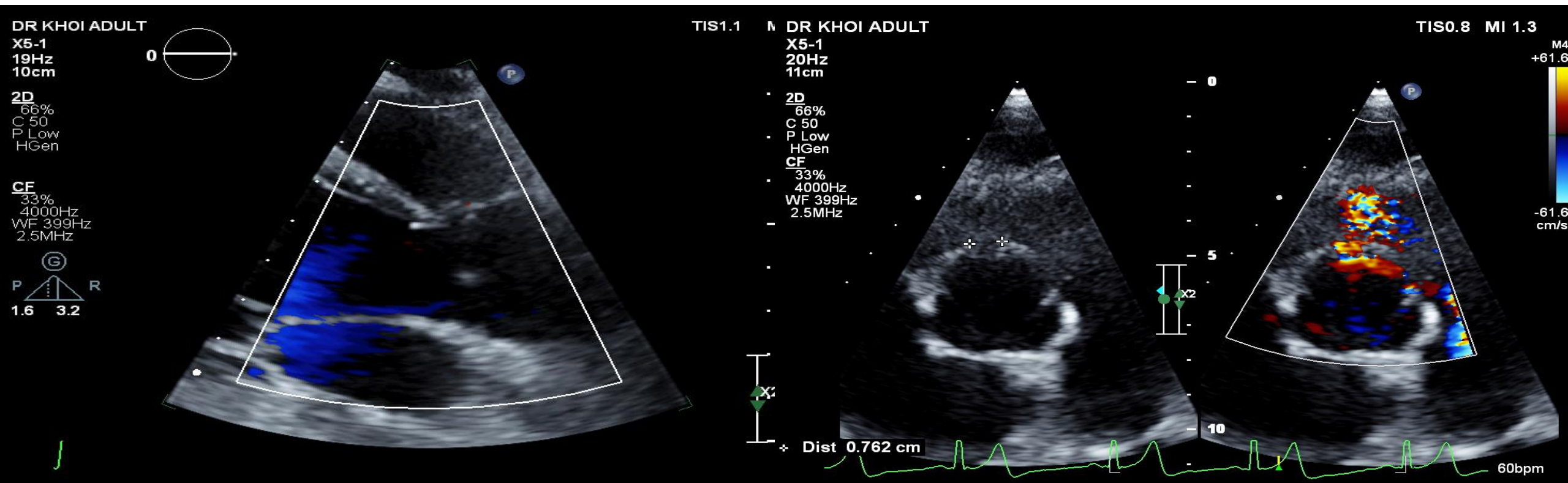
W 255  
C 127

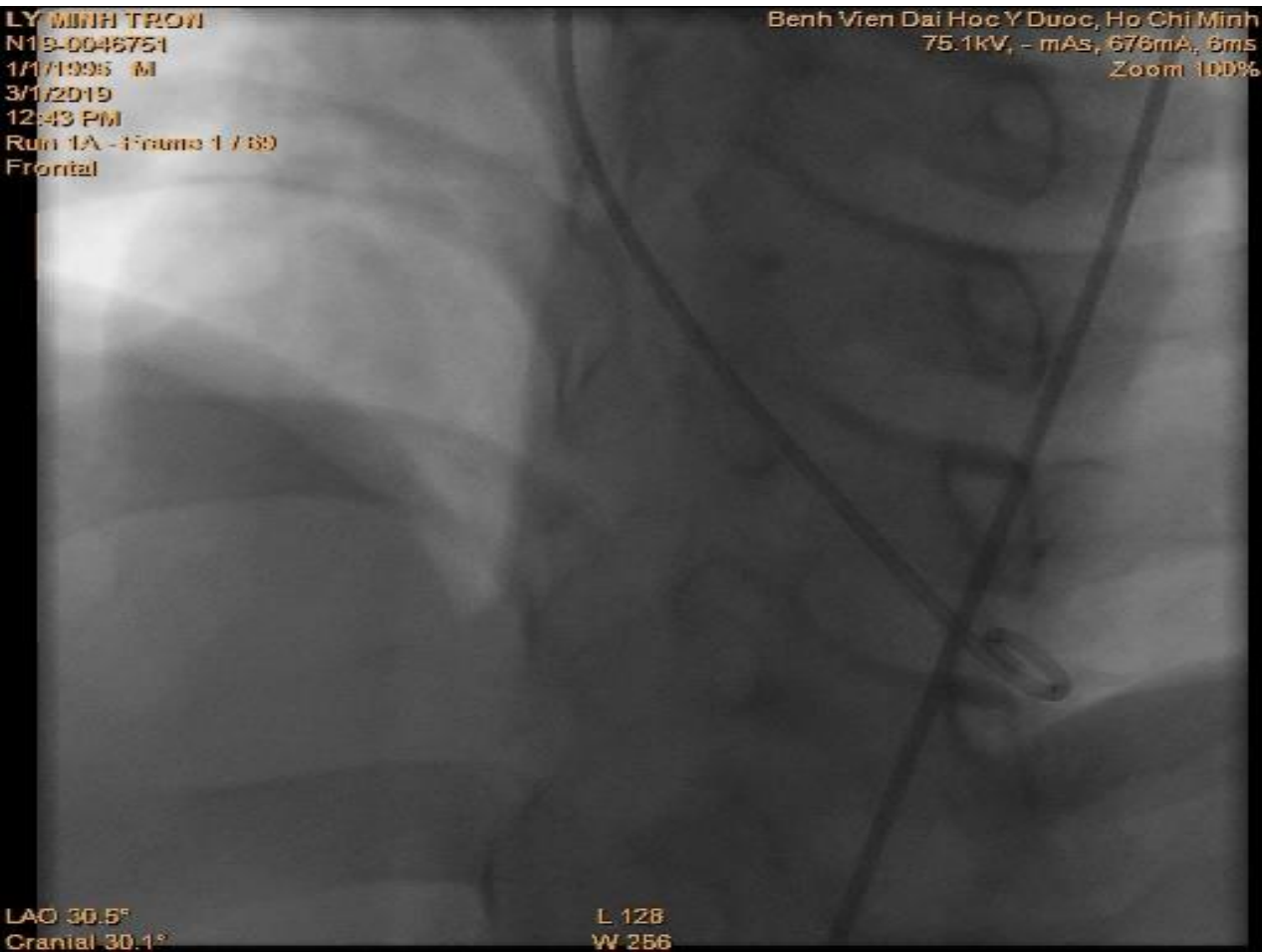
# 41 yo- woman



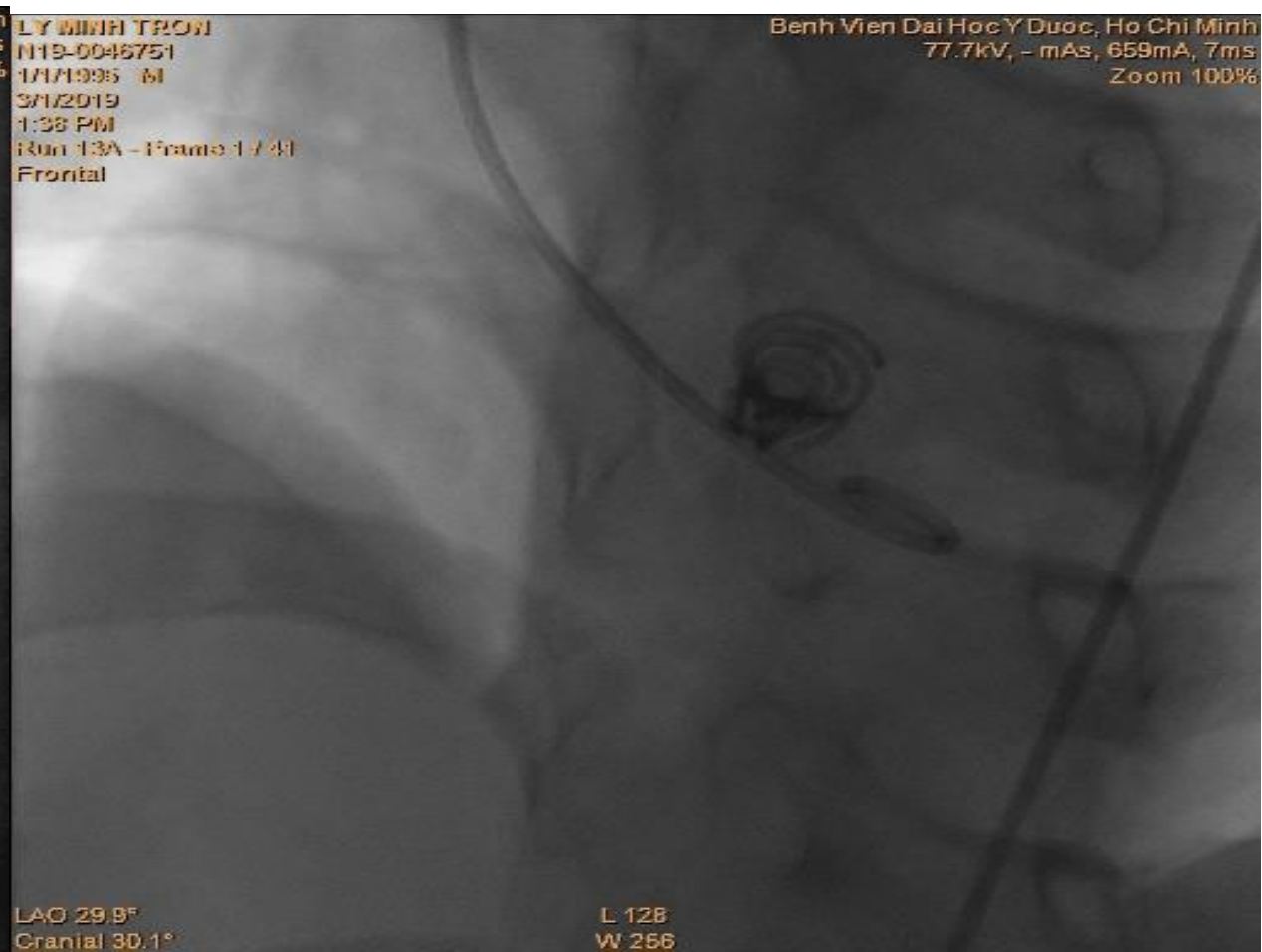
# Sub-Aortic w/o rim (type A)+ Aortic valve prolapse

## 29 YO-MAN





# NIT-OCCLUD LÊ VSD 12x6



# 14 yo-Girl; 26kg

GE MEDICAL SYSTEMS  
Yankin Children Hospital

LIN HTET THAZIN/7yrs  
# 1232  
F

Nov 15 2019  
12:04:50

(Flt. 3)

LAT  
Seq: 2  
FRAME = 1 / 60

FOV: 12x12 cm  
LAO: 90.0 deg  
CRA: 0.3 deg  
L: 0.0 deg  
Tilt: 0 deg  
Mag = 1.00  
FL: ROT:  
WW: 256/WL: 128  
XA 512x512

GE MEDICAL SYSTEMS  
Yankin Children Hospital

LIN HTET THAZIN/7yrs  
# 1232  
F

Nov 15 2019  
12:04:50

(Flt. 3)

FRNT  
Seq: 2  
FRAME = 1 / 60

FOV: 12x12 cm  
LAO: 27.8 deg  
CRA: 28.3 deg  
L: 1.3 deg  
Tilt: 0 deg  
Mag = 1.00  
FL: ROT:  
WW: 256/WL: 128  
XA 512x512

# MFO KONAR 10/8

GE MEDICAL SYSTEMS  
Yankin Children Hospital

LIN HTET THAZIN 7yrs F MEDICAL SYSTEMS  
# 1232 antkin Children Hospital  
F

LIN HTET THAZIN 7yrs F MEDICAL SYSTEMS  
# 1232 antkin Children Hospital  
F

Nov 15 2018  
14:47:31

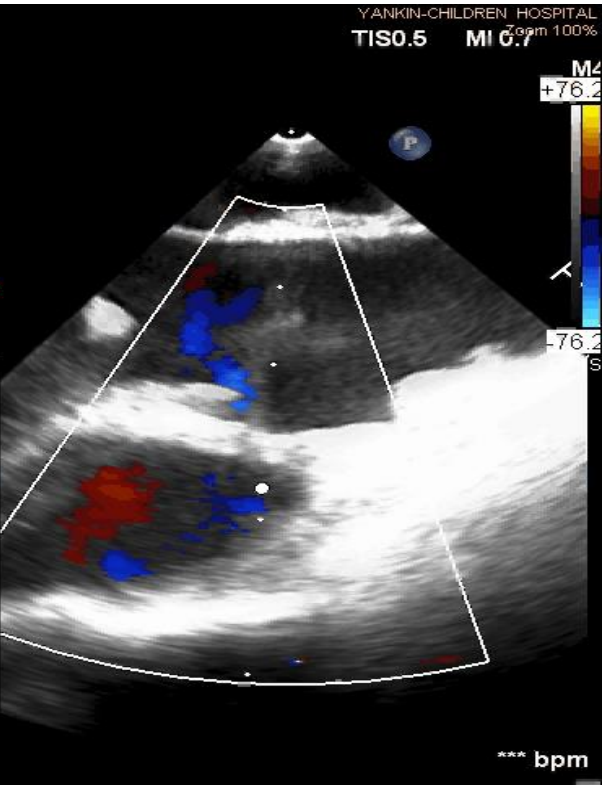
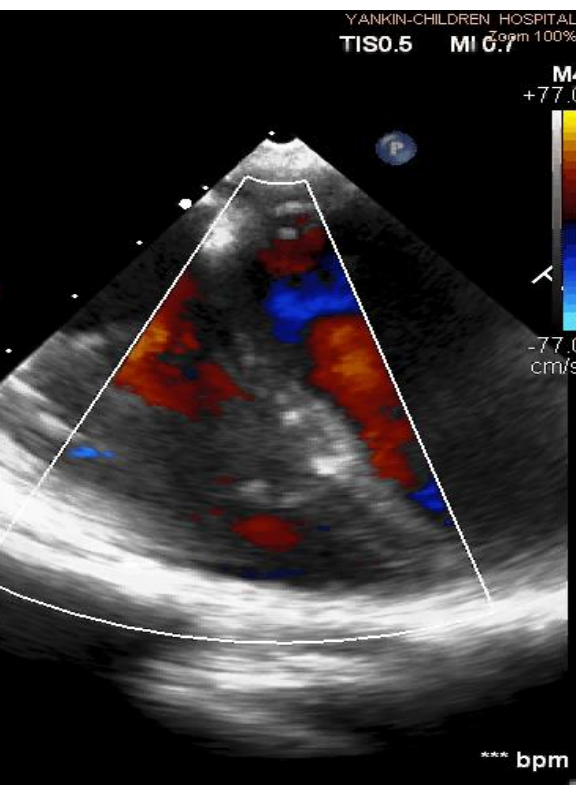
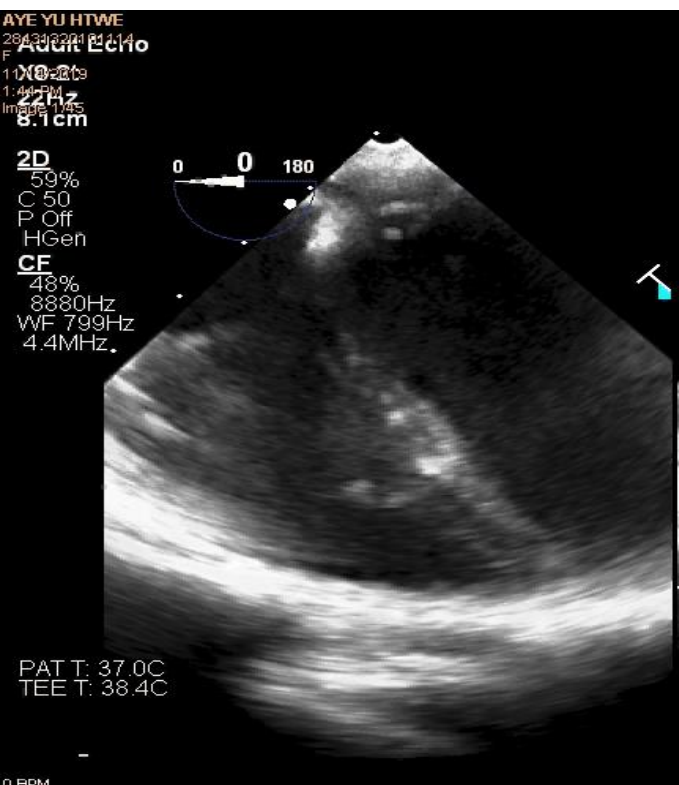
Nov 15 2018  
14:47:31

FOV: 12x12 cm  
LAO: 29.5 deg  
CRA: 29.4 deg  
L: 1.3 deg  
Tilt: 0 deg  
Mag = 1.00  
FL: ROT  
WAW: 256WV: 128  
XA 512x512

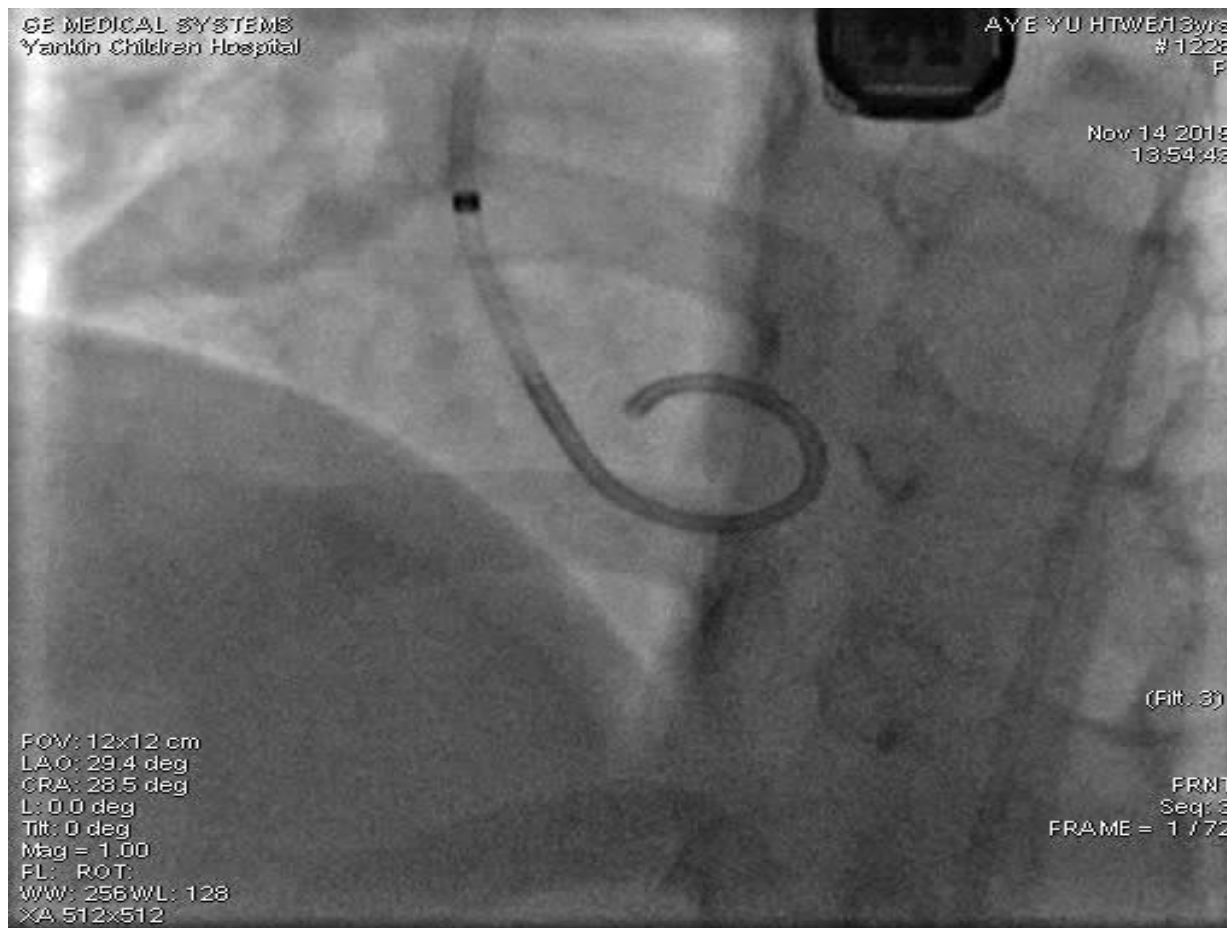
(Flt. 3)  
FRNT VA: 0.0 deg  
Seq: 88 0.0 deg  
FRAME = 1 / 38

FOV: 12x12 cm  
LAO: 89.1 deg  
CRA: 0.0 deg  
L: 0.0 deg  
Tilt: 0 deg  
Mag = 1.00  
FL: ROT  
WAW: 256WV: 128  
XA 512x512

(Flt. 3)  
FRNT VA: 0.0 deg  
Seq: 88 0.0 deg  
FRAME = 1 / 38



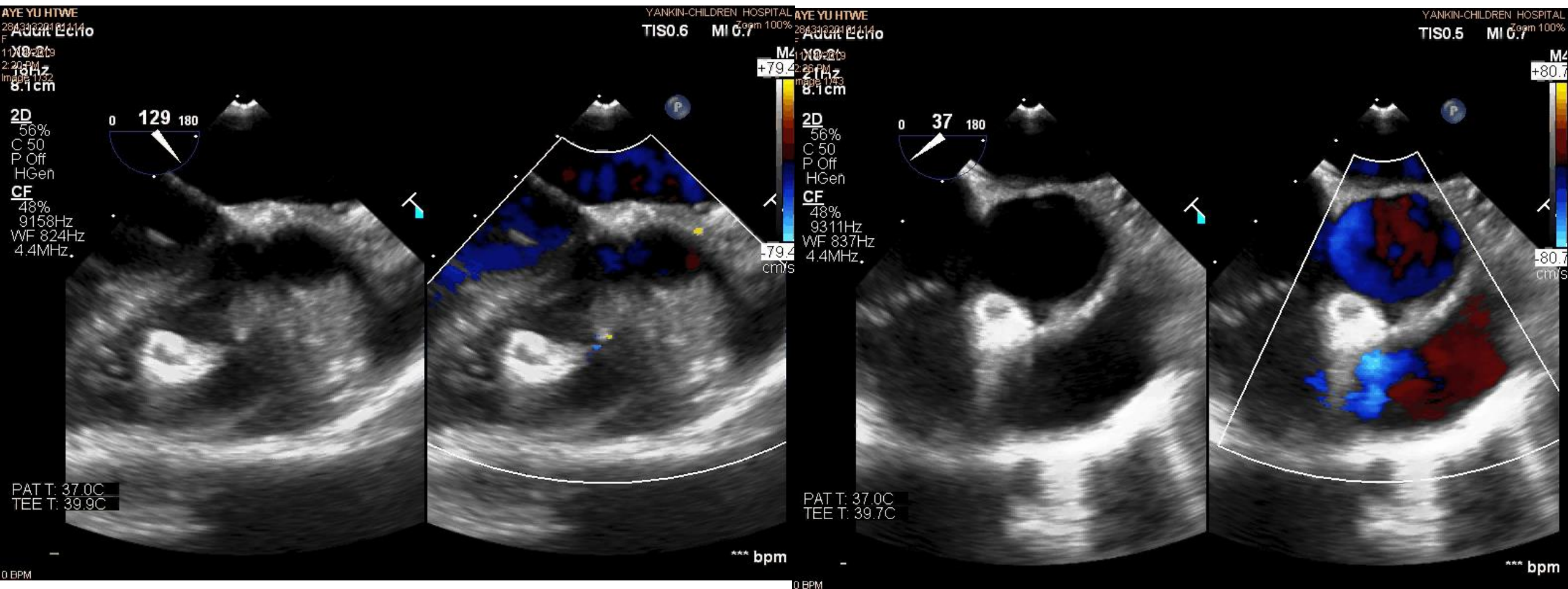
# 7YO-GIRL; 14kg



# MFO, KONAR 10/8

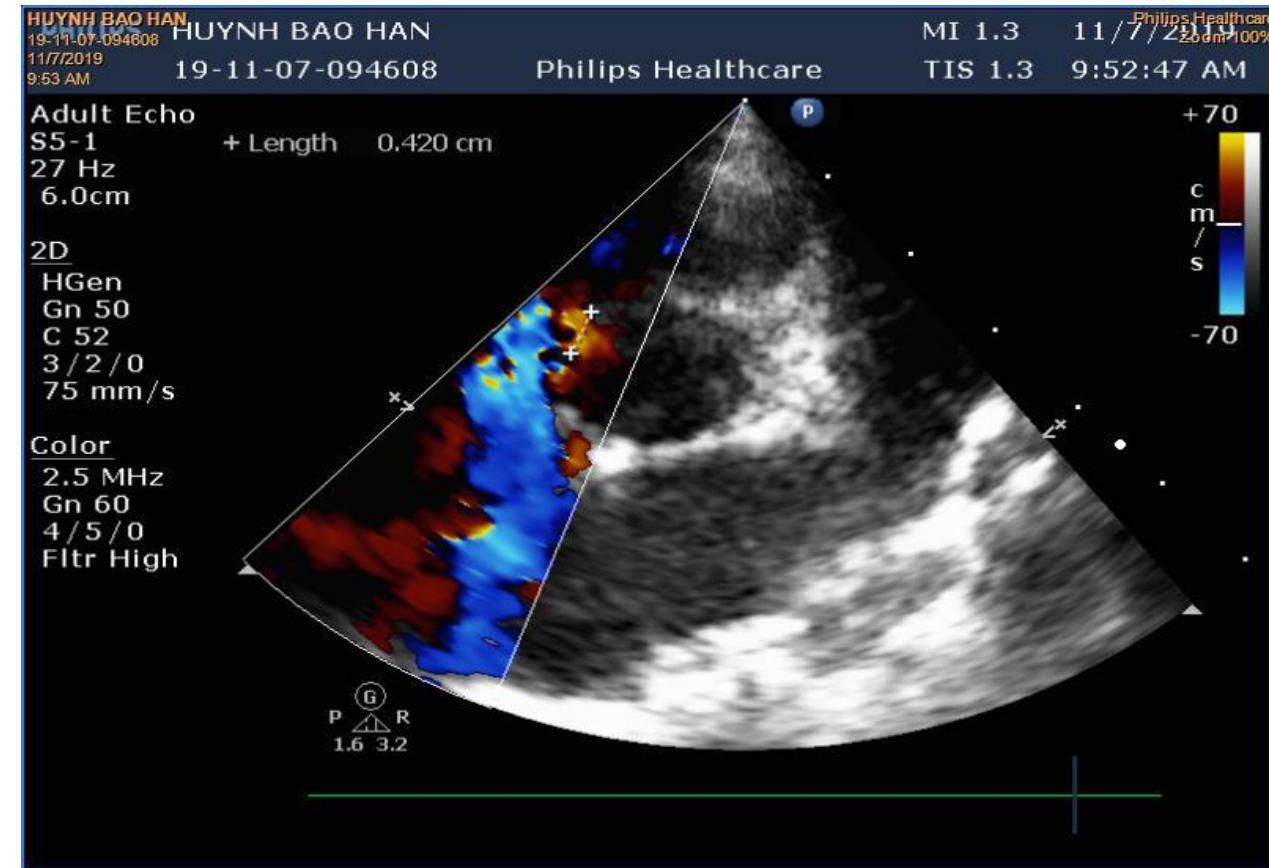
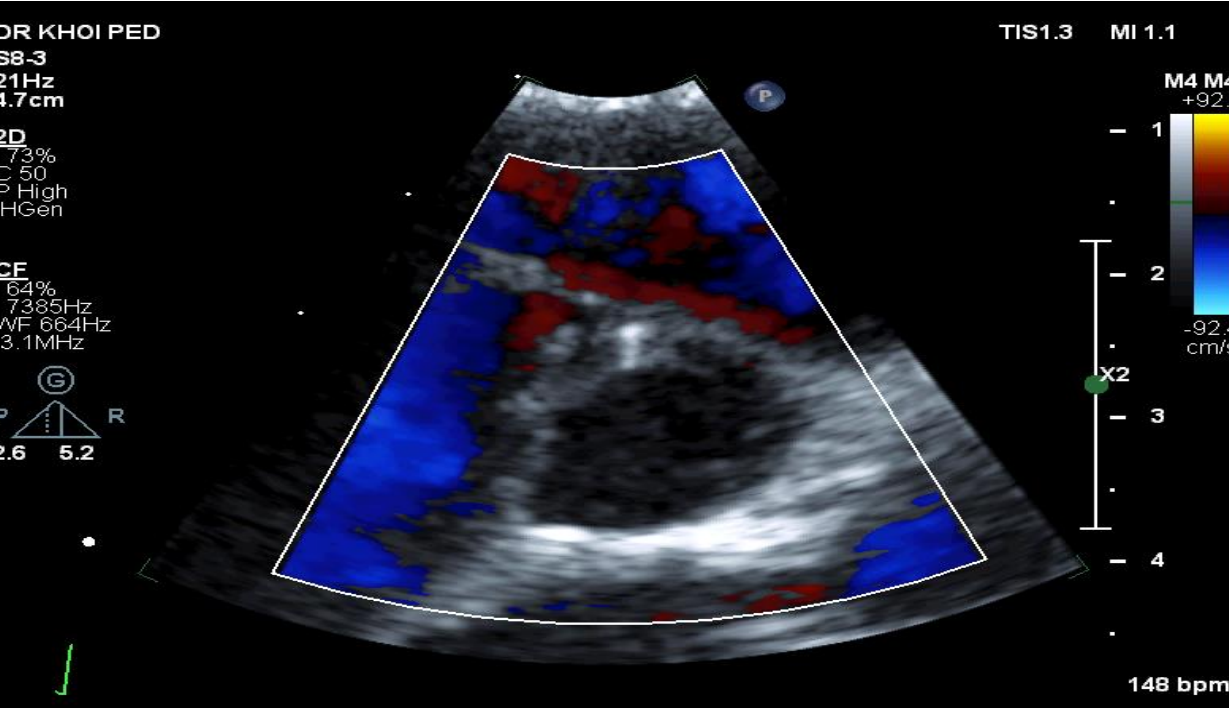
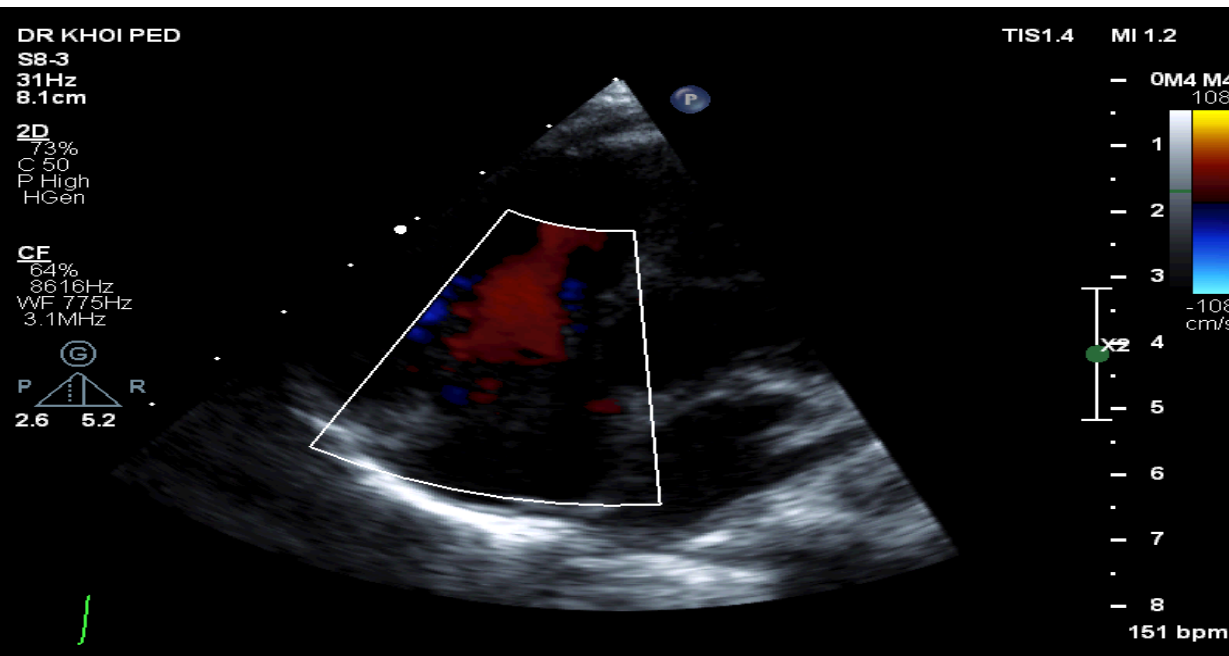


# Echo checked: No AR, No RVOT narrowing



# Tricuspid regurgitation

2 YO-Girl, 9kg



**HUYNH BAO HAN**  
N19-0093173  
4/11/2018 11:15 AM  
11/7/2019  
Series 1  
Run 1A - Frame 1 / 77  
Frontal  
11/7/2019

Benh Vien Dai Hoc Y Duoc, Ho Chi Minh  
64.7kV, - mAs, 312mA, 4ms  
Zoom 100%

**HUYNH BAO HAN**  
N19-0093173  
4/11/2018 11:29 AM  
11/7/2019  
Series 7  
Run 7A - Frame 1 / 87  
Frontal  
11/7/2019

Benh Vien Dai Hoc Y Duoc, Ho Chi Minh  
64.8kV, - mAs, 324mA, 4ms  
Zoom 100%

LAO 30.2°  
Cranial 29.7°

L 128  
W 256

**HUYNH BAO HAN**  
N19-0093173  
4/11/2018 11:15 AM  
11/7/2019  
Series 1  
Run 1B - Frame 1 / 77  
Lateral  
11/7/2019

Benh Vien Dai Hoc Y Duoc, Ho Chi Minh  
62.5kV, - mAs, 215mA, 4ms  
Zoom 100%

**HUYNH BAO HAN**  
N19-0093173  
4/11/2018 11:29 AM  
11/7/2019  
Series 7  
Run 7B - Frame 1 / 87  
Lateral  
11/7/2019

L 128

Benh Vien Dai Hoc Y Duoc, Ho Chi Minh  
62.5kV, - mAs, 216mA, 4ms  
Zoom 100%

LAO 90.5°  
Caudal 0.3°

L 128  
W 256

**HUYNH BAO HAN**  
N19-0093173  
4/11/2018 11:15 AM  
11/7/2019  
Series 1  
Run 1C - Frame 1 / 77  
Caudal  
11/7/2019

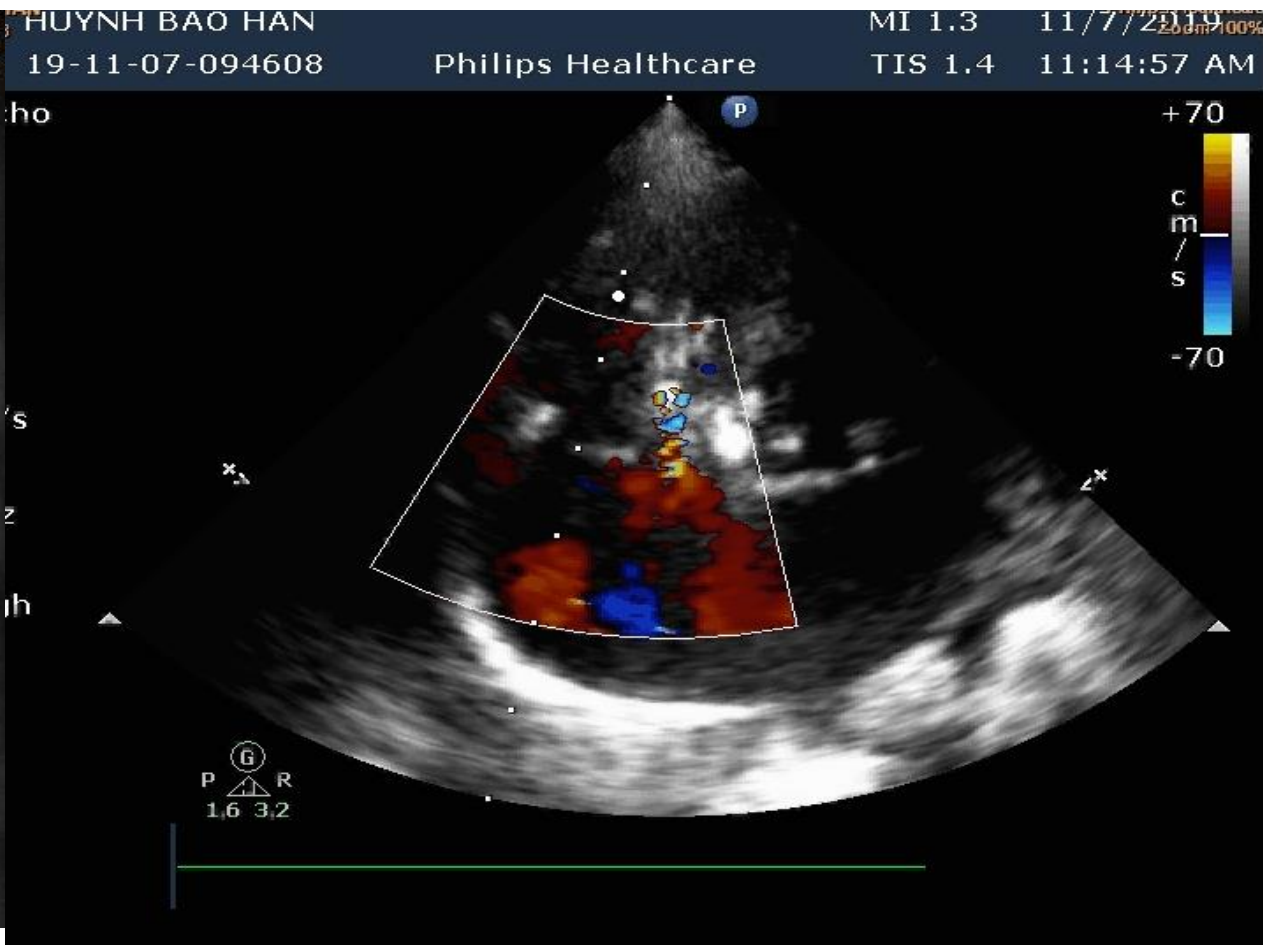
Benh Vien Dai Hoc Y Duoc, Ho Chi Minh  
62.5kV, - mAs, 215mA, 4ms  
Zoom 100%

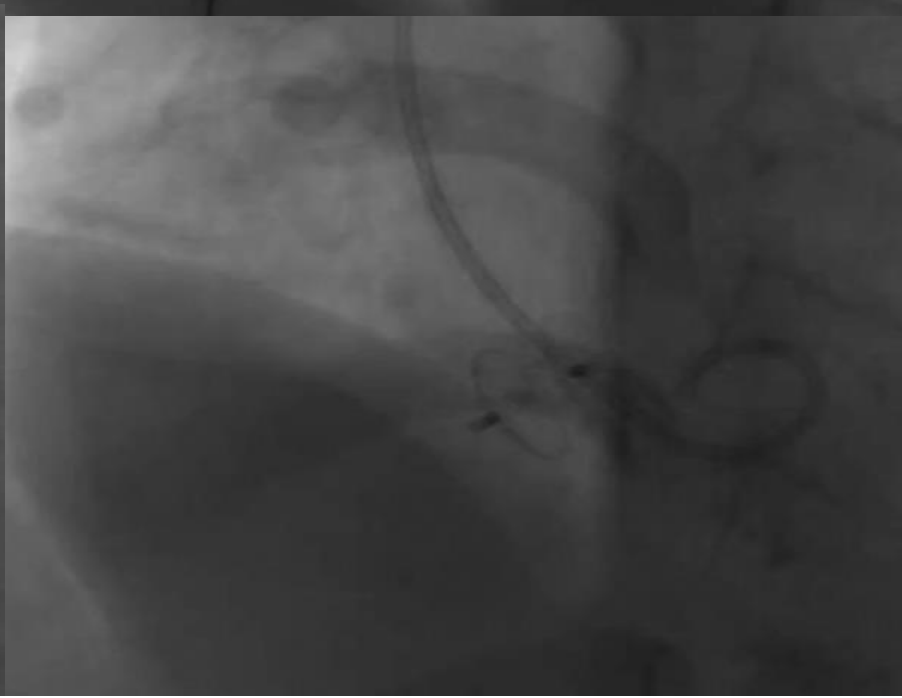
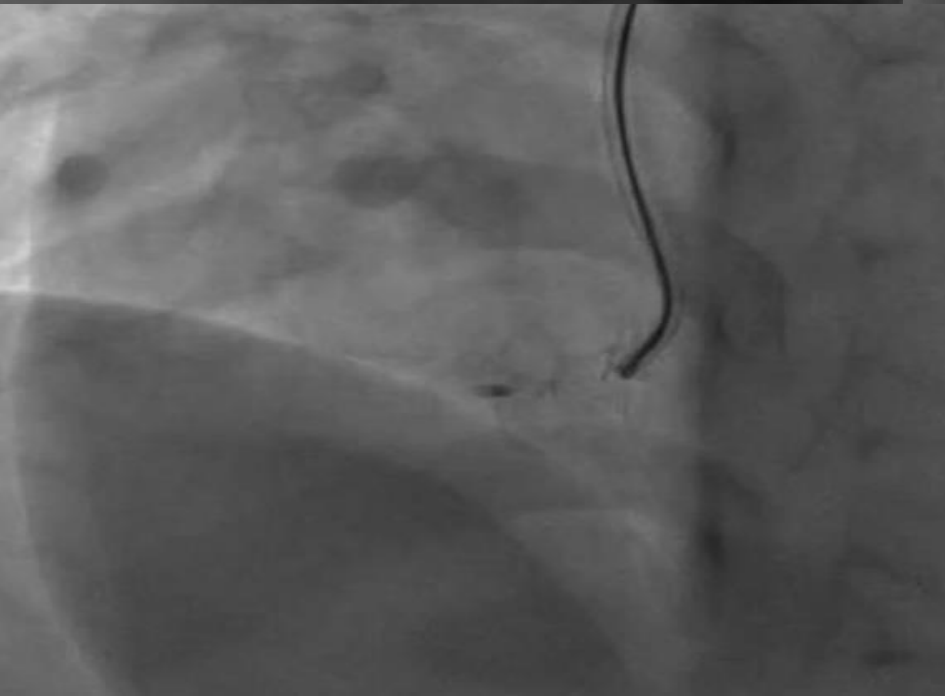
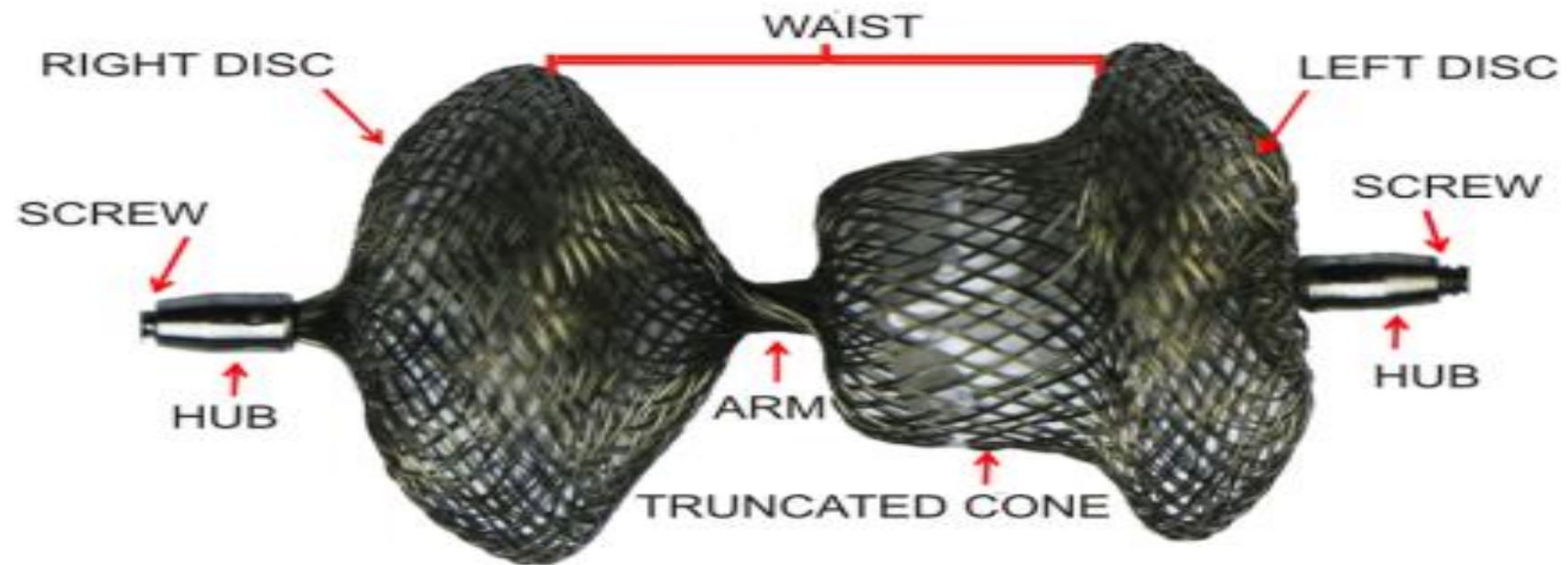
**HUYNH BAO HAN**  
N19-0093173  
4/11/2018 11:29 AM  
11/7/2019  
Series 7  
Run 7C - Frame 1 / 87  
Caudal  
11/7/2019

L 128

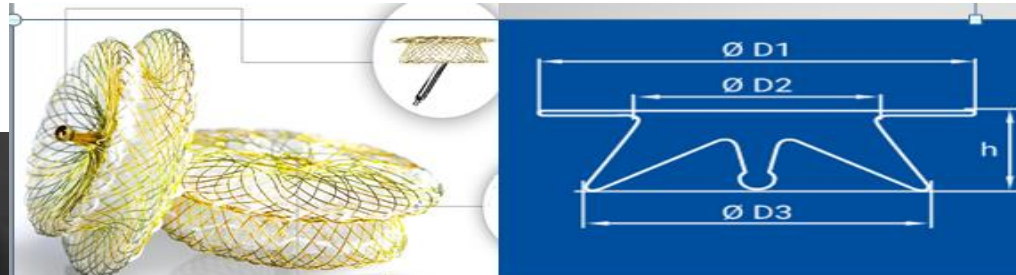
Benh Vien Dai Hoc Y Duoc, Ho Chi Minh  
62.5kV, - mAs, 216mA, 4ms  
Zoom 100%

# NIT-OCCLUDER Le-VSD 10/6





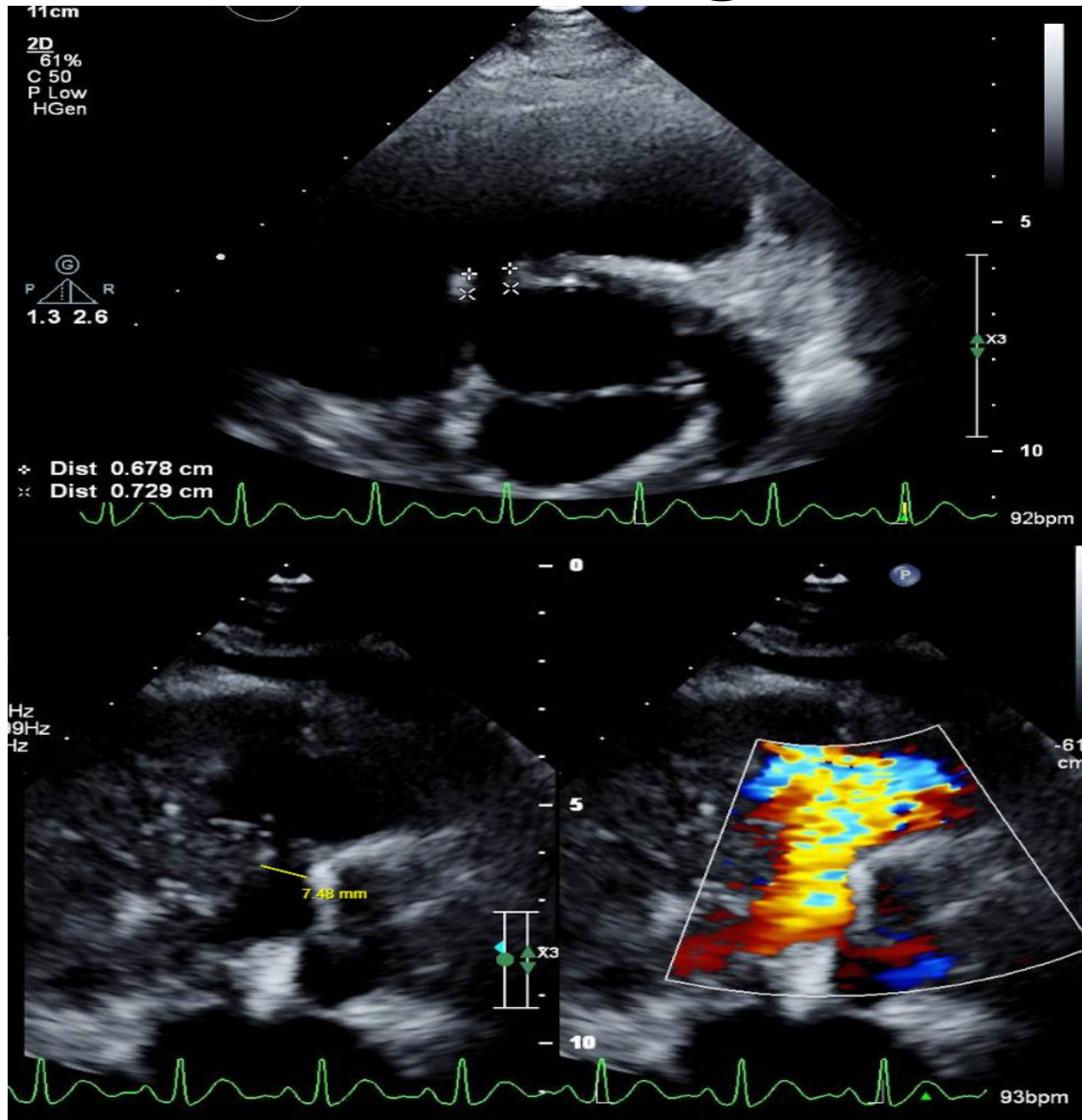
# pmVSD 06



**D1** - Distal disc diameter  
**D2** - Minimum waist diameter  
**D3** - Maximum waist diameter  
**h** - Height

Article No.	Height [mm]	Ø D1 [mm]	Ø D2 [mm]	Ø D3 [mm]	Sheath Size* [F]	Pusher Article No.
<b>Small</b>						
89VSD04S	5	10	4	8	6	55PP090
89VSD06S	5	12	6	10	6	55PP090
89VSD08S	5	14	8	12	6	55PP125
<b>Standard</b>						
84VSD04	5	12	4	8	6	55PP090
84VSD06	5	14	6	10	6	55PP090
84VSD08	5	16	8	12	6	55PP125

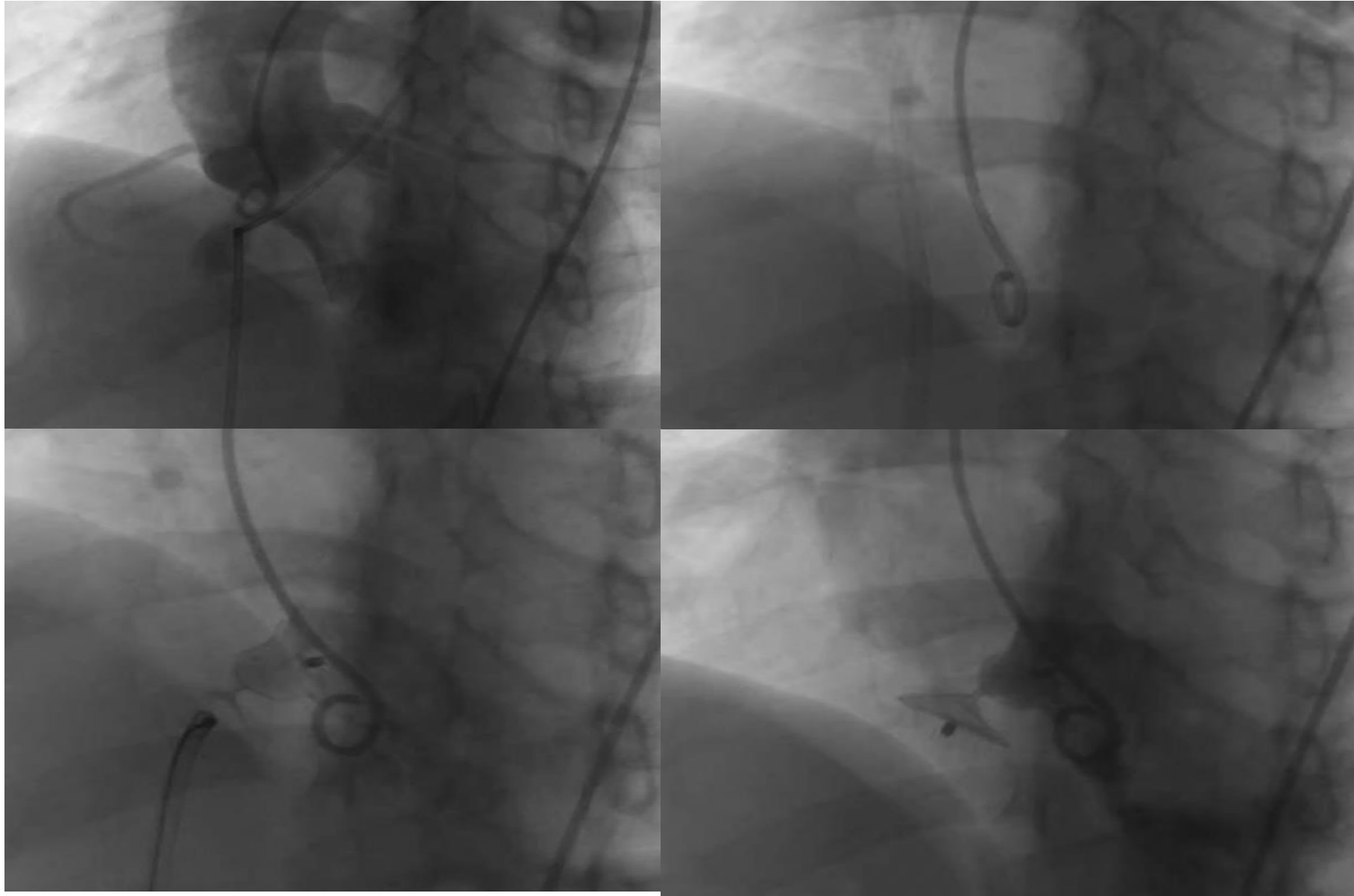
# Large VSD. 60-yo female



KONAR 14/12



39-YO Female. KONAR 14/12



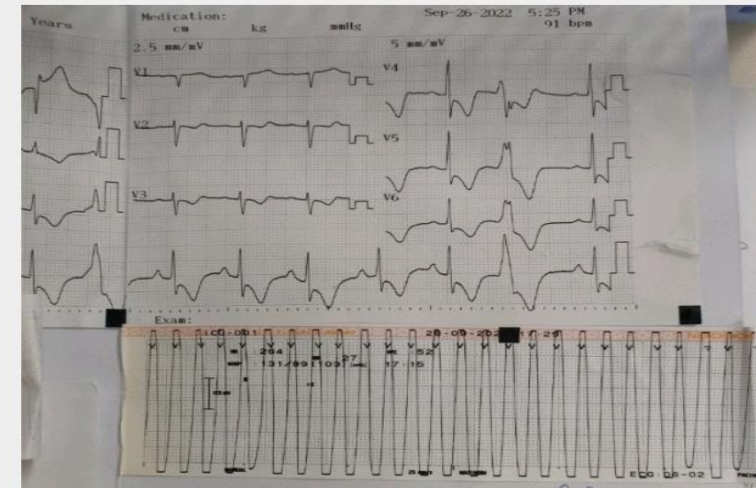
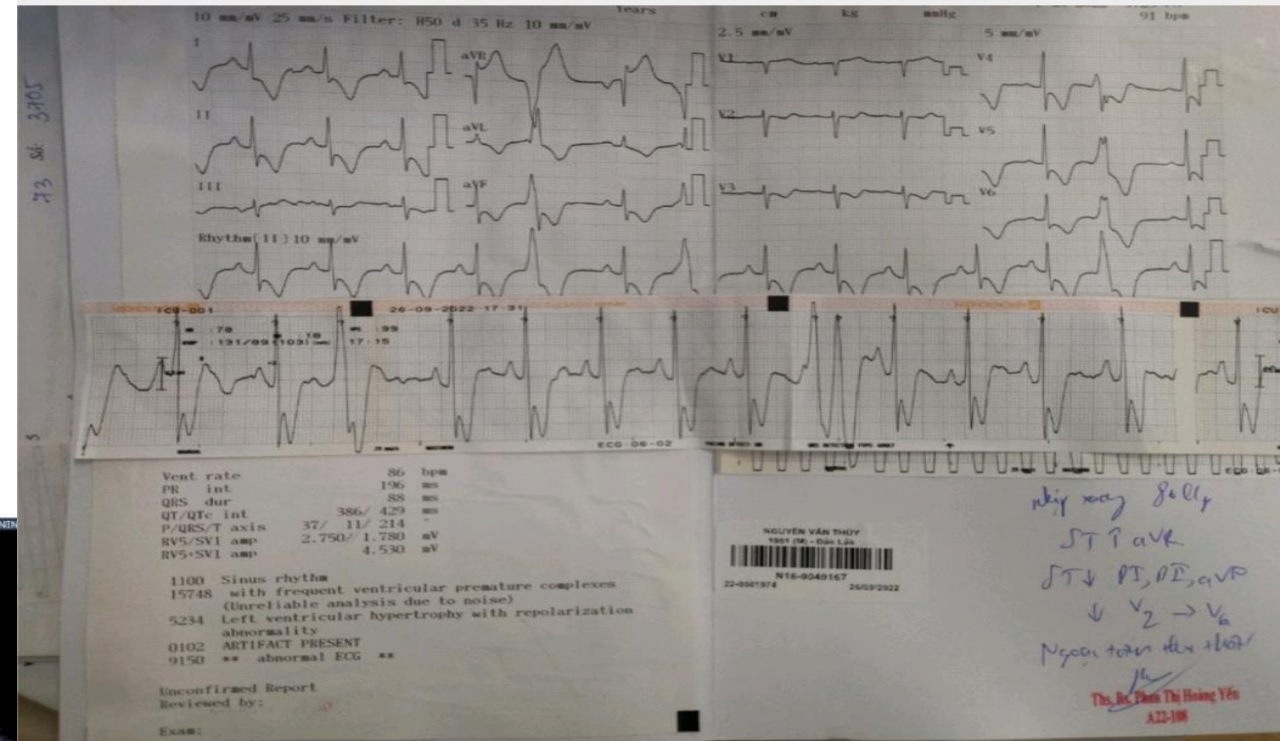
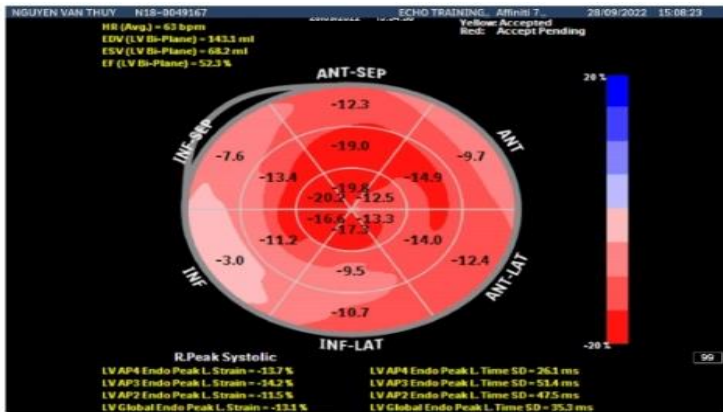
# With Arrhythmia

42-YO male

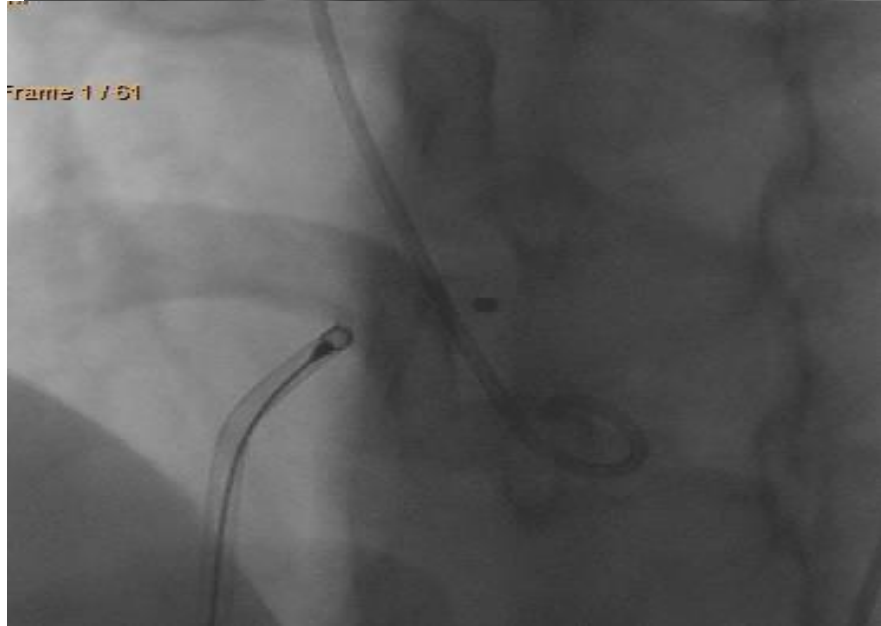
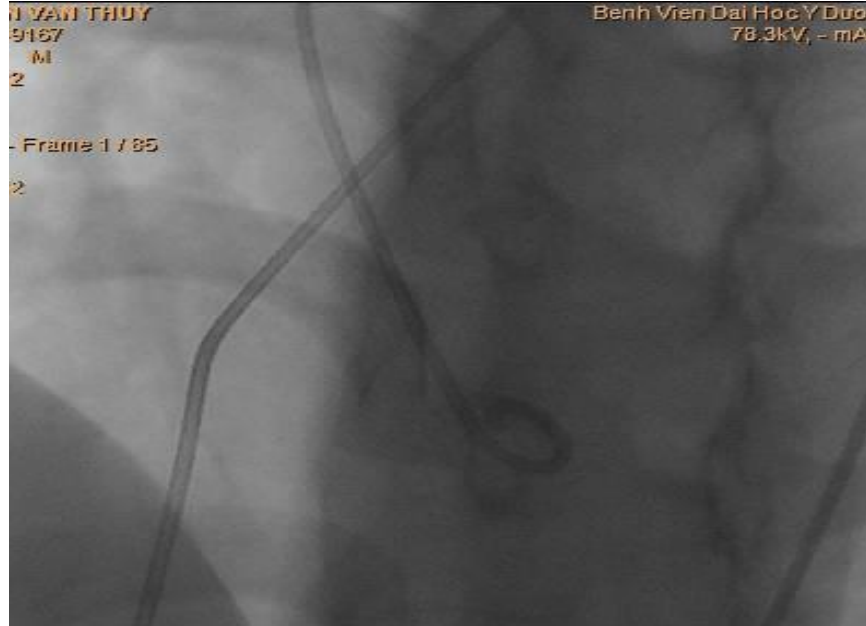
Palpitations, short of breath

VT → defibrillation.

Echo: VSD outlet



# KONAR 10/8



# CONCLUSION

Challenging case VSD device closure is feasible and safe if:

- Right indication
- Right patient selection
- knowing device usage
- Clear anatomy
- Skillful

**THANK YOU**