Transcatheter Intervention services in YKCH

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- Catheterization laboratory at YKCH opened at 24th August 2015

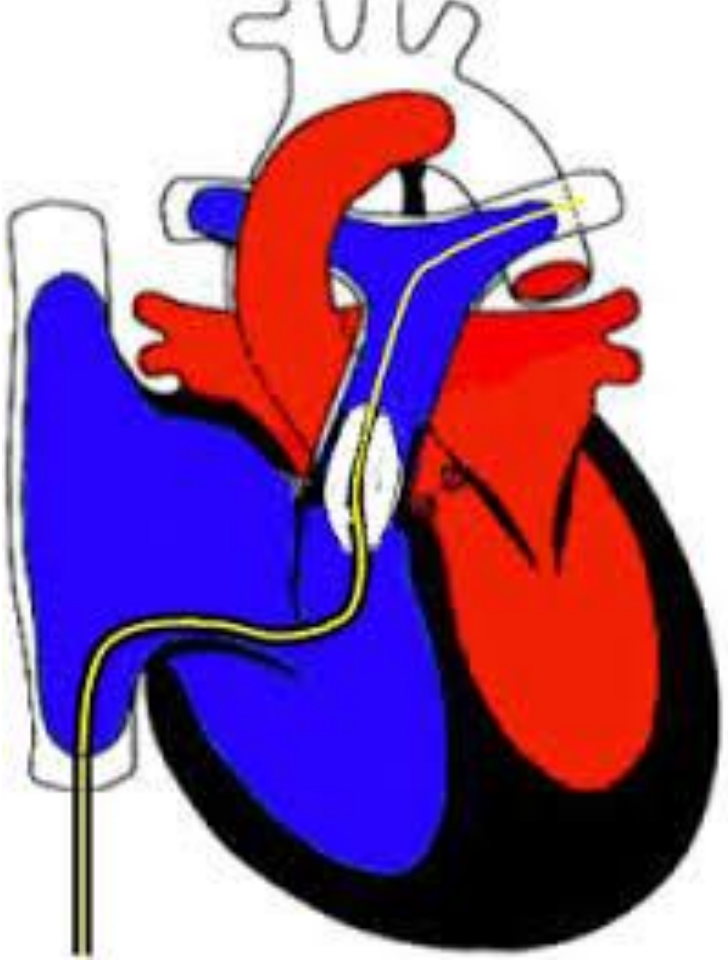

Innova
GE Healthcare

Cardiac catheterizations

- Diagnostic catheterization
  - Haemodynamic calculation
  - Selective angiogram
- Catheter intervention procedures
  - Balloon valvuloplasty
  - Balloon angioplasty
  - Closing defects
  - Creating defect
  - Percutaneous valve repalcement
  - Electrical therapy with either pacemakers or catheter ablation

Balloon valvuloplasty

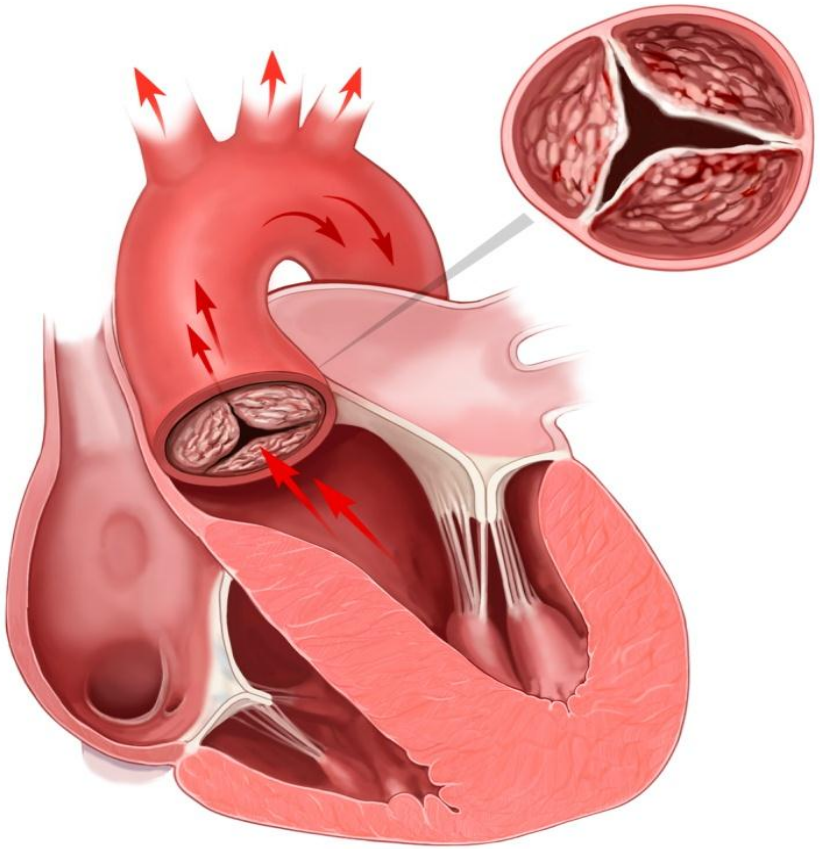
(1) Pulmonary valve stenosis



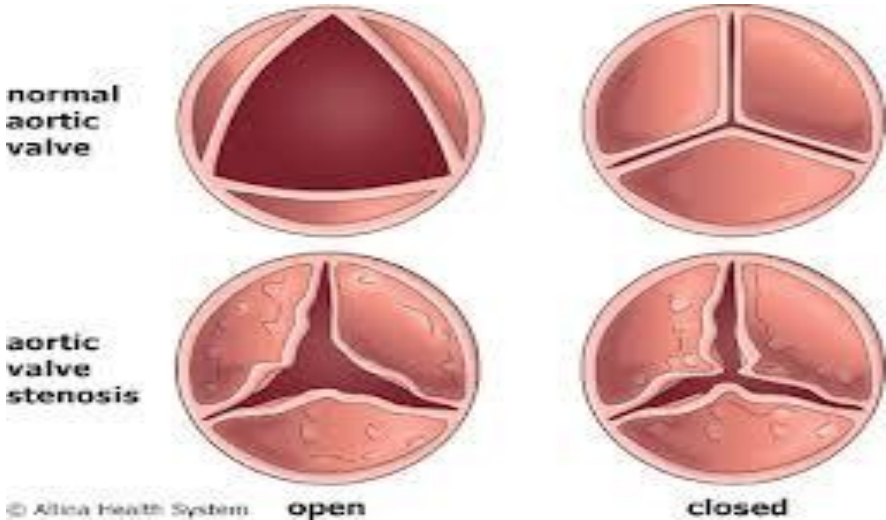
- Balloon dilatation by Kan et al in 1982
- now considered to be first-line treatment
- Neonates with critical pulmonary stenosis (surgery - high mortality)
- systolic gradient between the right ventricle and the pulmonary artery > 35mmHg

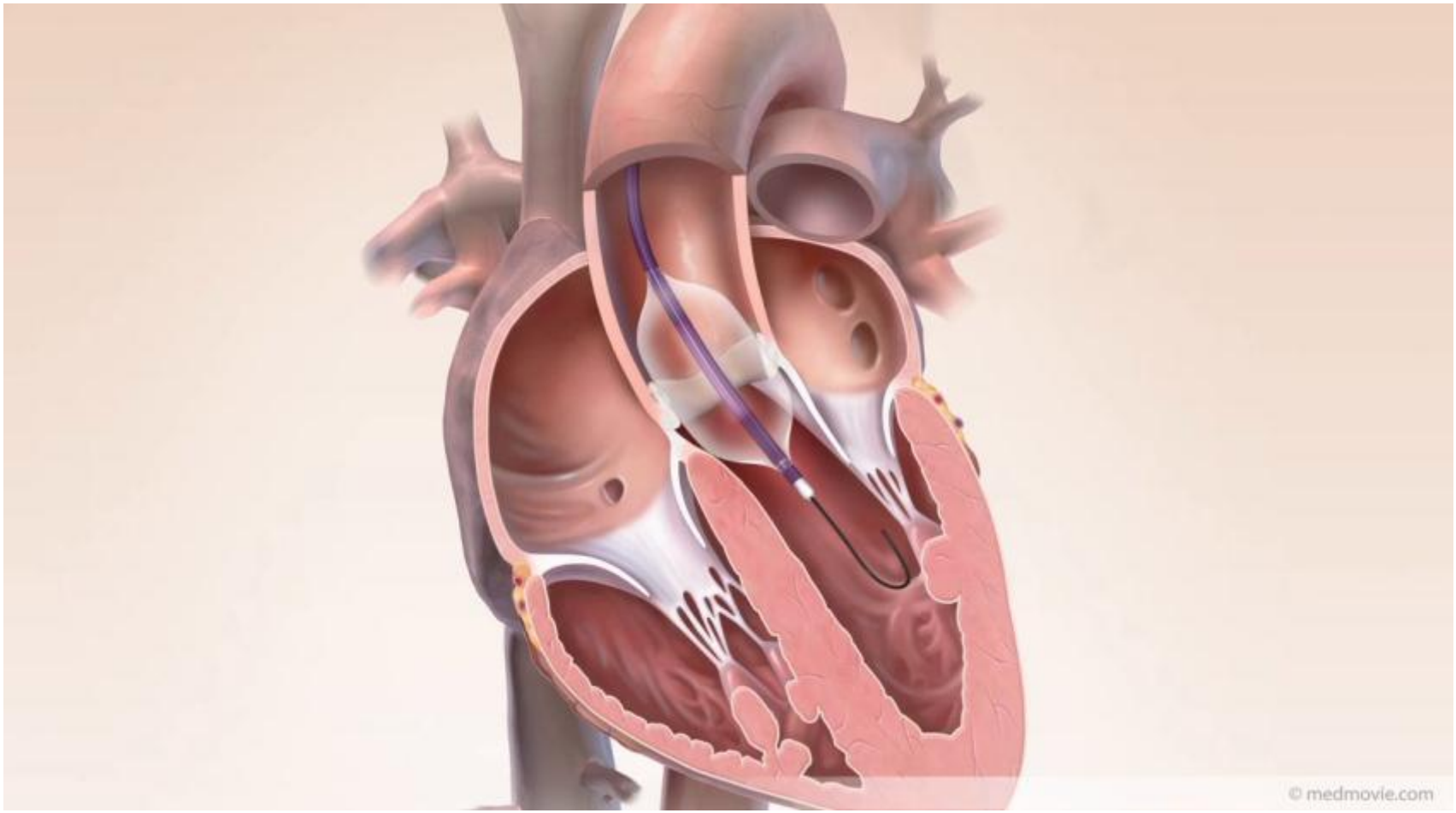
(2)Aortic stenosis

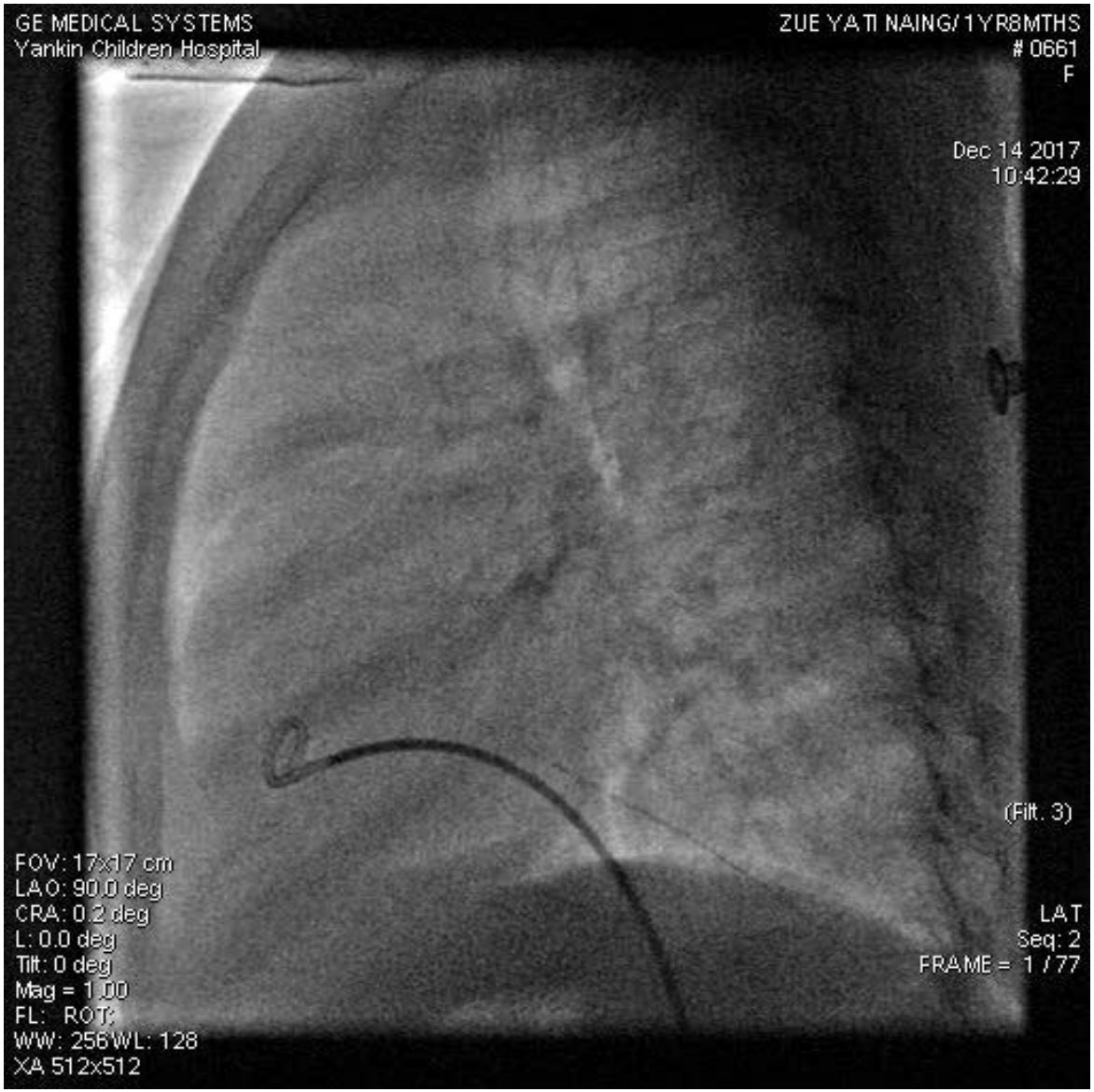
- Balloon dilatation congenital aortic valve stenosis by Lababidi et al in 1984
- has gradually become the treatment of choice



- Doppler peak gradient >70 mmHg
- left ventricular strain on the ECG and peak gradient > 60 mmHg




© medmovie.com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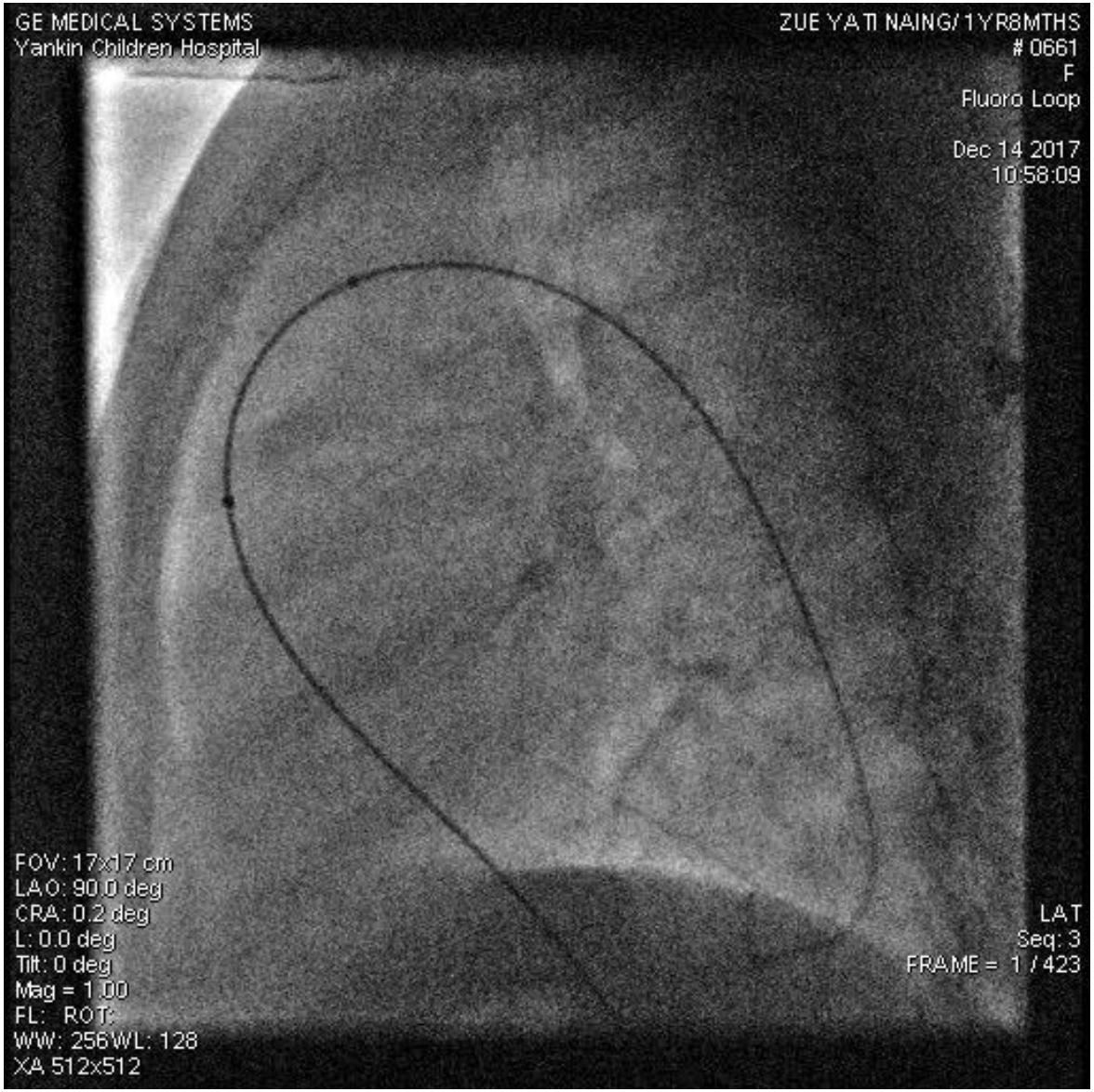
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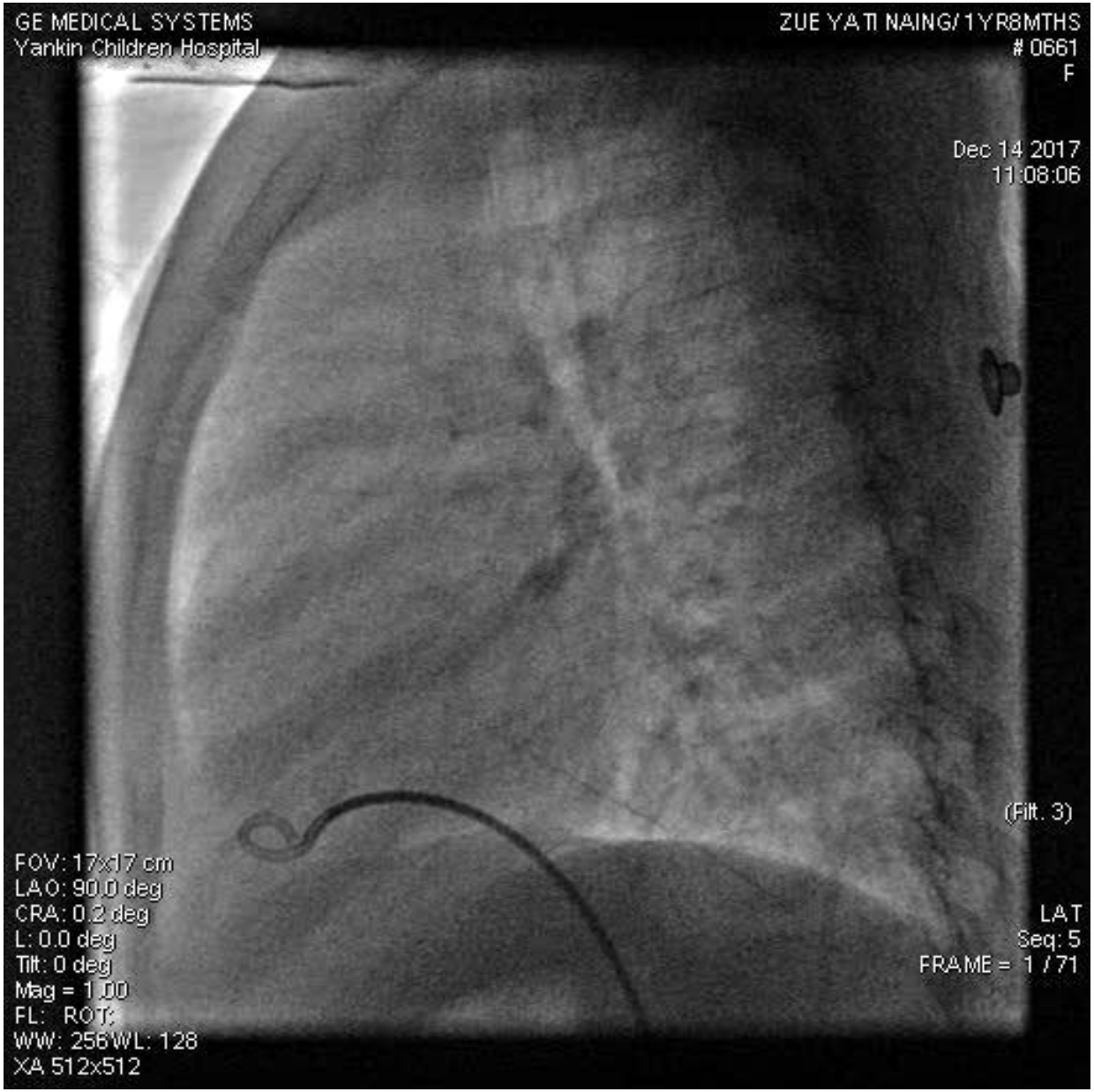
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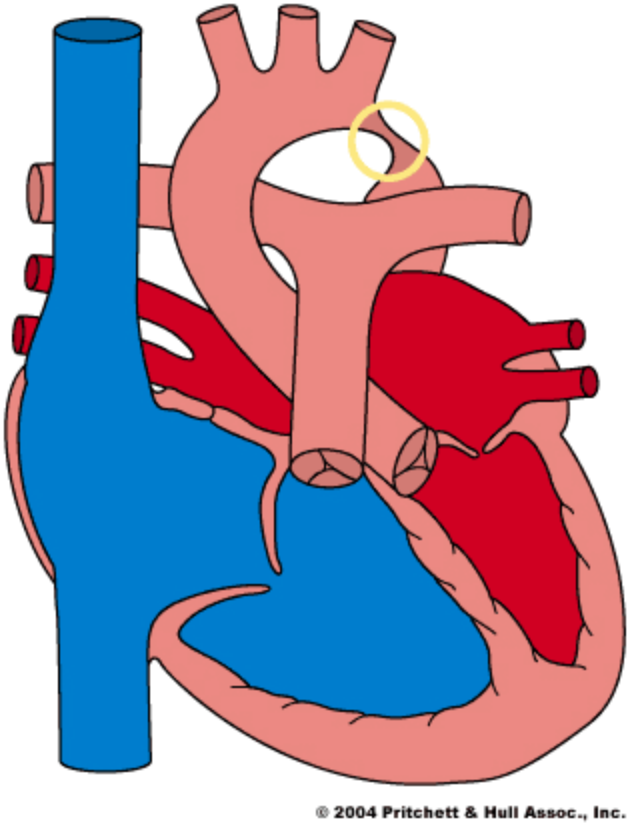
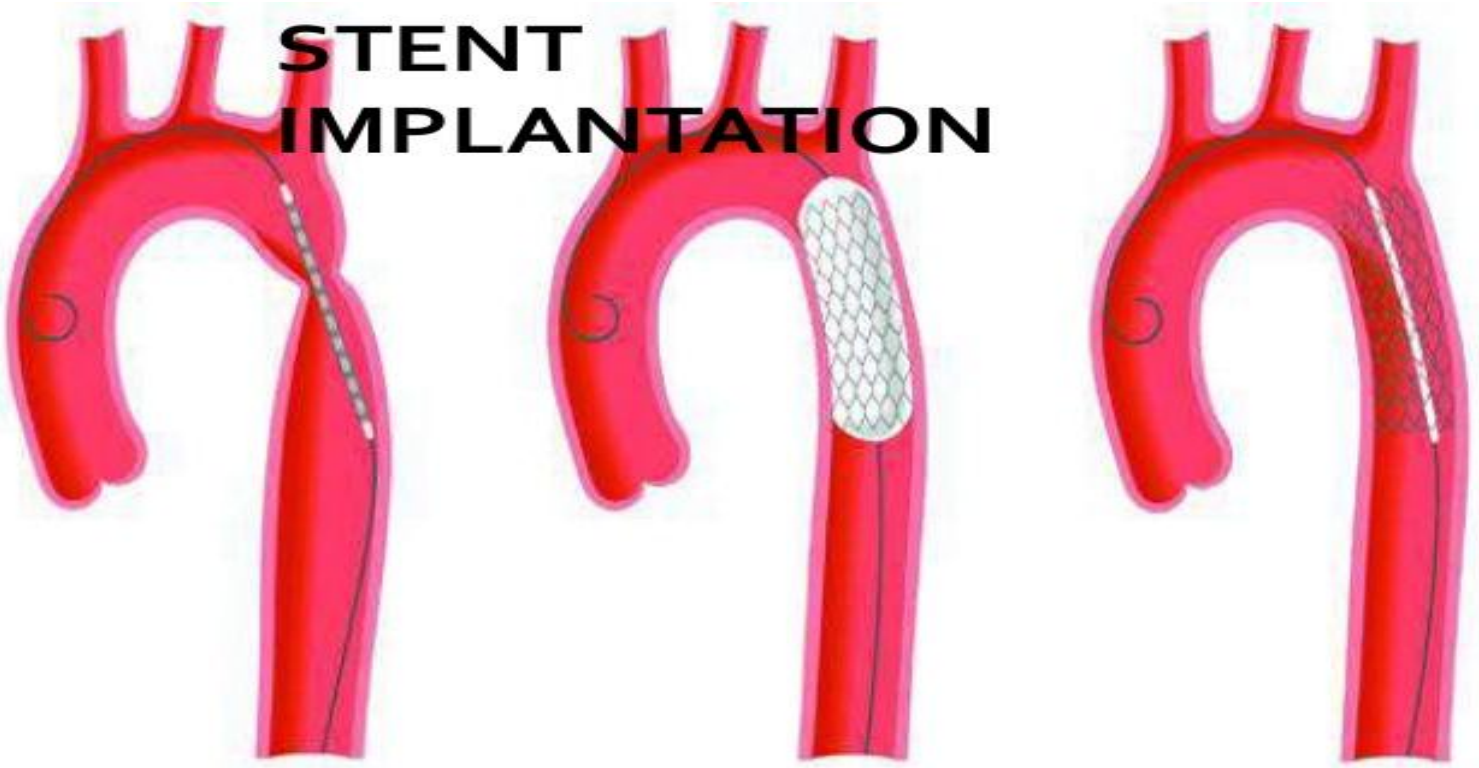
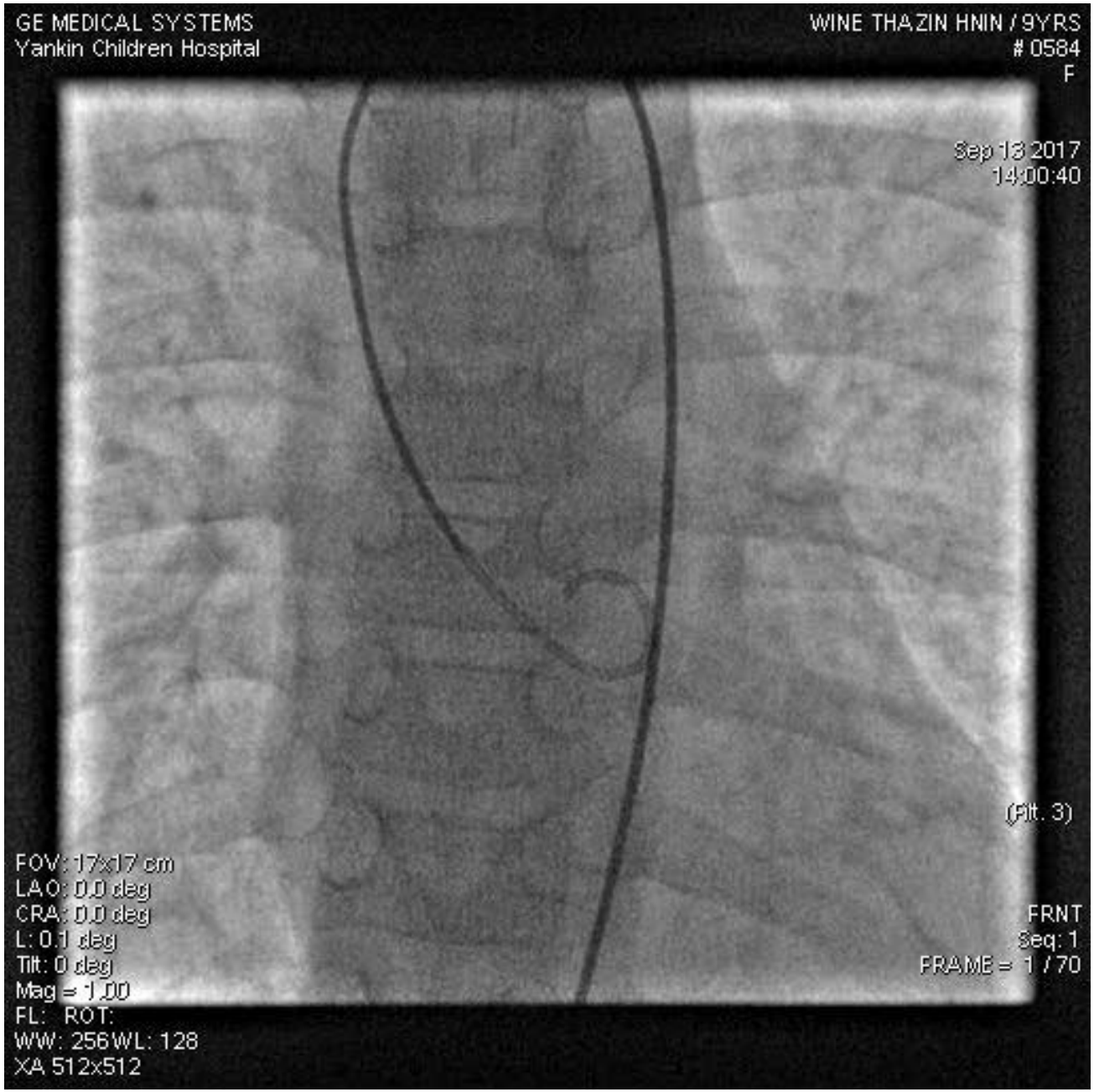
Balloon Angioplasty

Coarctation of aorta



STENT IMPLANTATION

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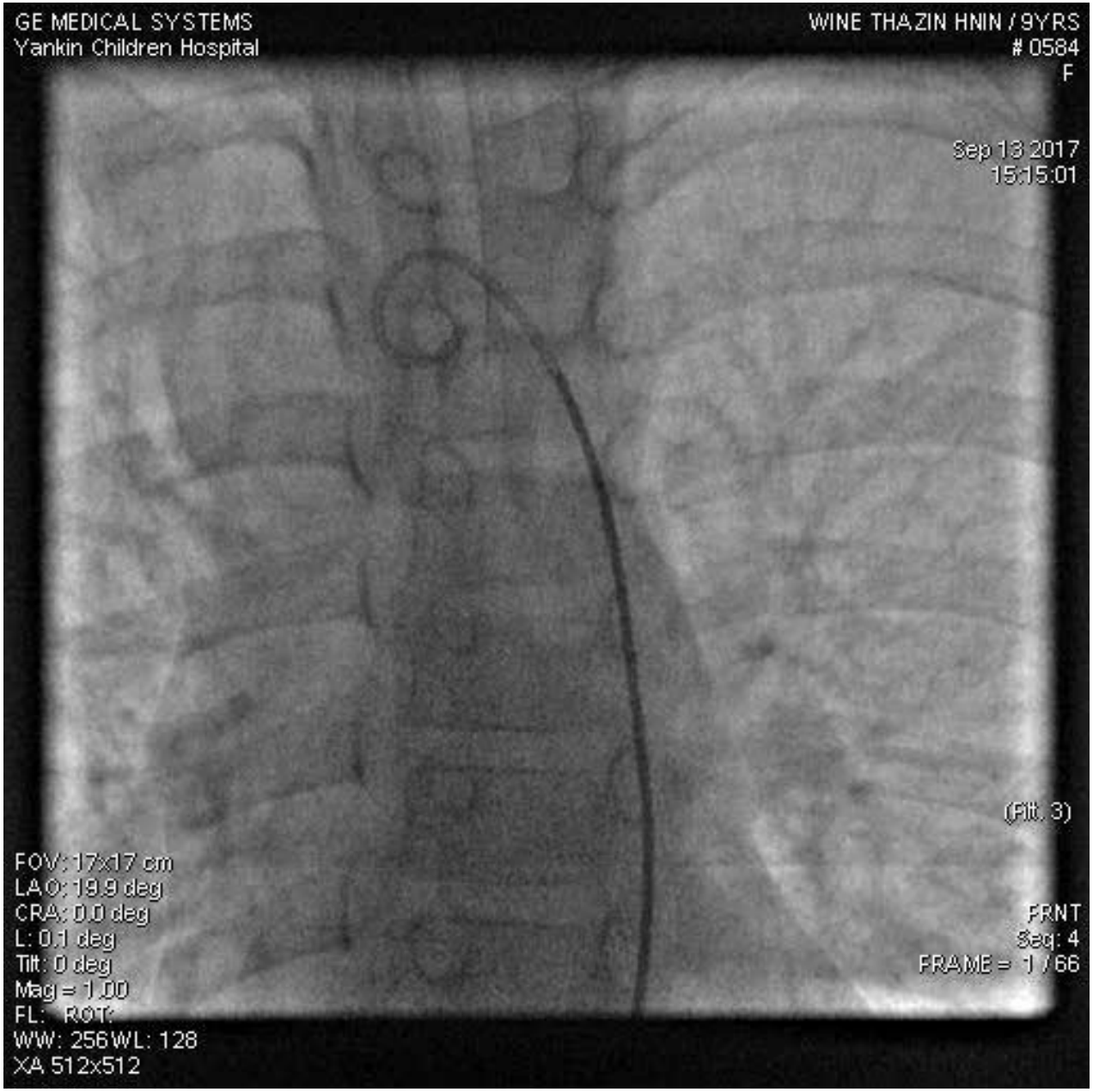
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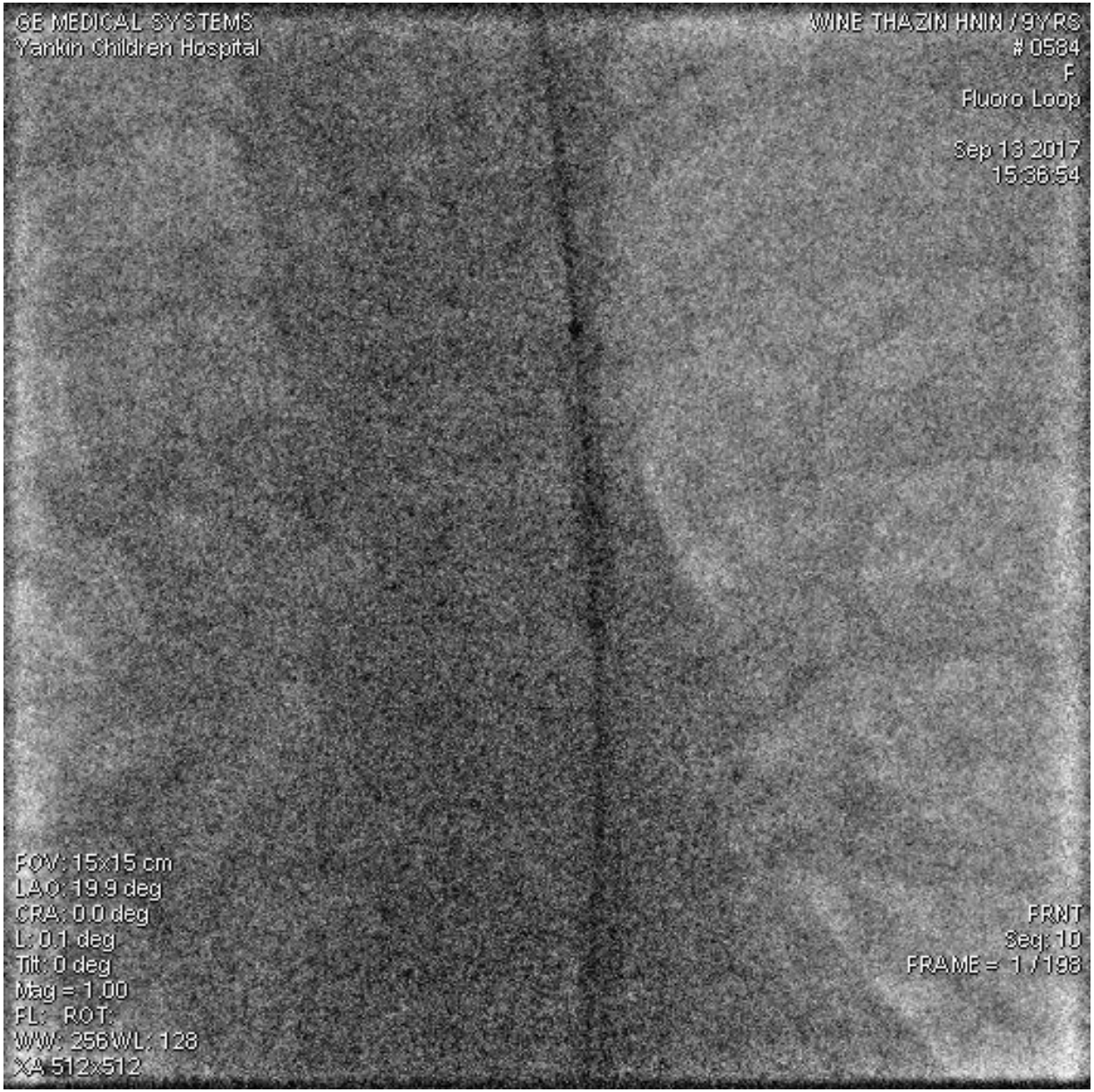
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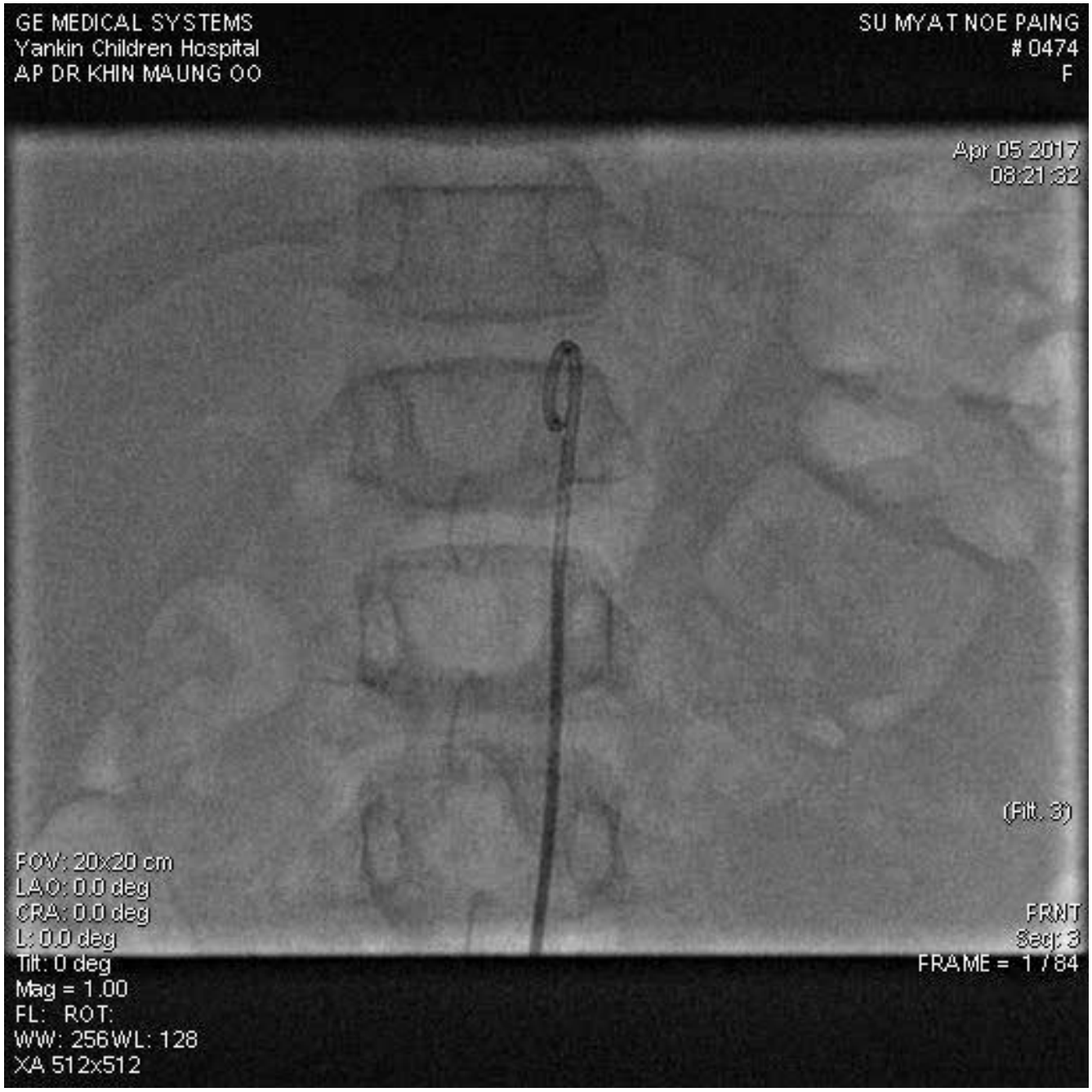
Renal artery stenosis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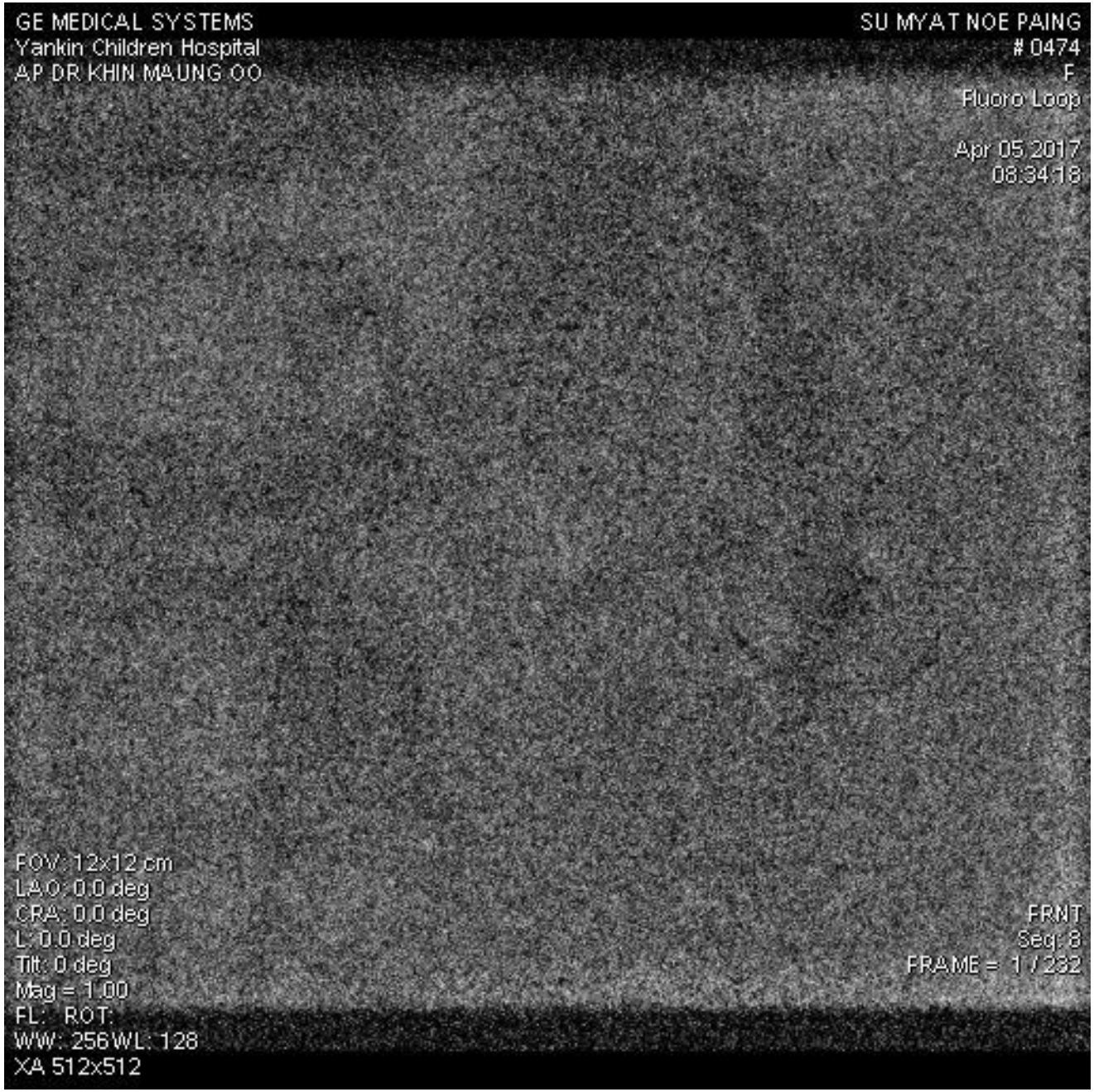
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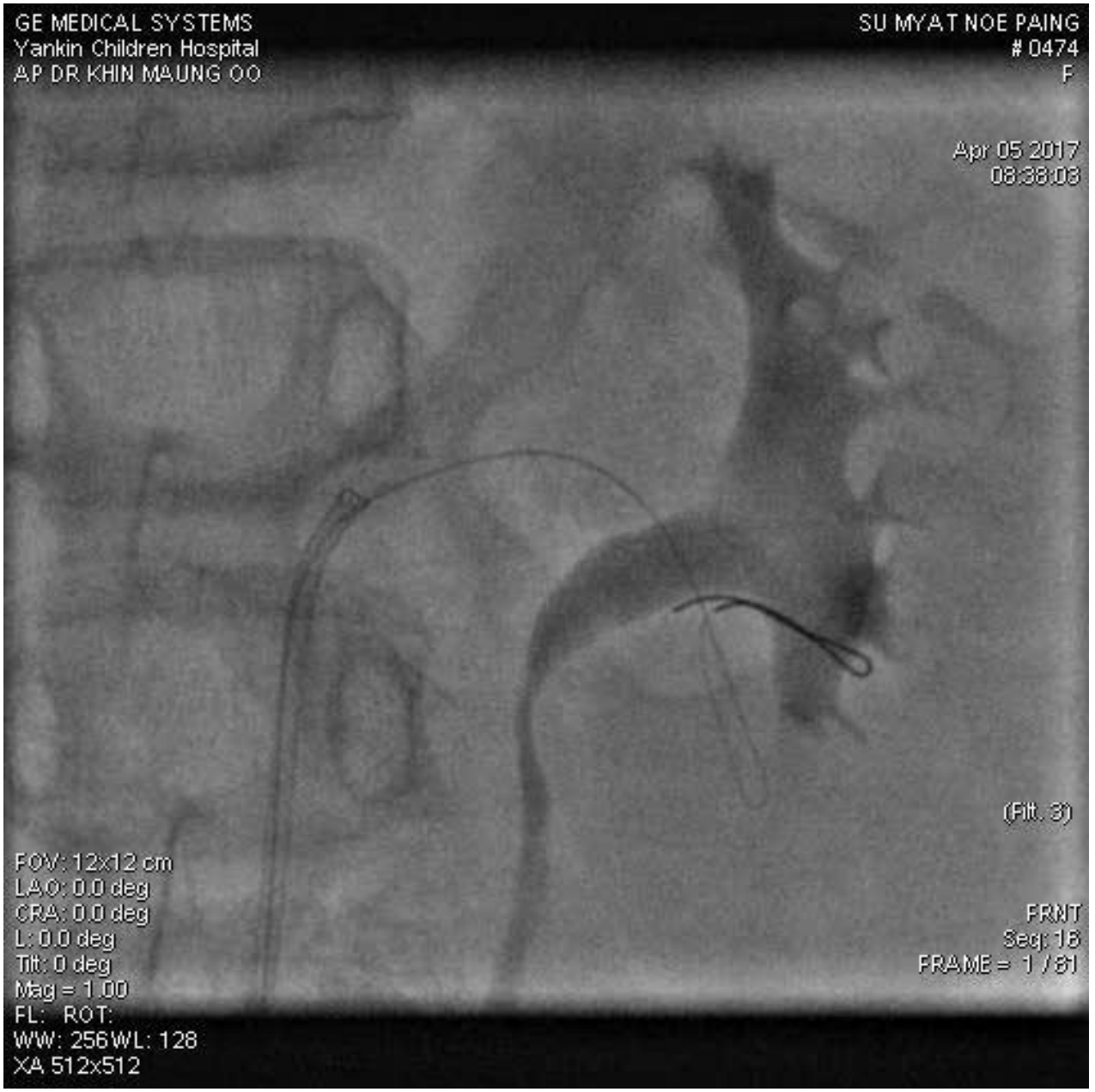
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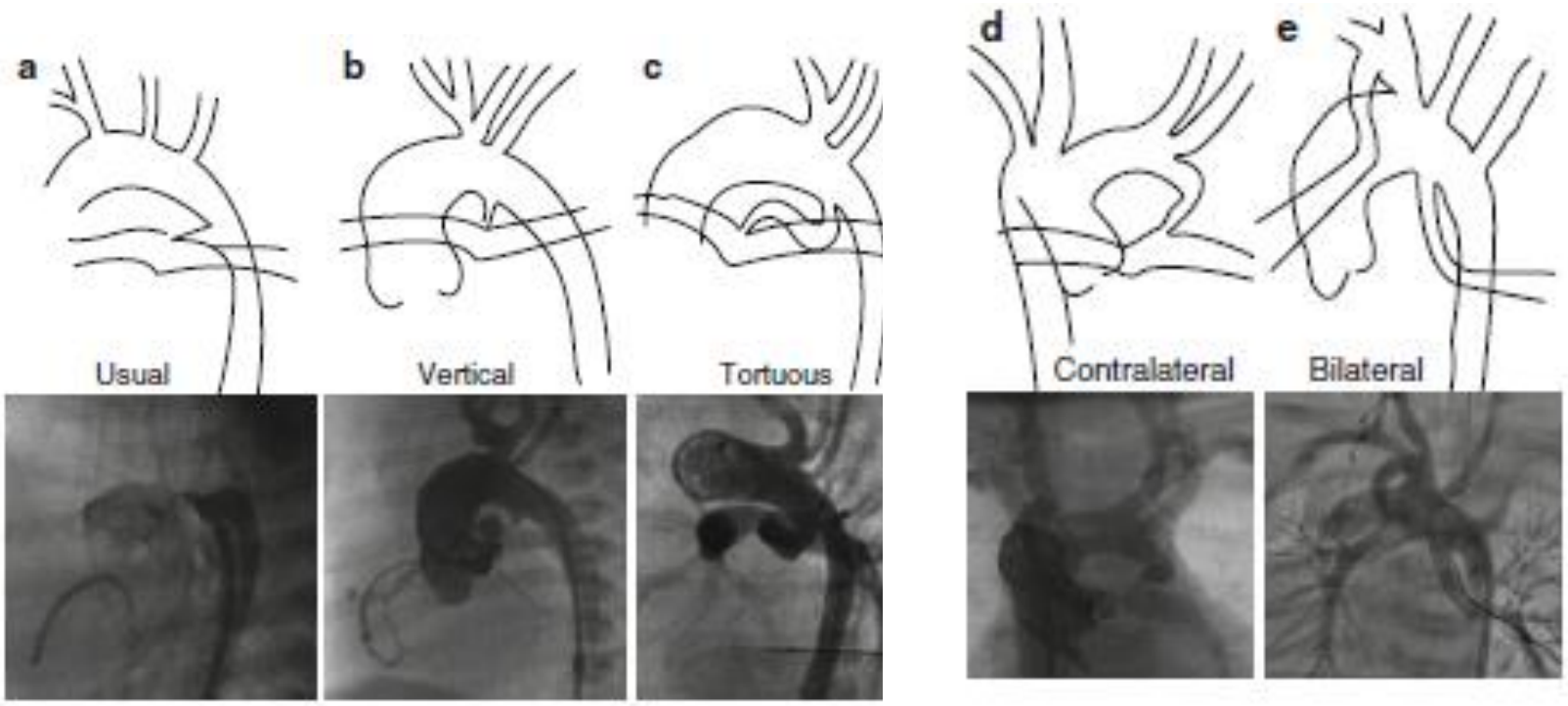
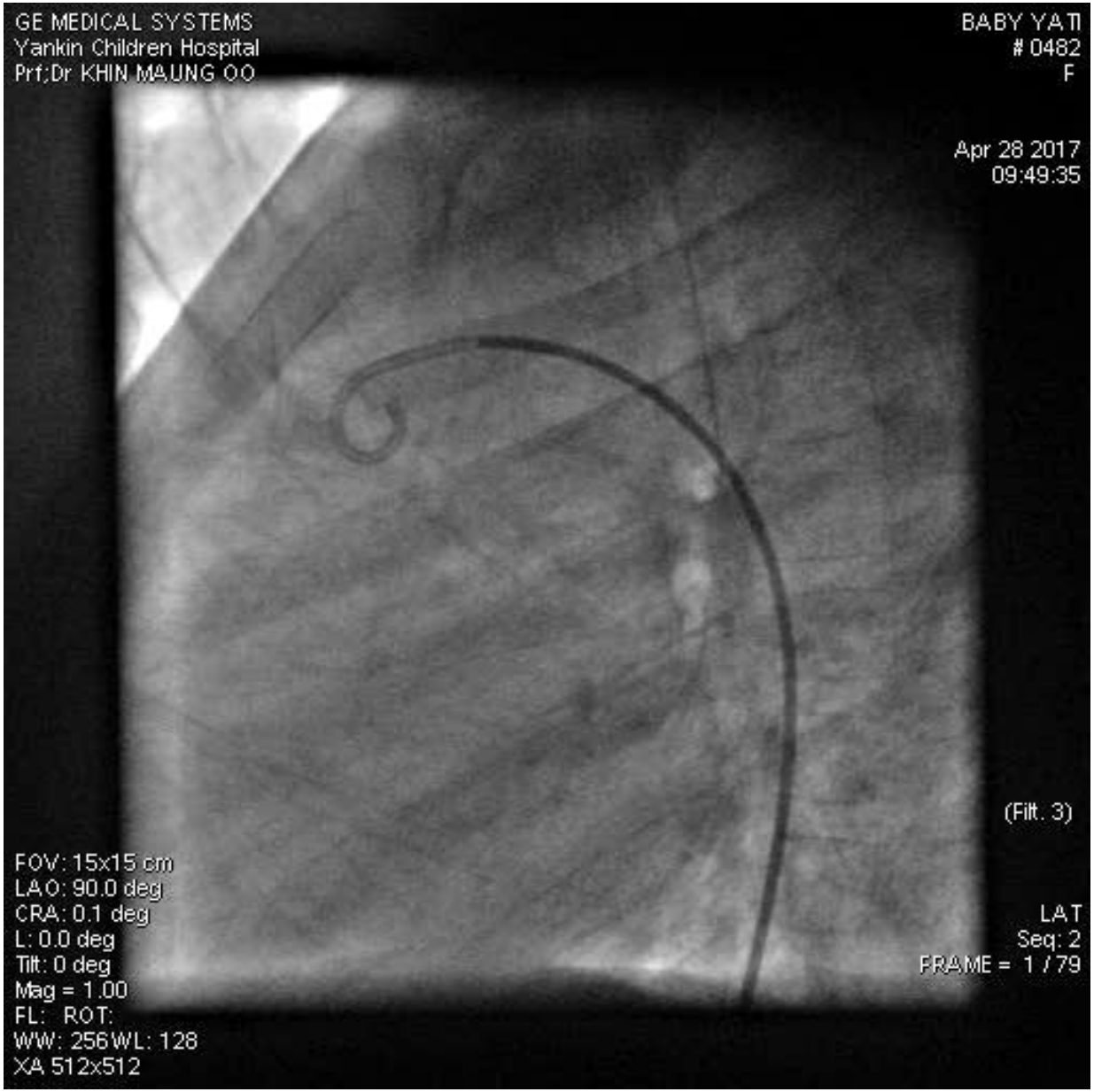
PDA stenting for duct dependent pulmonary circulation

- Ductal stenting provides a nonsurgical attractive alternative option to surgical aortopulmonary shunts
- Comparing to surgical shunt, less ICU stays and bleeding, less frequent use of transfusion and inotropes

Different ductal morphology



- A 2 year old boy with cyanosis
- Sat: 70% on RA
- 2DE (30/03/2016): D - TGA. Severe pulmonary valvular stenosis. VSD. Small PDA. No ASD.
- Suggested to do BT shunt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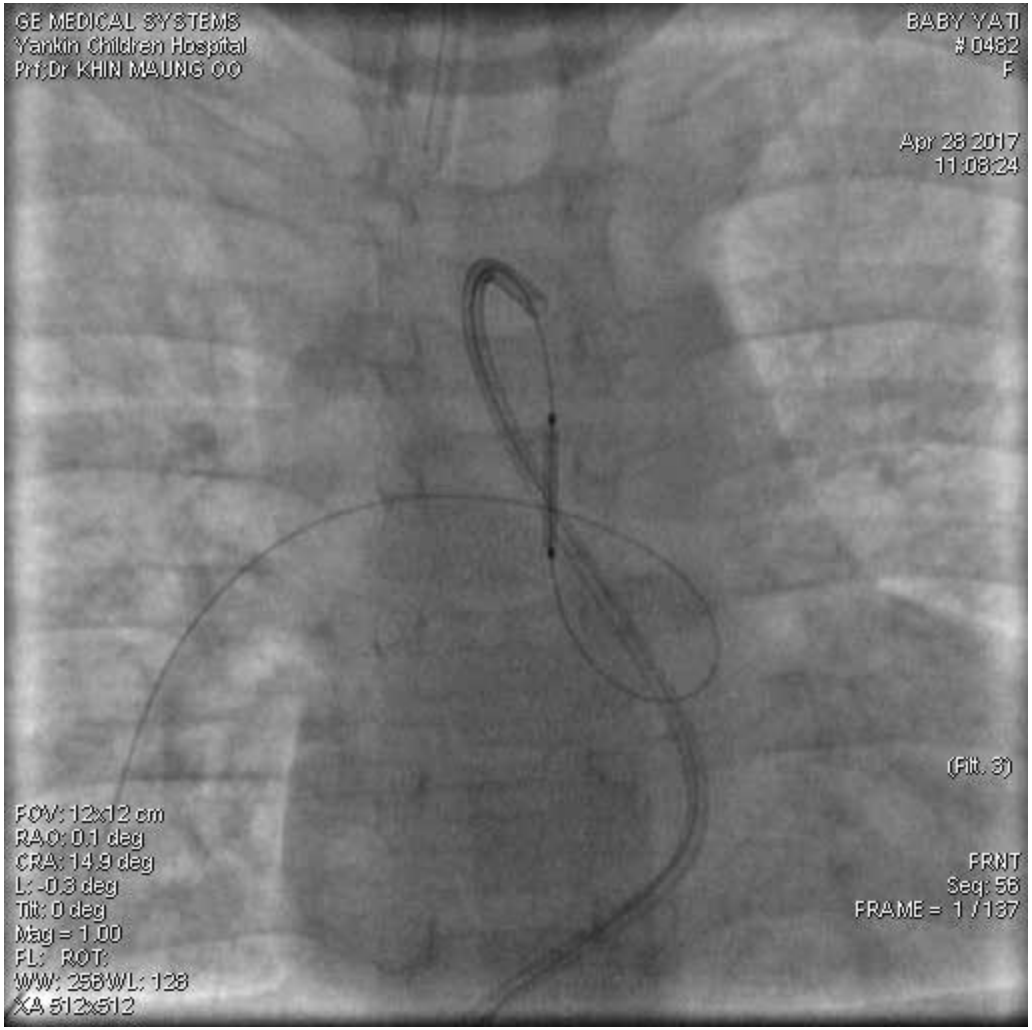
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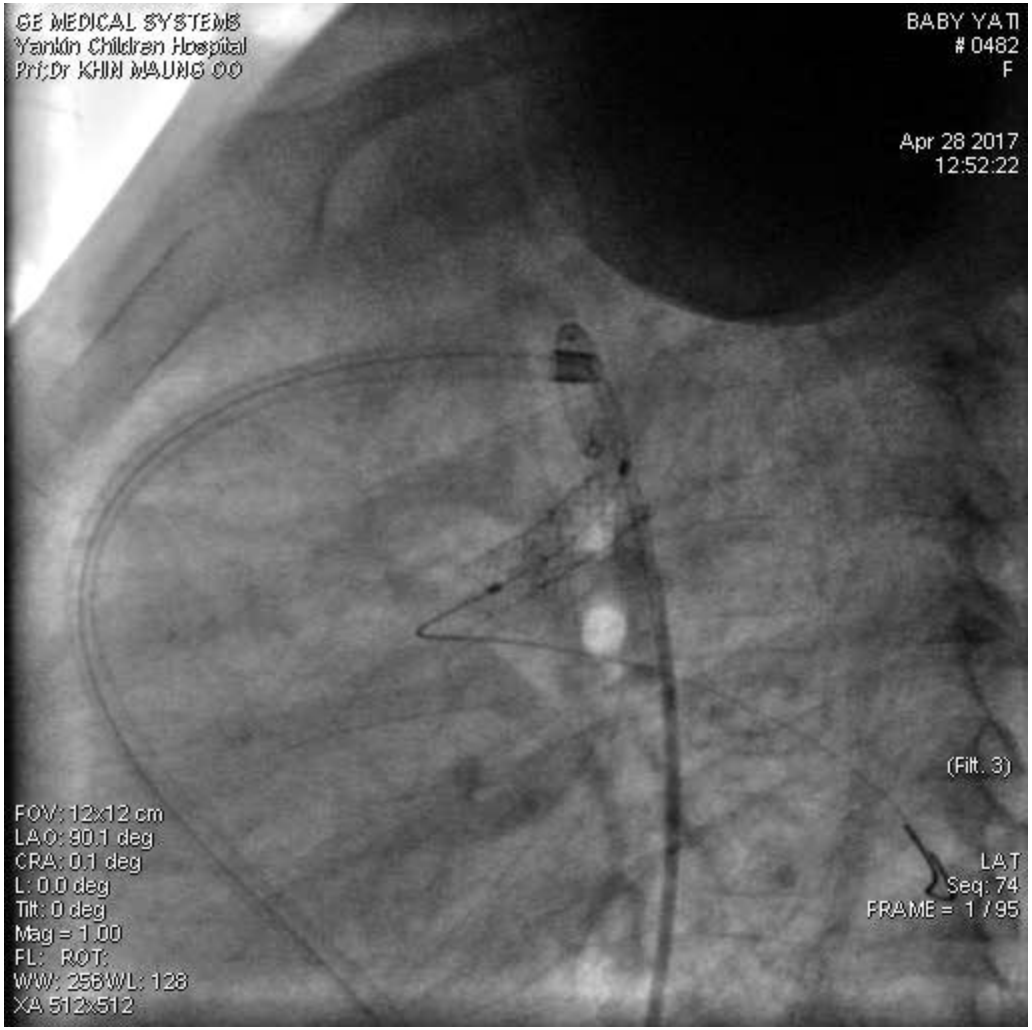
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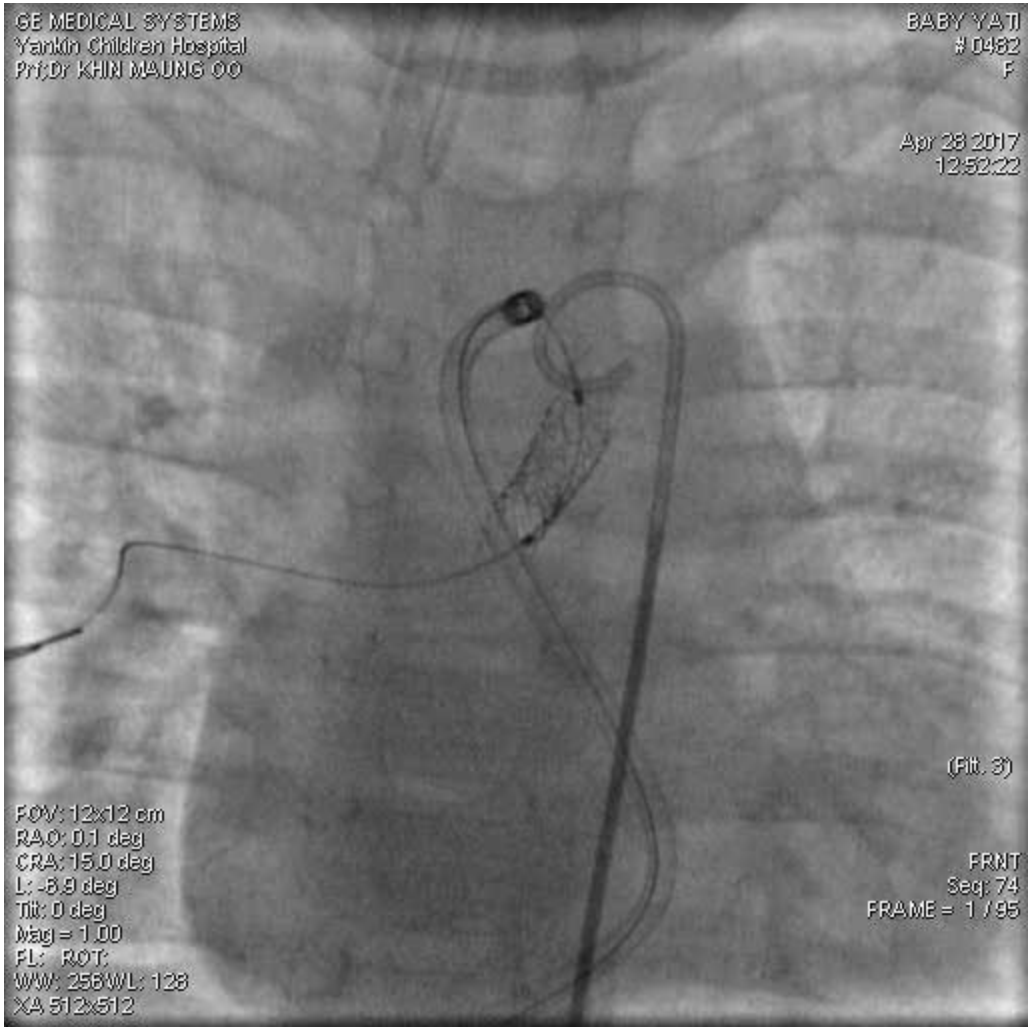
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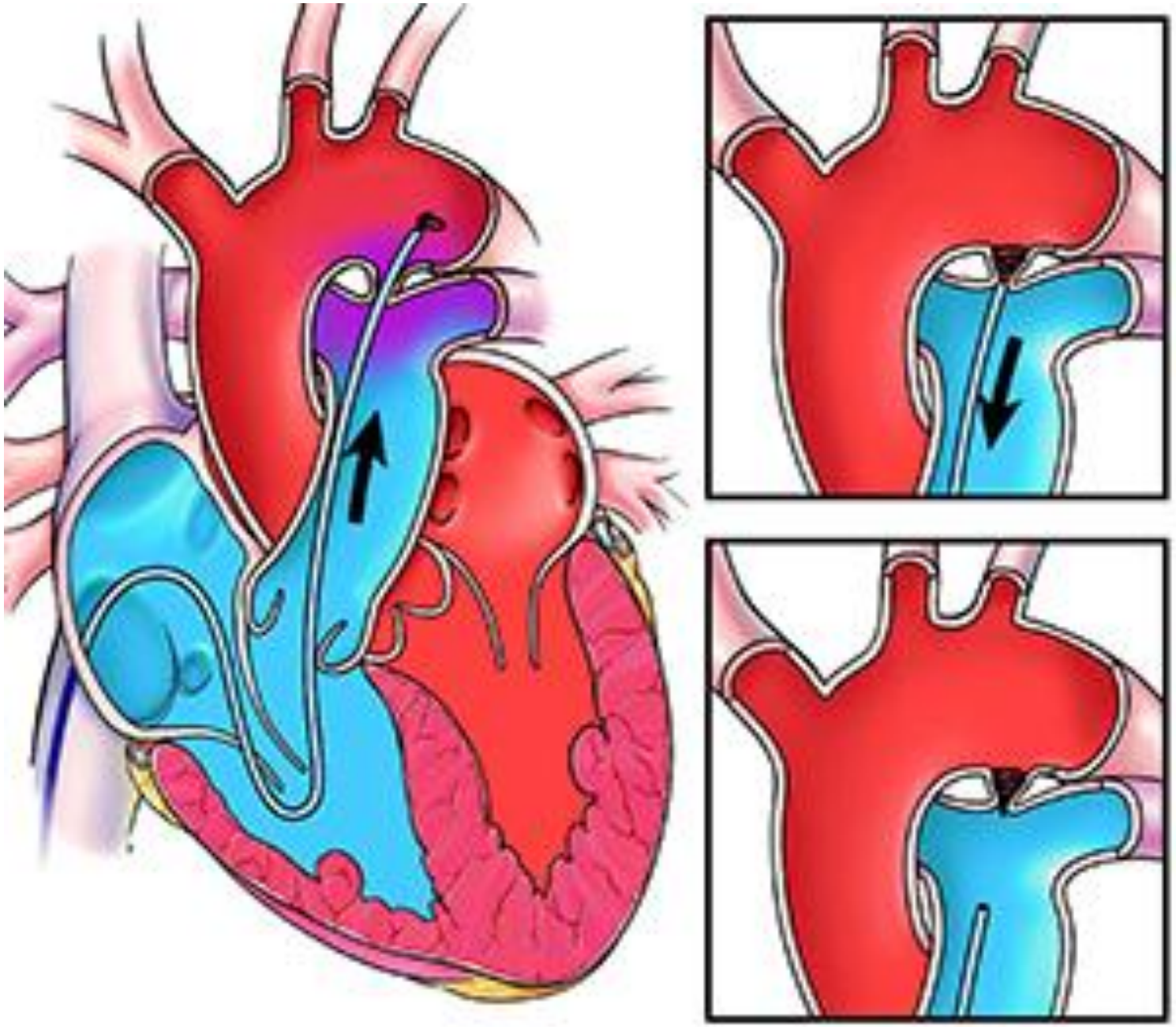
Closing defects

1. Patent Ductus Arteriosus

❖ Coil occlusion of the PDA was introduced by Cambier et al in 1992

❖ now considered to be first-line treatment.

❖highly successful at closing small and very large PDAs,



Indications for PDA closure

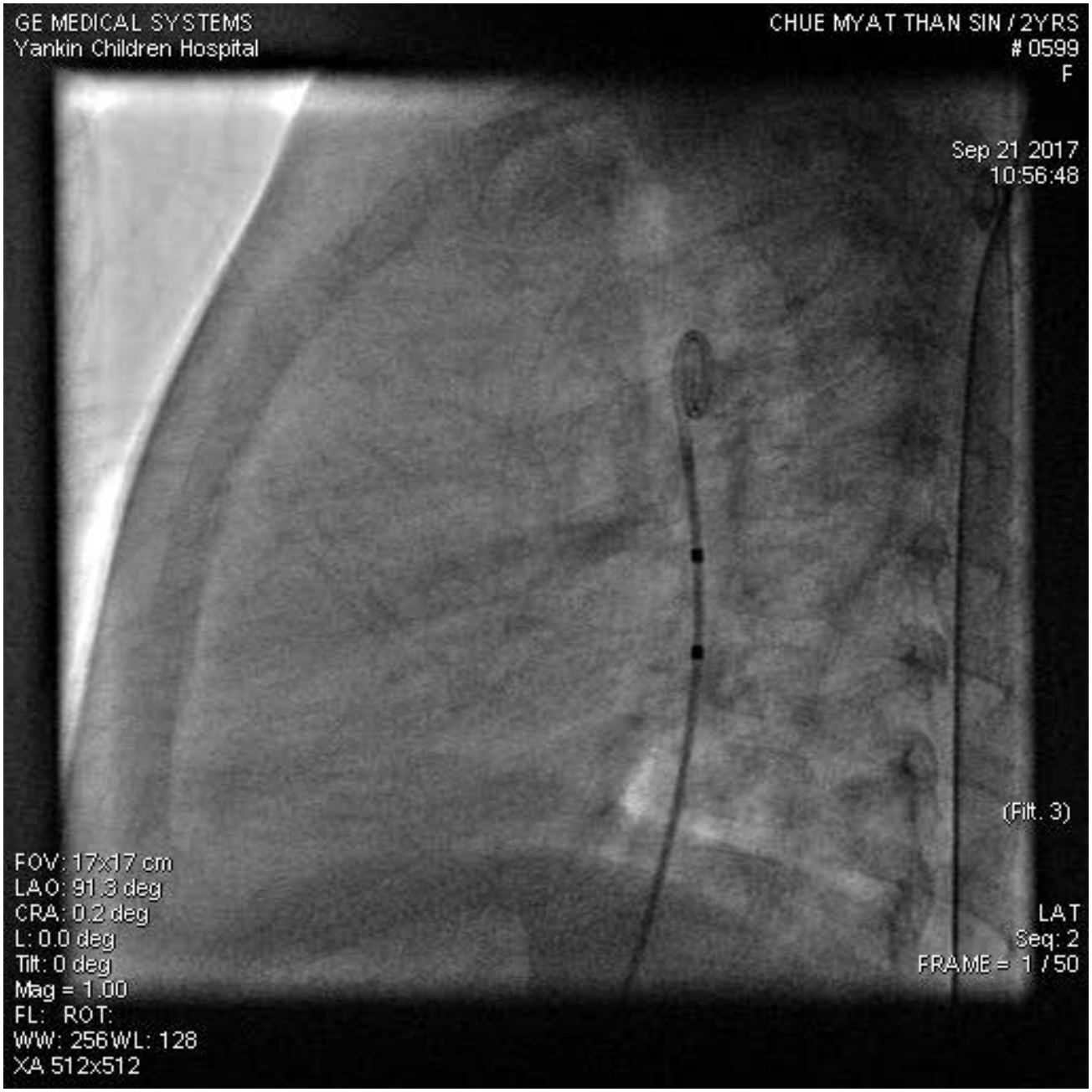
- Symptoms of heart failure
- Signs of left heart volume overload with an echo evidence of a significant left to right shunt through a PDA
- (1) LA enlargement (LA –Ao ratio > 1.5)
- (2) LV enlargement (LVEDD >+2 SD for the age)

- Patient selection for PDA device closure
- Minimal body weight – 6-7 Kg (the use of devices or coils in small infants with large PDA may have a high incidence of complications)

Amplatzer Duct Occluder

ADOI **ADO II** **ADO II AS**

PFM nit occluded PDA Coil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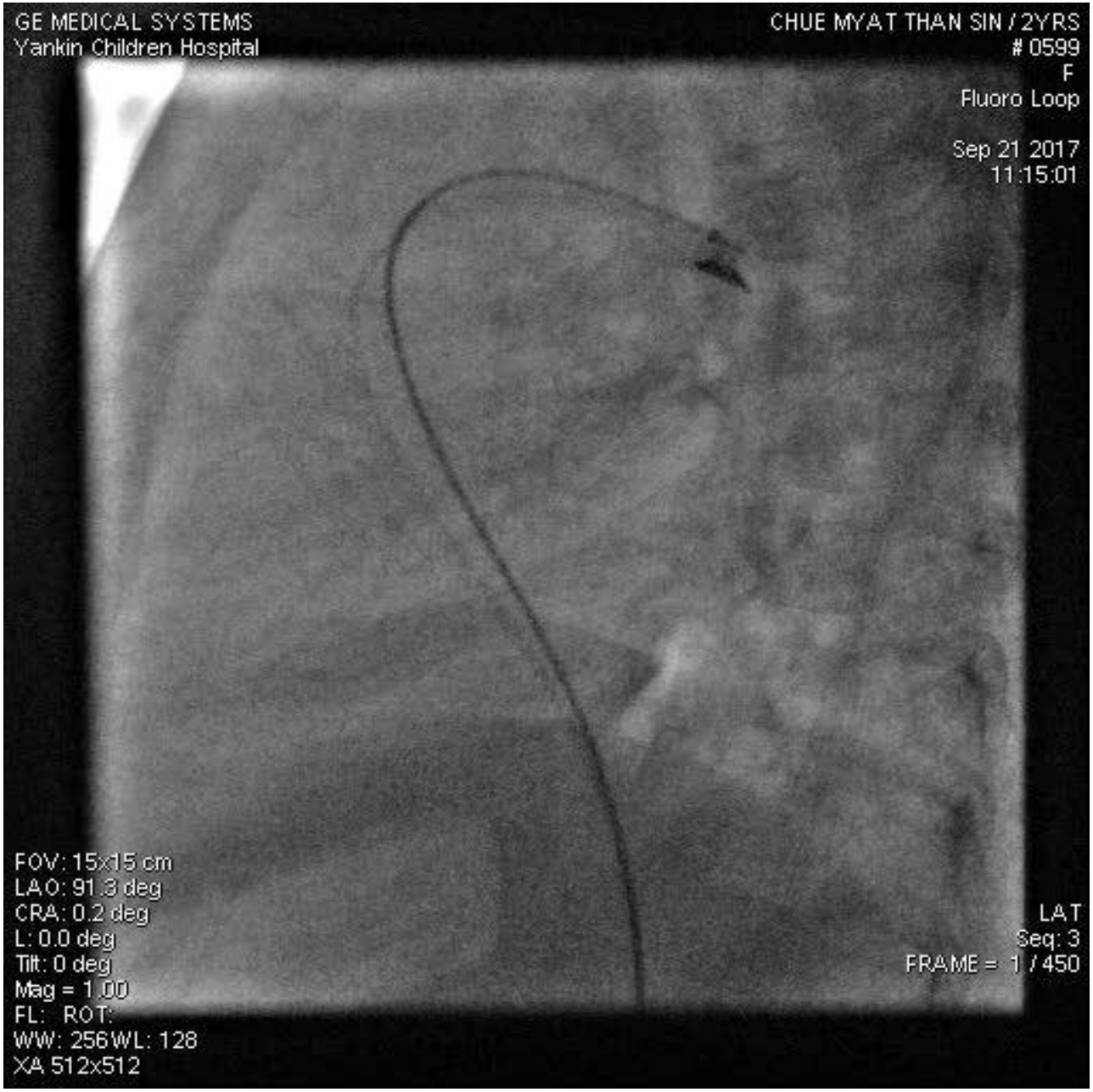
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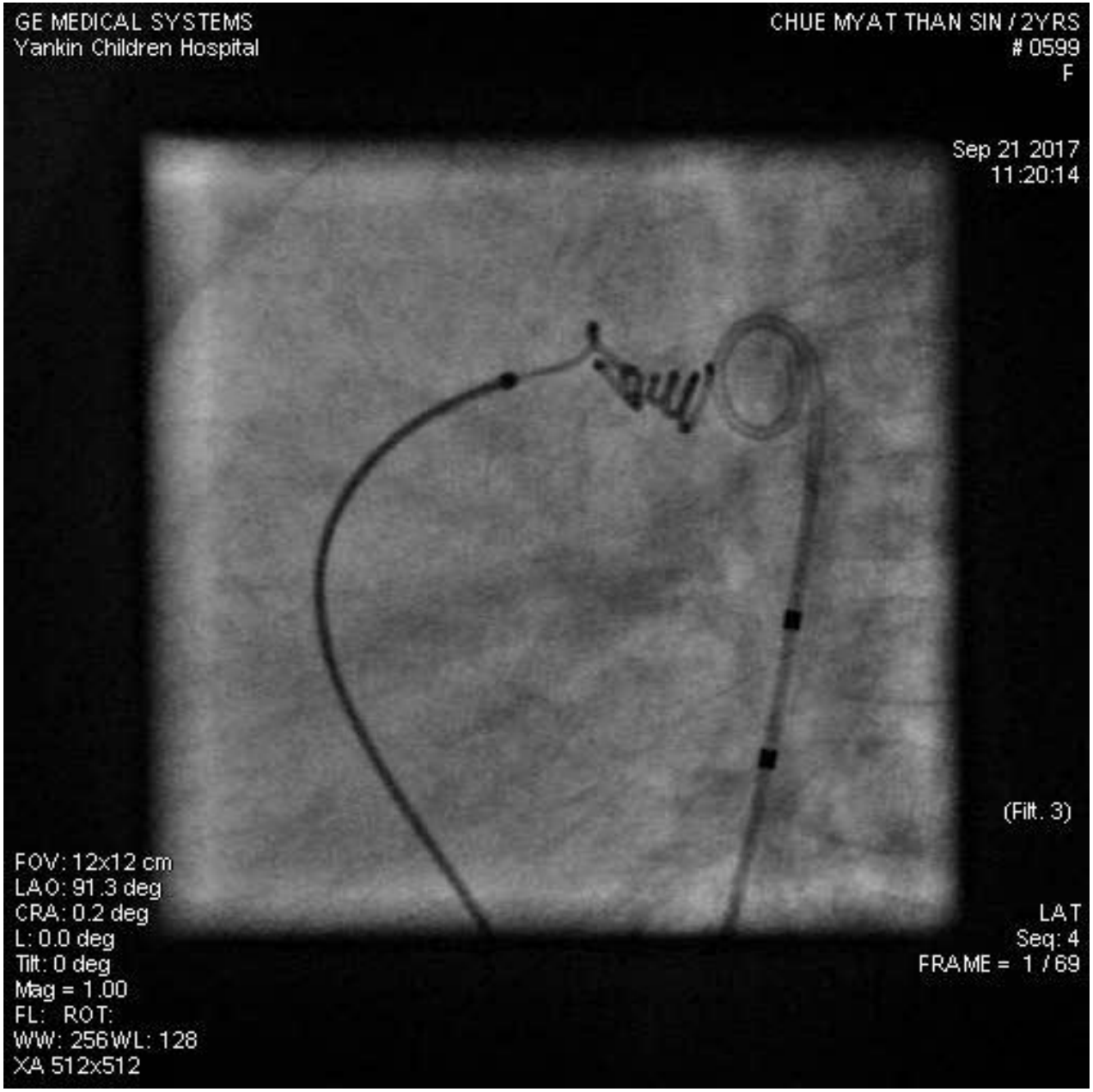
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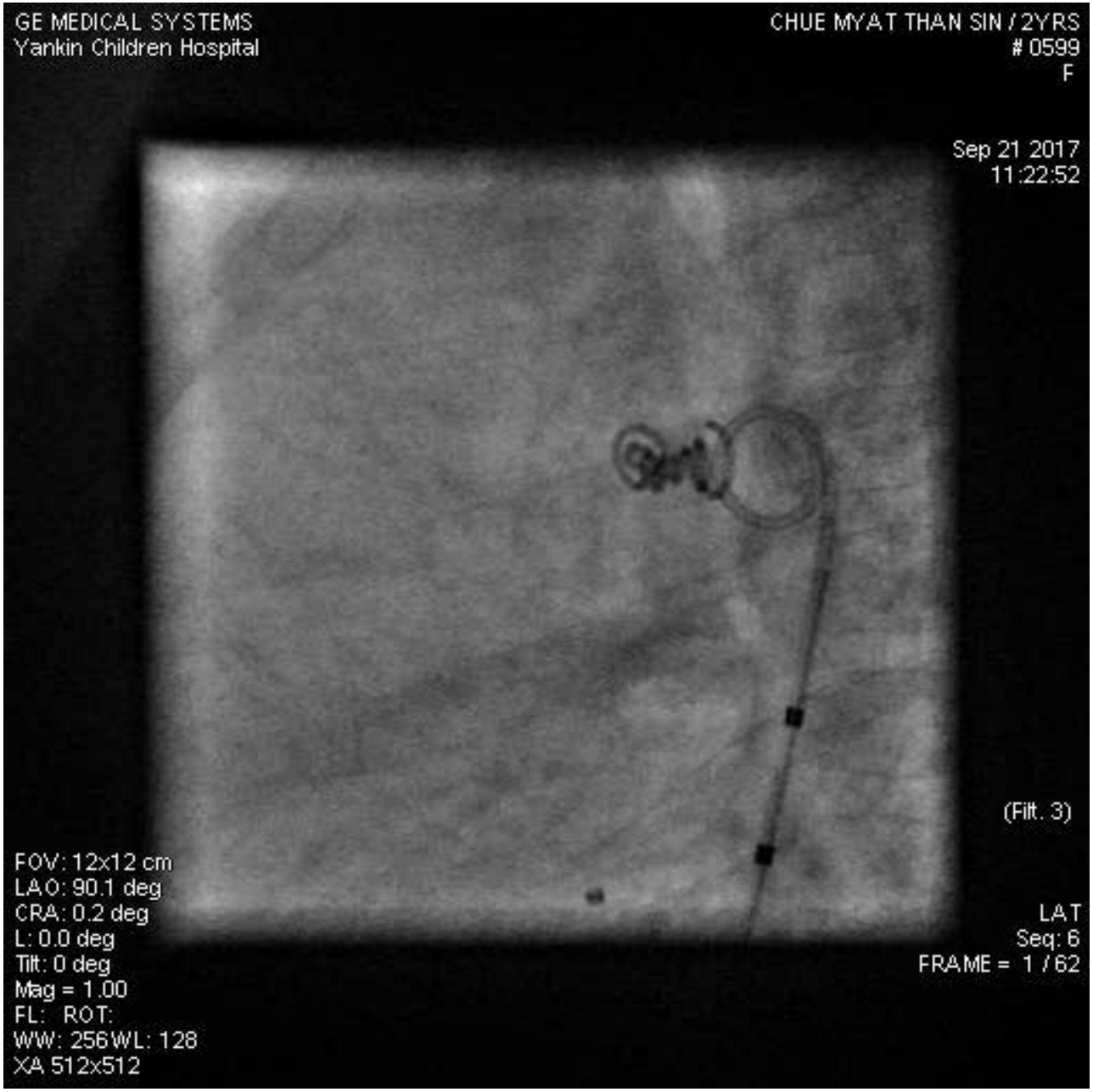
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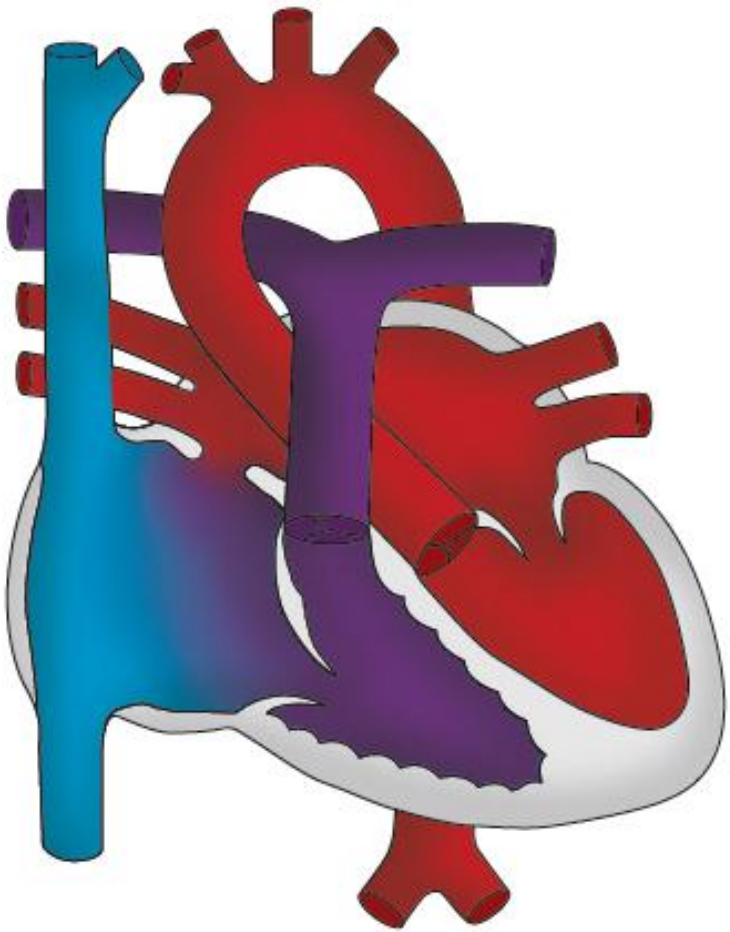
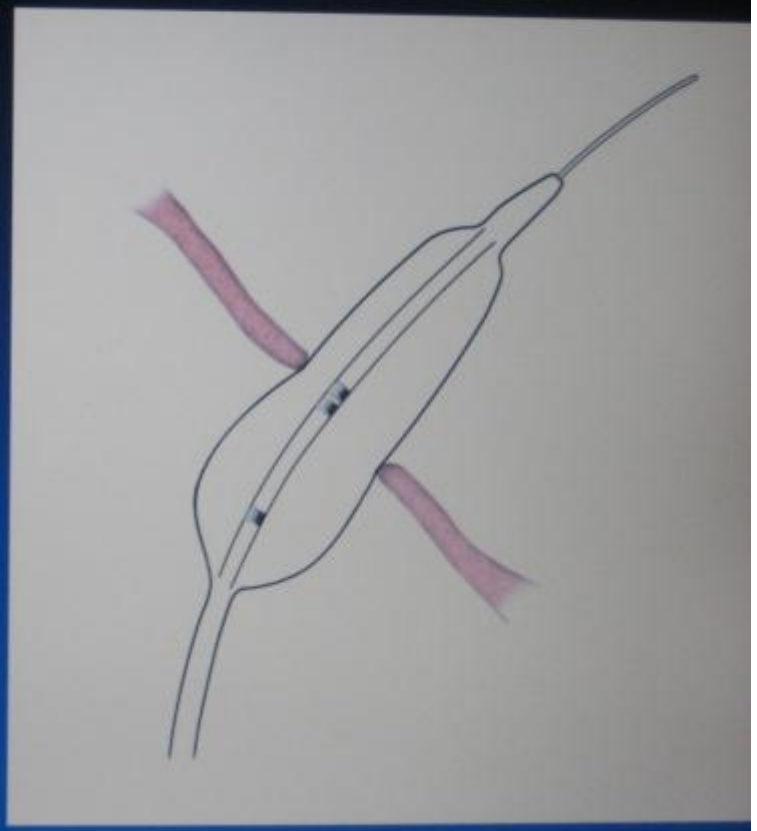
2. Atrial Septal Defect

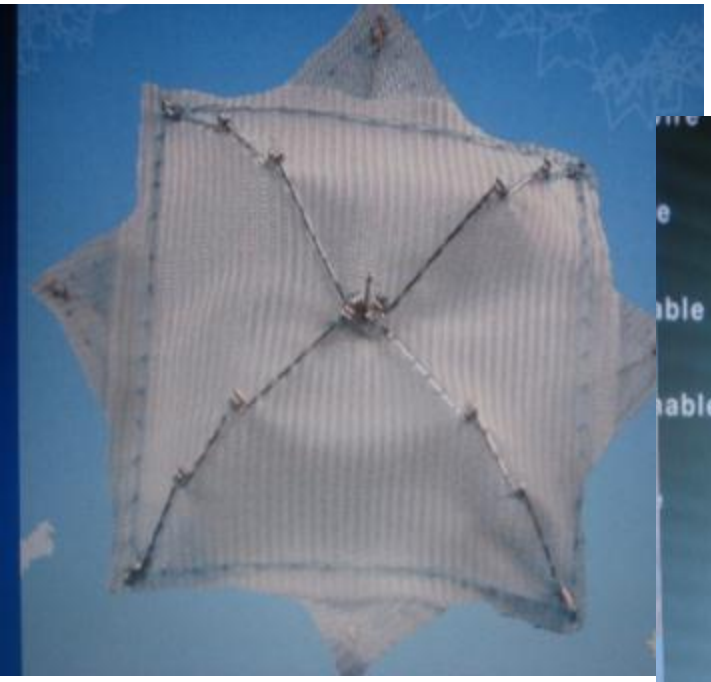
- by King et al, in 1974
- Effective occlusion rate is 85-99% immediately after closure
- transcather occlusion is now considered to be the treatment of choice for patients with suitable defects.

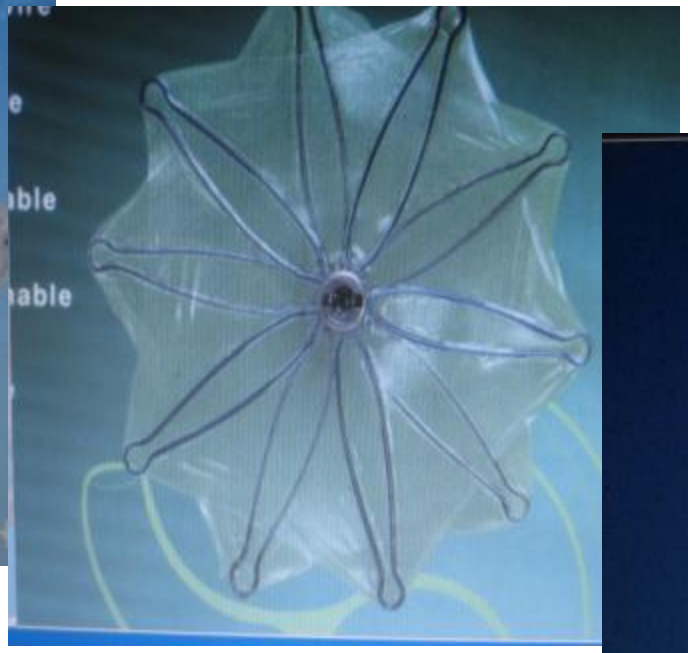


Sizing Balloon for ASD Closure

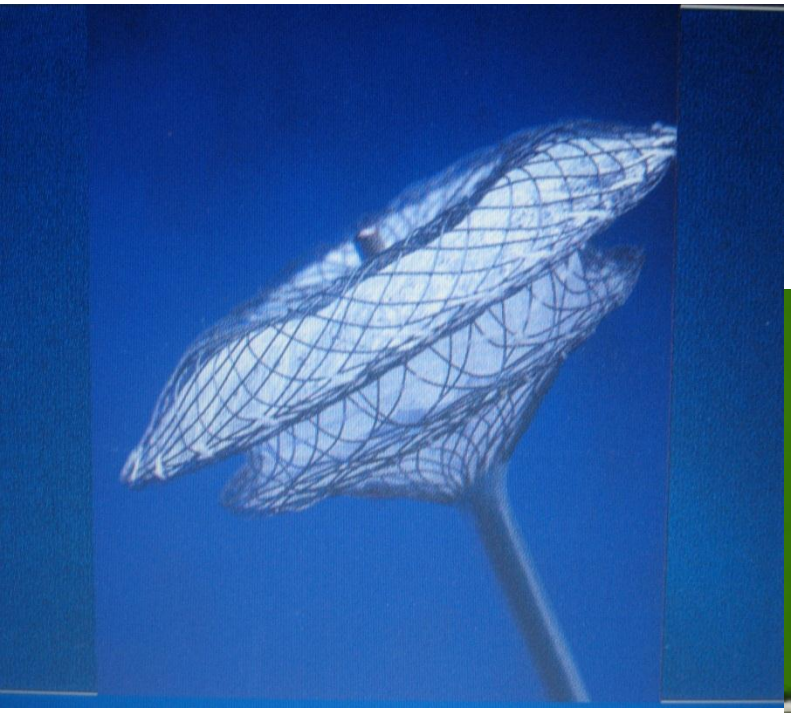


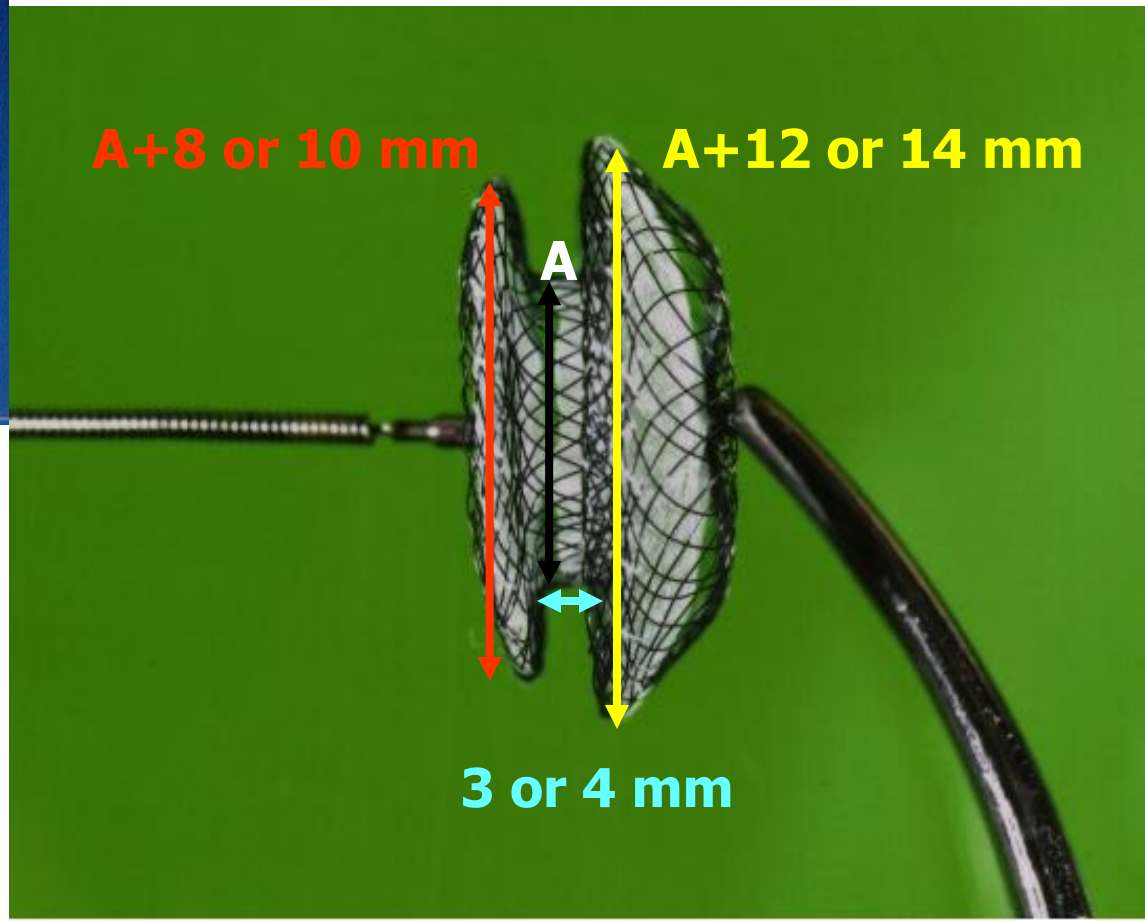
catheter closure of secundum atrial septal defect (ASD) has been performed using various devices.

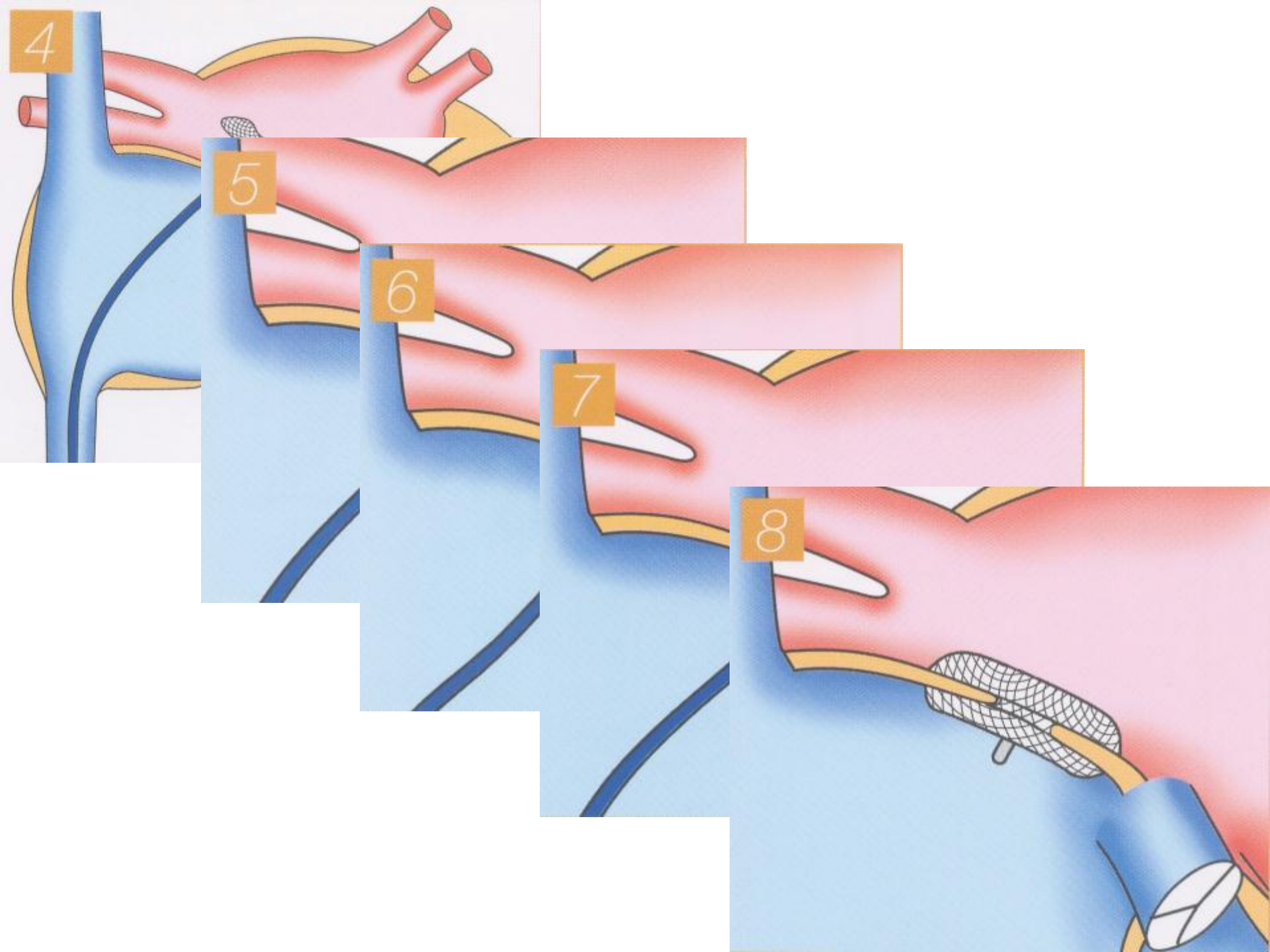




The most commonly used device is Amplatzer Septal Occluder (ASO).



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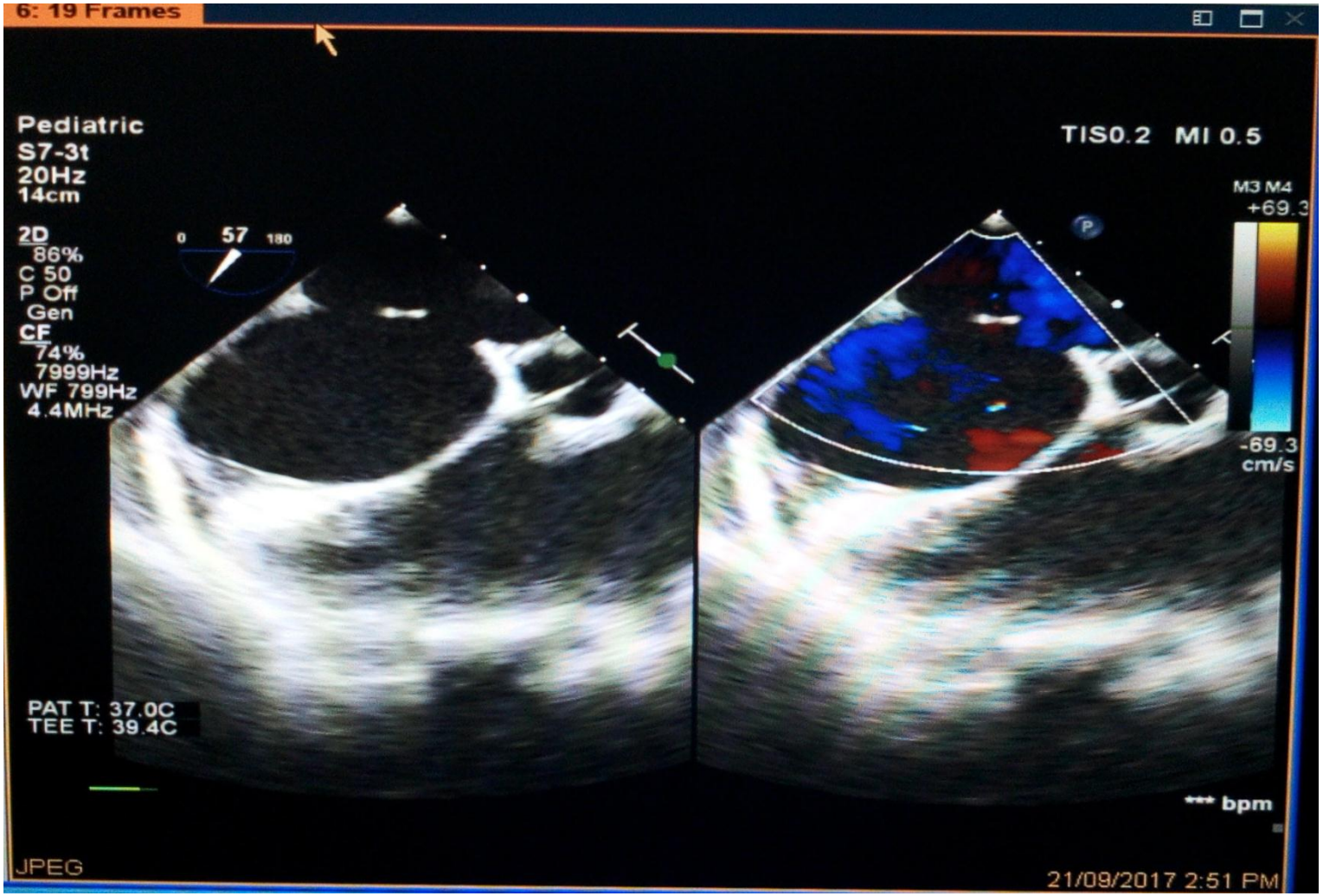
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57
180
TIS0.2 MI 0.5
M3 M4
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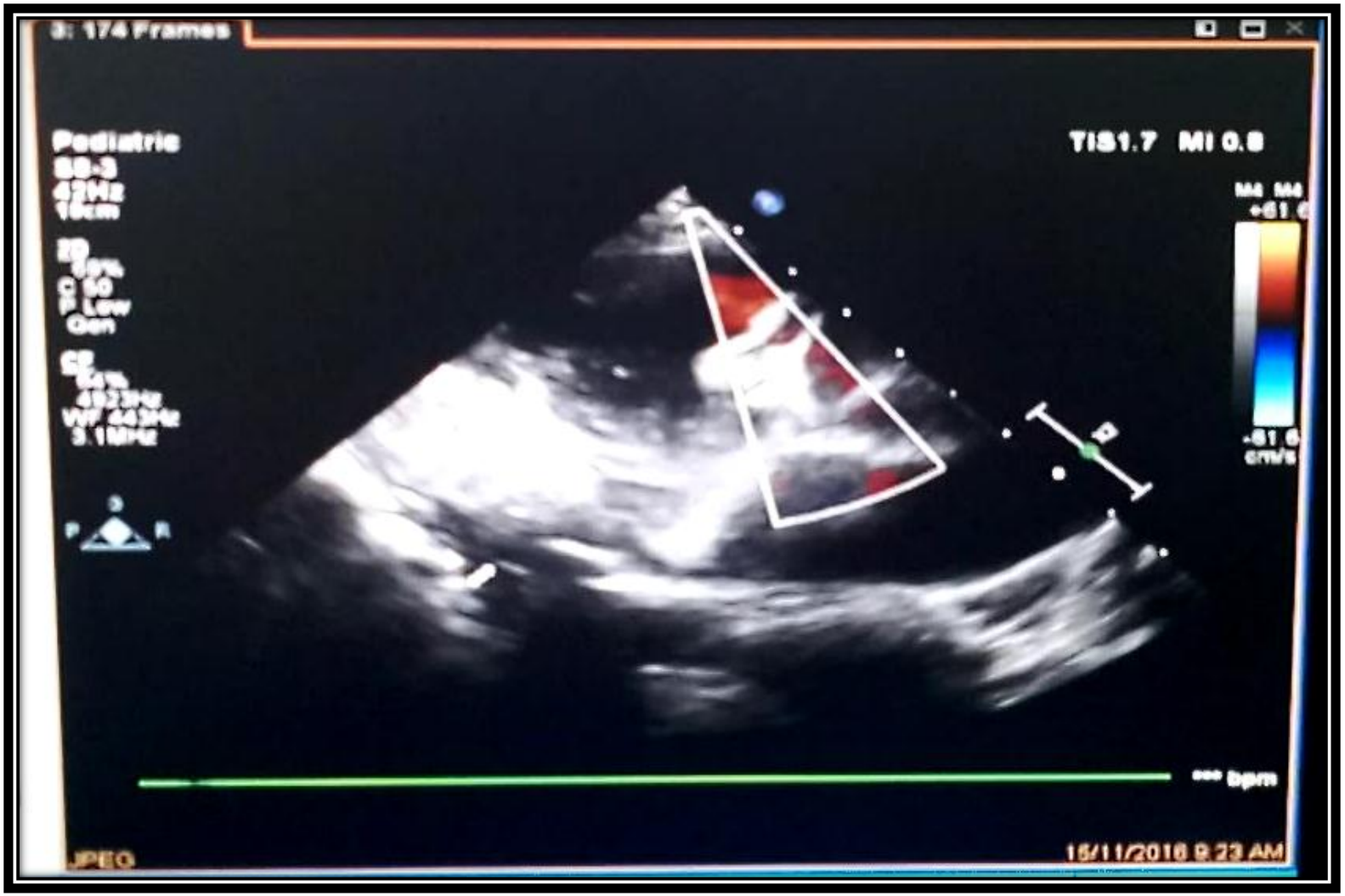
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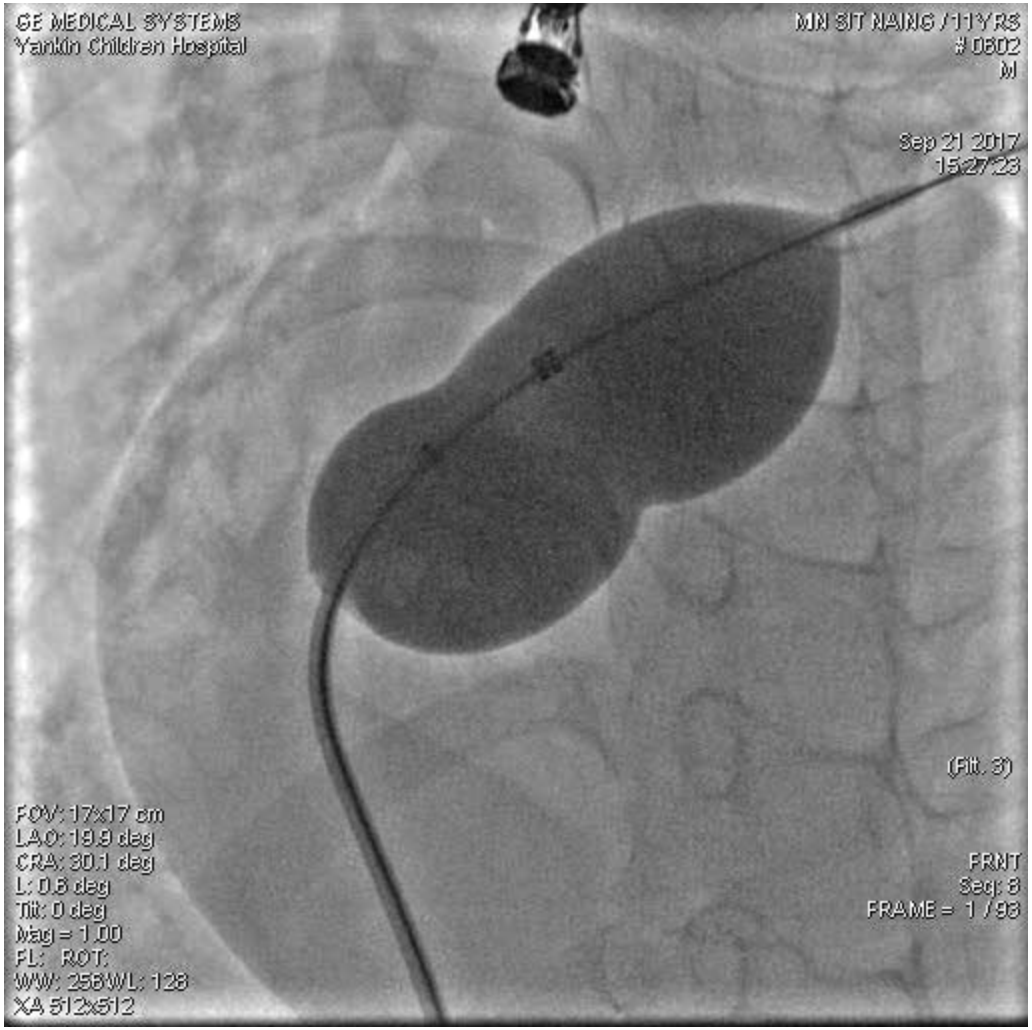
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Yankin Children Hospital
MIN SIT NAING / 11YRS
0602
M
Sep 21 2017
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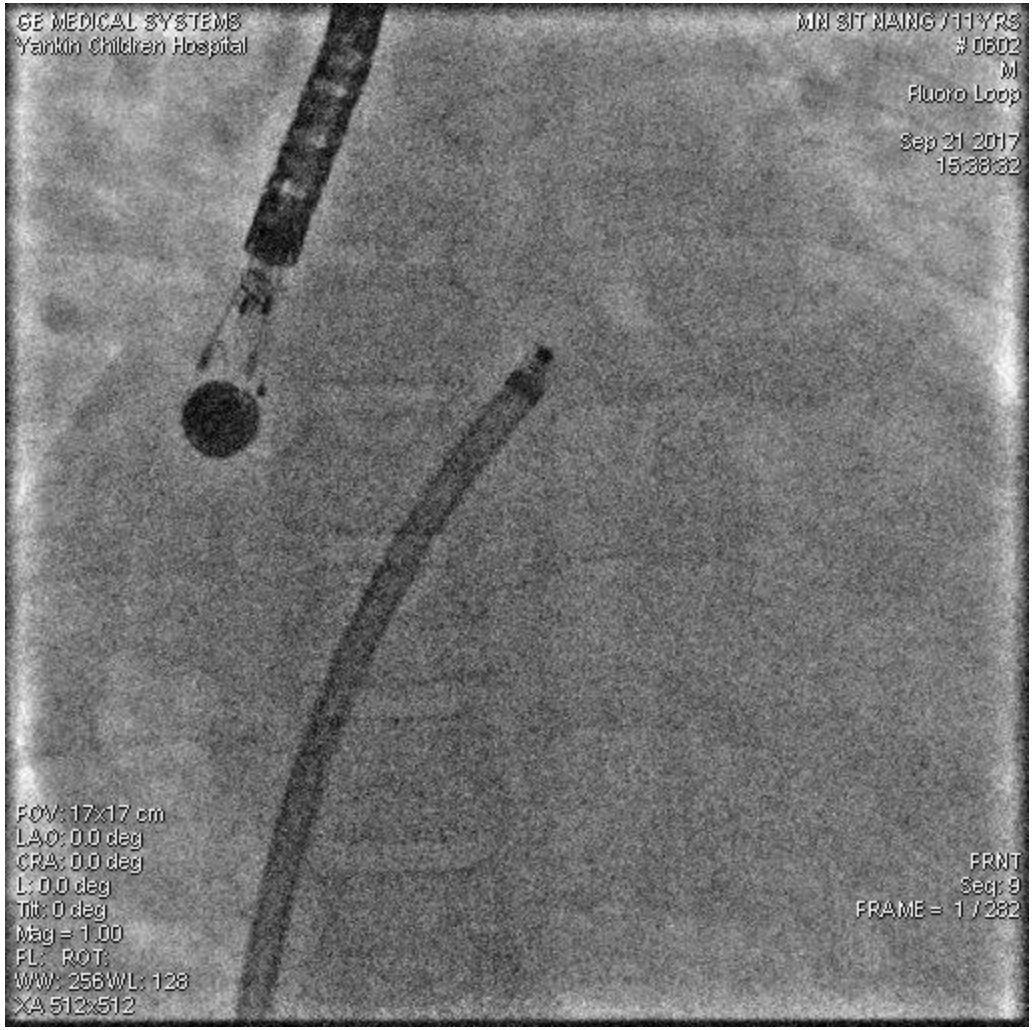
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MIN SIT NAING / 11YRS
0602
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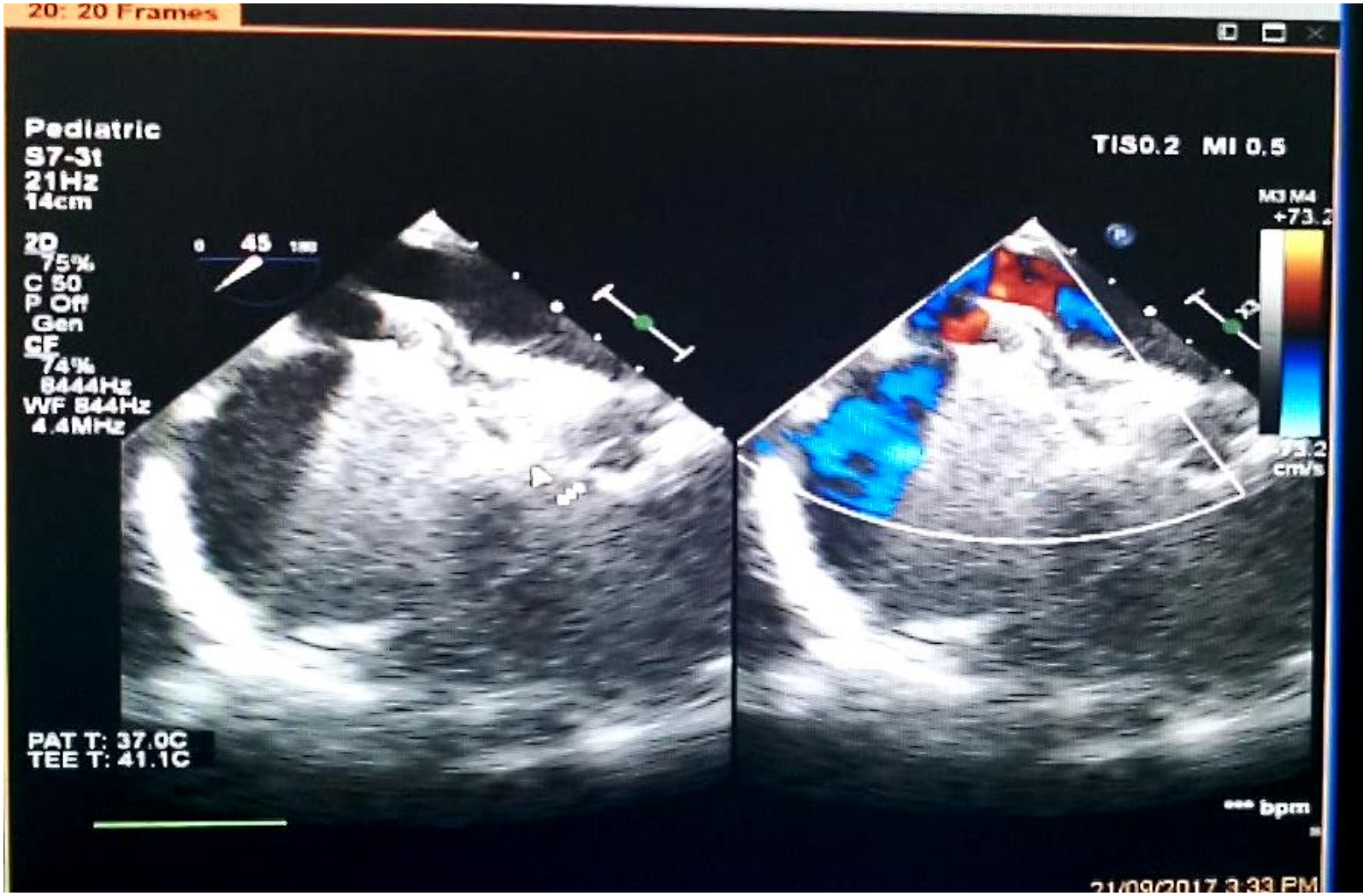
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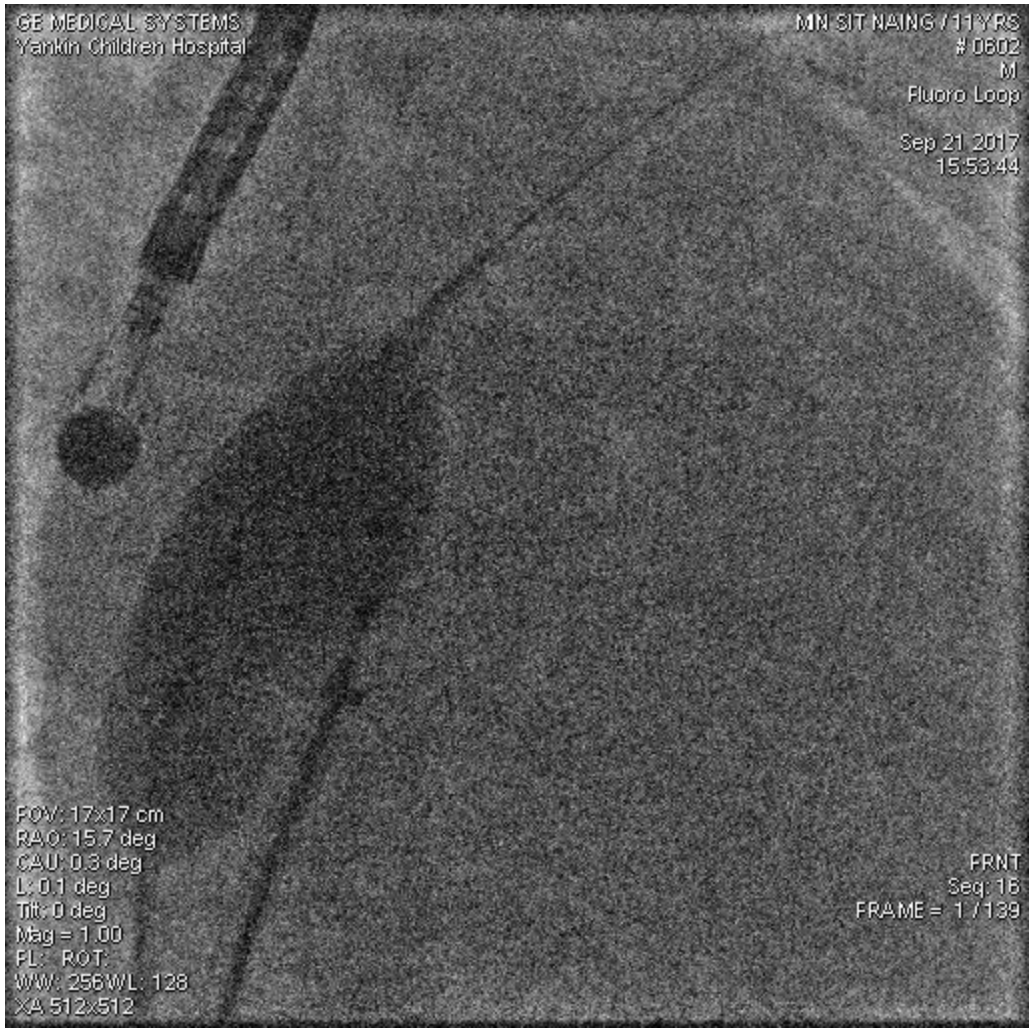
Pediatric
S7-3t
21Hz
14cm
ZO
75%
C 50
P Off
Gen
CF
74%
8444Hz
WF 844Hz
4.4MHz
0 45 180
TIS0.2 MI 0.5
M3 M4
+73.2
73.2
cm/s
PAT T: 37.0C
TEE T: 41.1C
bpm
21/09/2017 3:33 PM


GE MEDICAL SYSTEMS
Yankin Children Hospital
MN SIT NAING / 11YRS
0602
M
Fluoro Loop
Sep 21 2017
15:53:44
FOV: 17x17 cm
RAO: 15.7 deg
CAU: 0.3 deg
L: 0.1 deg
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Mag = 1.00
PL: ROT:
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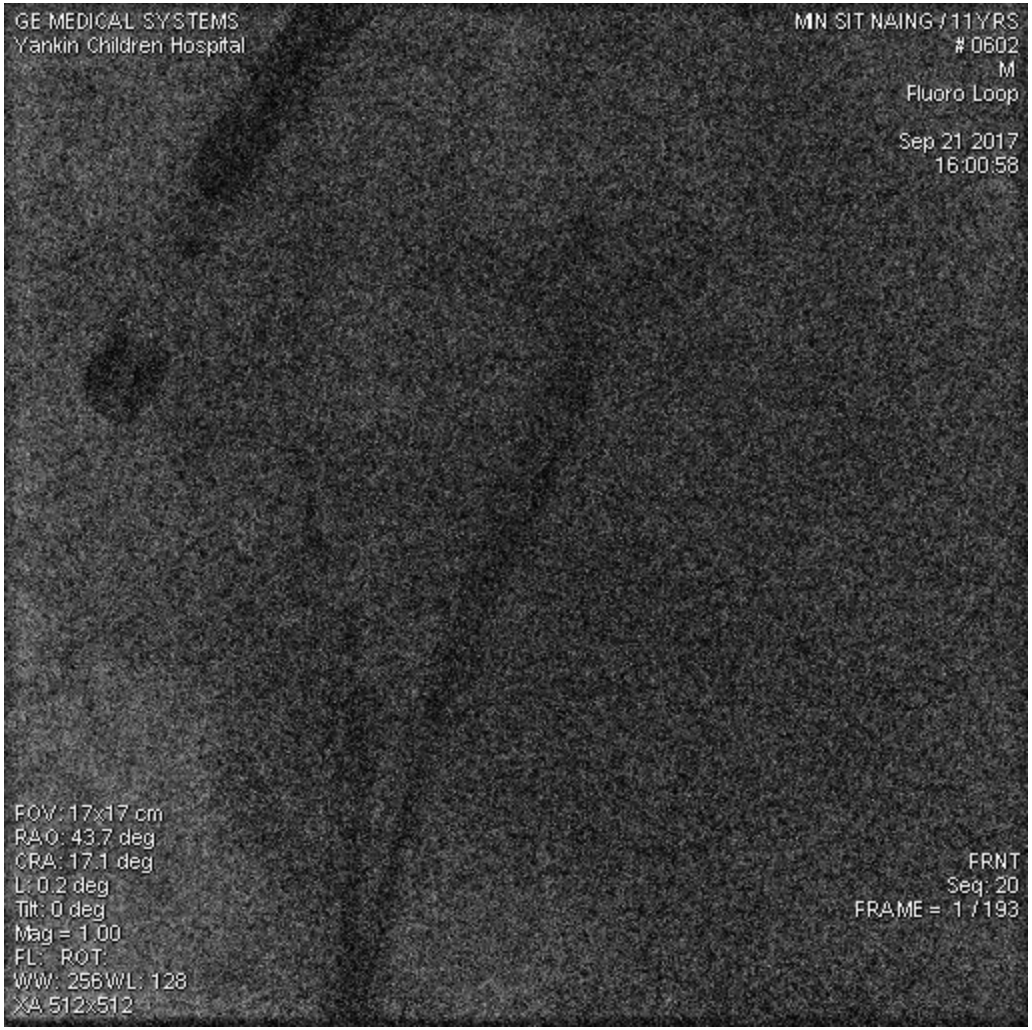
XA 512x512
FRNT
Seq: 16
FRAME = 1 / 139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Yankin Children Hospital
MN SIT NAING / 11YRS
0602
M
Fluoro Loop
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CRA: 17.1 deg
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FRNT
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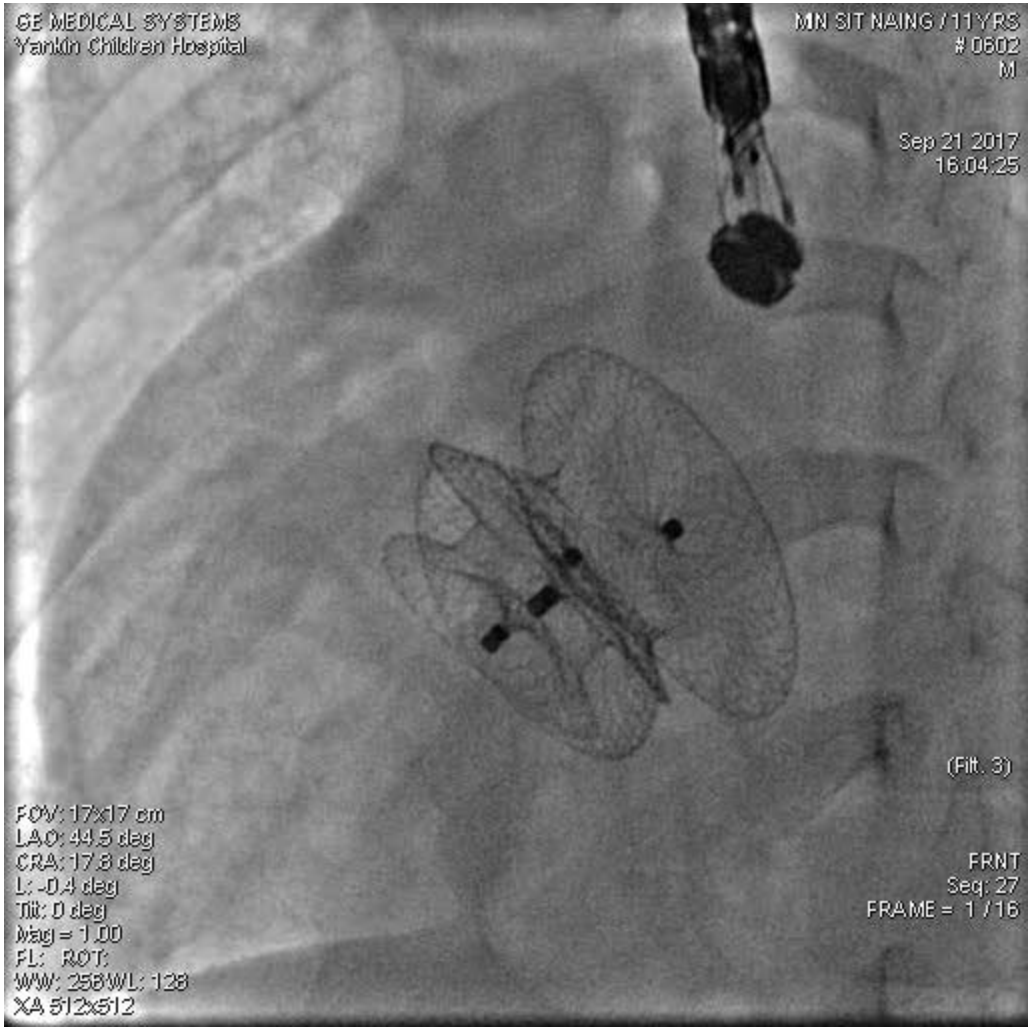
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Yankin Children Hospital
MN SIT NAING / 11YRS
0602
M
Sep 21 2017
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(Filt. 3)
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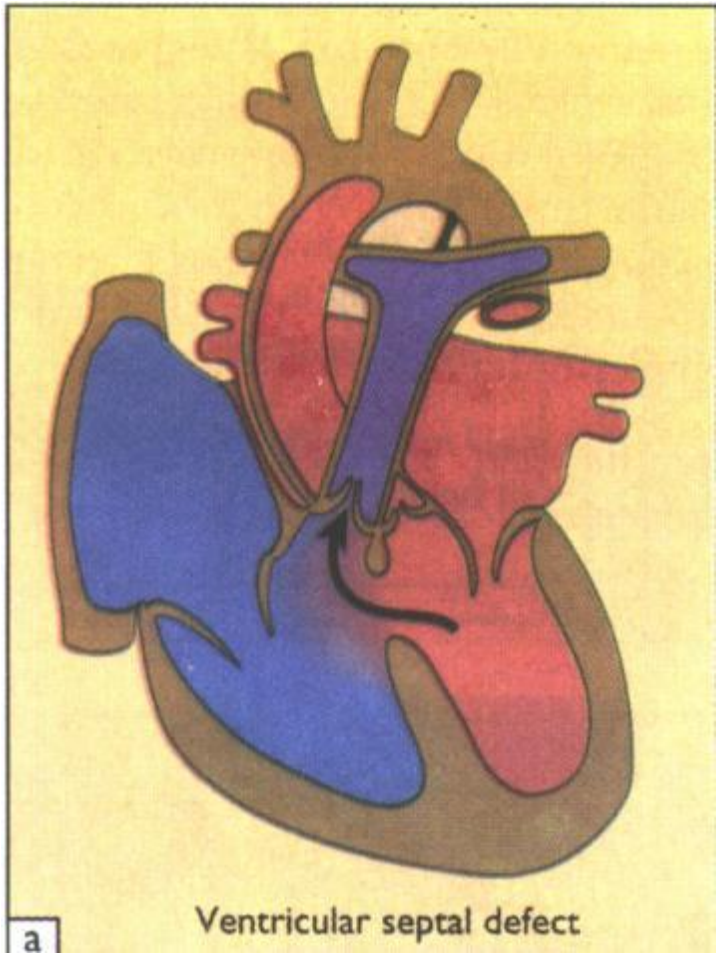
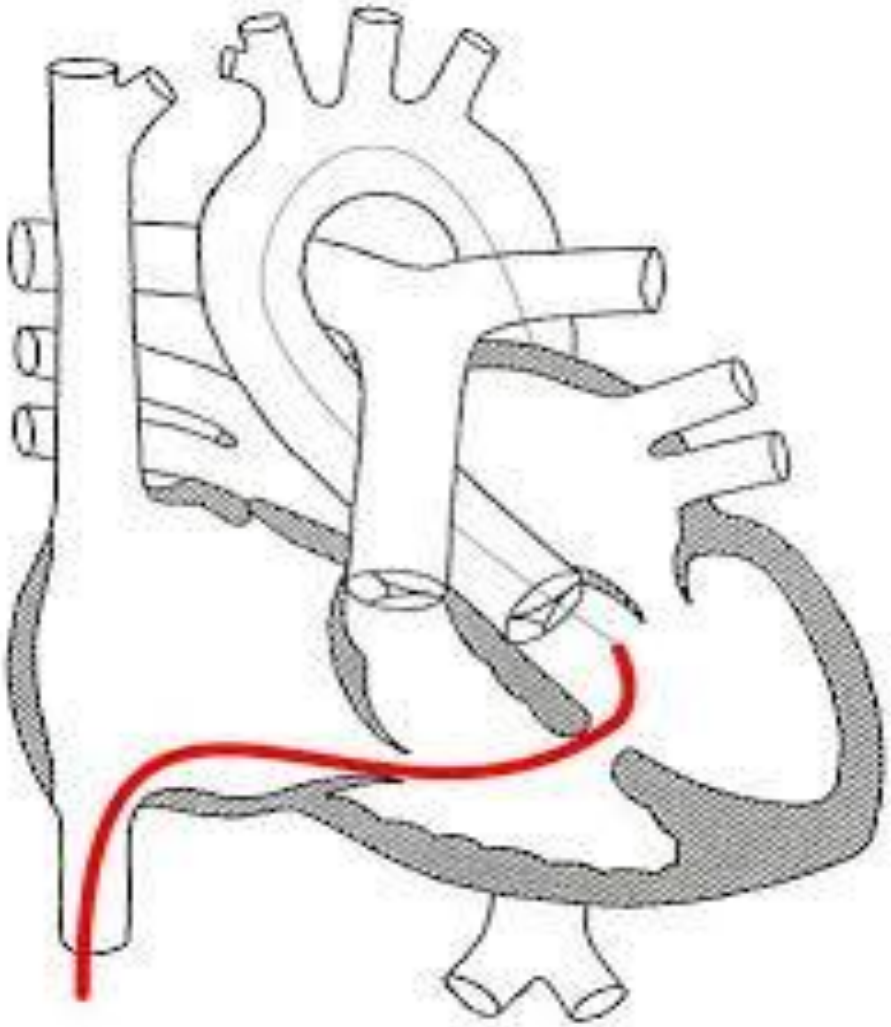
LAO: 44.5 deg
CRA: 17.8 deg
L: -0.4 deg
Tilt: 0 deg
Mag = 1.00
FL: ROT:
WW: 258 WL: 128
XA 512x512
FRNT
Seq: 27
FRAME = 1 / 16

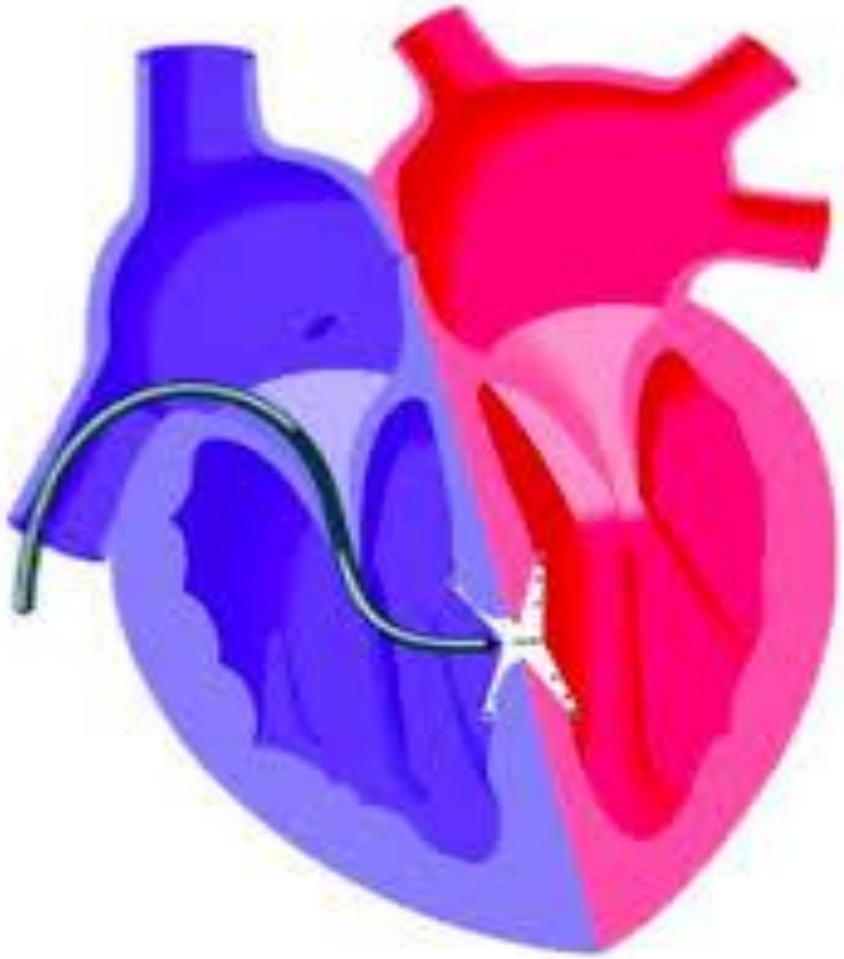

31: 21 Frames
Pediatric
S7-3t
21Hz
14cm
ZD
75%
C 50
P Off
Gen
CE
74%
8444Hz
WF 844Hz
4.4MHz
TIS0.2 MI 0.5
M3 M4
+73.2
-73.2
cm/s
PAT T: 37.0C
TEE T: 41.7C
--- bpm
JPEG
21/09/2017 3:55 PM

3. Ventricular Septal Defect (VSD)

- first attempted by lock et al in 1988 with devices
- useful for multiple muscular defects (difficult for the surgeon)
- also tried to occlude suitable perimembranous ,subaortic subpulmonary, doubly comitted subarterial defectsbut devices in this location can interfere with aortic valve function.
- 1% risk of complete heart block requiring pacemaker insertion



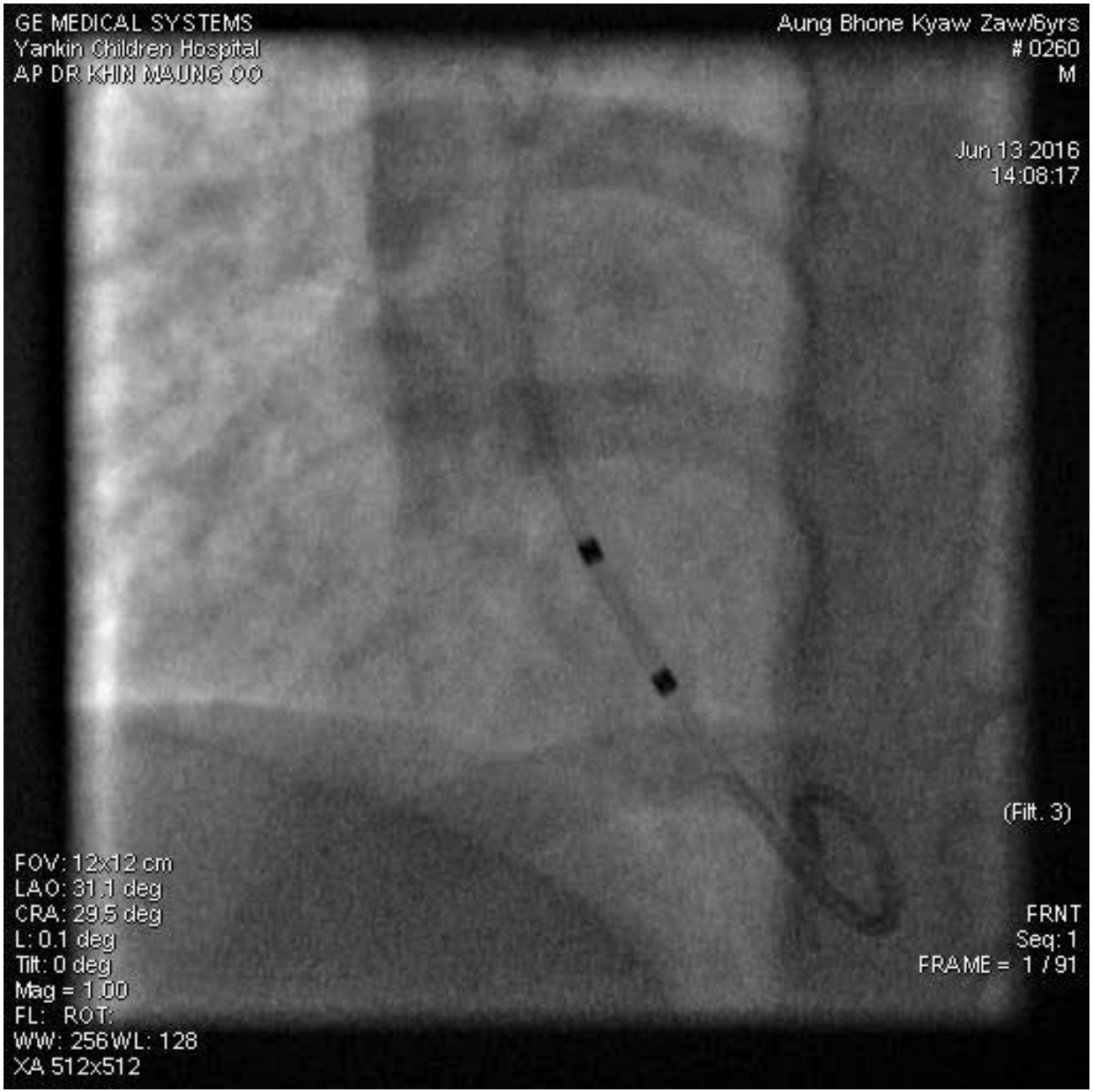


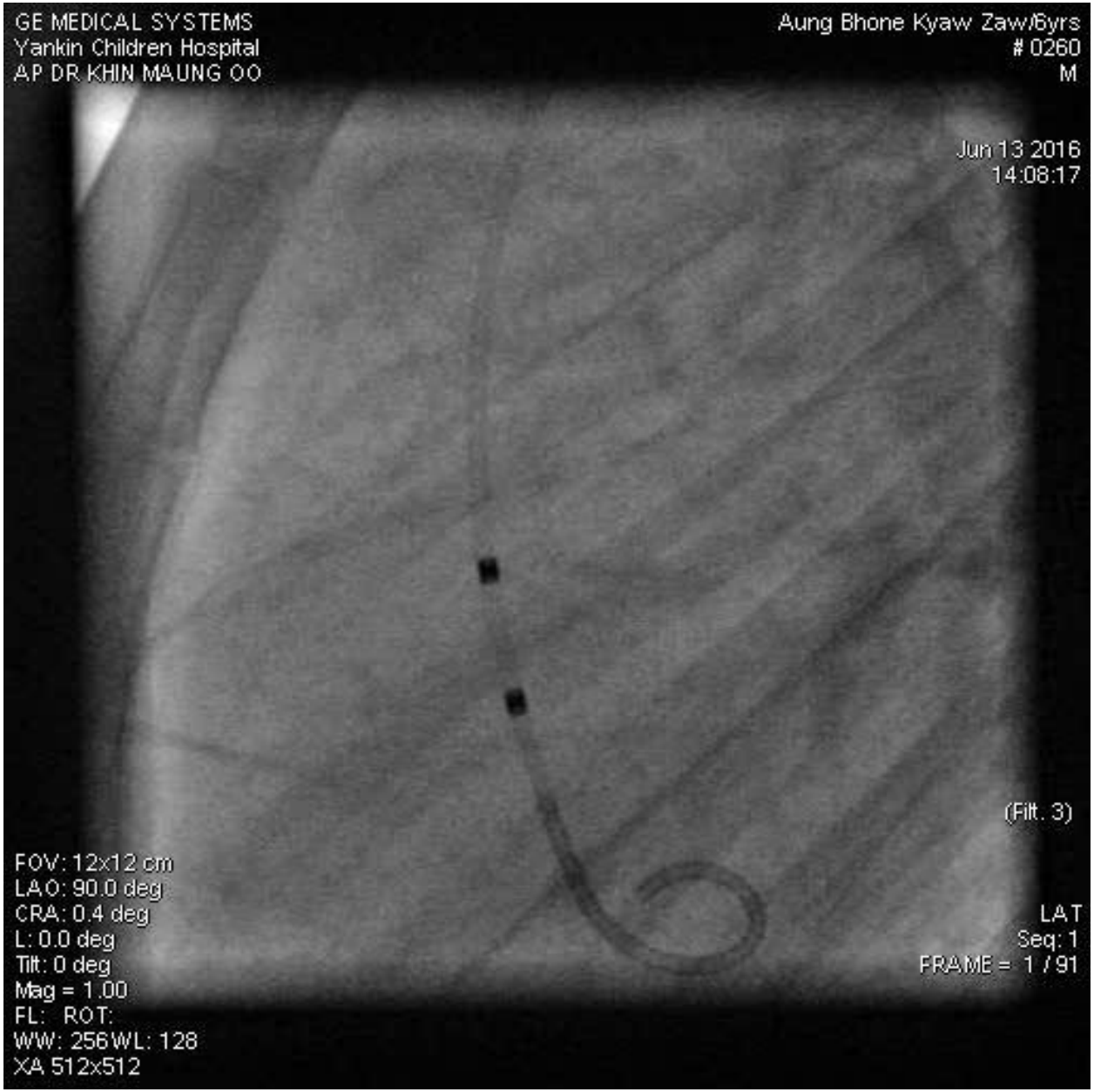


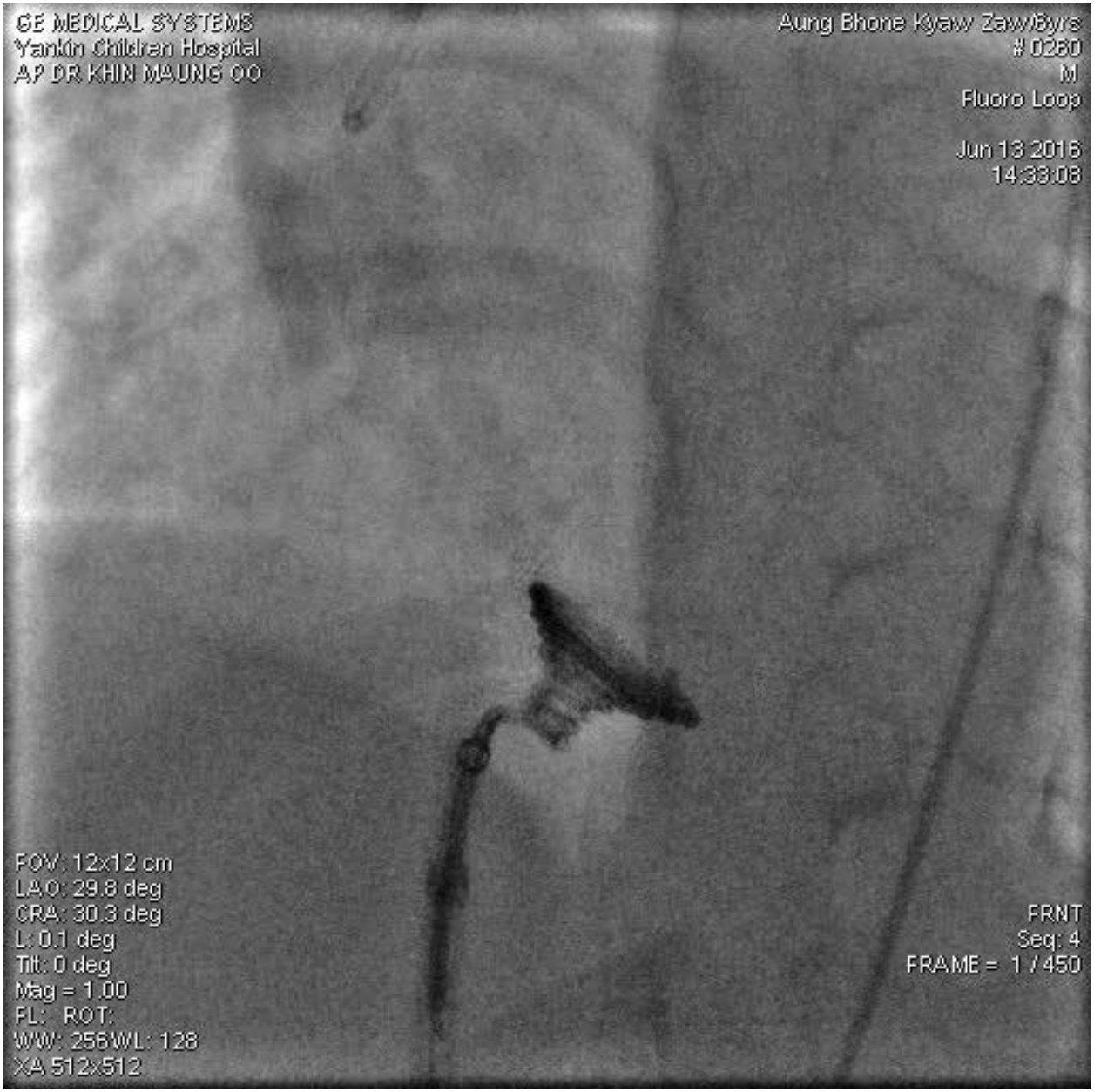
Indications for VSD closure

- Symptoms of heart failure
- Signs of left heart volume overload with an echo evidence of a significant left to right shunt through a VSD
- (1) LA enlargement (LA –Ao ratio > 1.5)
- (2) LV enlargement (LVEDD >+2 SD for the age)

- Types of VSD that can be closed by device
- PM VSD, not larger than 7 mm
- Some muscular VSD
- Some subaortic VSD
- But never doubly committed VSD and VSD with malaligned IVS


GE MEDICAL SYSTEMS
Yankin Children Hospital
AP DR KHIN MAUNG OO
Aung Bhone Kyaw Zaw/6yrs
0260
M
Jun 13 2016
14:08:17
(Filt. 3)
FOV: 12x12 cm
LAO: 31.1 deg
CRA: 29.5 deg
L: 0.1 deg
Tilt: 0 deg
Mag = 1.00
FL: ROT:
WW: 256 WL: 128
XA 512x512
FRNT
Seq: 1
FRAME = 1 / 91


GE MEDICAL SYSTEMS
Yankin Children Hospital
AP DR KHIN MAUNG OO
Aung Bhone Kyaw Zaw/6yrs
0260
M
Jun 13 2016
14:08:17
(Filt. 3)
FOV: 12x12 cm
LAO: 90.0 deg
CRA: 0.4 deg
L: 0.0 deg
Tilt: 0 deg
Mag = 1.00
FL: ROT:
WW: 256 WL: 128
XA 512x512
LAT
Seq: 1
FRAME = 1 / 91


GE MEDICAL SYSTEMS
Yankin Children Hospital
AP DR KHIN MAUNG OO
Aung Bhone Kyaw Zaw/6yrs
0260
M
Fluoro Loop
Jun 13 2016
14:33:08
FOV: 12x12 cm
LAO: 29.8 deg
CRA: 30.3 deg
L: 0.1 deg
Tilt: 0 deg
Mag = 1.00
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XA 512x512
FRNT
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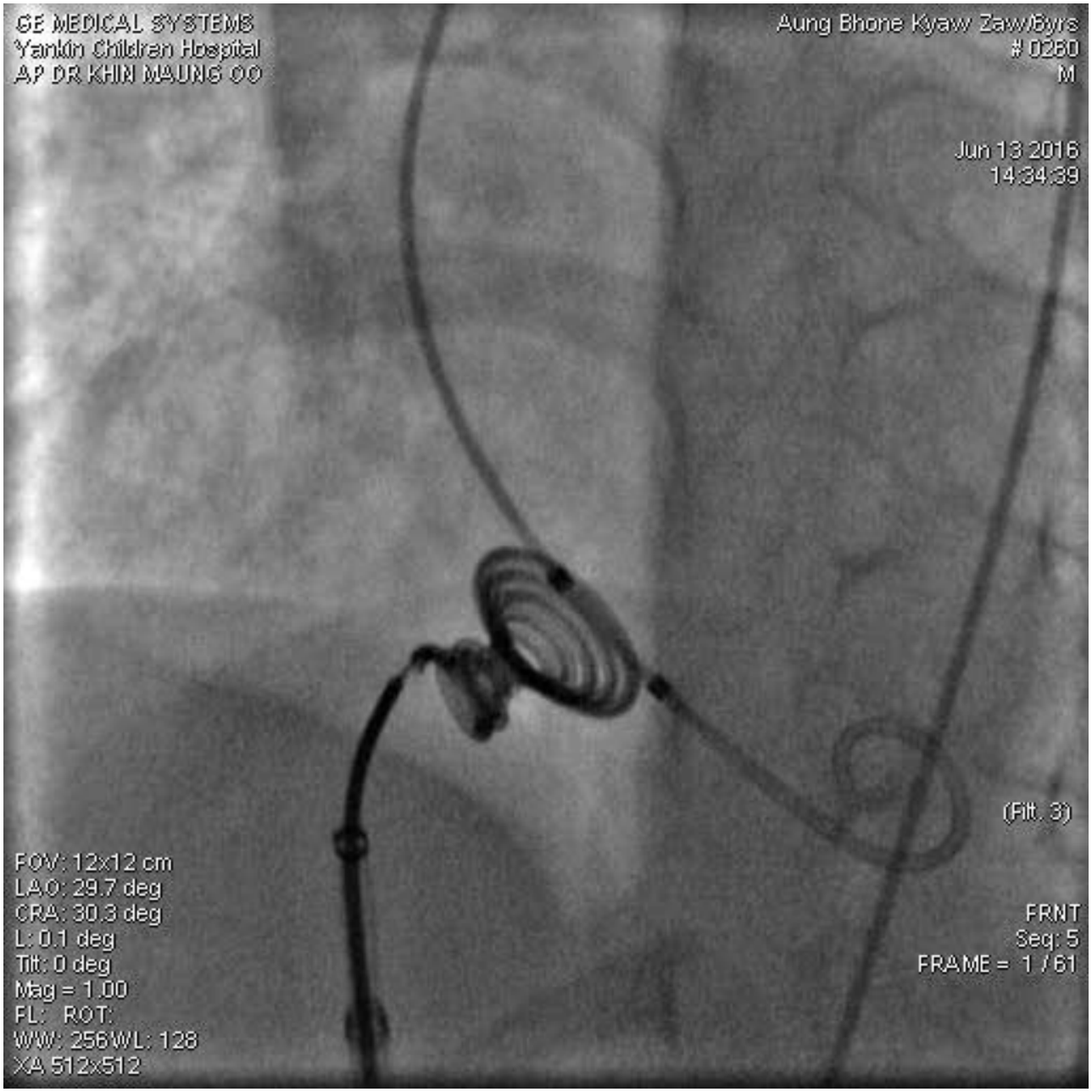
FRAME = 1 / 450


GE MEDICAL SYSTEMS
Yankin Children Hospital
AP DR KHIN MAUNG OO
Aung Bhone Kyaw Zaw/6yrs
0260
M
Jun 13 2016
14:34:39
(Filt. 3)
FOV: 12x12 cm
LAO: 29.7 deg
CRA: 30.3 deg
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Tilt: 0 deg
Mag = 1.00
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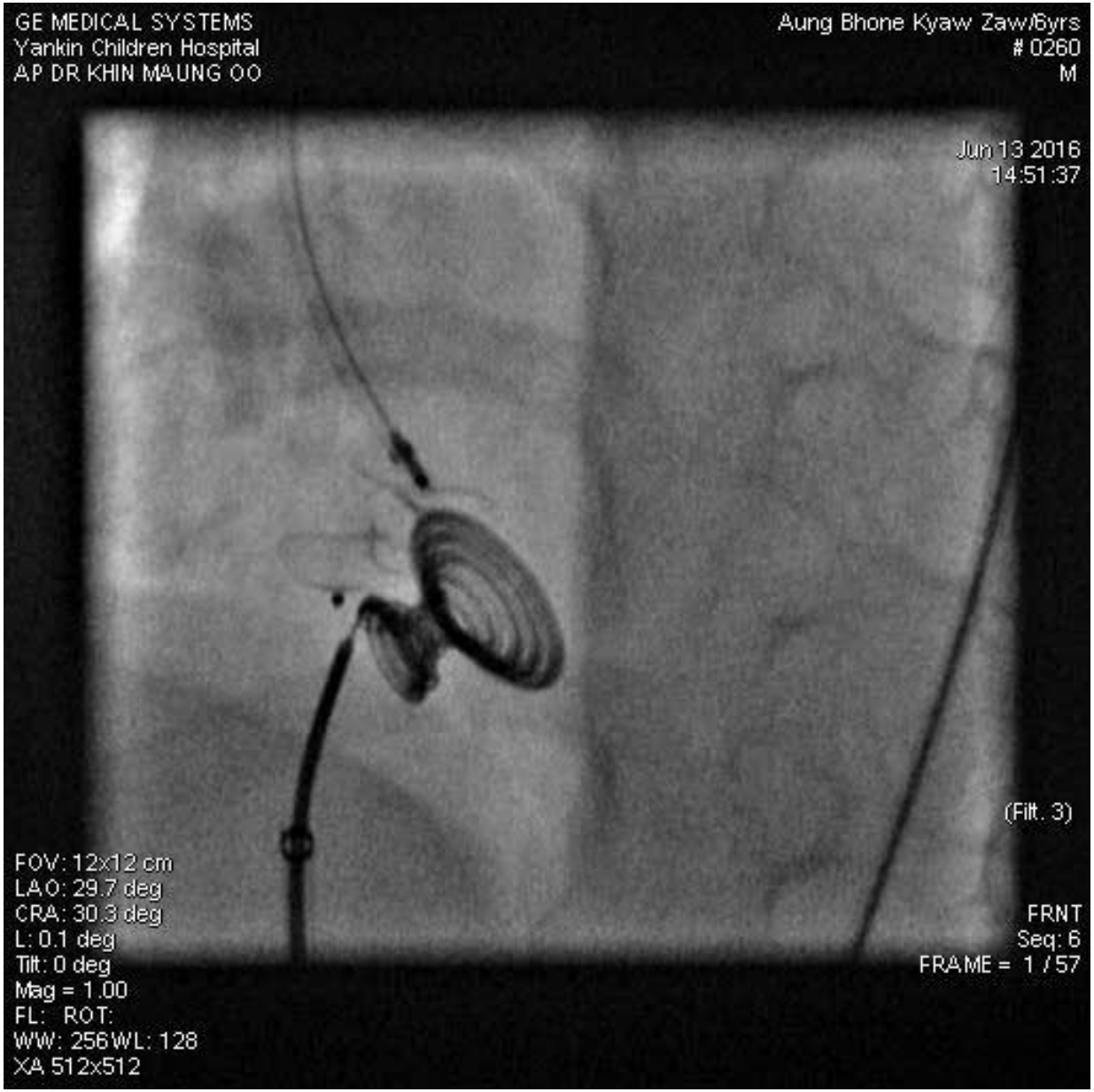
WW: 256 WL: 128
XA 512x512
FRNT
Seq: 5
FRAME = 1 / 61


GE MEDICAL SYSTEMS
Yankin Children Hospital
AP DR KHIN MAUNG OO
Aung Bhone Kyaw Zaw/6yrs
0260
M
Jun 13 2016
14:51:37
(Filt. 3)
FOV: 12x12 cm
LAO: 29.7 deg
CRA: 30.3 deg
L: 0.1 deg
Tilt: 0 deg
Mag = 1.00
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WW: 256 WL: 128
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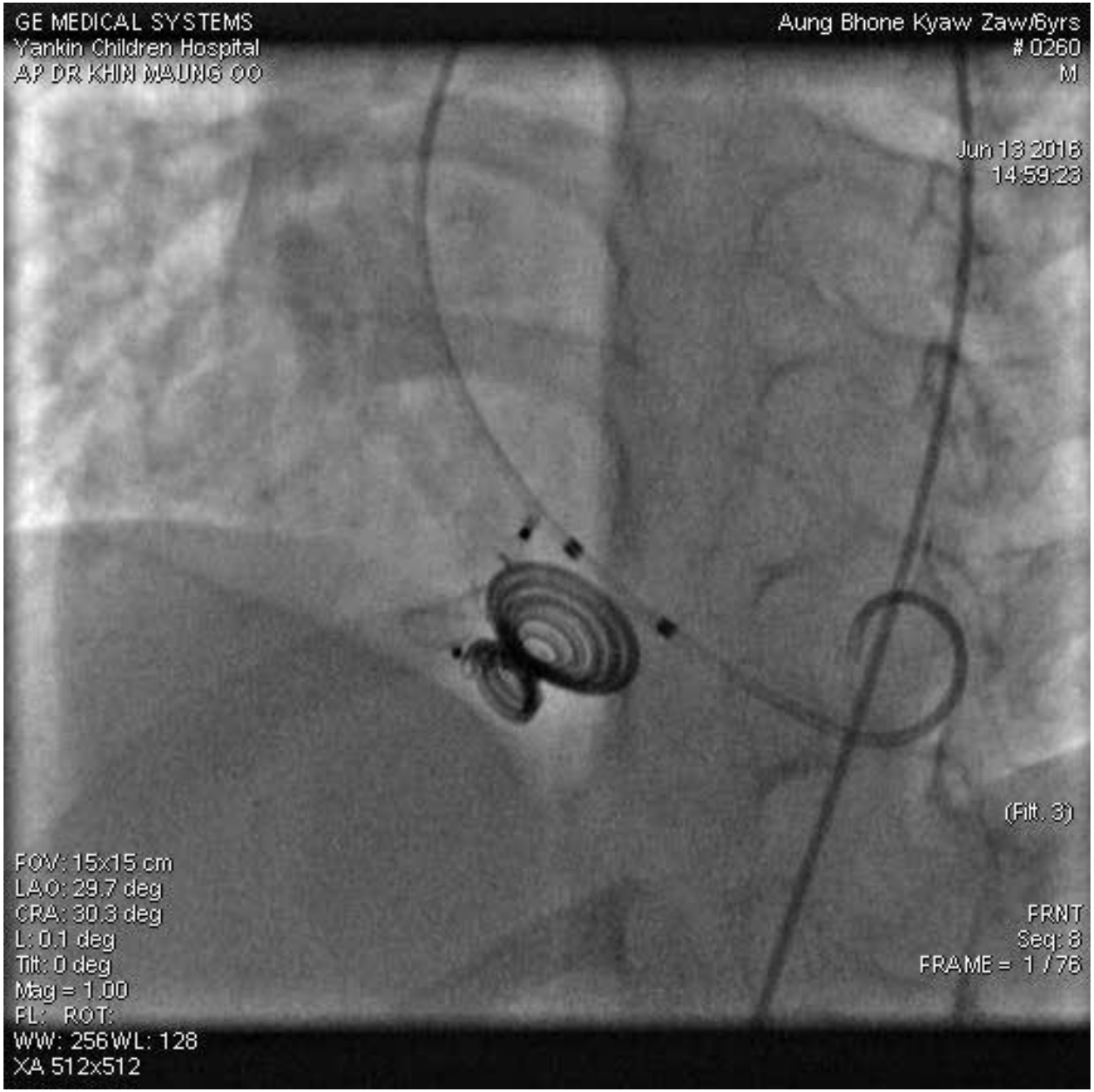
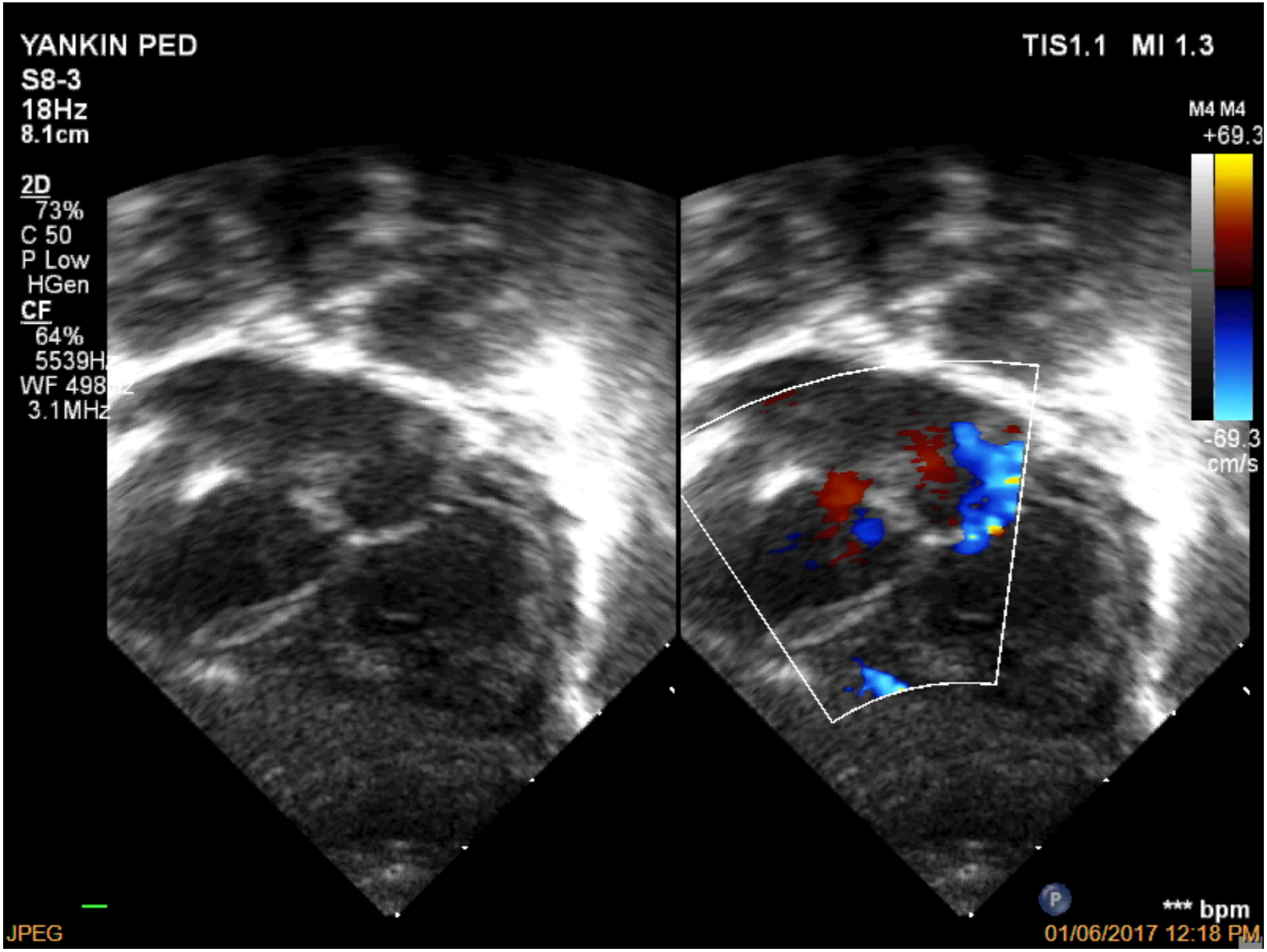
FRNT
Seq: 6
FRAME = 1 / 57


GE MEDICAL SYSTEMS
Yankin Children Hospital
AP DR KHIN MAUNG OO
Aung Bhone Kyaw Zaw/6yrs
0260
M
Jun 13 2016
14:59:23
(Filt. 3)
FOV: 15x15 cm
LAO: 29.7 deg
CRA: 30.3 deg
L: 0.1 deg
Tilt: 0 deg
Mag = 1.00
FL: ROT:
WW: 256 WL: 128
XA 512x512
FRNT
Seq: 8
FRAME = 1 / 76

Creating a defect

Atrial septostomy

- simple transposition of the great arteries who are younger than 1 month of age with a restrictive interatrial communication
- may also be indicated for palliation in neonates with other congenital heart lesions in whom all systemic, pulmonary, or mixed venous blood must traverse through a restrictive interatrial communication to return to the circulation.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S8-3
18Hz
8.1cm
2D
73%
C 50
P Low
HGen
CF
64%
5539H
WF 498
3.1MHz
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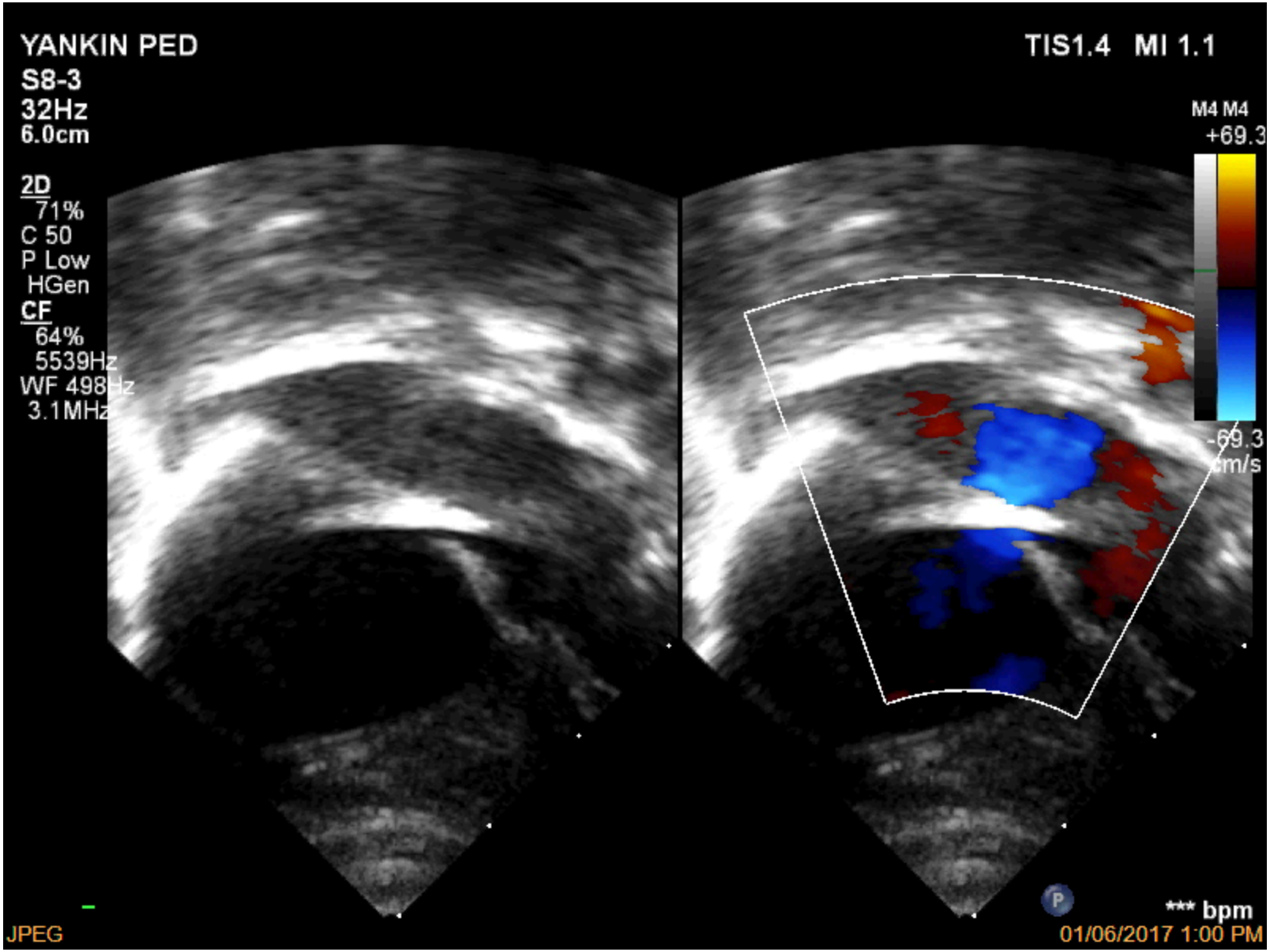
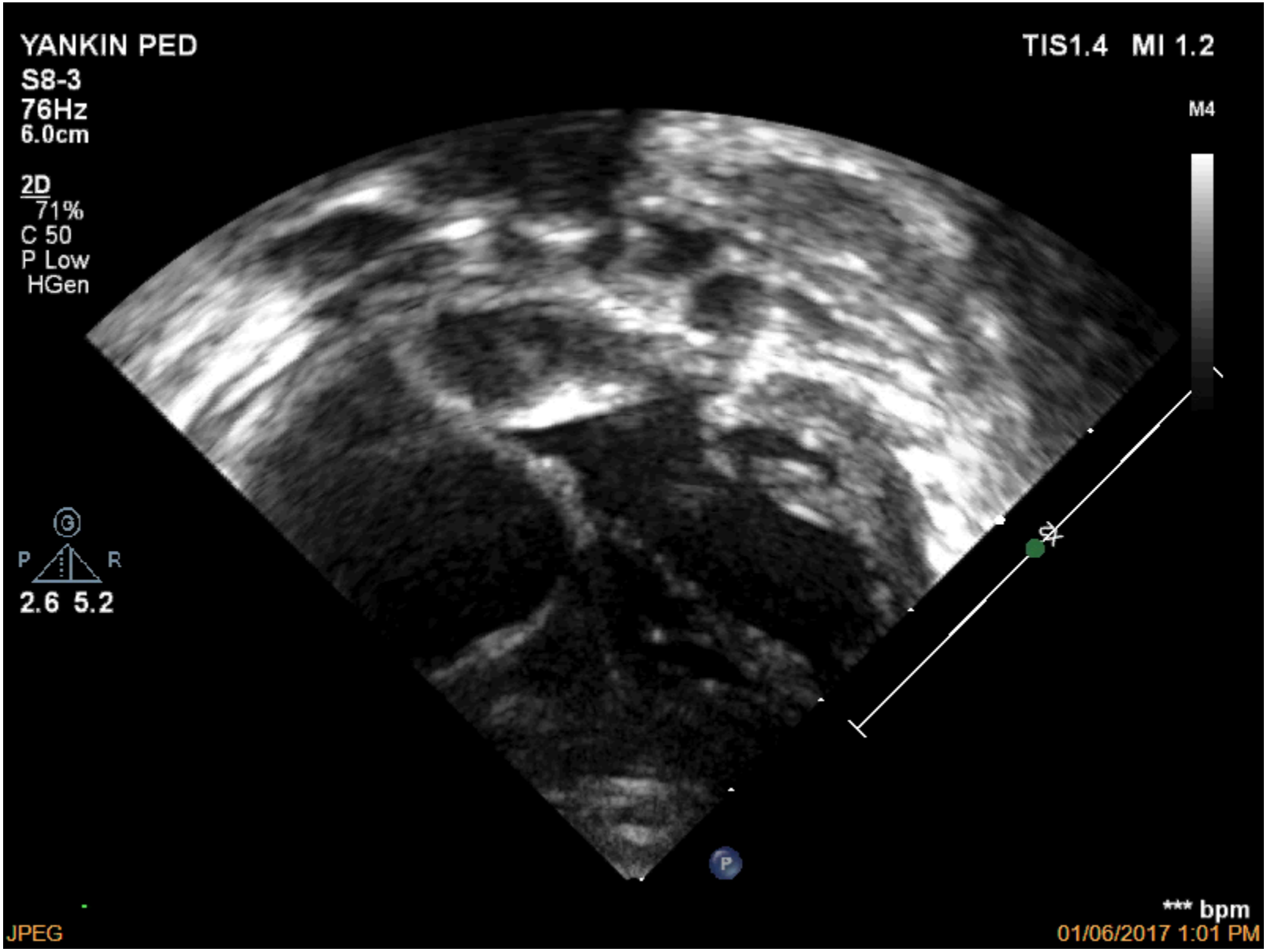
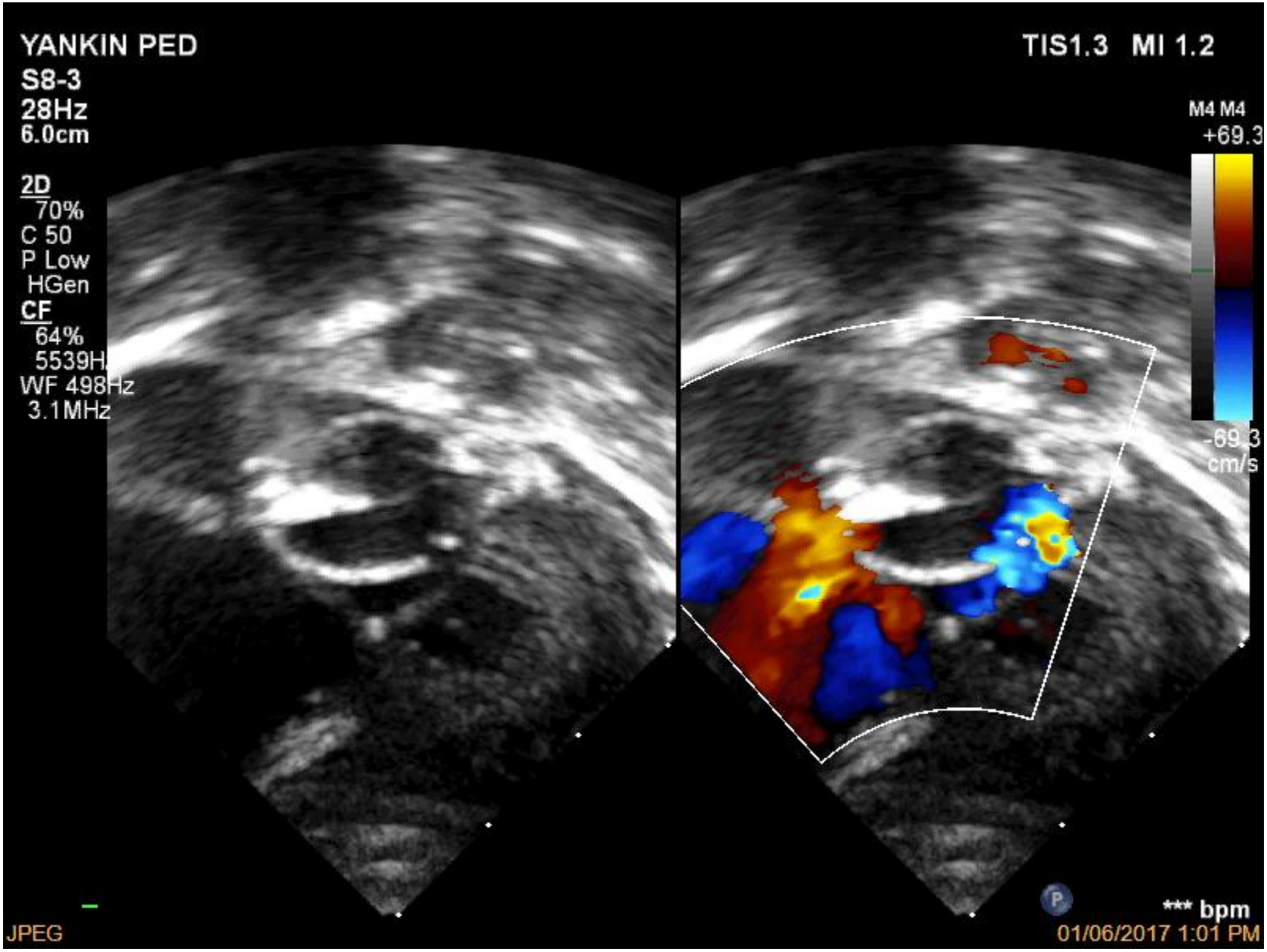
M4 M4
+69.3
-69.3
cm/s
*** bpm
JPEG
01/06/2017 12:18 PM


YANKIN PED
S8-3
32Hz
6.0cm
2D
71%
C 50
P Low
HGen
CF
64%
5539Hz
WF 498Hz
3.1MHz
TIS1.4 MI 1.1
M4 M4
+69.3
-69.3
cm/s
*** bpm
01/06/2017 1:00 PM
JPEG


YANKIN PED
S8-3
76Hz
6.0cm
2D
71%
C 50
P Low
HGen
TIS1.4 MI 1.2
M4
G
P
R
2.6 5.2
*** bpm
JPEG
01/06/2017 1:01 PM


YANKIN PED
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6.0cm
2D
70%
C 50
P Low
HGen
CF
64%
5539H
WF 498Hz
3.1MHz
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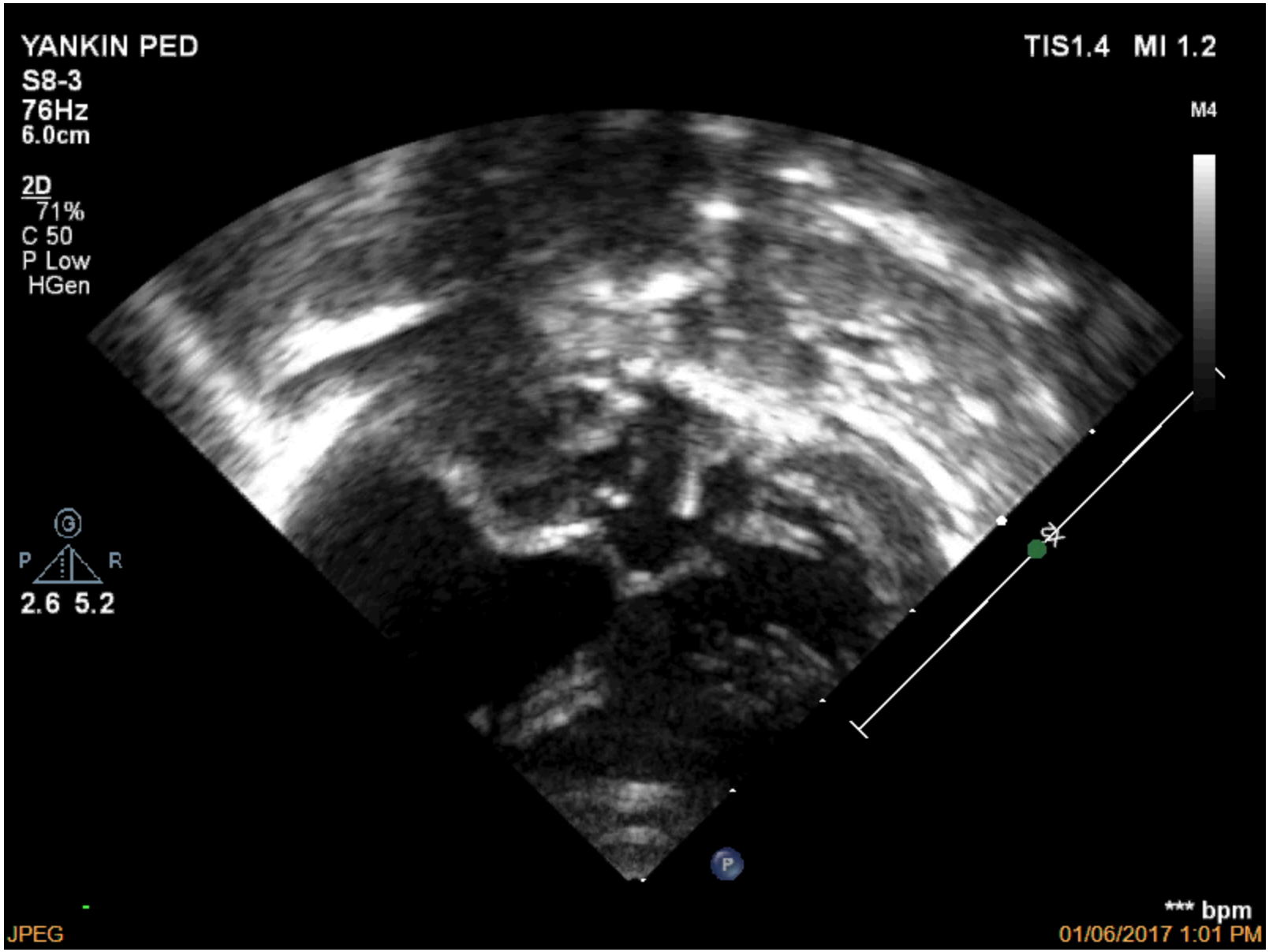
M4 M4
+69.3
-69.3
cm/s
*** bpm
01/06/2017 1:01 PM
JPEG


YANKIN PED
S8-3
76Hz
6.0cm
2D
71%
C 50
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HGen
TIS1.4 MI 1.2
M4
P
R
2.6 5.2
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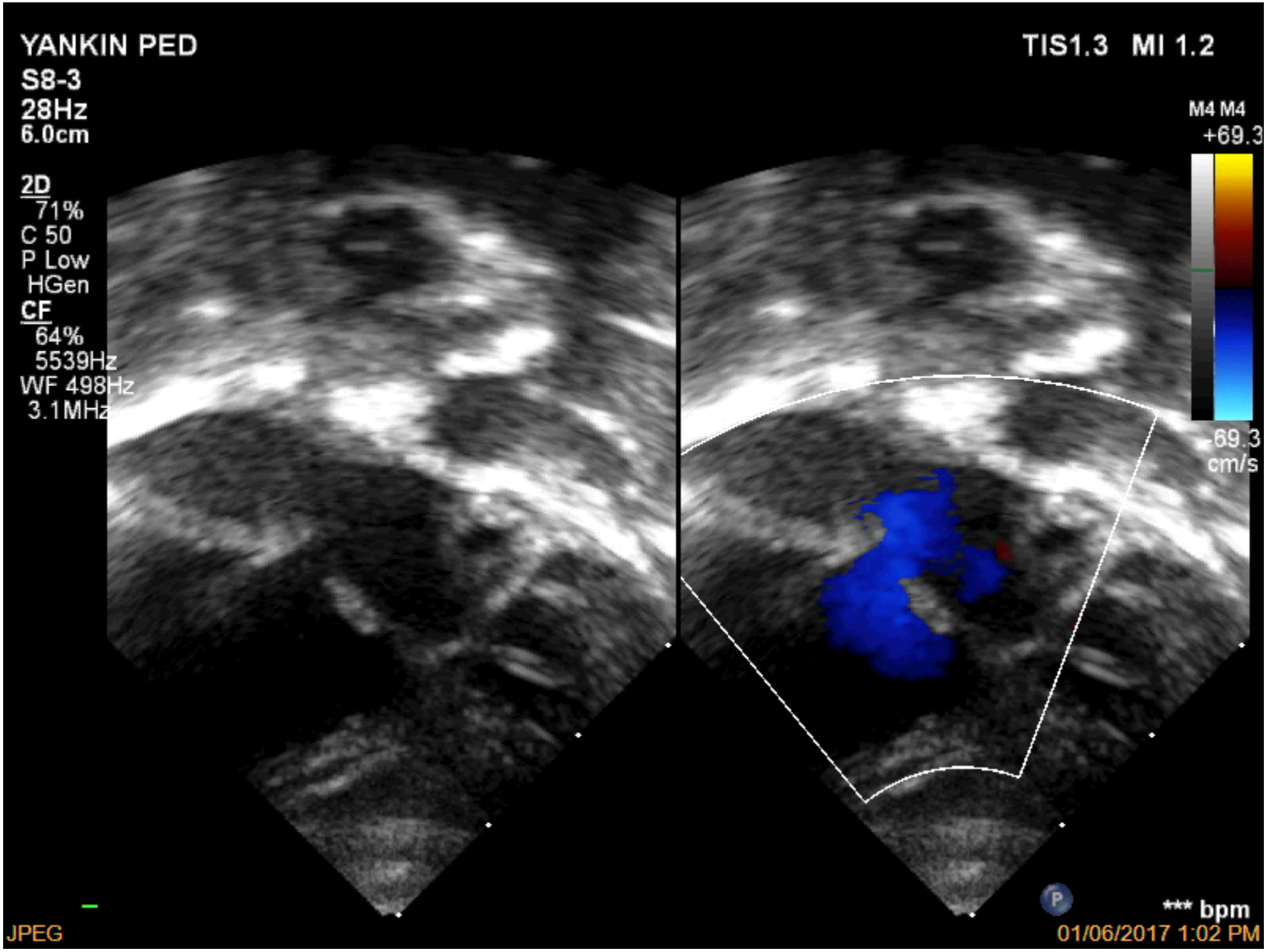
YANKIN PED
S8-3
28Hz
6.0cm
2D
71%
C 50
P Low
HGen
CF
64%
5539Hz
WF 498Hz
3.1MHz
TIS1.3 MI 1.2
M4 M4
+69.3
-69.3
cm/s
*** bpm
JPEG
01/06/2017 1:02 PM

The coil occlusion of unwanted blood vessels

- Aortopulmonary collateral arteries
- Coronary artery fistulae
- Arteriovenous malformations
- Venous collaterals

Interventional electrophysiology

is required for

- congenital and postoperative complete heart block
- sick sinus syndrome

• is now usually performed with the transvenous route rather than surgical epicardial placement

- 2 boys
- one with nodal dysfunction
- the other with complete heart block

Complications of Transcatheter Interventions

- Puncture sites- Femoral artery/vein- hematoma, bleeding
- Arterial or venous thrombosis
- Vessel or chamber perforation
- Small Devices – embolization
  residual shunt – hemolysis (Haemoglobinurea)
- Large Devices - PDA -Coarctation, left pulmonary artery stenosis
  ASD , VSD- erosion, valves regurgitation
- Large Balloons- PS, AS - rupture
- Radiation exposure

These can be reduced by

- careful patient and device selection
- meticulous technique
- low-dose radiation
- most important: operator experience

The growth of interventional cardiology

- Some lesions are now curable without the need for surgery

- Cardiac surgeons can increasingly operate on more complex lesions such as TOF, Tricuspid atresia, hypoplastic left heart syndrome.

- More importantly, Hybrid procedures (combined transcatheter and surgical interventions can manage these complex patients resulting in a better overall outcome for the child born with congenital heart disease