Transcatheter closure of large Atrial Septal Defects in small children: Acute results and short term follow up

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Our experience

- Is limited to Amplatzer septal occluder
- Can not be extrapolated to other devices

Large defects in small children

- No universal definition
- Small children < 20 kg
- Large ASD: ASO size is 10 mm or more than the weight of the child in kgs
- 7 kg child requiring ASO ≥ 17 mm

Background

- Safety and efficacy of large ASOs in adults is well established
- Safety and efficacy of ASOs for small to moderate sized ASDs in children has also been reported
- Paucity of data for large ASOs in small children

Aim

- Feasibility, safety and efficacy of large ASOs in small children

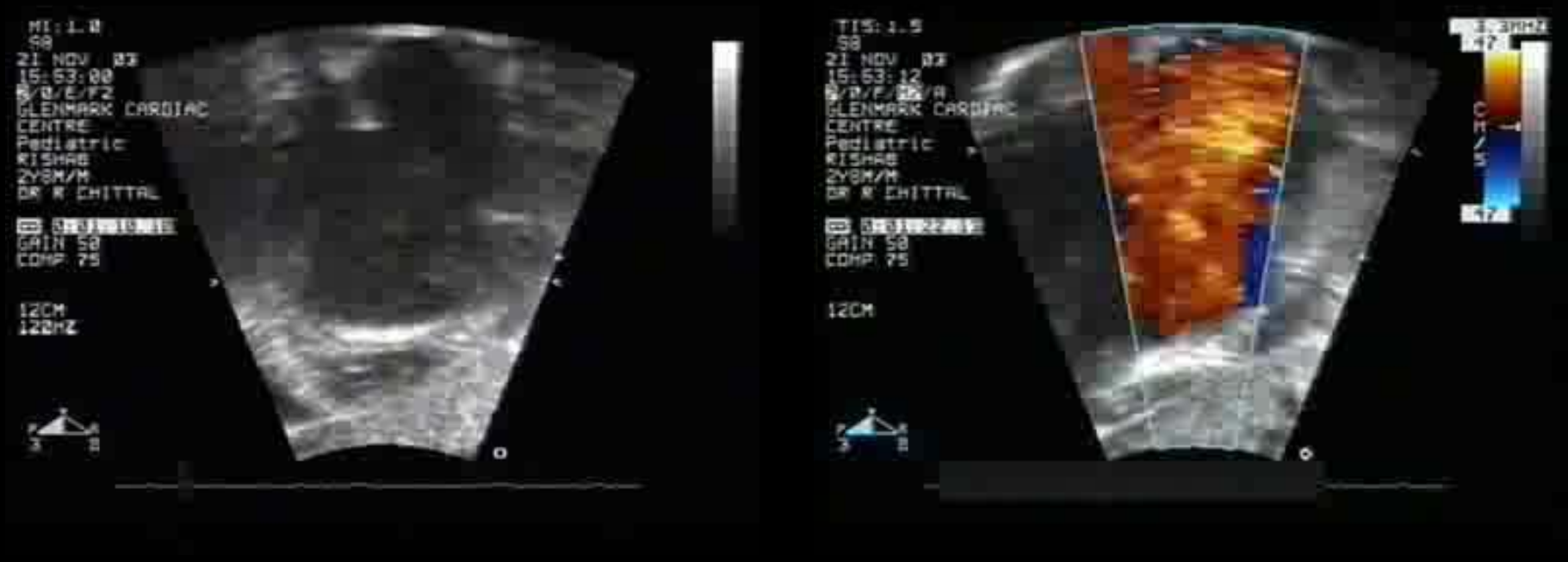
Patient evaluation

- History and Physical Examination
  - SOB/fatiguability, repeated RTI, FTT
  - Cardiomegaly, E/O PHT, MDM in the TA
- ECG: Axis, RV potentials, conduction abnormality
- X-ray: Heart size and plethora
- Echo: TTE

2 DE/CD

- Subcostal, apical and parasternal views
- Size of the defect, SVC/IVC/aortic/atrial/AV valve rims
- PA pressure
- Is there a role for measuring atrial septal length?

10 kg with 22 mm ASD



Patient Selection

- Children < 20 kgs
- Shunt is left to right
- Adequate rims (≥ 5mm)
- Absence of severe PHT (PAP > 75% of systemic pressure): Free from LRTI
- Absence of other abnormality requiring Sx

Procedural details

- All under GA with TTE/TEE guidance
- 100 i.u./kg of Heparin
- Hemodynamics and oximetry
- No angiography
- Balloon sizing of the defect - optional
- BSD + 2mm

Procedural details

- Access
- Accommodation of LA disc
- Alignment of the device

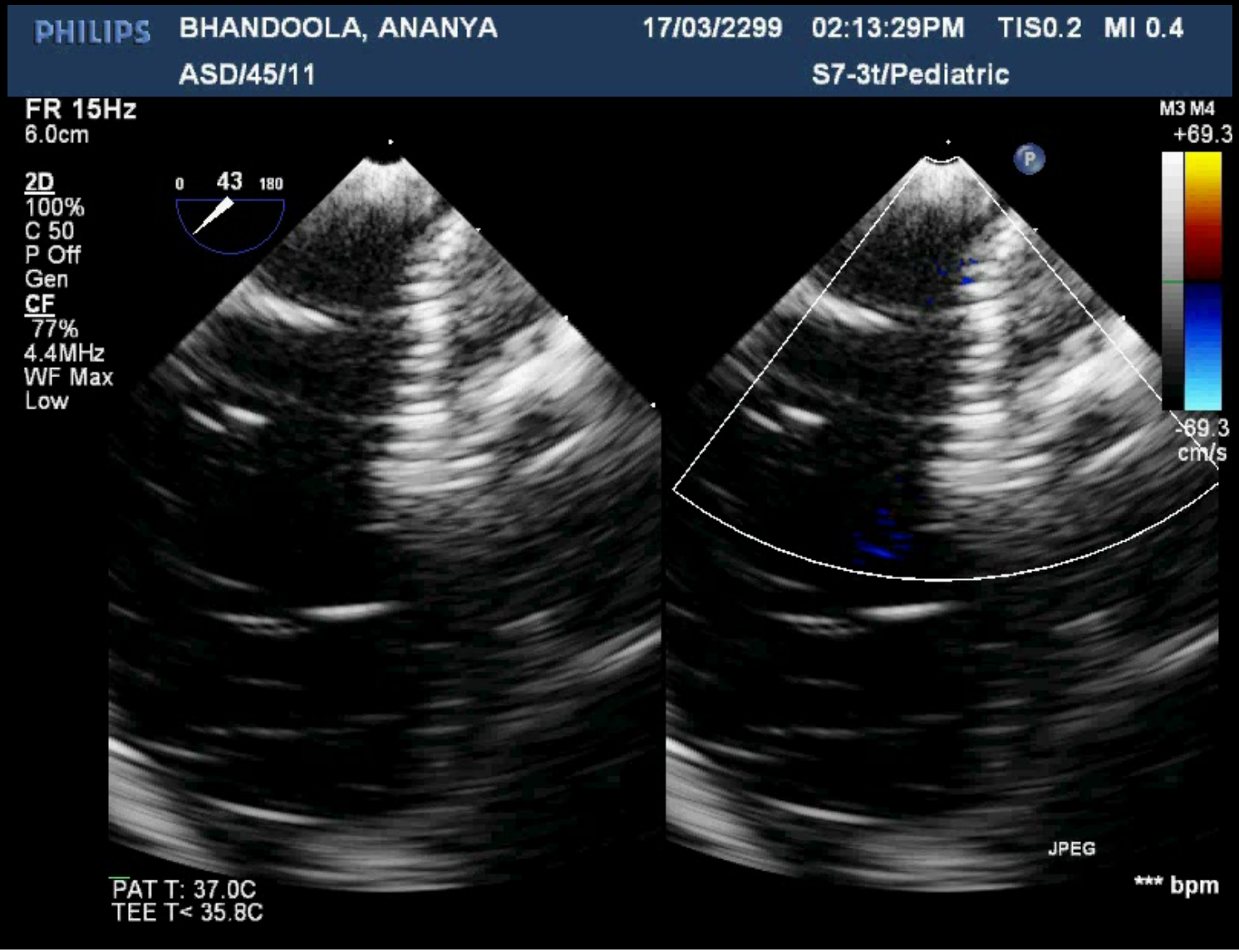
Access

- < 10kg upto 9F
- 10-15 kg upto 10F
- 15-20 kg upto 12F
- No obvious venous injury or venous thrombosis
- No Doppler data

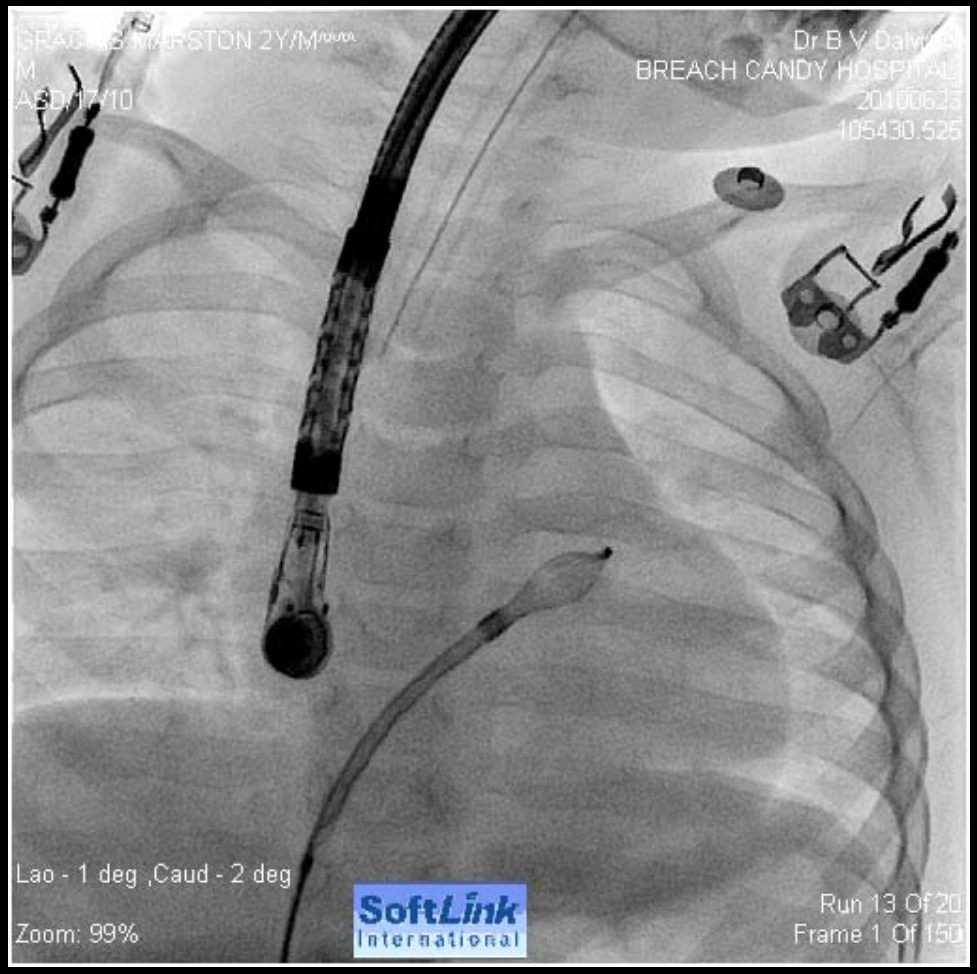
Accommodation

- LA is small
- Posterior LA wall is flat
- Tendency of the LA disk to herniate through the defect
- Anchoring the LA disc in LSPV, RSPV, LA appendage
- Uniqueness of the device design

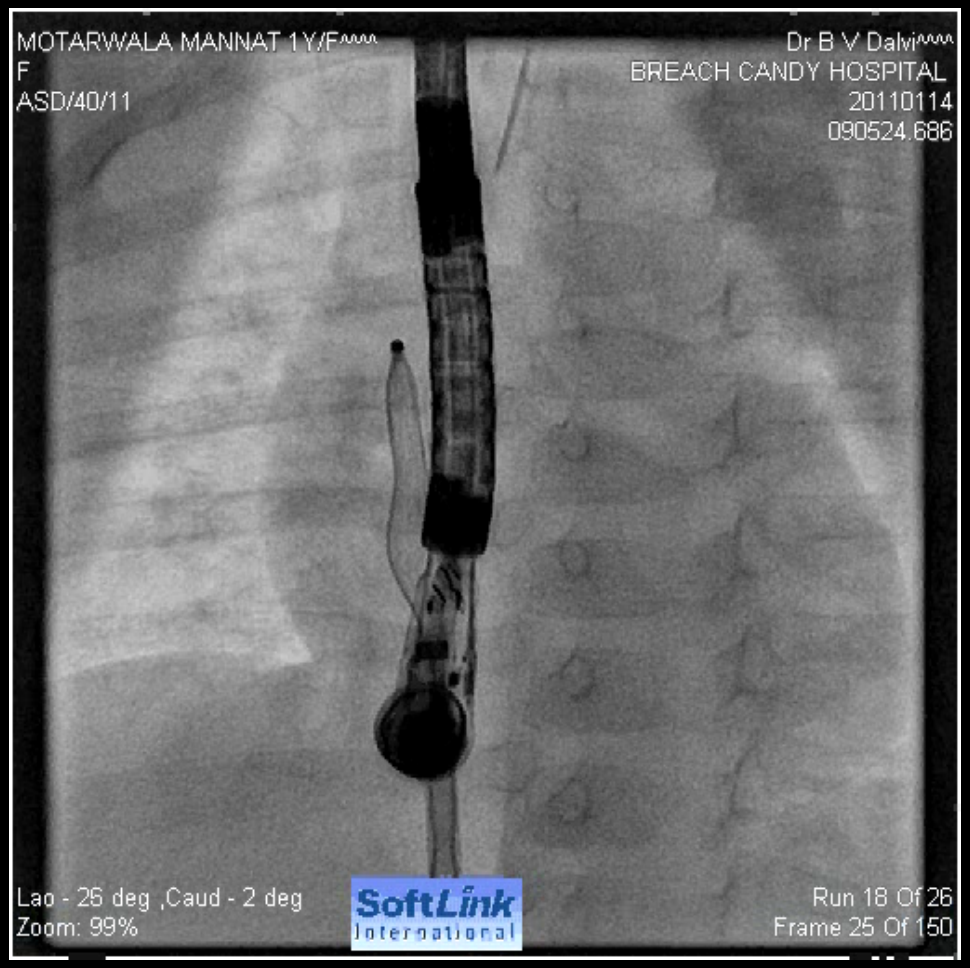
LA disc unable to accommodate

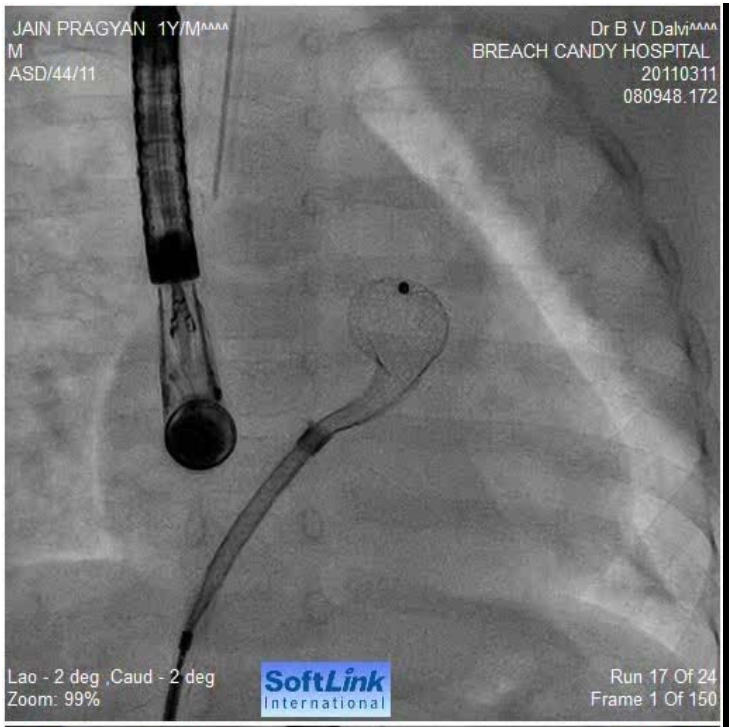


10 kg with a 20 mm ASO

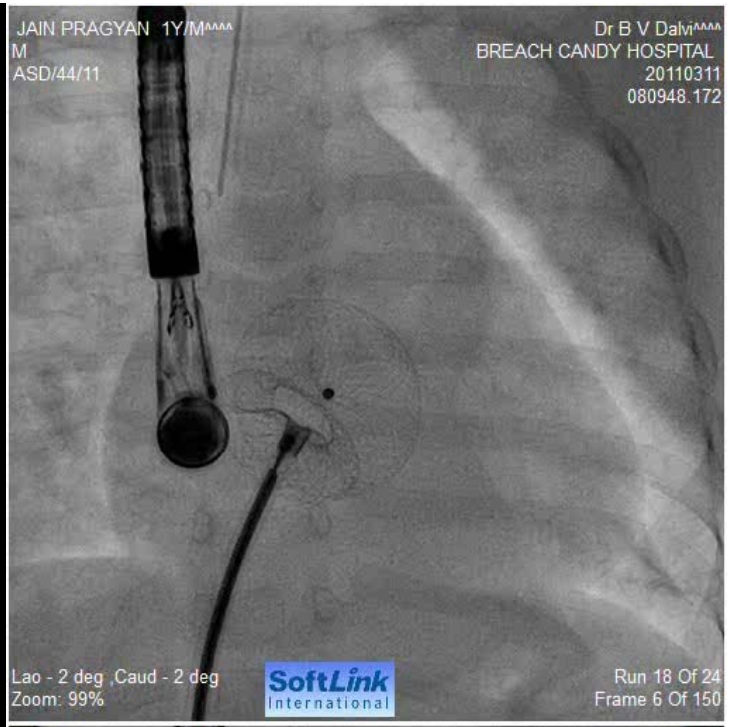


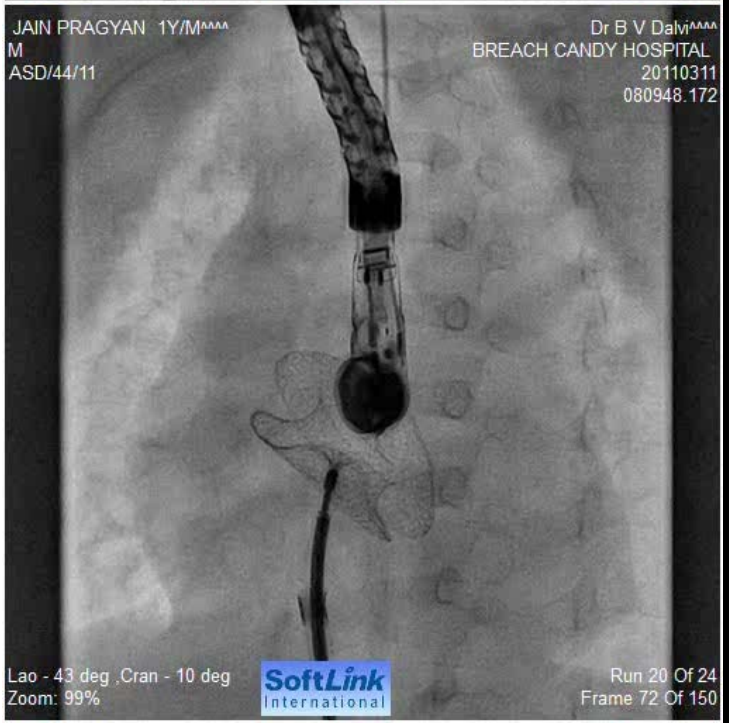
6 kg with a 16 mm ASO

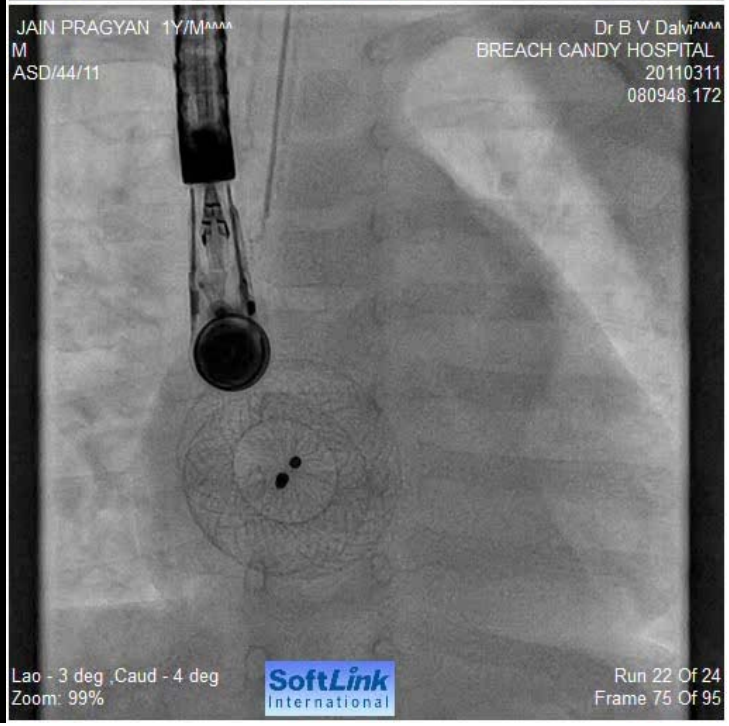




5 kg with
16 mm ASO



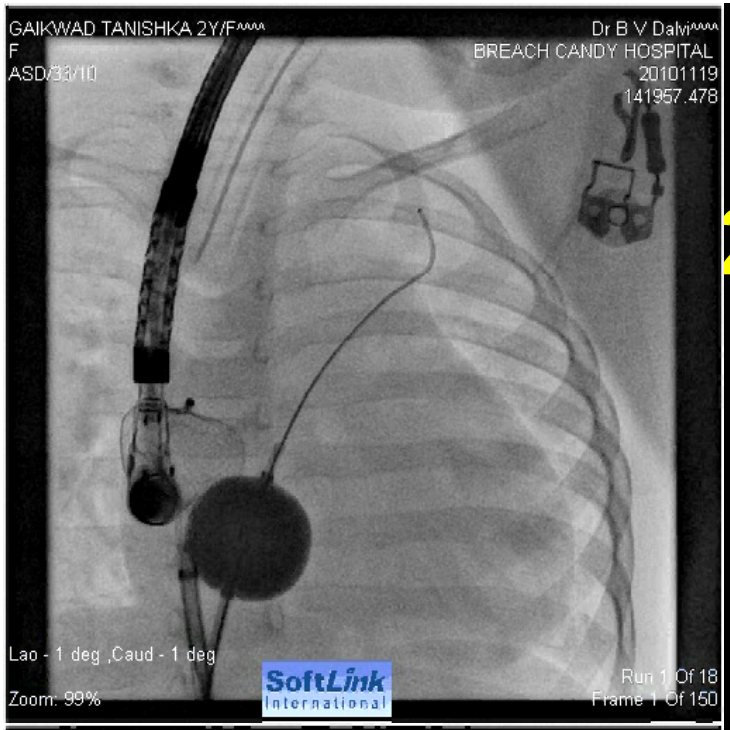




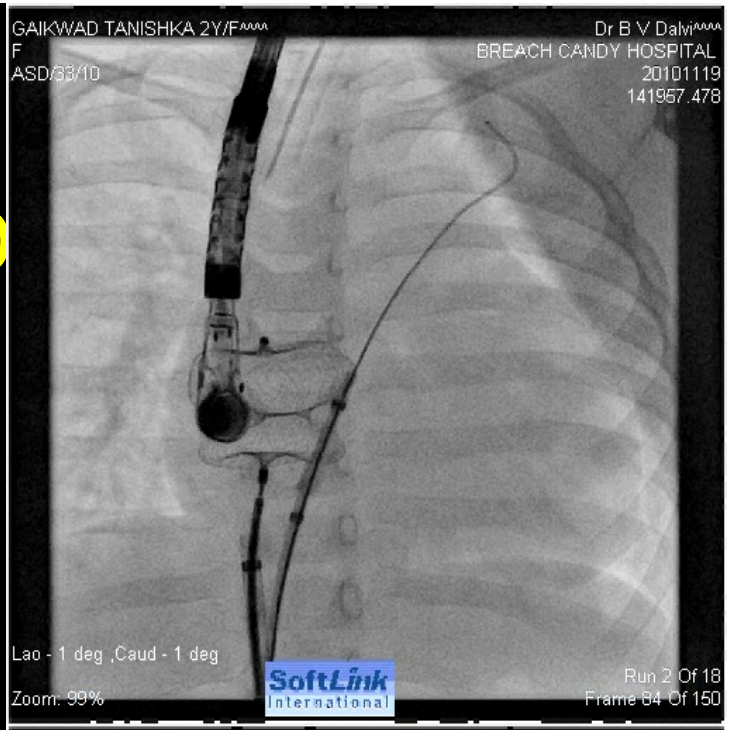
Alignment

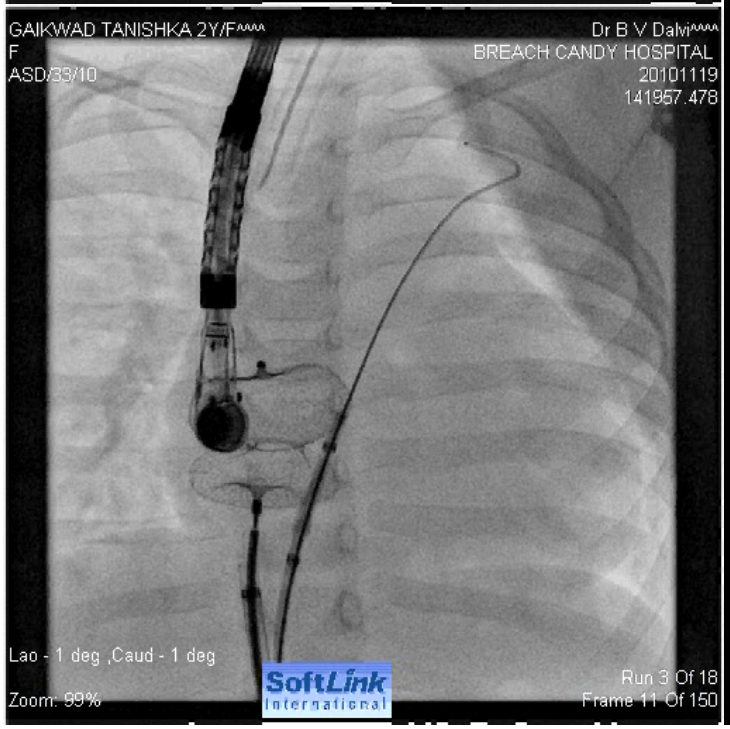
- LA disc refuses to align itself with the plane of the IAS
- Balloon assisted technique
- Device delivery from just outside RSPV or LSPV

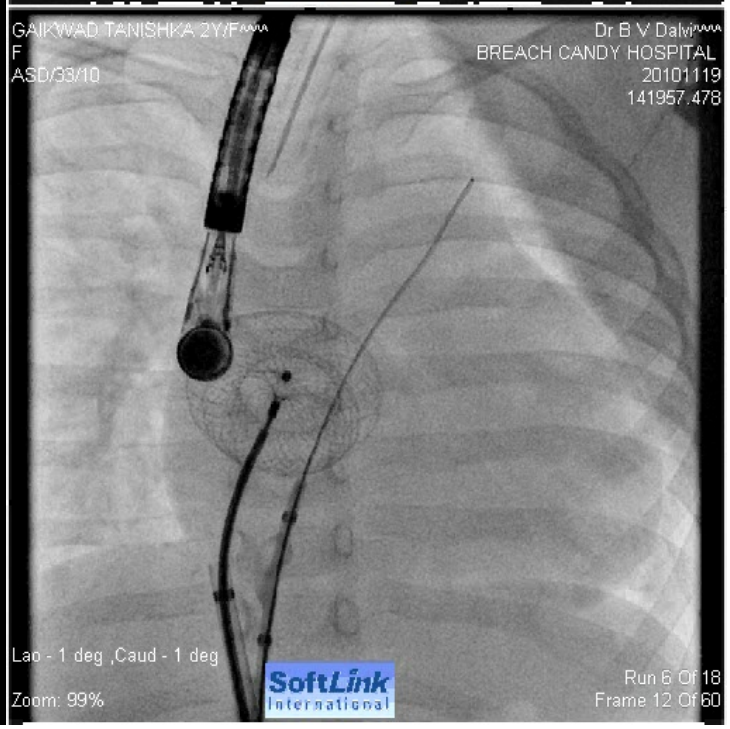
LA disc unable to align



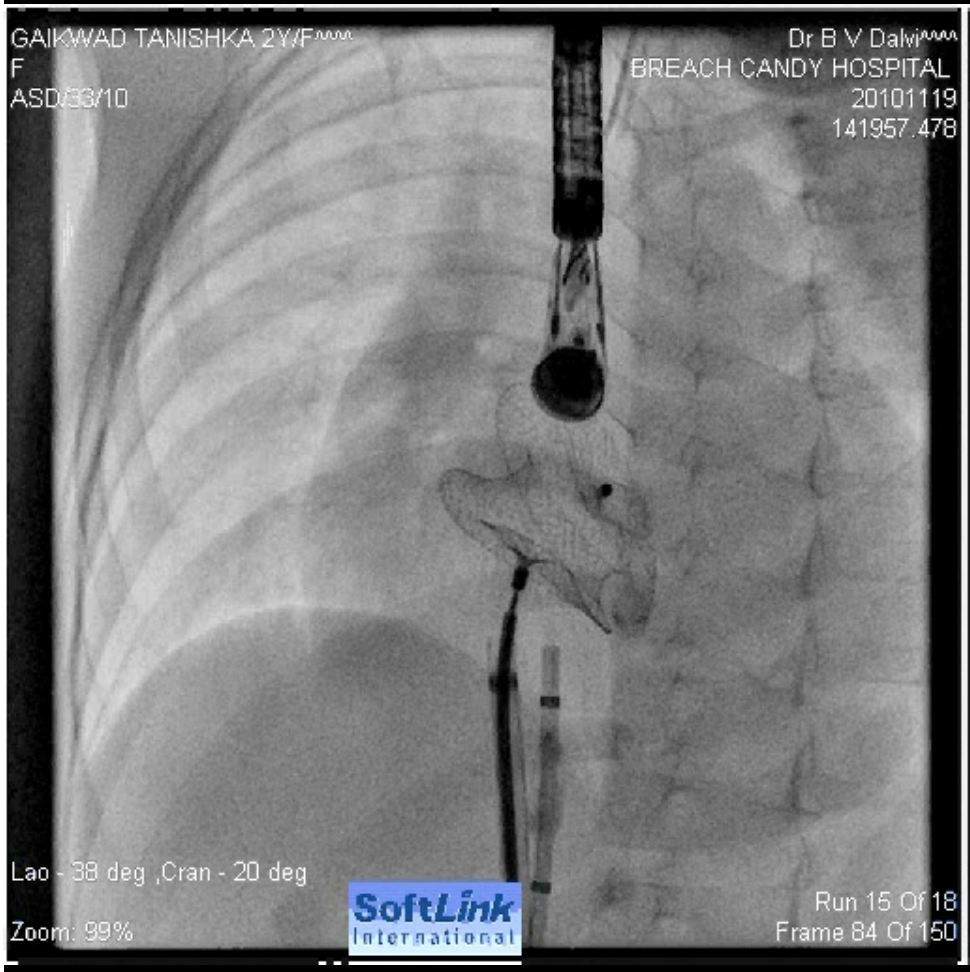
9kg with 24mm ASO

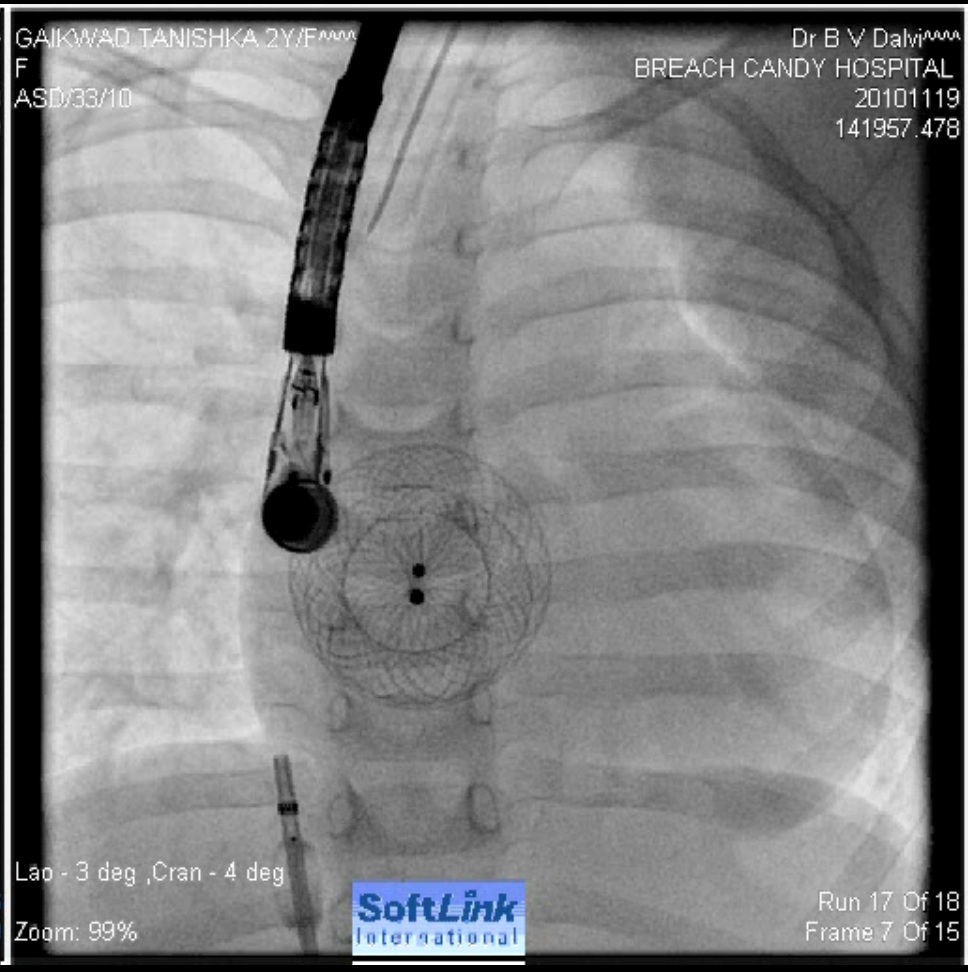






9 kg with 24 mm ASO





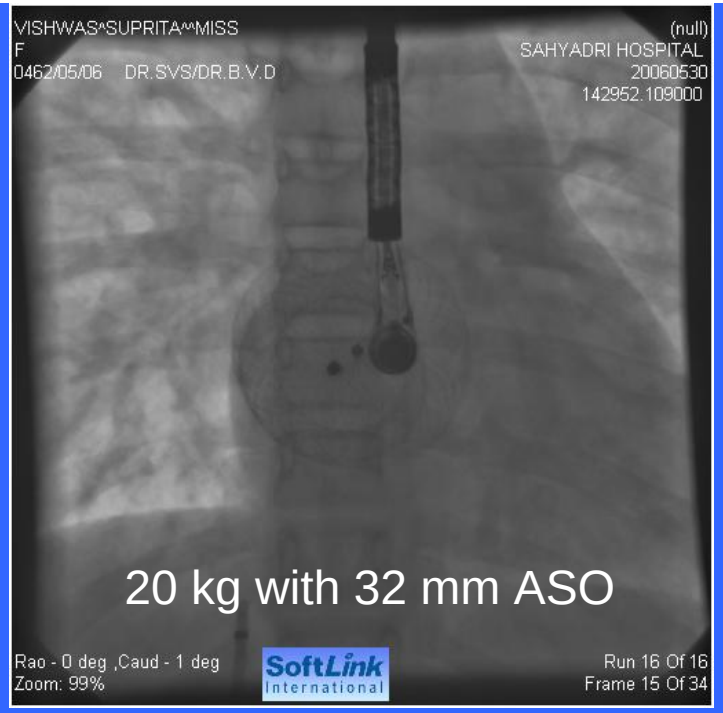
Baseline Characteristics

Number	112
Age	1-8 years (5)
Weight	5-20 kg (16)
CTR > 50%	76
Atrial arrhythmia	0
PAP	37.3 ± 7.8 mmHg
Qp:Qs	2.6 ± 0.3
ASD diameter on echo	15-27 mm (22)
BSD	16-30 (24)

Results

- Successful deployment : 111/112
- Residual shunt on table : Foaming : 47
- Device size : 16 to 32 (24)
- Procedural time : 60 to 134 min (90)
- Fluroscopy time : 5.6 to 26.4 min (11.5)


TALESARA^HRIDAY 1Y/M
M
101/ASD/06
DR B V DALVI
BREACH CANDY HOS
20060714
094258.000
8 kg with 24 mm ASO
Rao - 2 deg ,Caud - 2 deg
Zoom: 99%
SoftLink International
Run 12 Of 12
Frame 2 Of 44

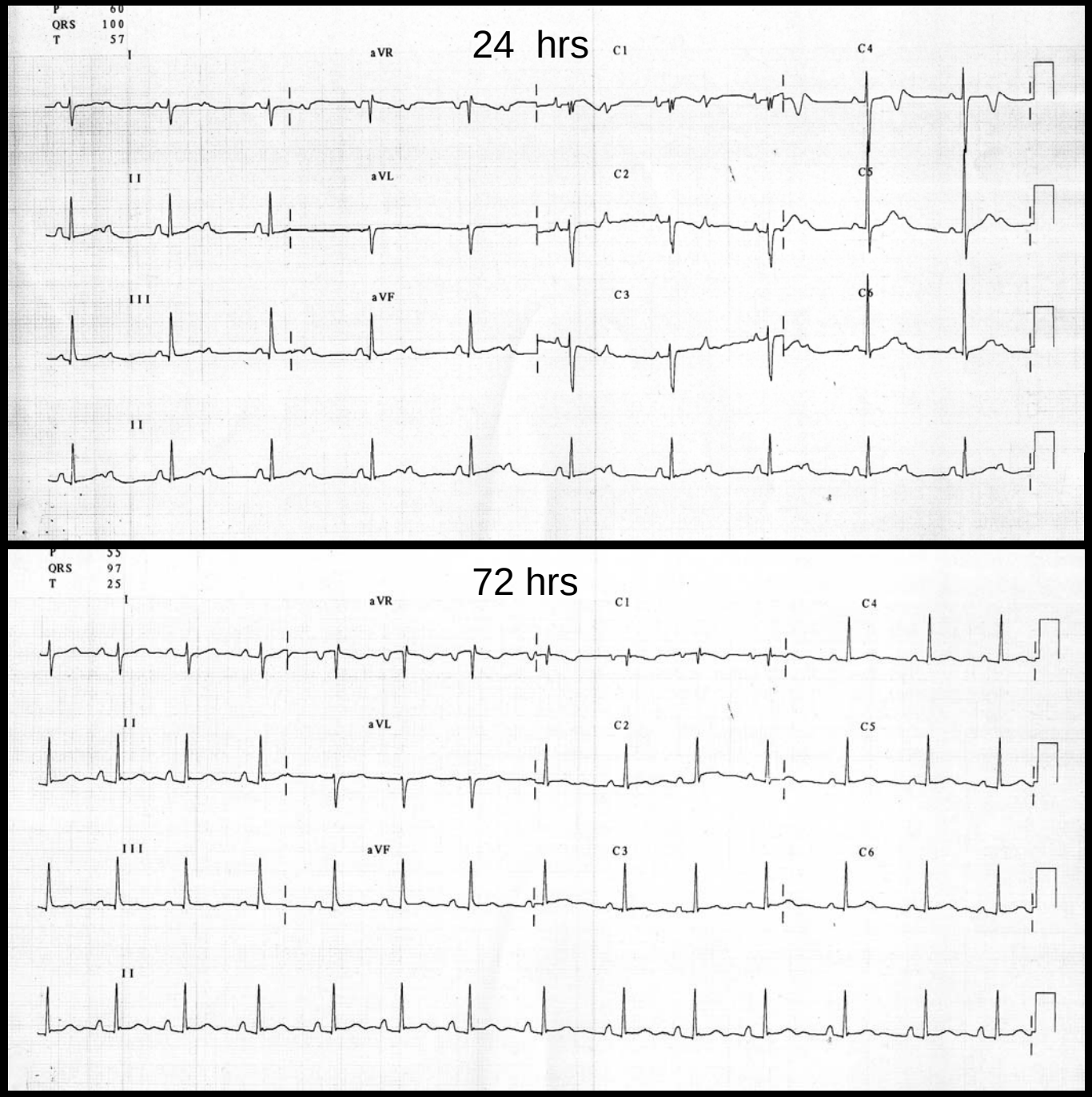

VISHWAS^SUPRITA^^MISS
F
0462/05/06 DR.SVS/DR.B.V.D
(null)
SAHYADRI HOSPITAL
20060530
142952.109000
20 kg with 32 mm ASO
Rao - 0 deg ,Caud - 1 deg
Zoom: 99%
SoftLink International
Run 16 Of 16
Frame 15 Of 34

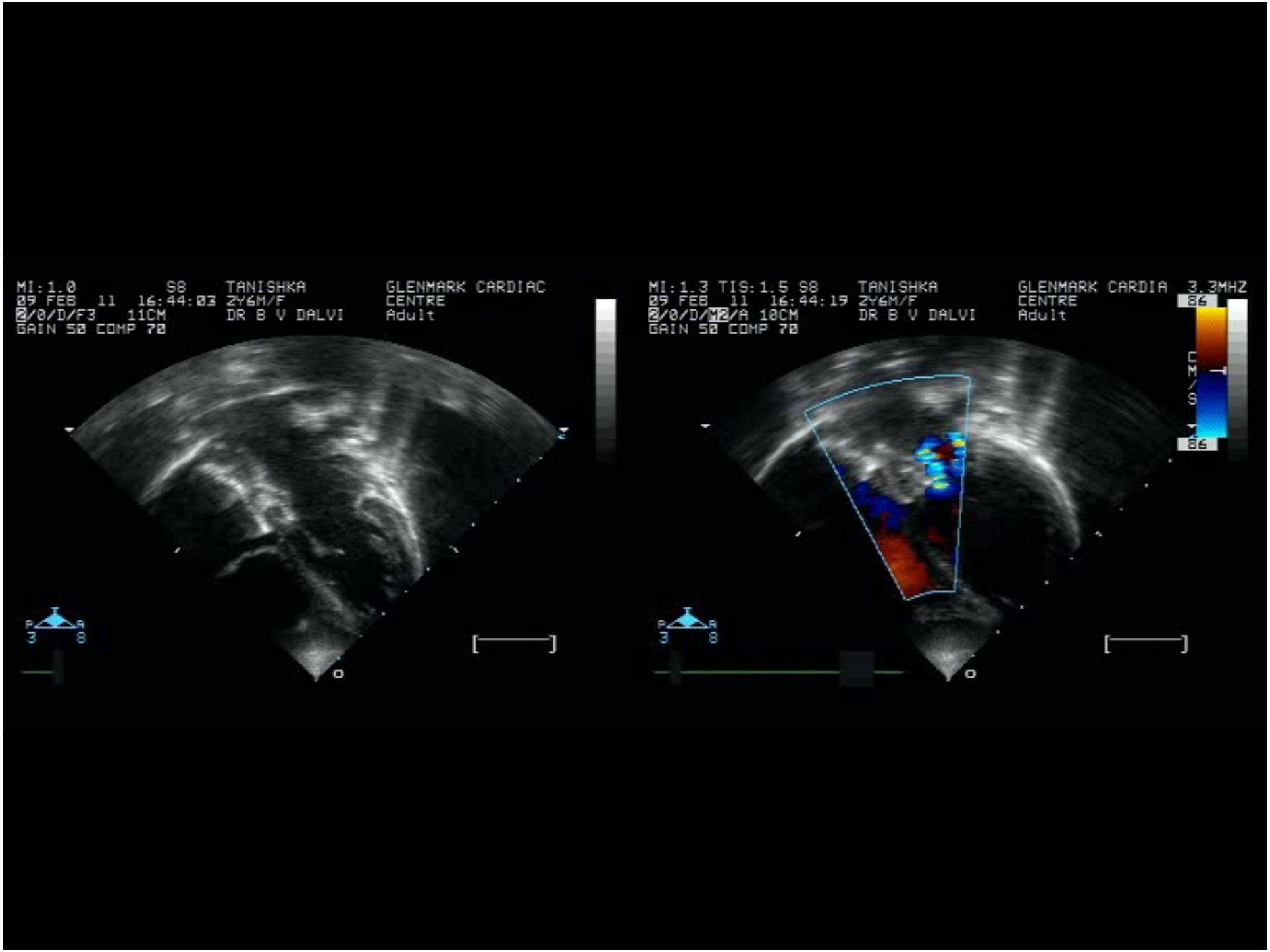

BABA R A KOTHARI 3Y
M
ASD 205/001394
DR.BHARAT DALVI
Dr. Balabhai Nanavati Hospital
20040206
083717.0000
11kg with 28 mm ASO
Rao - 1 deg ,Caud - 1 deg
Zoom: 99%
SoftLink International
Run 9 Of 9
Frame 2 Of 19


MAST G P WADHWANI 8Y
M
ASD 207/001390
DR.BHARAT DALVI
Dr. Balabhai Nanavati Hospital
20040206
110803.0000
18 kg with 32 mm ASO
Lao - 2 deg ,Caud - 0 deg
Zoom: 99%
SoftLink International
Run 15 Of 15
Frame 14 Of 25

Complications - Acute

- Failure : 1
- AV block (transient) : 1
- More than mild MR : 1
- Device migration/embolization : nil
- Pericardial effusion : nil
- TIA/CVA : nil
- Systemic/pulmonary venous problem : nil
- RV/LV inflow affection : nil


P 60
QRS 100
T 57
I
aVR
C1
C4
II
aVL
C2
C5
III
aVF
C3
C6
II
24 hrs
P 55
QRS 97
T 25
I
aVR
C1
C4
II
aVL
C2
C5
III
aVF
C3
C6
II
72 hrs


MI:1.0 S8 TANISHKA GLENMARK CARDIAC
09 FEB 11 16:44:03 2Y6M/F CENTRE
2/0/D/F3 11CM DR B V DALVI Adult
GAIN 50 COMP 70
MI:1.3 TIS:1.5 S8 TANISHKA GLENMARK CARDIA 3.3MHZ
09 FEB 11 16:44:19 2Y6M/F CENTRE
2/0/D/M2/A 10CM DR B V DALVI Adult
GAIN 50 COMP 70
86
CM/S
86

Follow up

- Schedule: 4 weeks, 6 months, every year
- Clinical examination
- ECG
- X-ray
- 2DE/CD

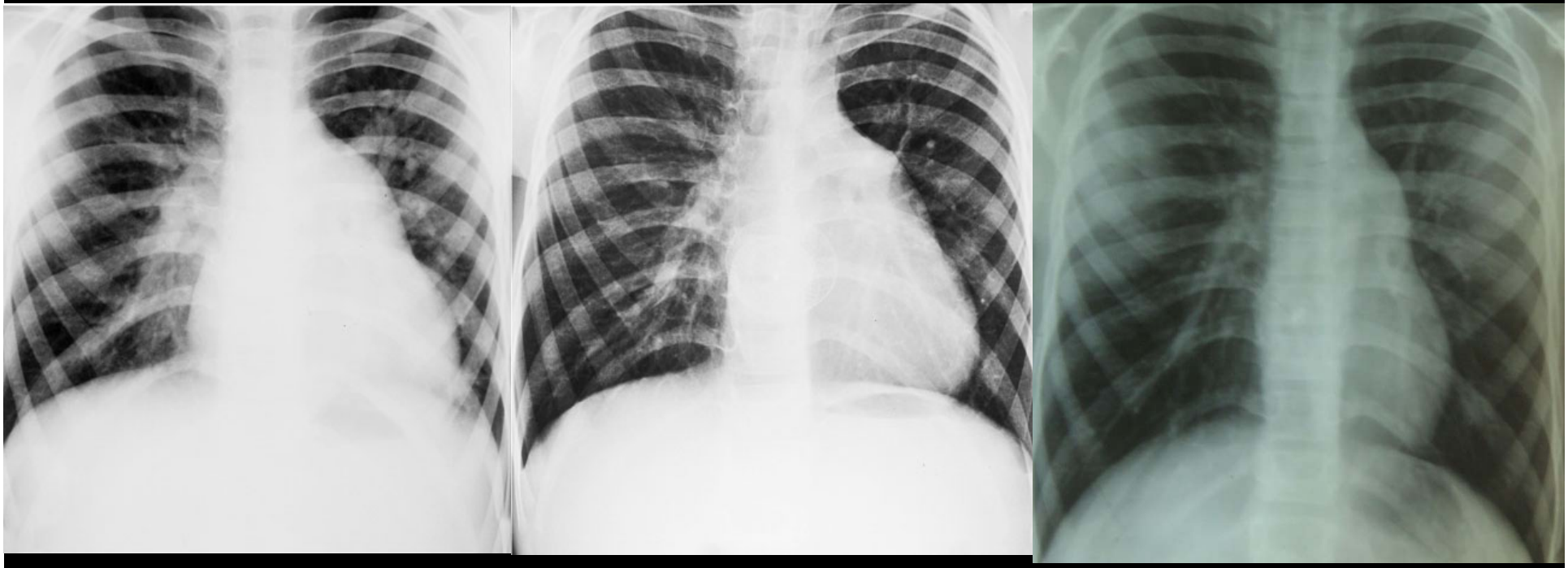
Follow up data

FU available	92
Duration of FU	2 to 96 (30)
Reduction in CTR on x-ray	76/92
RVVO on M-mode	29/92
PAP on Doppler	37.4±7.9 to 28.5±3.2

Follow up - Complications

- Residual shunt : 3
- Deaths, delayed perforation, pericardial effusion : 0
- Thrombus, TIA, CVA : 0
- Neo MR or TR : 0
- Systemic/pulmonary venous problems: 0
- Tachy/brady arrhythmias: 0

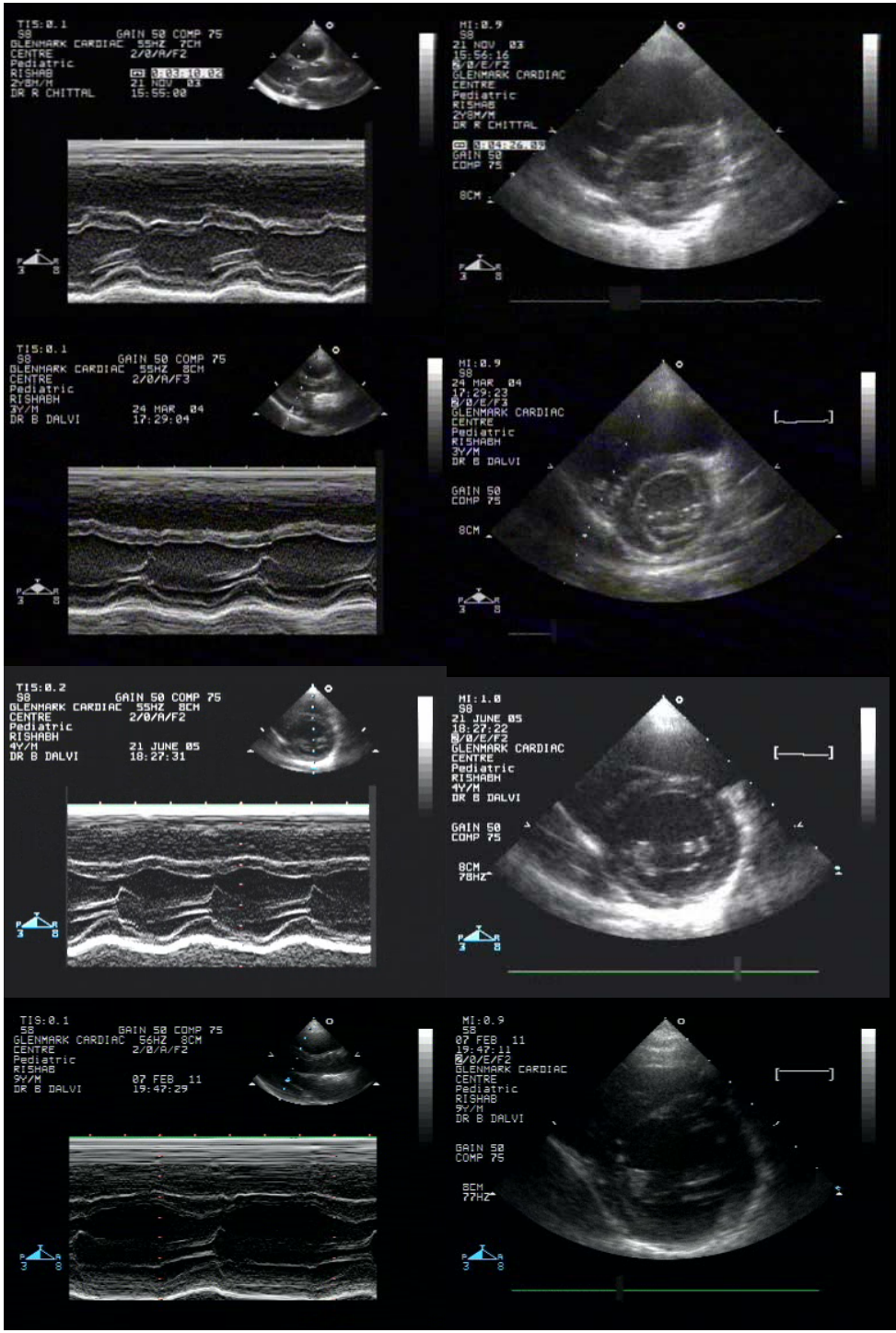
16 kg with 26 mm ASO

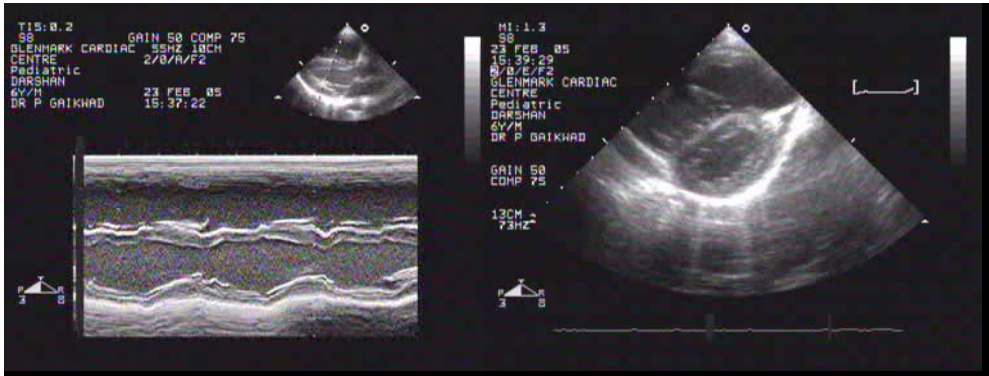


Before

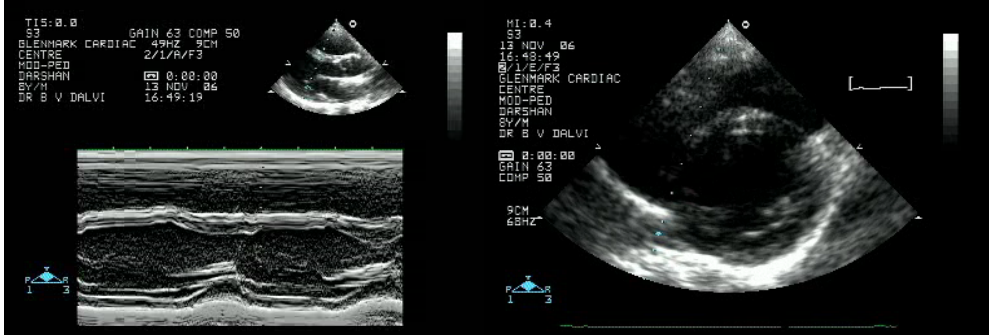
1 year FU

7 year FU

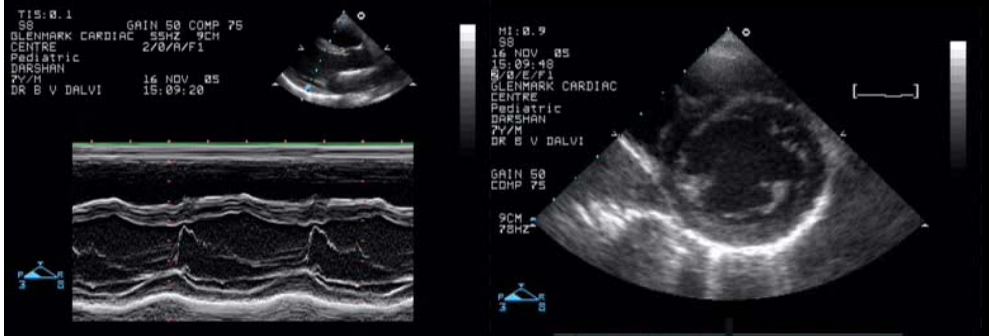

Before
3 months FU
18 months FU
7 Years FU



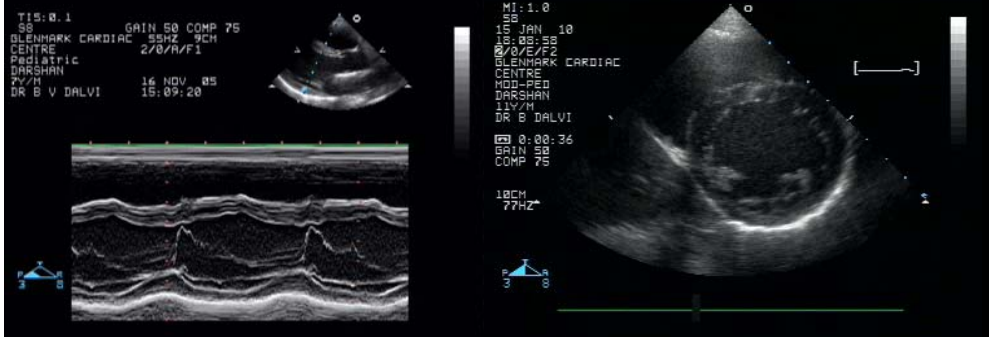
Before



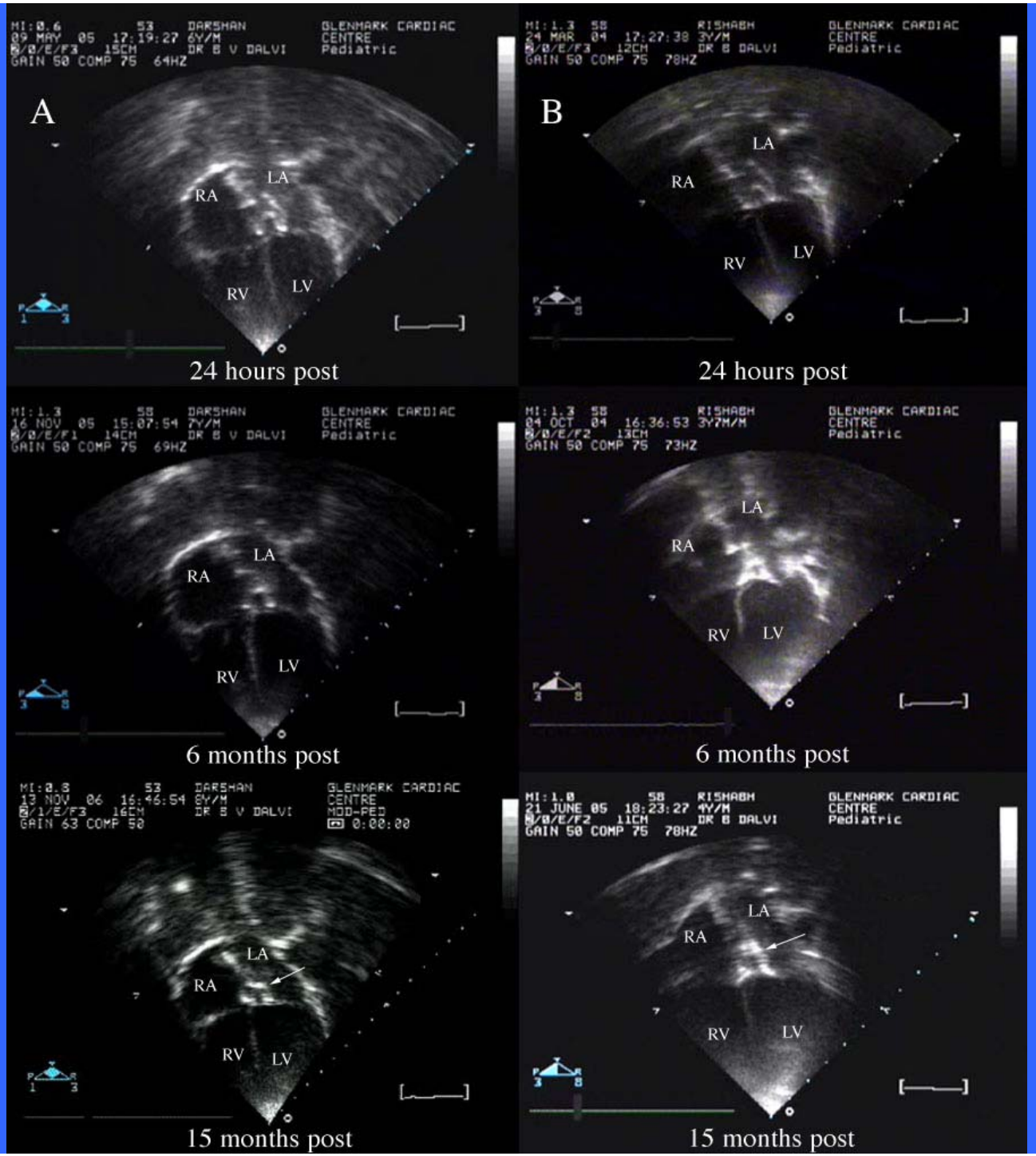
6 months FU



20 months FU



6 years FU


A
LA
RA
RV
LV
24 hours post
B
LA
RA
RV
LV
24 hours post
LA
RA
RV
LV
6 months post
LA
RA
RV
LV
6 months post
LA
RA
RV
LV
15 months post
LA
RA
RV
LV
15 months post

Conclusion

- Closure of large ASDs in children (< 20 kg) requiring ASOs ≥ 10 mm the body weight is feasible
- Most often need technical modifications
- Short and intermediate term efficacy and safety is documented in this cohort
- Long term implications (erosion, thrombosis, AV valve function, arrhythmias and ventricular function) need further FU