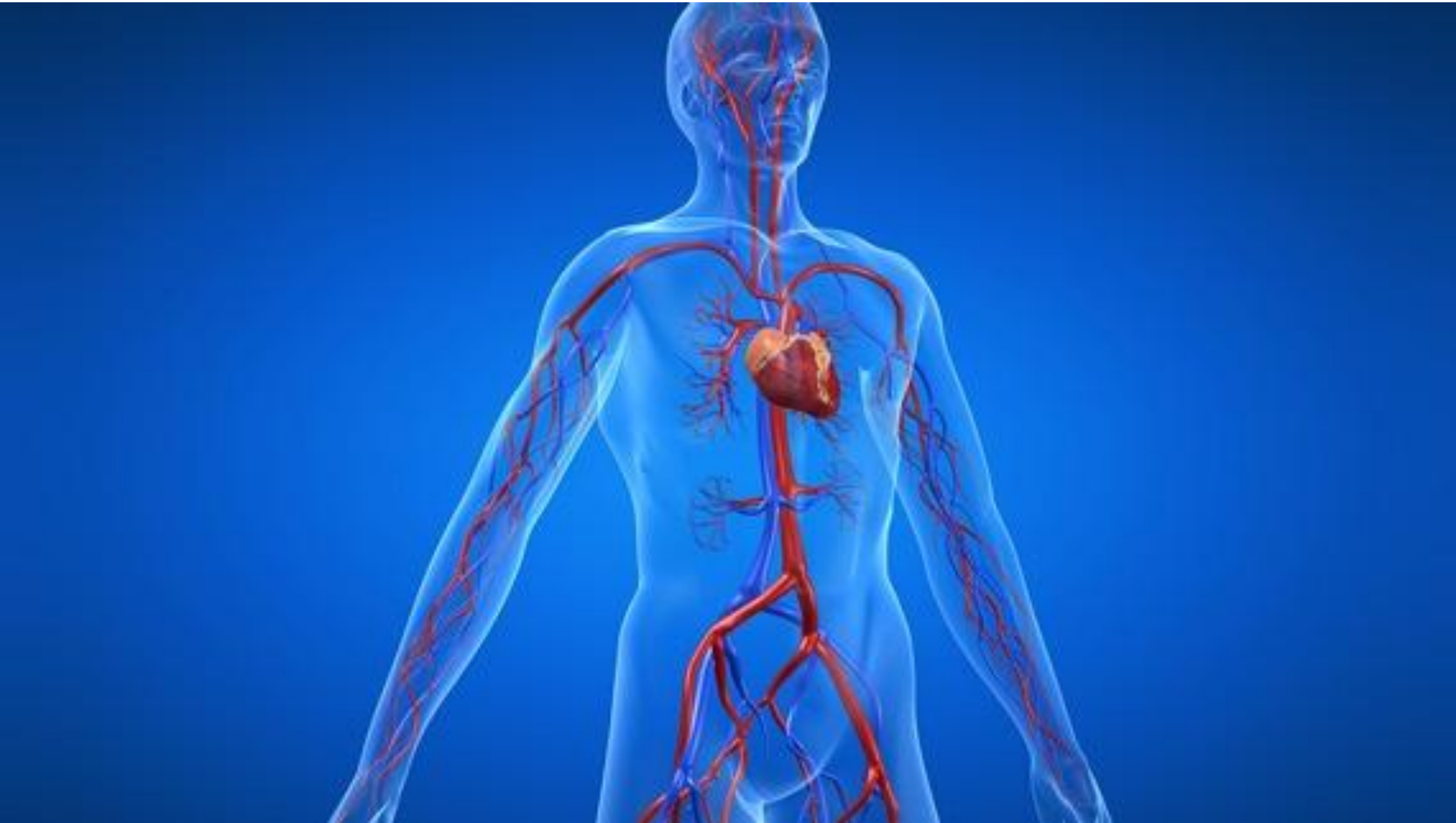
Future prospect of Hybrid Procedures for CHD

Asan Medical Center

Yun, Tae - Jin

CV Catheter interventions



CV Catheter interventions
-Currently established-

- **ASD** device closure
- **PDA** device closure
- Ballooning for **PA with IVS**
- Ballooning for **CoA / Re-CoA**
- Ballooning for **critical AS**
- Stenting of **branch PA stenosis**
- Coil embolization of **MAPCA/PAVM**

CV Catheter interventions
-Evolving-

- Percutaneous **VSD closure**
- Percutaneous **PVR / TVR**
- Percutaneous **AVR/MVR**
- Cath.lab **Fontan** procedure
- ……

Jobless cardiac surgeon

Hybrid procedure

Blue ocean in the future

Hybrid procedures

-Surgeon's perception-

Aberrational

Beneficial

Collaborative

Detour

Hybrid procedures

-Surgeon's perception-

Aberrational

Beneficial

Collaborative

Det

Standard procedure? : No!
Adjunct to conventional procedure
Routine hybrid strategy ?

Hybrid procedures

-Surgeon's perception-

Aberrational

Beneficial

Collabora

Detour

Lower early risks
⇒ Better early outcome
Better longer term outcome?
Better overall outcome?

Hybrid procedures

-Surgeon's perception-

Aberrational

Beneficial

Collaborative

Detour

Hybrid procedures

-Surgeon's perception-

Aberrational

Beneficial

Collaborative

Detour

AMC experience of Hybrid procedures

- **Bilateral PA band / ductal stent for TA (IIc) in 2005**
- **21 hybrid procedures**

  Bilateral PA banding / ductal stenting: 11

  Draining vein stenting for obstructive TAPVD: 2

  Perventricular muscular VSD closure: 3

  RVOT stenting: 6
- **In the OR / C-arm guided**

Case 1

- F/13 days
- Genstational age: 32^{+5} weeks
- Body weight at Op: 2,180 gm
- R/O necrotizing enterocolitis
- ABGA: 7.41-51-42-32-78%
- Echocardiography:

  Tricuspid atresia (IIc), Large ASD

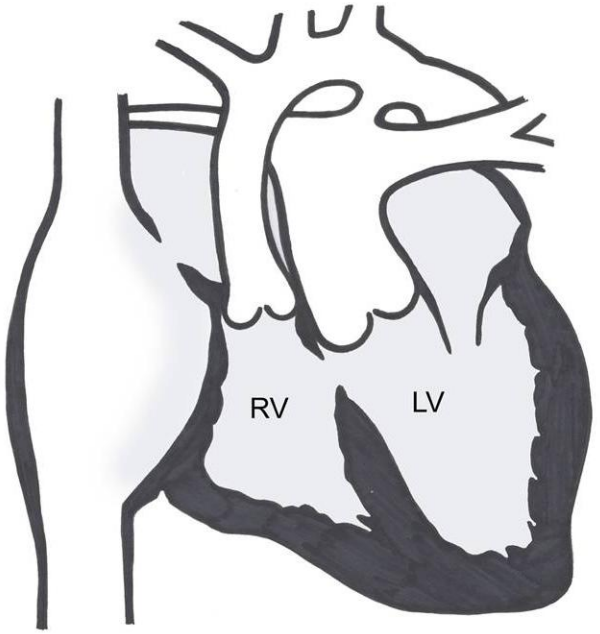
  Restrictive VSD, No MR

  d-TGA, Severe COA,

  Large ductus with R-L shunt,

  Hypoplasia of transverse arch

  Small ascending aorta (5.5 mm)



What should we do?

Conventional approach

1. Arch repair + PAB
2. Norwood type repair

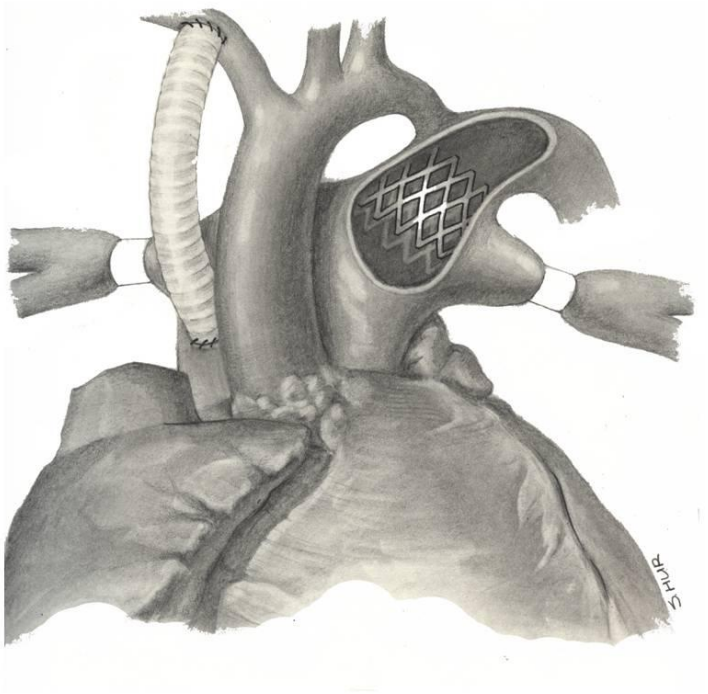
   Arch repair + DKS + RV-PA conduit (or shunt)

Detour

Hybrid palliation (bilateal PAB + ductal stent)

Case 1

- Hybrid Op (05.11.24) in the OR
  Bilateral PA banding
  Ductal stenting
  Reverse BT shunt (3.5 mm)

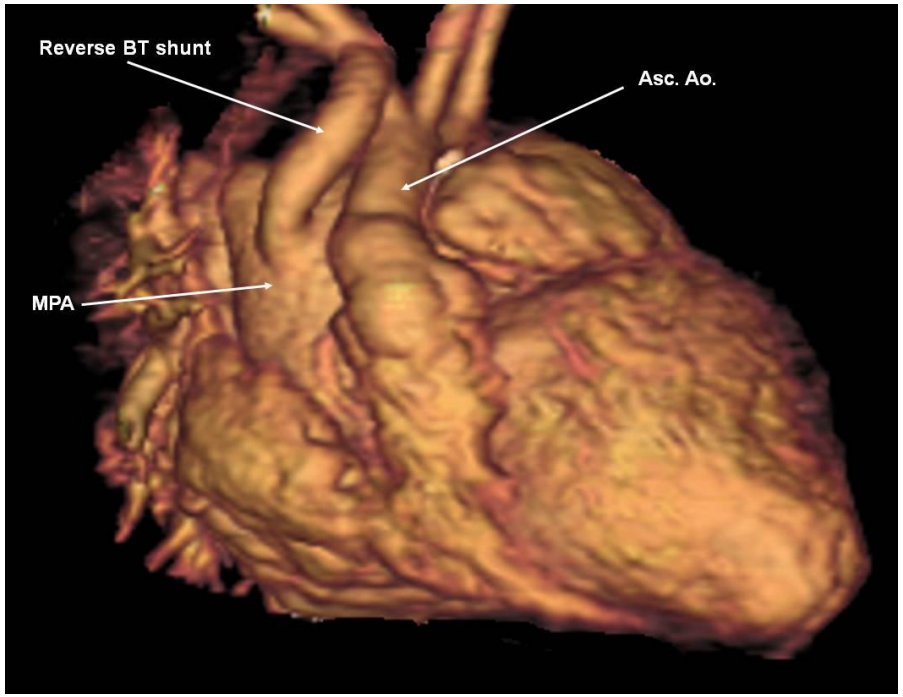


- Postop course
  POD 17: Extubation
  POD 29: GW transfer
  POD 31: Discharge home

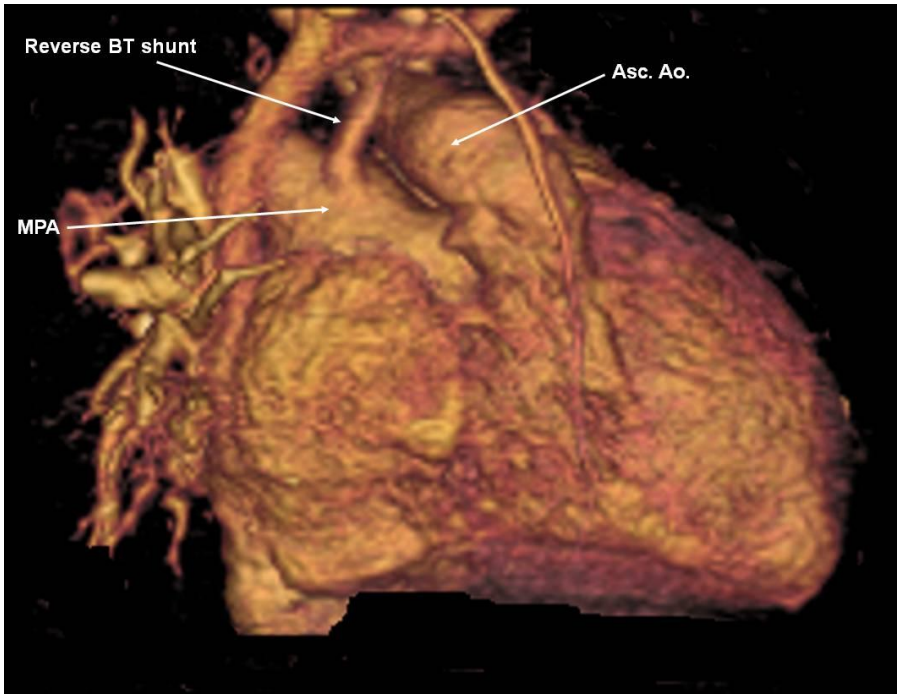
- BCPS (2006.5.18)
- ECC Fontan (2008.8.12)

Case 1

Post-op 1 month



Post-op 4 month

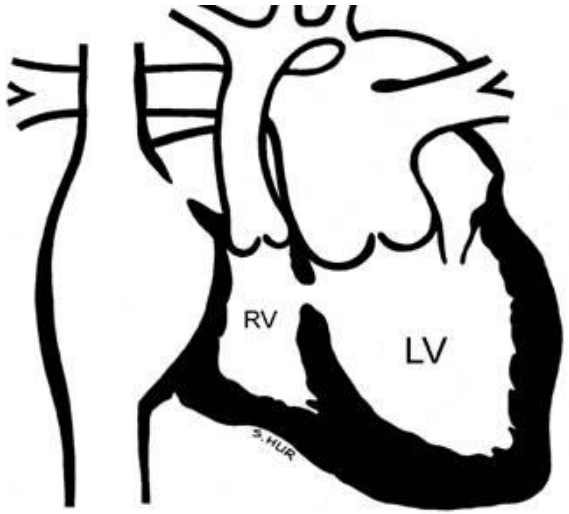


Case 1

Reverse Blalock-Taussig Shunt Facilitates the Growth of the Ascending Aorta After Hybrid Palliation

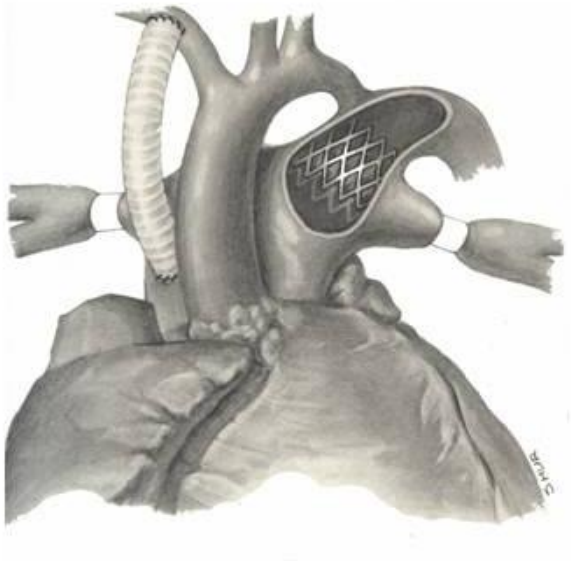
Tae-Jin Yun, MD, PhD, Won-Chul Cho, MD, Sung-Ho Jung, MD, Dong-Man Seo, MD, Hyun-Woo Goo, MD, and Young-Hwue Kim, MD

Divisions of Pediatric Cardiac Surgery and Pediatric Cardiology, and Department of Radiology, Asan Medical Center, College of Medicine, University of Ulsan, Seoul, Republic of Korea



A 13-day-old baby girl with tricuspid atresia (IIc), who was prematurely born at 32 weeks and 5 days of gestation and weighed 2.2 kg, underwent bilateral pulmonary artery banding, ductal stenting, and reverse Blalock-Taussig shunt. Cardiac computerized tomography at 4 months postoperatively showed that the ascending aorta outgrew the somatic growth, presumably thanks to the forward flow through the reverse Blalock-Taussig shunt. At 6 months postoperatively, the patient underwent a successful second-stage operation.

(Ann Thorac Surg 2007;83:1886–8)

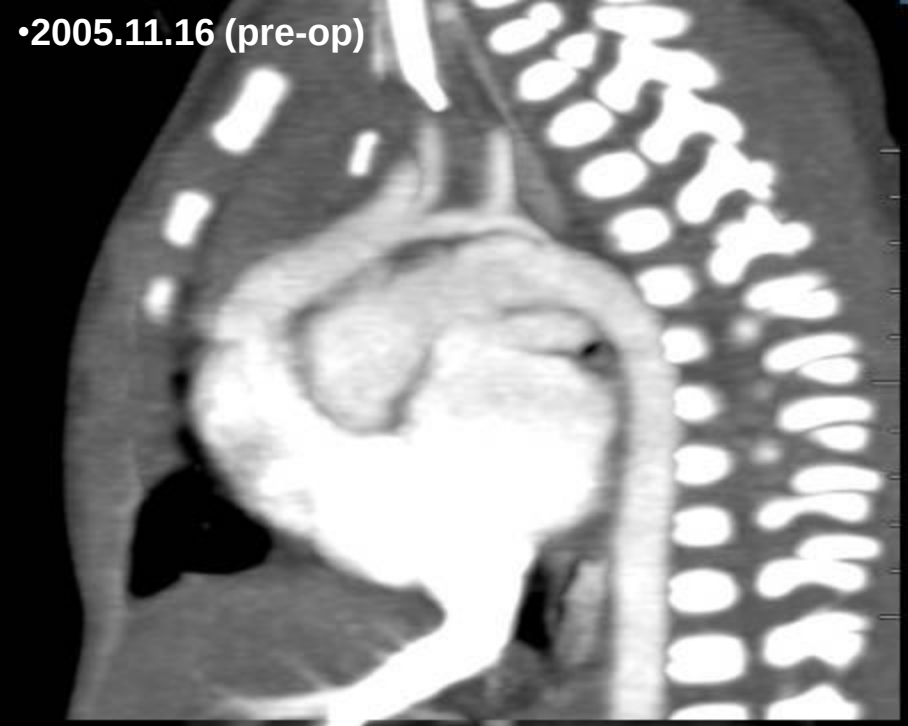


Case 1

Table 1. Changes in the dimensions of the cardiac structures on preoperative and postoperative cardiac computerized tomography

	Preoperative	Post-op.1 month	Post-op.4 month
AVA (mm)	5.0	5.6	9.4
AVA (z)	-4.0	-3.1	-0.8
Asc.Ao (mm)	5.5	6.6	11.7
PVA (mm)	9.5	9.8	11
PVA (z)	2<	2<	2<
MPA (mm)	15.3	17.6	21.3
AVA / PVA	0.53	0.57	0.85
Asc.Ao / MPA	0.36	0.38	0.55
VSD (mm)	3.9	3.9	4.1
VSDAI (cm^2/m^2)	0.80	0.79	0.55
VSD / AVA	0.78	0.69	0.44

Post-op, Postoperative; AVA(mm), aortic valve annulus diameter in mm; AVA(z), aortic valve annulus diameter in z-score; Asc.Ao (mm), ascending aorta diameter in mm at the sino-tubular junction; PVA(mm), pulmonary valve annulus diameter in mm; PVA(z), Pulmonary valve annulus diameter in z-score; MPA(mm); main pulmonary artery diameter in mm at the bifurcation; VSD, Ventricular Septal Defect; VSDAI, VSD area index


•2005.11.16 (pre-op)


2005.12.21 (post-op 1 m)


2006.3.30 (post-op 4 m)


2006.6.5. (post-op 6m,
after 2nd stage Op)

Case 2

- F / 11 days
- Genstational age: 39^{+3} weeks
- Body weight at Op: 3,168 gm
- ABGA: 7.46-40-61-92%
- Echocardiography

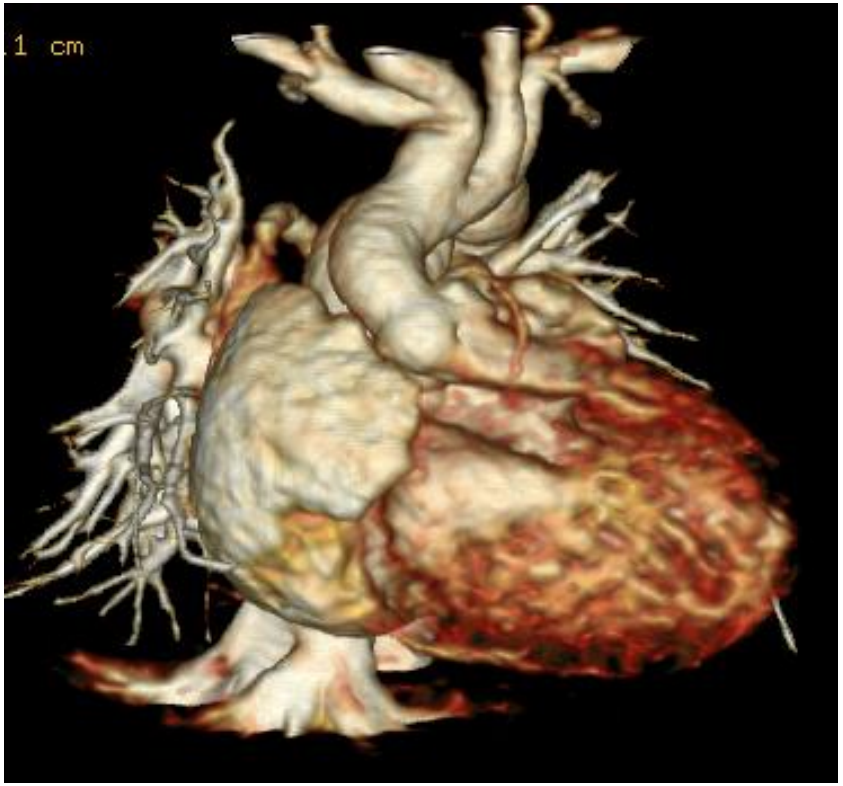
  DILV

  L-TGA, Ao from rudimentary RV

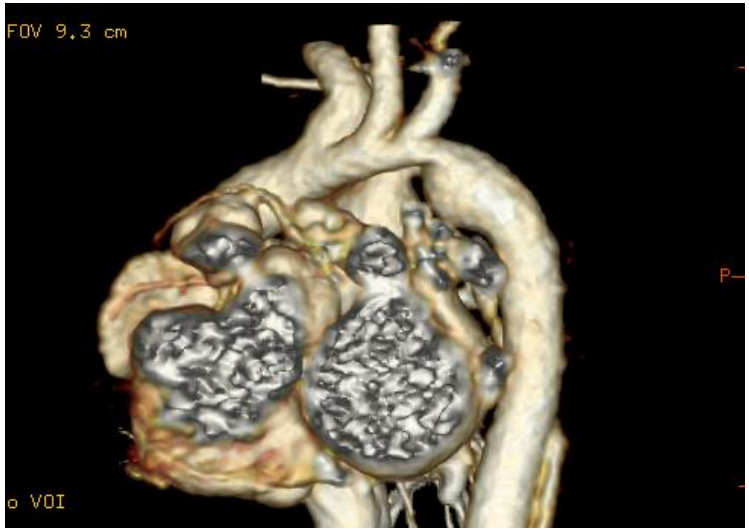
  Sizable BVF

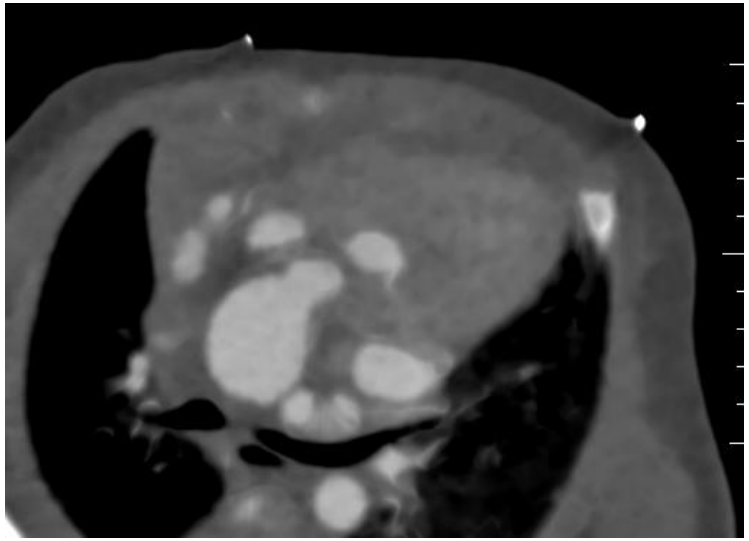
  Small isthmus (no CoA)

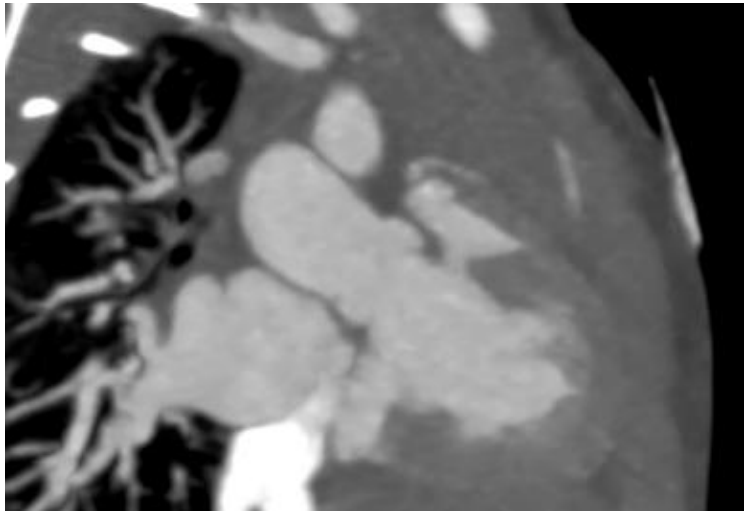
  Closing PDA



Case 2







What should we do?

Conventional approach

1. Arch repair + PAB
2. Norwood type repair

   Arch repair + DKS + RV-PA conduit (or shunt)

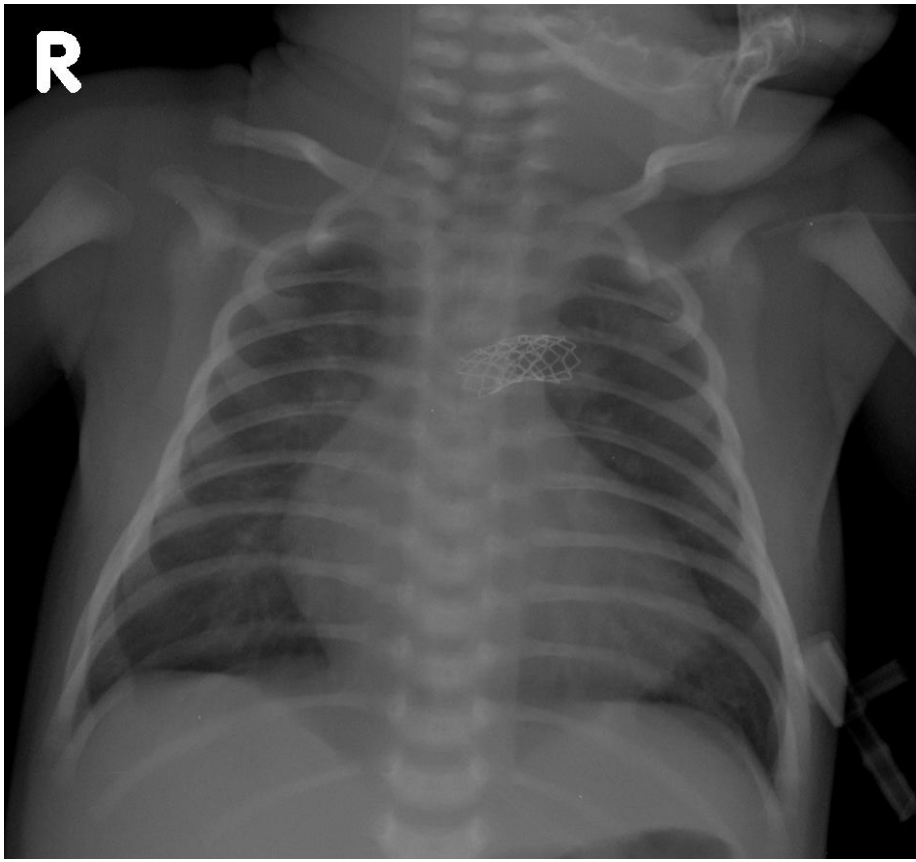
Detour

Hybrid palliation (bilateal PAB + ductal stent)

Case 2

- Hybrid Op (11.09.6) in the OR
  - Bilateral PA banding
  - Ductal stenting

- Postop course
  - POD 2: Delayed sternal closure
  - POD 6: Extubation
  - POD 9: GW transfer
  - POD 15: Discharge home



Case 3

- F / 4 days
- Genstational age: 36^{+6} weeks
- Body weight at Op: 3,450 gm
- ABGA: 7.49-28-47-86%
- Echocardiography

  DILV

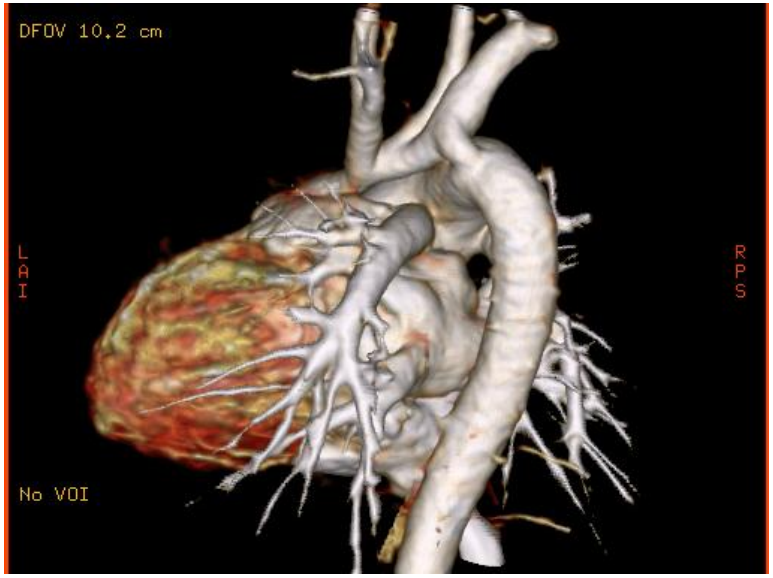
  L-TGA, Ao from rudimentary RV

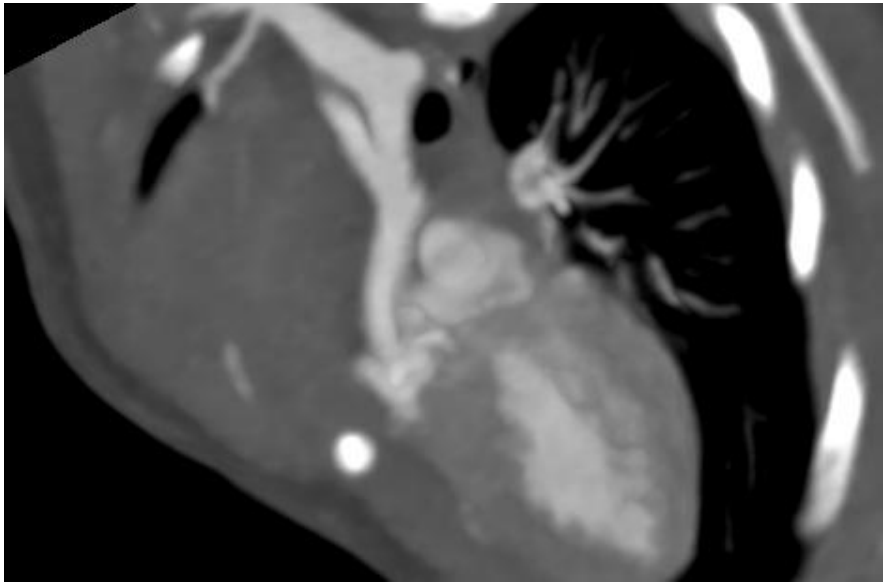
  Restrictive BVF

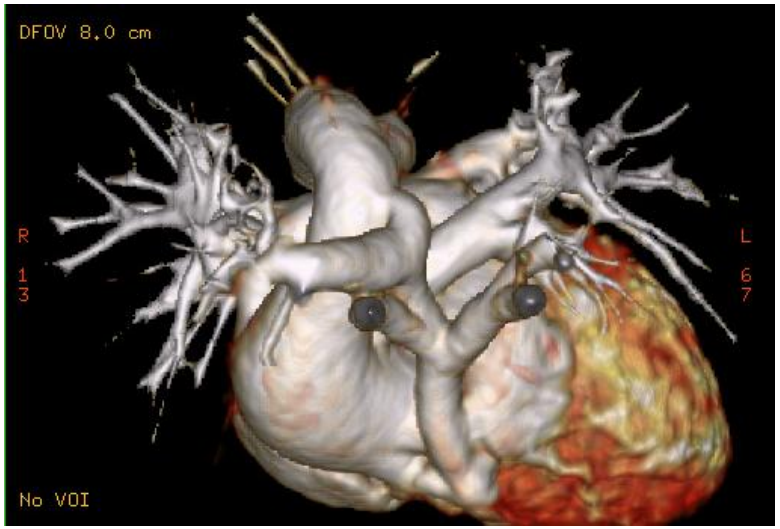
  Small isthmus (no CoA)

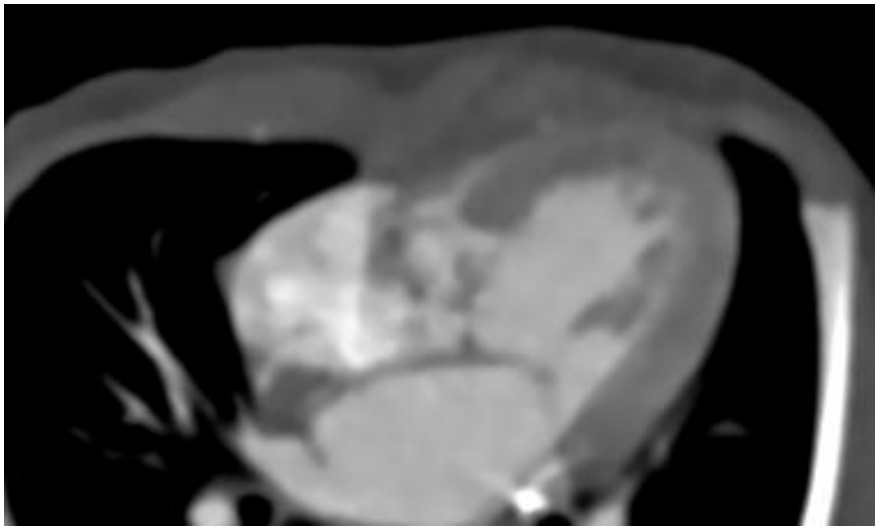
  Large PDA

Case 3





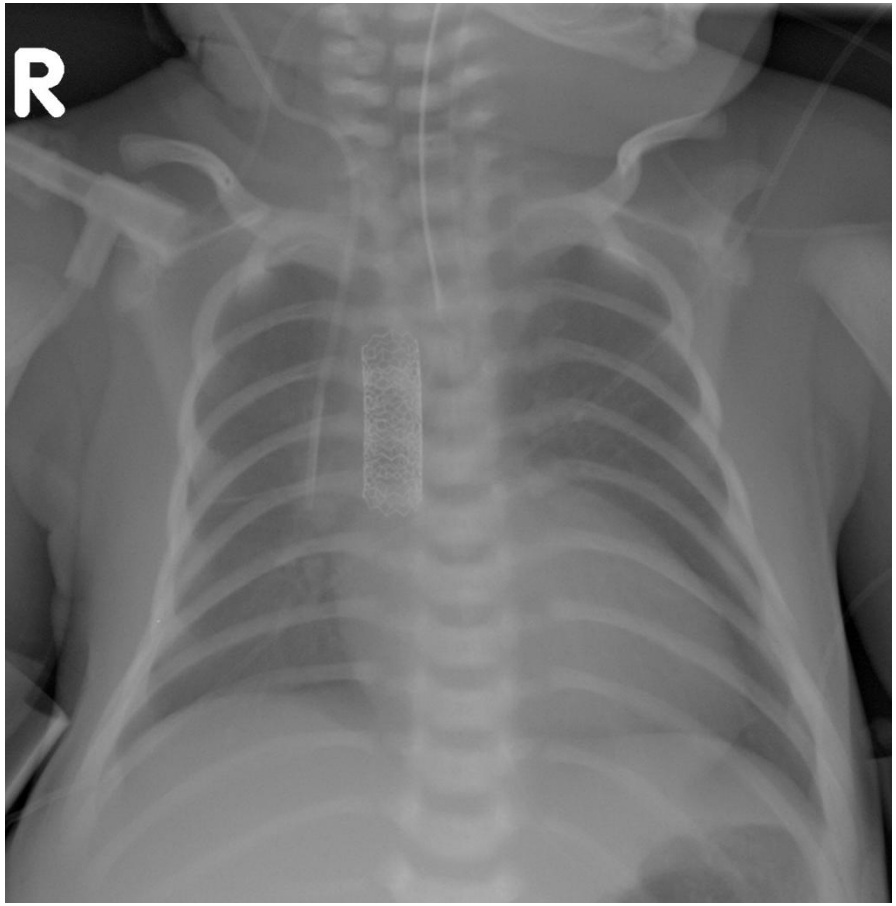




Case 3

- Hybrid Op (11.11.28) in the OR
  Bilateral PA banding
  Ductal stenting
  Reverse BT shunt (4 mm)

- Postop course
  POD 4: Extubation



Case 4

- M / 26 months
- Body weight at Op: 12.7 kg
- s/p PAB for m-VSD
- Echocardiography

tight PA banding

MPA velocity : 3.9 m/sec

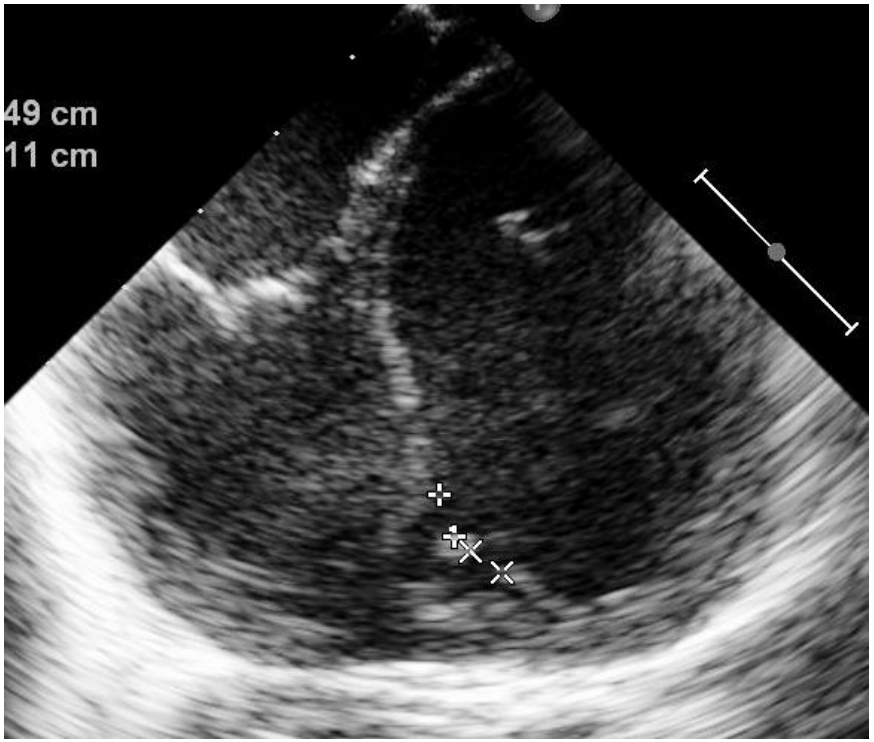
multiple muscular VSDs 2 sites

TR Gr 1/4 (TR velocity 4.5m/sec)

MR trace(A2 jet)

Ventricular function looks good

No pericardial effusion



What should we do?

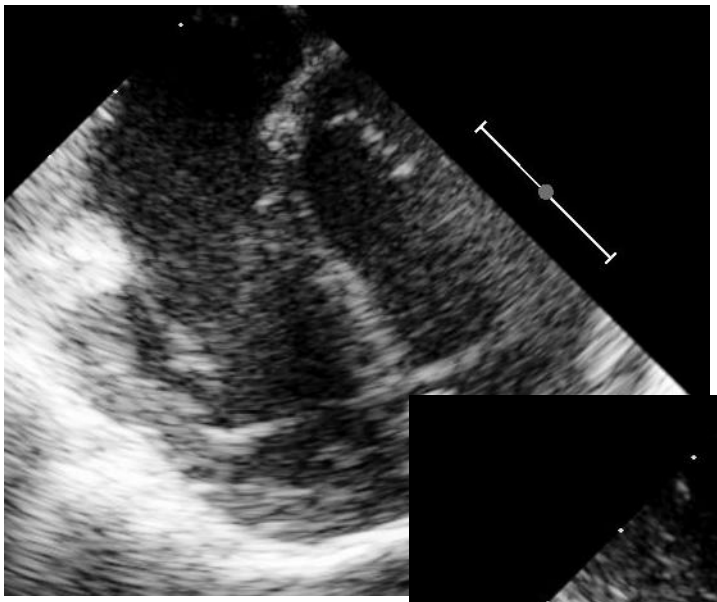
Conventional approach

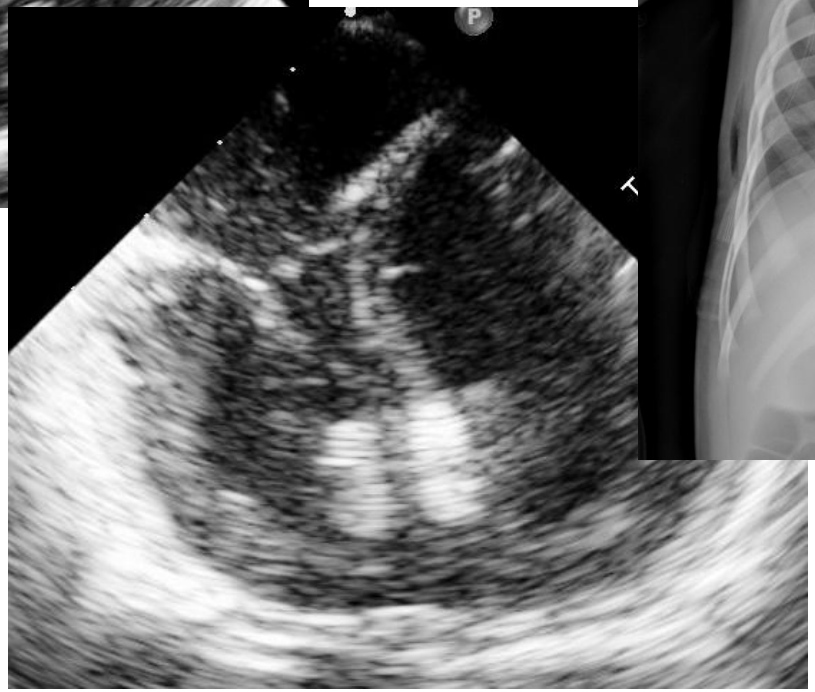
VSD repair via RV-tomy or LV-tomy

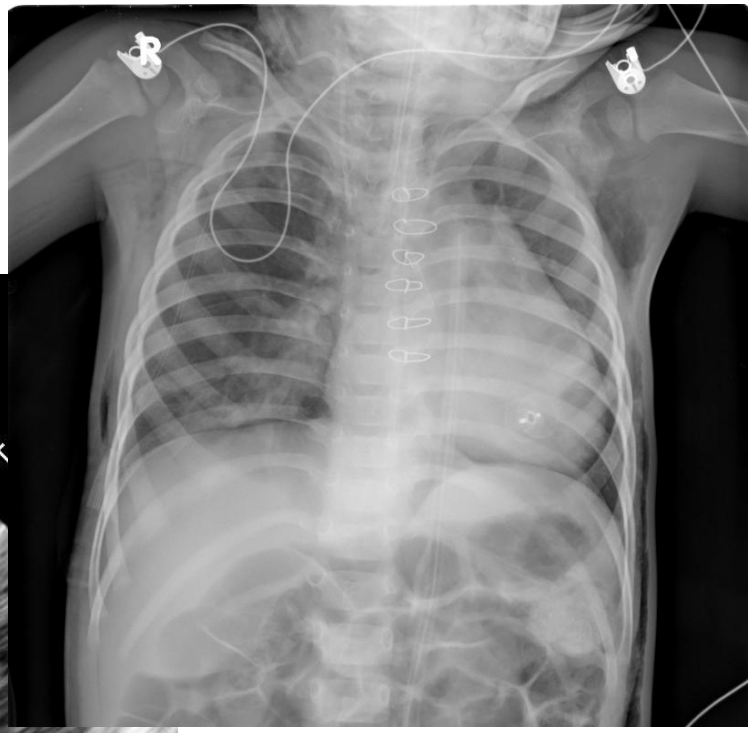
Detour

Hybrid palliation (perventricular device closure)

Case 4







Case 5

- F / 26 days
- Genstational age: 37+4 week
- Body weight at Op: 2,249 gm
- R/O neonatal sepsis
- ABGA: 7.41-51-42-32-78%
- Echocardiography

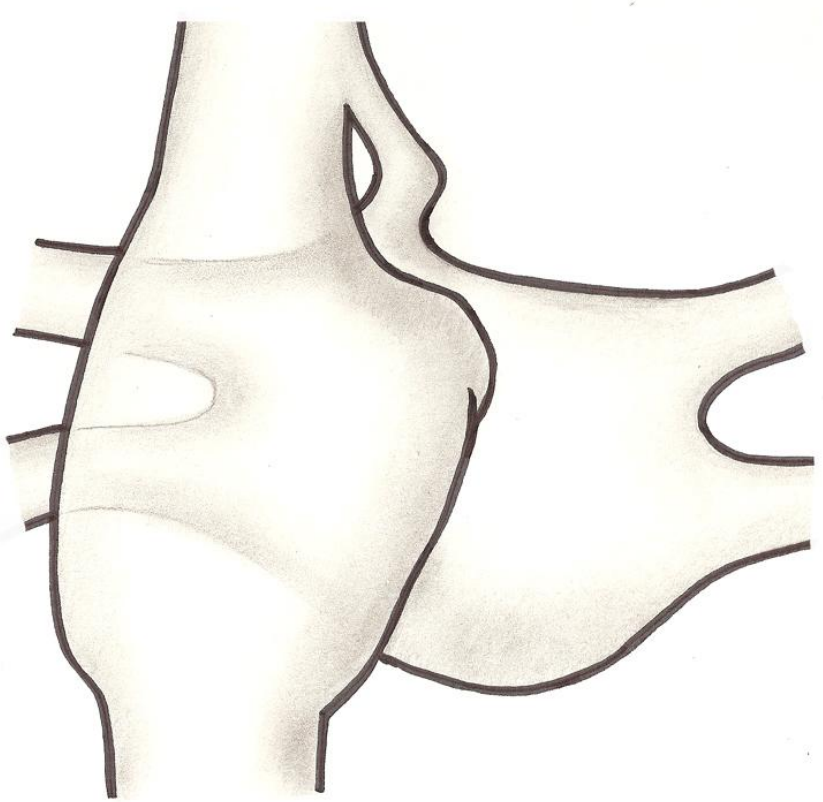
  Right atrial isomerism

  Unbalanced AVSD with small LV

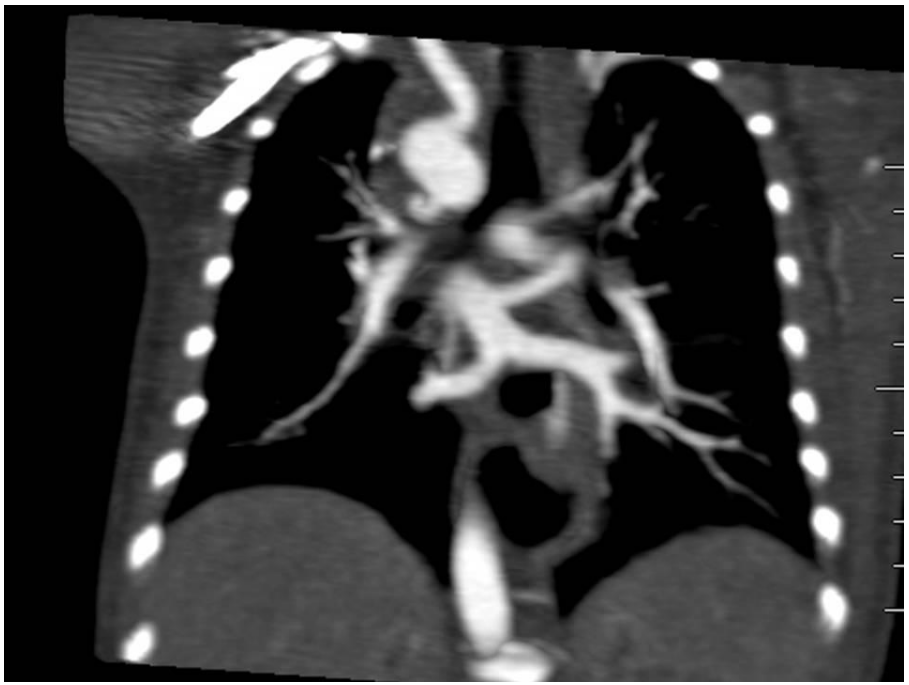
  DORV without PS

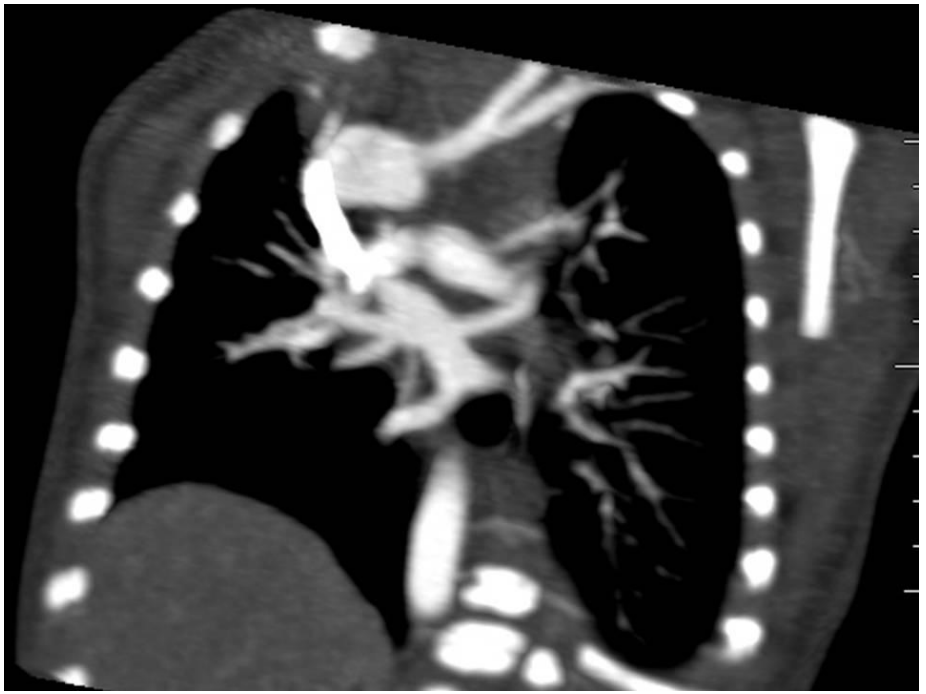
  Bilateral SVC

  Supracardiac TAPVD draining to SV
  RA junction with severe obstruction



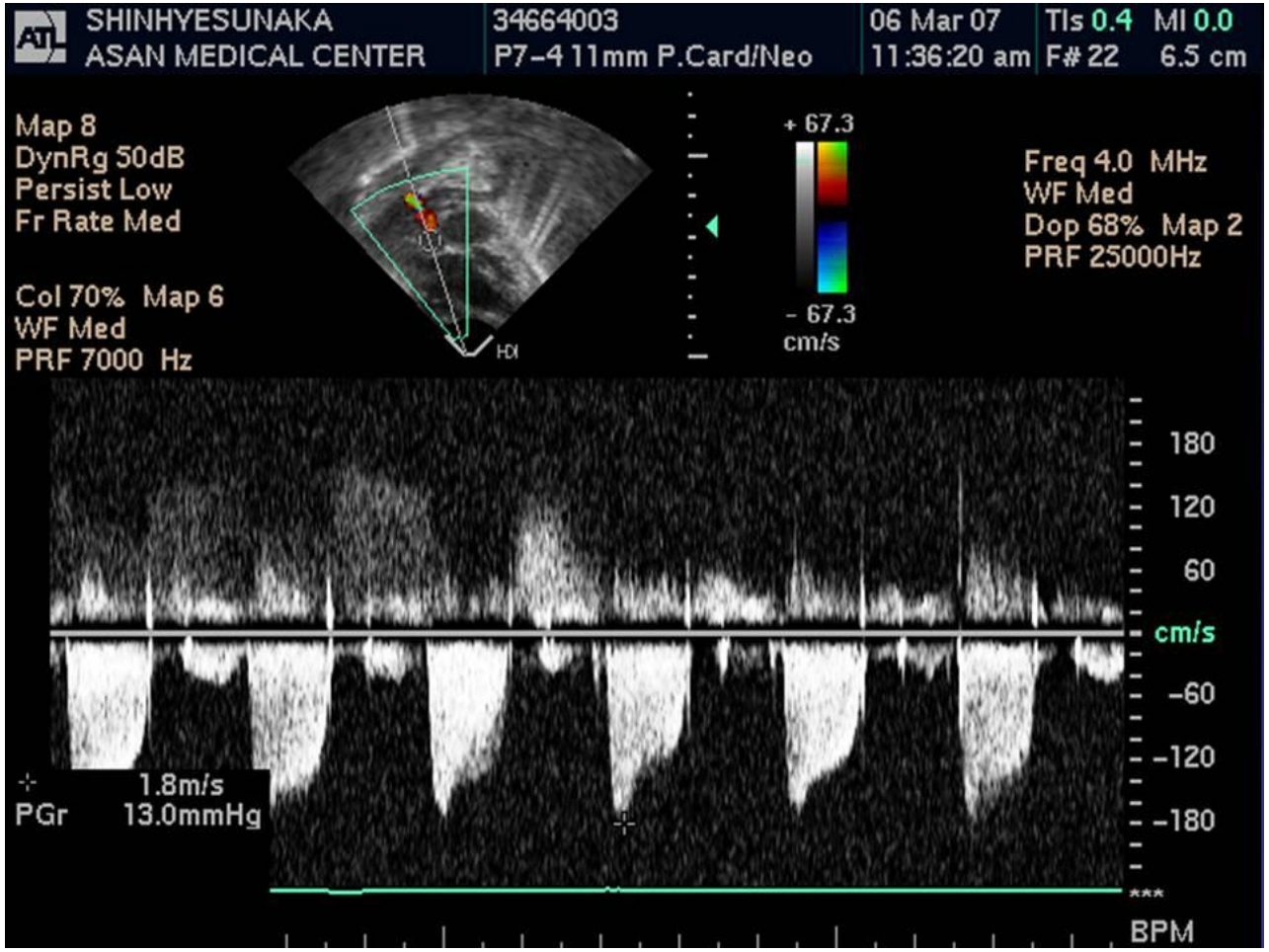
Case 5





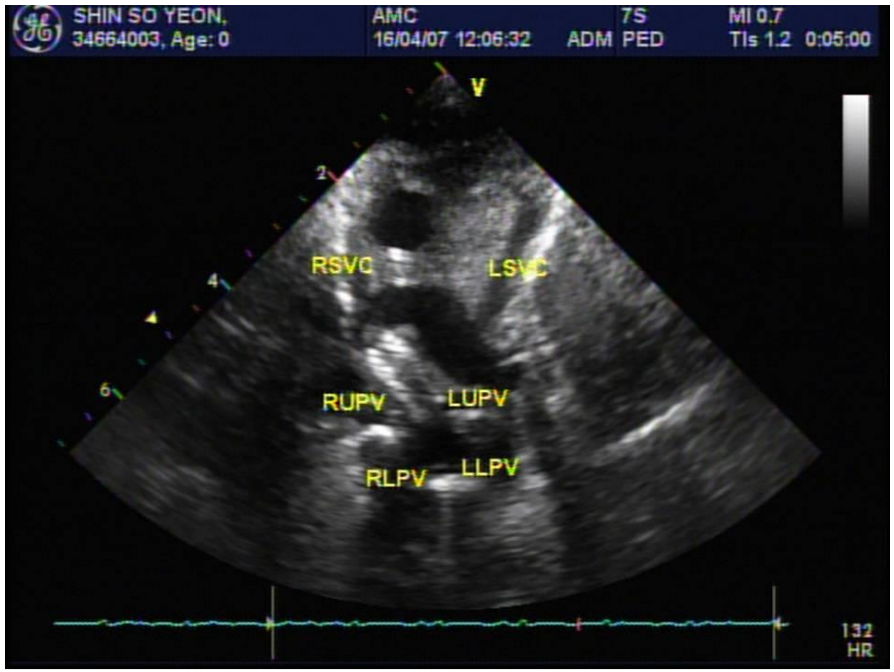
Cardiac CT at postnatal day 1

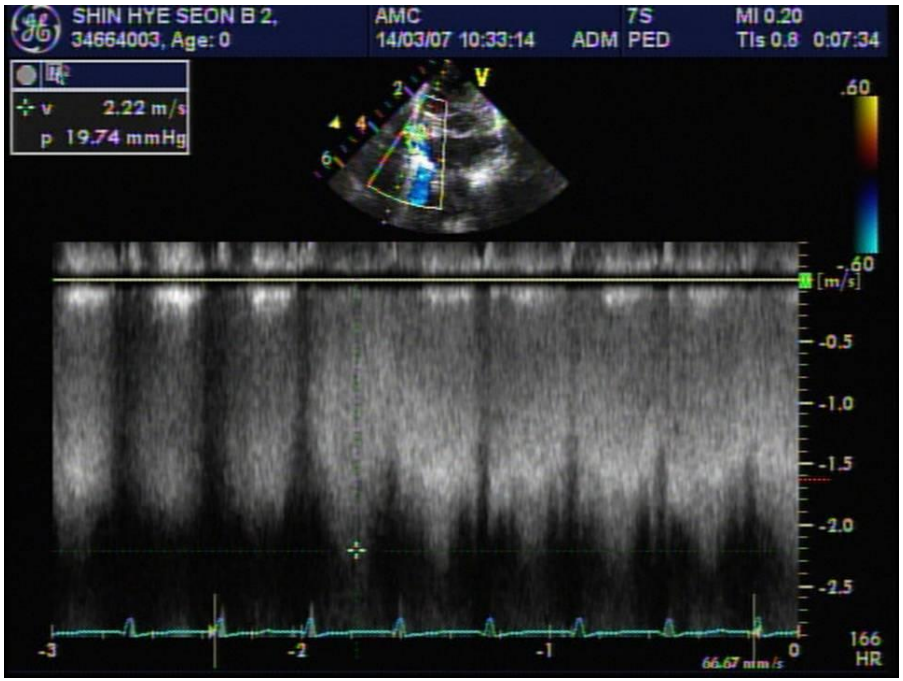
Case 5



Echocardiography at age 1 day

Case 5





Echocardiography at age 8 day

What should we do?

Conventional approach

1. Withdrawal
2. PDA ligation + PA banding
3. PDA ligation + PA banding + TAPVD repair

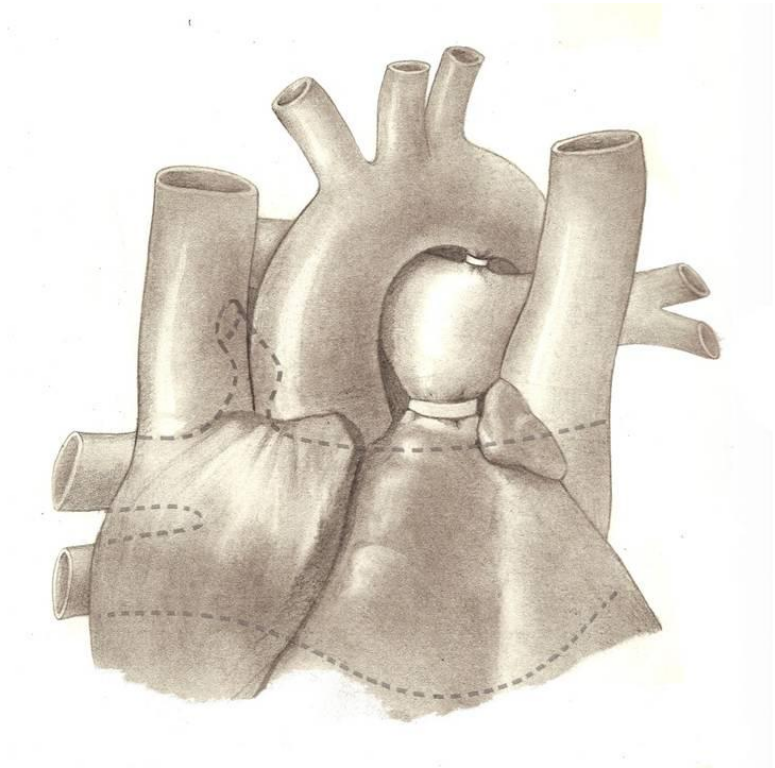
Detour

Hybrid palliation (TAPVD draining v. stent)

Case 5

Hybrid palliation for RAI,TAPVD

(Age: 24 days, BWt: 2.29kg)



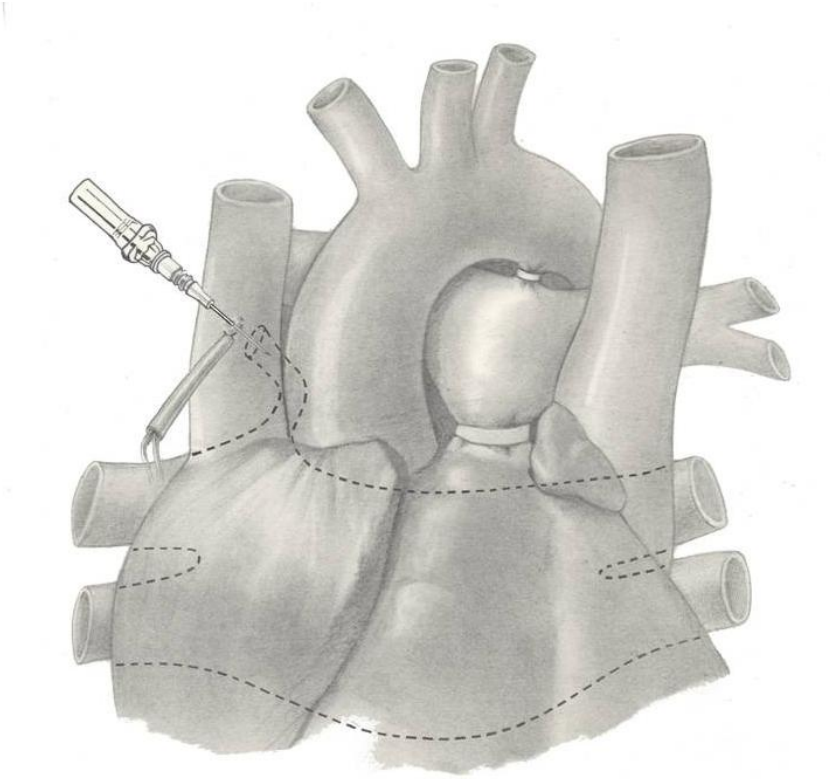
PDA ligation

PAB

Case 5

Hybrid palliation for RAI,TAPVD

(Age: 24 days, BWt: 2.29kg)

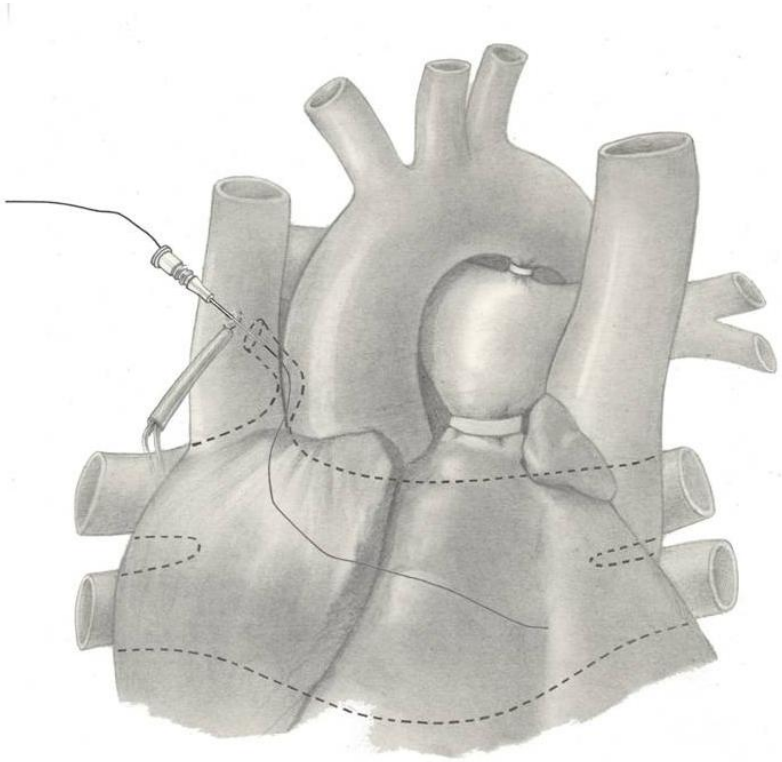


Introduction of angiocath (22G)

Case 5

Hybrid palliation for RAI,TAPVD

(Age: 24 days, BWt: 2.29kg)

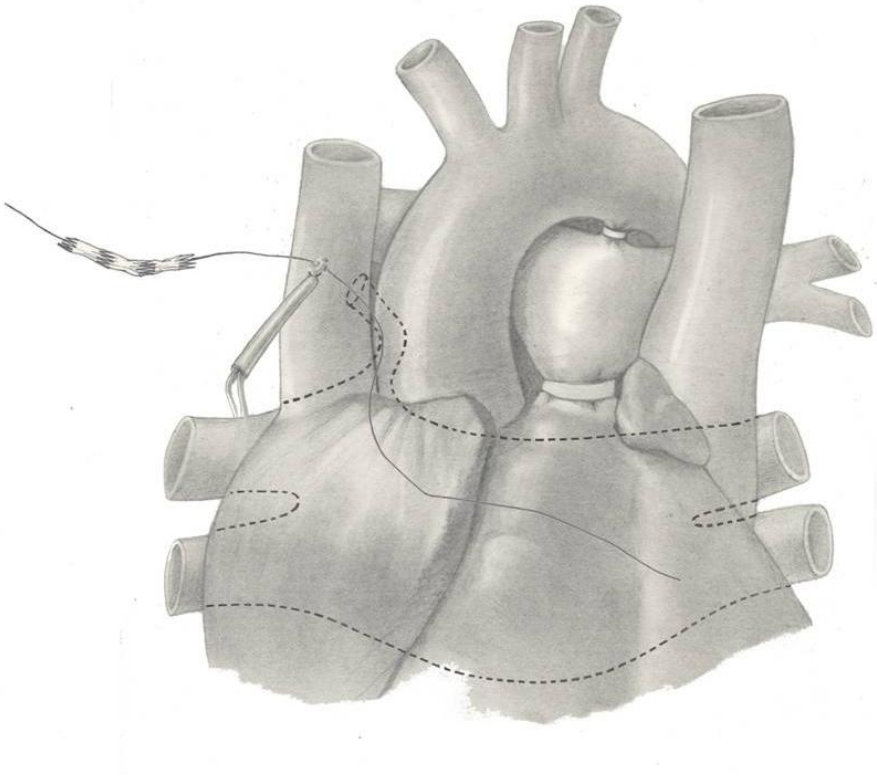


Introduction of guide wire

Case 5

Hybrid palliation for RAI,TAPVD

(Age: 24 days, BWt: 2.29kg)

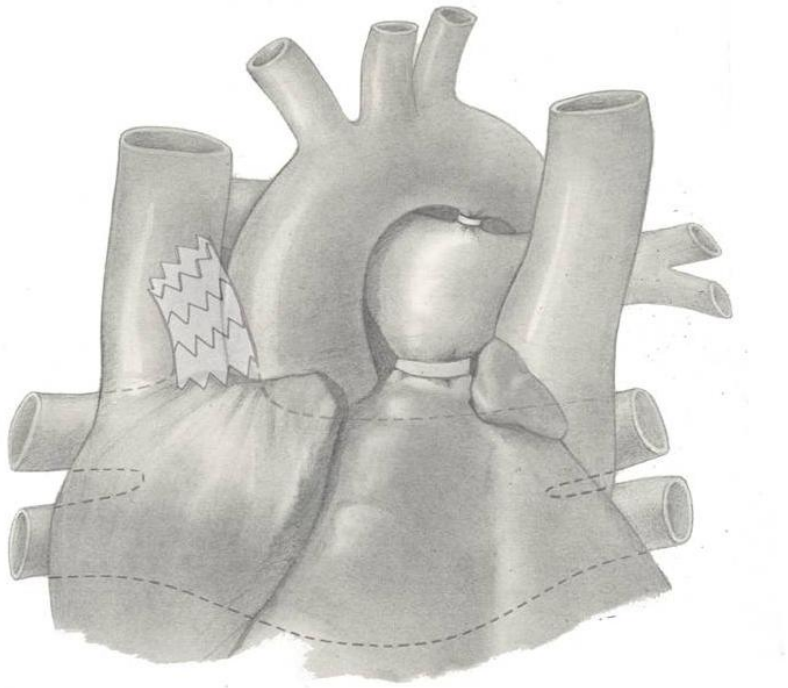


Introduction of stent

Case 5

Hybrid palliation for RAI,TAPVD

(Age: 24 days, BWt: 2.29kg)



Placement of stent

(Drug eluting, 4.5 mm, Endeavor TM. Medtronic Inc. Minneapolis)

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INTERACTIVE CARDIOVASCULAR AND THORACIC SURGERY

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www.icvts.org

Negative results - Congenital

Hybrid palliation for right atrial isomerism associated with obstructive total anomalous pulmonary venous drainage

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Abstract

A twenty-four-day-old girl, who was prematurely born at 36 weeks of gestation, and weighed 2.2 kg, and diagnosed with right atrial isomerism, functionally single ventricle, bilateral superior vena cava (SVC) and obstructive supracardiac total anomalous pulmonary venous drainage (TAPVD) draining to the junction between the right SVC and the right atrium, underwent a hybrid procedure in the operating room, which consisted of pulmonary artery banding, ductus ligation and stenting of the draining vein of TAPVD. Obstruction at the drainage site of TAPVD was initially relieved after stenting, but, one month after the procedure, the distal end of the stent became stenotic and she received bilateral sutureless repair of TAPVD. At postoperative seven months, she underwent bidirectional cavopulmonary shunt uneventfully, and she has been followed-up for two months in a stable state without any problem in the pulmonary venous pathway.

Keywords: TAPVD; Right atrial isomerism; Hybrid procedure

1. Introduction

Although the prognosis of right atrial isomerism (RAI) associated with obstructive total anomalous pulmonary venous drainage (TAPVD) is very poor even in contemporary series [1,2], aggressive TAPVD repair upon initial palliation

necrotizing enterocolitis, antimicrobial treatment was initiated. From the 15th day of life, she began to show desaturation (70%), tachypnea, and pulmonary venous congestion on chest X-ray. Follow-up echocardiography revealed that the draining site of TAPVD had become

Hybrid procedures

-Future prospect-

Surgeons want to join catheter intervention!

Detour