



Bedside VAD Management

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Pre-VAD Key Points



CONSENSUS STATEMENT

ISHLT consensus statement for the selection and management of pediatric and congenital heart disease patients on ventricular assist devices

Endorsed by the American Heart Association

- Timing of VAD → **Before** significant end-organ dysfunction or clinical deterioration
- Indications for VAD → **Failure** of medical management
- VAD strategies → **Bridge** to transplant, candidacy, decision, destination therapy
- **Device selection**

The Journal of
Heart and Lung
Transplantation

<http://www.jhltonline.org>

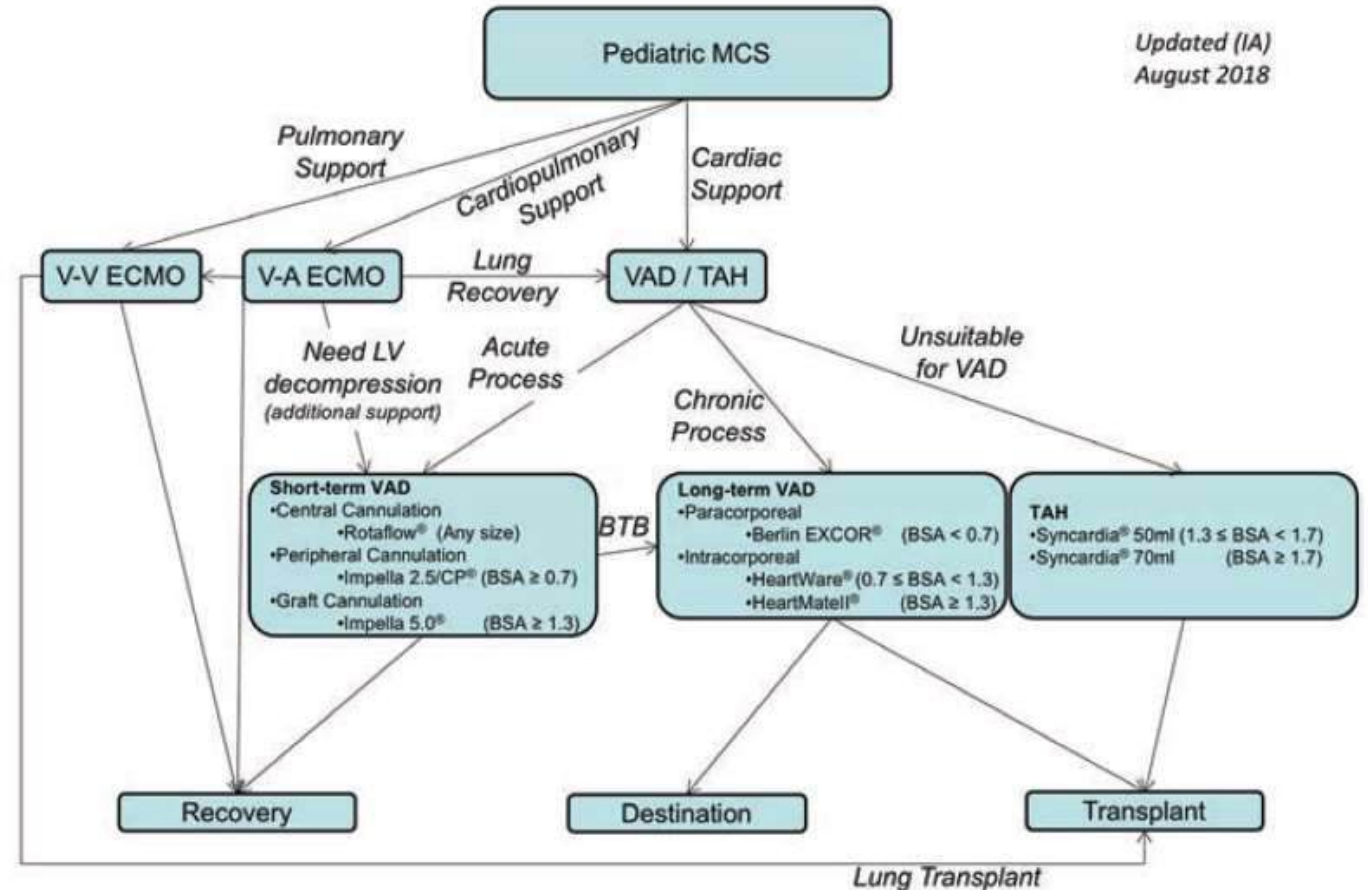
2021



Device Selection and Strategy

Key Points:

- Patient size
- Patient anatomy
- Implant configuration
- Expected duration of support



Texas Children's Hospital Handbook

CHOP

Current Experience

- **16 patients currently supported**
 - **Location**
 - Inpatient: 12
 - Outpatient: 4 (was 8!)
 - **Anatomy**
 - BIVAD: 2
 - SVAD: 4
 - (Fontan-2, Glenn-1, Hybrid-1)



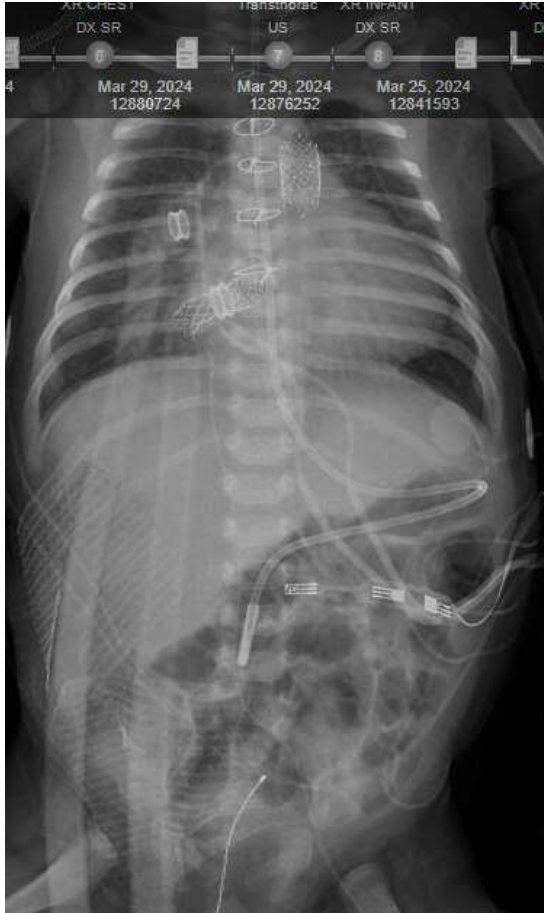
Recent Successes (NOT including explants):

- DMD destination HeartWare LVAD x 6 years transitioned to adult
- HM3 BIVAD to transplant after 2 years (outpatient)
- Fontan HM3 SVAD to transplant after 1 year (outpatient)
- RV-aorta, PA, L-loop HM3 LVAD to transplant after 3 years (outpatient)
- Berlin TAH to transplant after 9 months

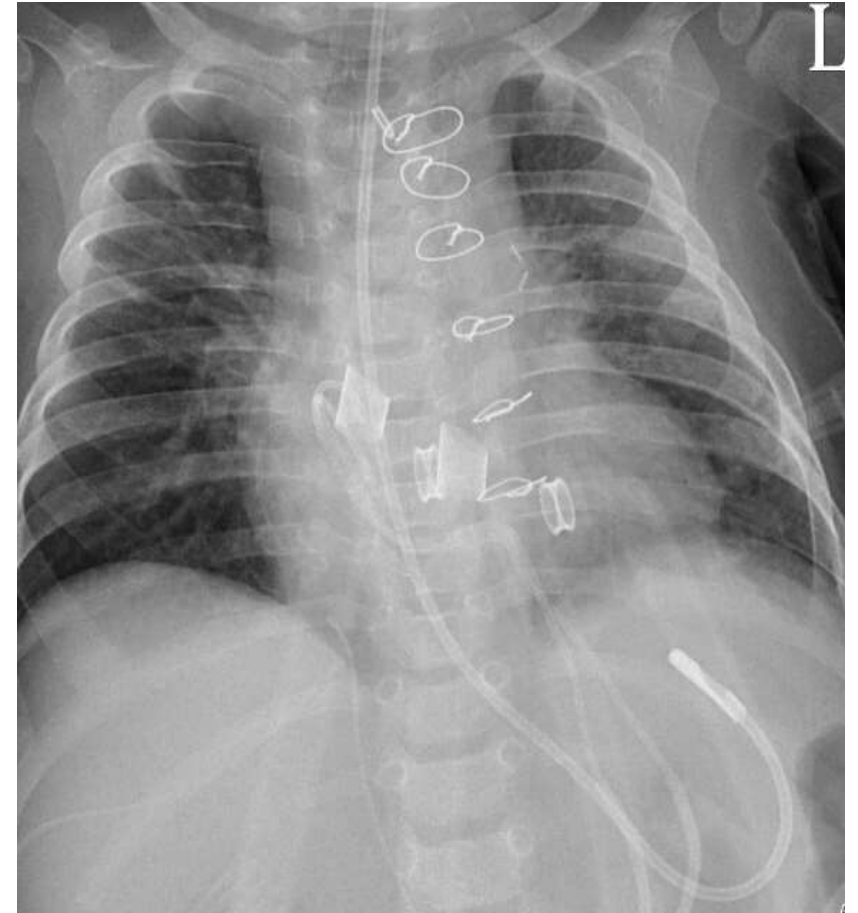
Berlin Heart Strategies



DCM



HLHS, Hybrid + VAD



TAH

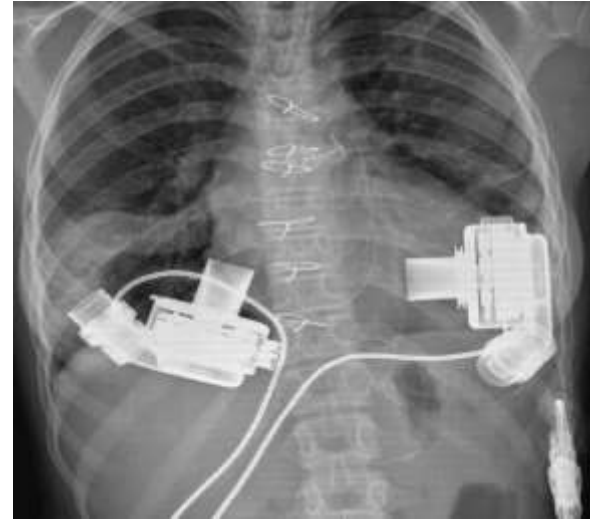
HeartMate 3 Strategies



DCM
2 ventricle, D-Loop, LVAD



RV-aorta, PA, Senning + Rastelli
2 ventricle, L-Loop, LVAD

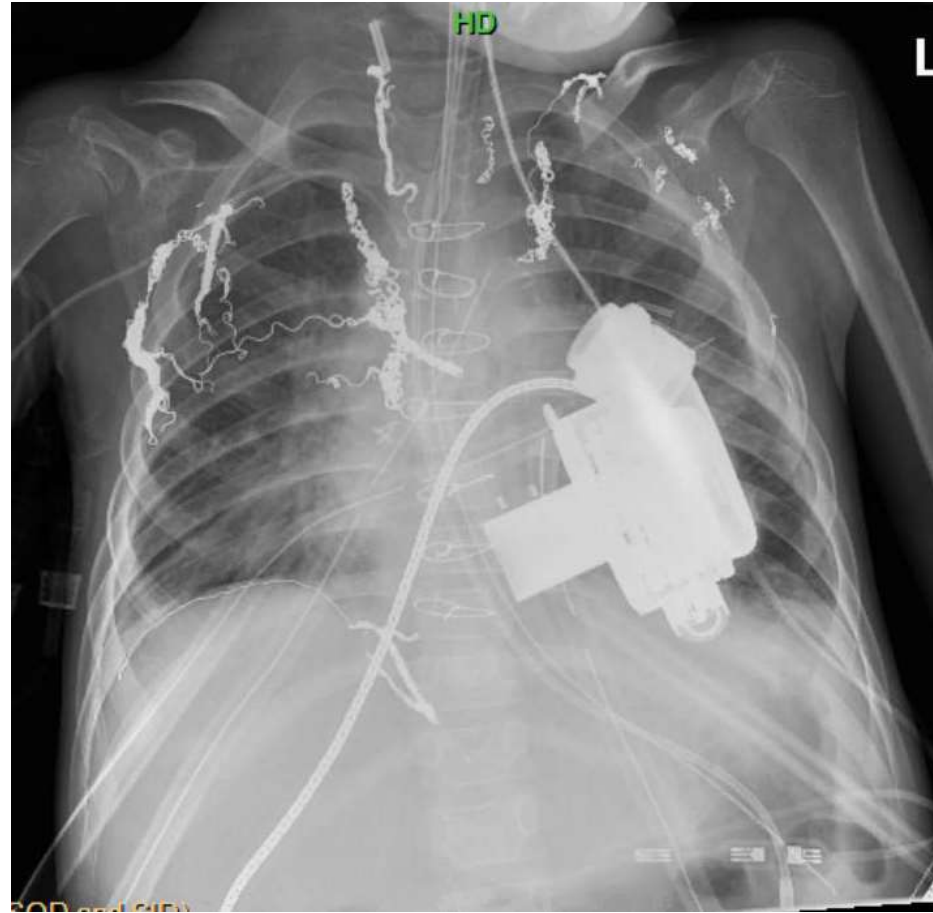


D-TGA s/p ASO
2 ventricle, D-Loop, BIVAD



HLHS, Fontan
Single ventricle, SVAD

HeartMate 3 Strategies



7 yo, 15.7 kg, HLHS s/p Fontan
HM3 (ventricle removed) + innominate vein turndown

Postoperative Goals

- **Goals of support:**
 - To restore and support full cardiac output
 - To decompress the central venous system
 - To allow for adequate end organ perfusion
 - *Potential* ventricular recovery
- All VADs are **preload** dependent and sensitive to **afterload**

Post
Jessica
RD, C
Goldsi
MSCE
Last R
Contac

Target 1: VAD Cardiac Index: >2.0 L/min/m ² Single ventricle 5-6 L/min/m ²	• CI = flow in L/min / BSA • Native cardiac contractility may also contribute to overall CO • Few VAD setting changes should be needed on the first post-op night, focus should be on titrating hemodynamics to allow the VAD to function optimally
Target 2: Ensure adequate cardiac output from VAD + native output to restore and maintain appropriate end organ perfusion	• SVO₂ $>70\%$/AVO₂ gradient $<30\%$ ◦ Monitor SVO₂ on POD 1 and Q day for first 3 days postoperatively then space as clinically appropriate • Stable or increasing NIRS ◦ Place cerebral and somatic • Stable or decreasing lactate ◦ Check within 30 minutes of returning from the OR with ABG, then Q1 hr until down trending x 2. Space as clinically appropriate. • Goal urine output by 8-12 hours post op ◦ Infants: 2 ml/kg/hour ◦ Children/Adolescents: >0.5-1 ml/kg/hour
Target 3: Optimize left ventricular decompression to optimize ventriculo-ventricular interaction leading to improved RV function, including minimizing TR	• Neutral septal position in apical 4 chamber view: improves RV function • Goal CVP and LAP < 12 ◦ Monitor CVP continuously for first 3 days post operative ◦ LAP monitoring at surgeon discretion • Aortic valve opening every 3-4 beats ◦ Limit possibility of aortic valve fusion and subsequent AI ◦ If opening every beat, may indicate inadequate decompression

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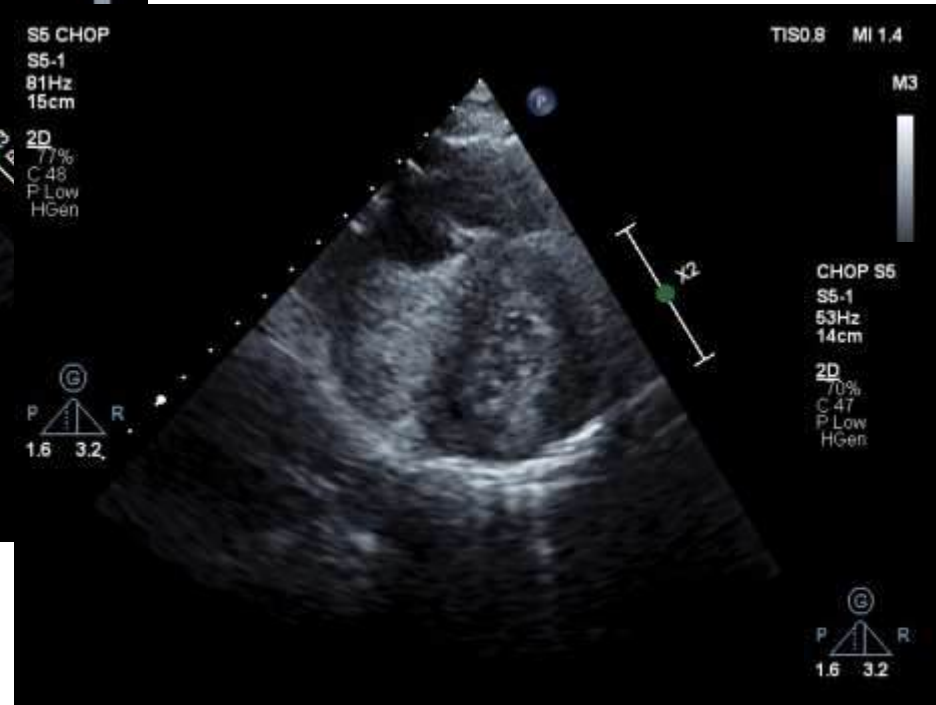
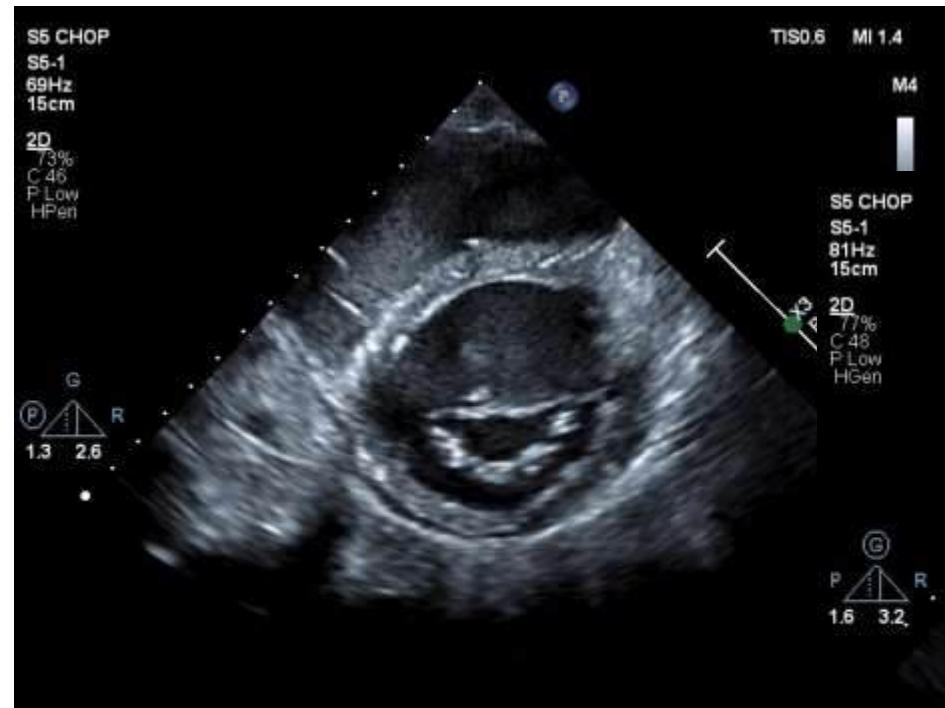
Adjusting VAD settings

What are we changing?

Settings or Strategy

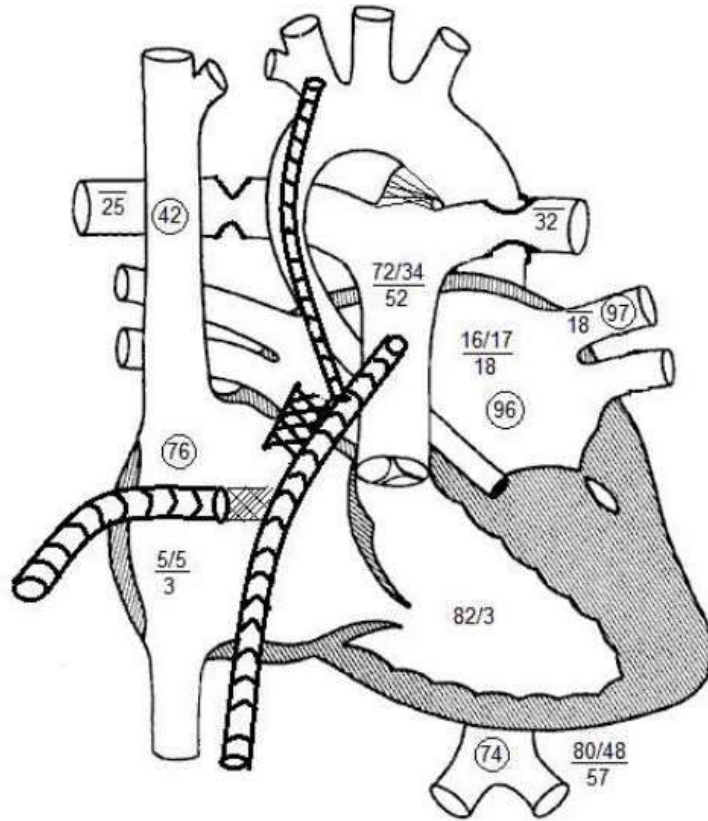
DCM

5600 RPM → 5400 RPM



- 15 yo, DCM
 - Acute decompensated HF
 - Milrinone, Epi, CPAP
 - HM3 9/2024

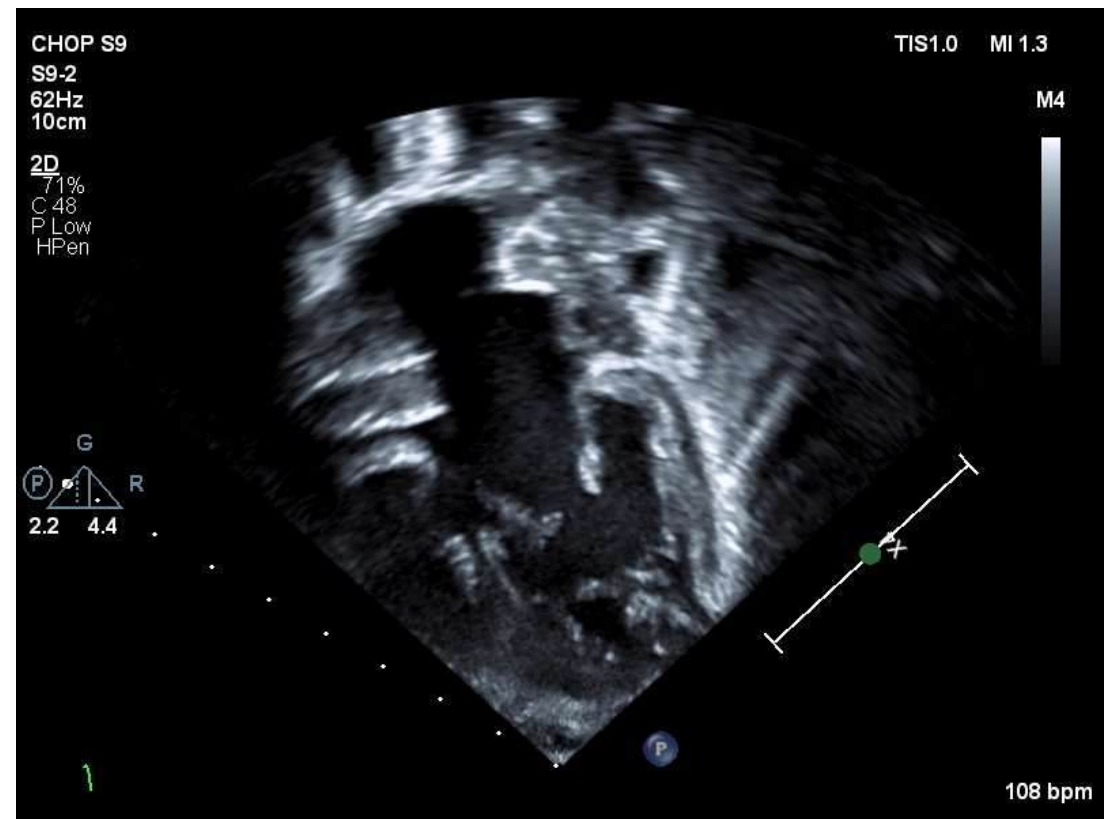
Hybrid + Berlin SVAD



HLHS → Hybrid + Berlin SVAD 1/18/2024
OHT 9/13/2024

PROCEDURES PERFORMED:

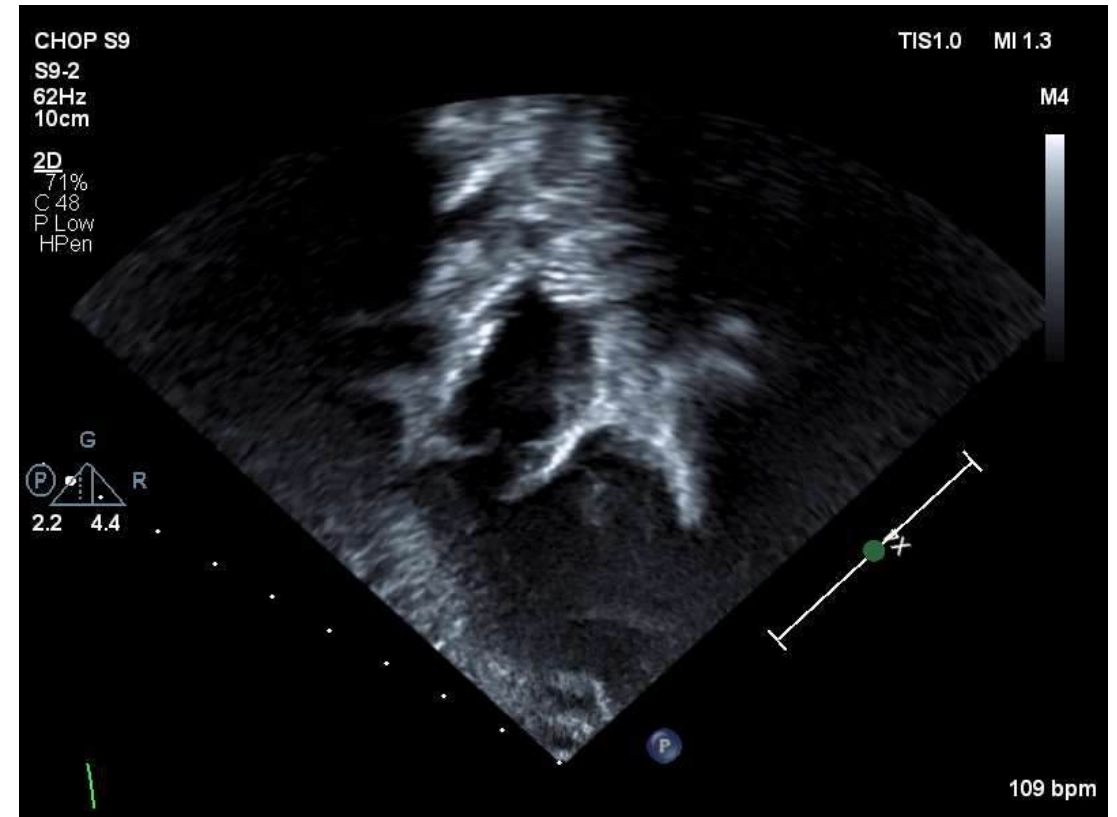
1. Hybrid VAD placement with bilateral pulmonary artery band and Berlin Heart 10 mL device (CPT: 33690)
2. Reverse BT shunt from the chimney graft on the main pulmonary trunk to the innominate artery (CPT: 33750)
3. Median sternotomy.



Hybrid + Berlin SVAD

VAD Course over 8 months

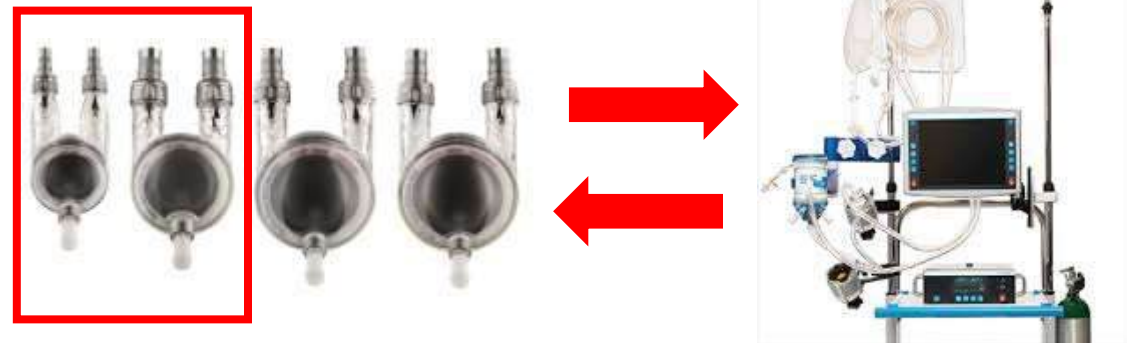
- 1/18/24: OR → Berlin cannulas + 10 ml pump
- 2/1/24: Cath lab → Balloon atrial septostomy
- 3/11-3/15/24 → Transitioned to Centrimag
 - 3/14/24: Cath lab → Inflow cannula stent
- 3/15/24 → Transitioned back to Berlin 10 ml
- 5/18/24: Cath lab → Atrial septal stent
- 5/28/24 → Transitioned Berlin 10 ml to 15 ml
- 9/13/2024 → Transplant



TAH



- DORV, subpulmonic VSD, side by side great vessels (Taussig-Bing) and hypoplastic arch
 - S/p arch augmentation, ASO, VSD closure, developed severe AI
 - S/p aortic valve replacement 7/23/23
 - Severe AI and heart failure
- 3/7/2024 Ventricles excised, TAH, Berlin cannulas + 10 ml Berlins
- 3/8/2024 Transition to Centrimag
- 3/29/2024 Transition to 10 ml Berlins
- 8/8/2024 Upsized to 15 ml Berlins
- 12/13/2024 OHT



CHOP VAD Rounds

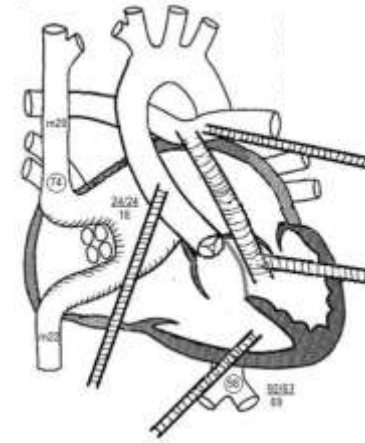
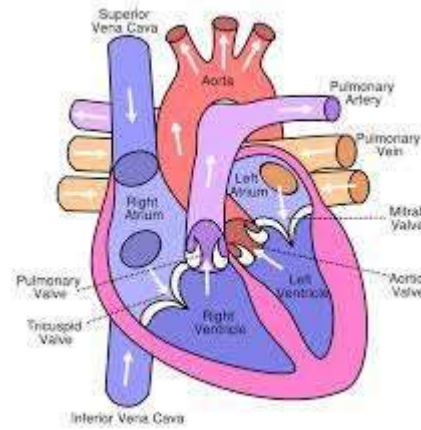


Thank You



CARDIOLOGY
2025 

Berlin Orientation



Single LVAD, D-Loop



BIVAD, D-Loop



BIVAD, L-Loop