CARDIOLOGY 2025

# Berlin Heart Active: Optimizing Use for Challenging Anatomy

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Cardiac Center

# Disclosures

- Off label use

# Objectives

- Active Driver Experience
- Anatomic Challenges
- Future State

# Active Driver

# IKUS Drive Unit

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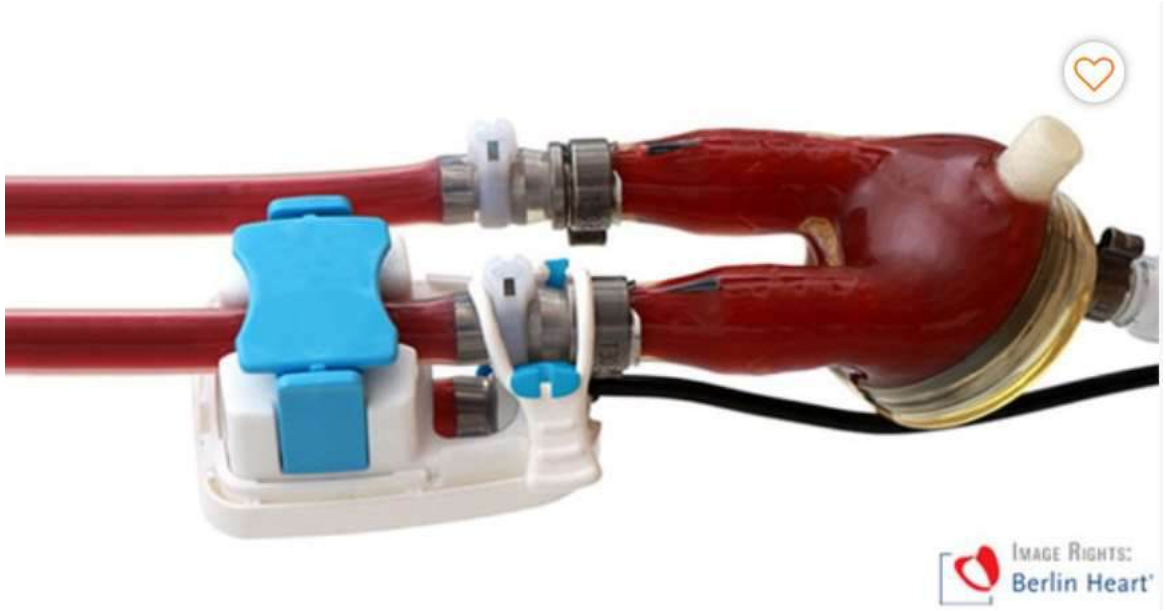

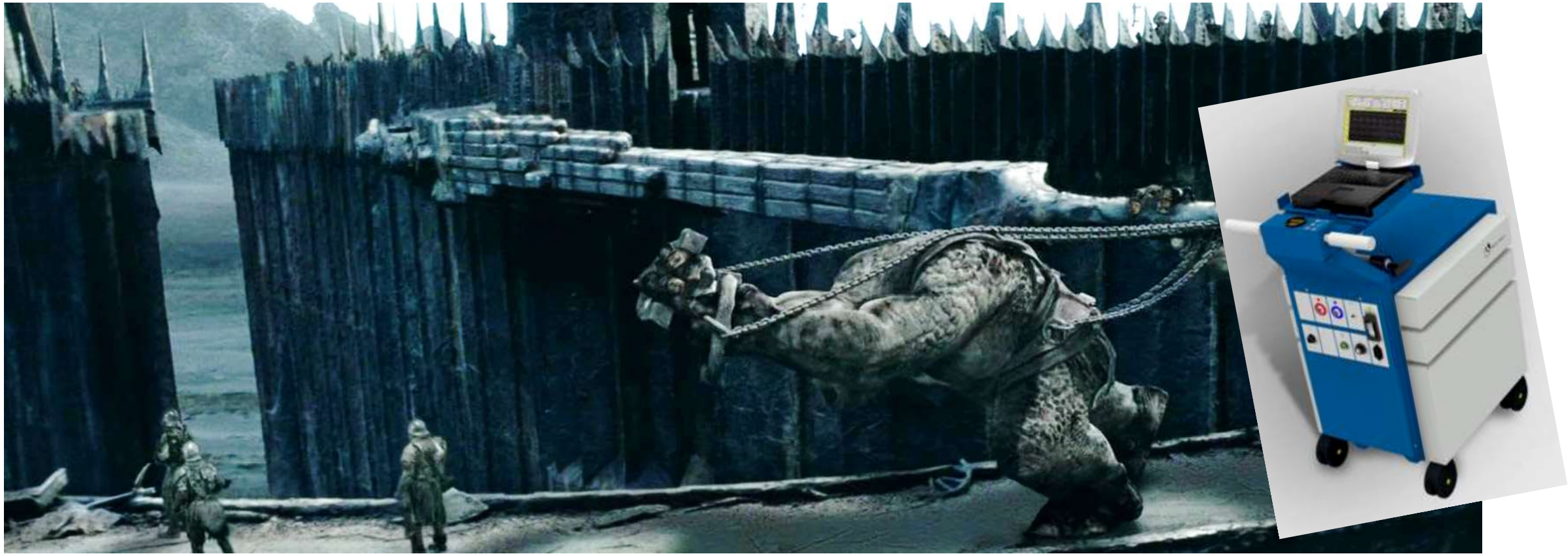

## First North American experience with the Berlin Heart EXCOR Active driver

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- Flow probe temp alarms
- Low flow alarms
  - Only once had to change
- Caregivers trained
- More mobility

**Table 1** Demographic and Clinical Characteristics of the Cohort

| Characteristic | Total cohort ($n$ = 7) N (%) or median (IQR) |
|---|---|
| *Demographic and clinical* | |
| Age at implant (years) | 2.5 (0.8, 4.3) |
| Sex | |
| Male | 2 (28.6) |
| Female | 5 (71.4) |
| Diagnosis | |
| Non-CHD | 5 (71.4) |
| CHD | 2 (28.6) |
| Weight (kg) | 12.1 (8.9, 19.2) |
| Height (cm) | 84.7 (70.9, 103.3) |
| Cannulation strategy | |
| LVAD | 4 (57.1) |
| BiVAD | 3 (42.9) |
| Outcome of support | |
| Transplant | 6 (85.7) |
| Death on device | 1 (14.3) |
| Total time on VAD support (days) | 75.0 (49.0, 135.5) |
| EXCOR Active driver | |
| Time to transition (days) | 12 (9.5, 18.5) |
| Time on EXCOR Active driver (days) | 65.0 (32.0, 81.0) |
| Parents/caregivers trained on EXCOR Active (yes) | 7 (100) |

Abbreviations: BiVAD, Biventricular assist device; CHD, congenital heart disease; cm, centimeter; IQR, interquartile range; kg, kilogram; LVAD, left ventricular assist device; VAD, ventricular assist device.

# Besides mobility, what biggest advantage?

- Mobility is still the biggest advantage
  - More pieces to think about when going on road trips
    - And every perfusionist does it a little differently
- Less obtrusive
  - Quieter
  - Smaller
- Technology is modern/easier

# Other advantages?

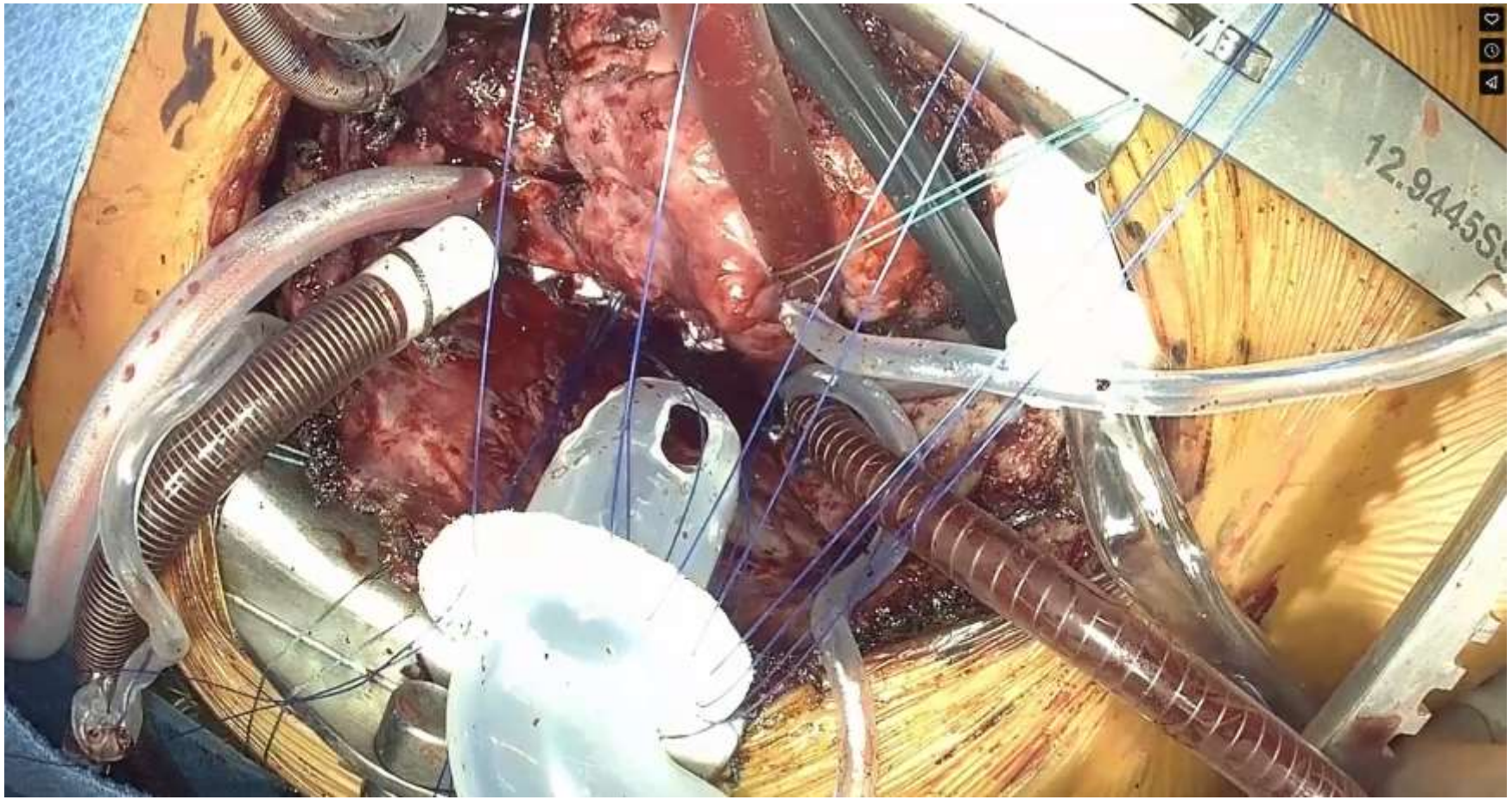
- Flow probe
  - Not perfect
  - Not sure it's always accurate
  - Something for bedside nurse to hyperfocus on
- Trends in systolic/diastolic pressure
  - e.g. increasing diastolic pressure can be indication that atrial septum getting more restrictive in stage 1 hybrid

# Challenges and your response?

- We tinker more
  - IKUS was set and forget
  - Have to titrate settings far more often
  - Specifically inadequate response to high SVR
  - May have to switch to manual mode
- More low flow alarms (painful)
- Software glitches – change out driver at unplanned times
- More other alarms (have to call more) – might get better

# Challenging Heart Disease

# Challenge: Restrictive & Hypertrophic CM



Kari, 2024

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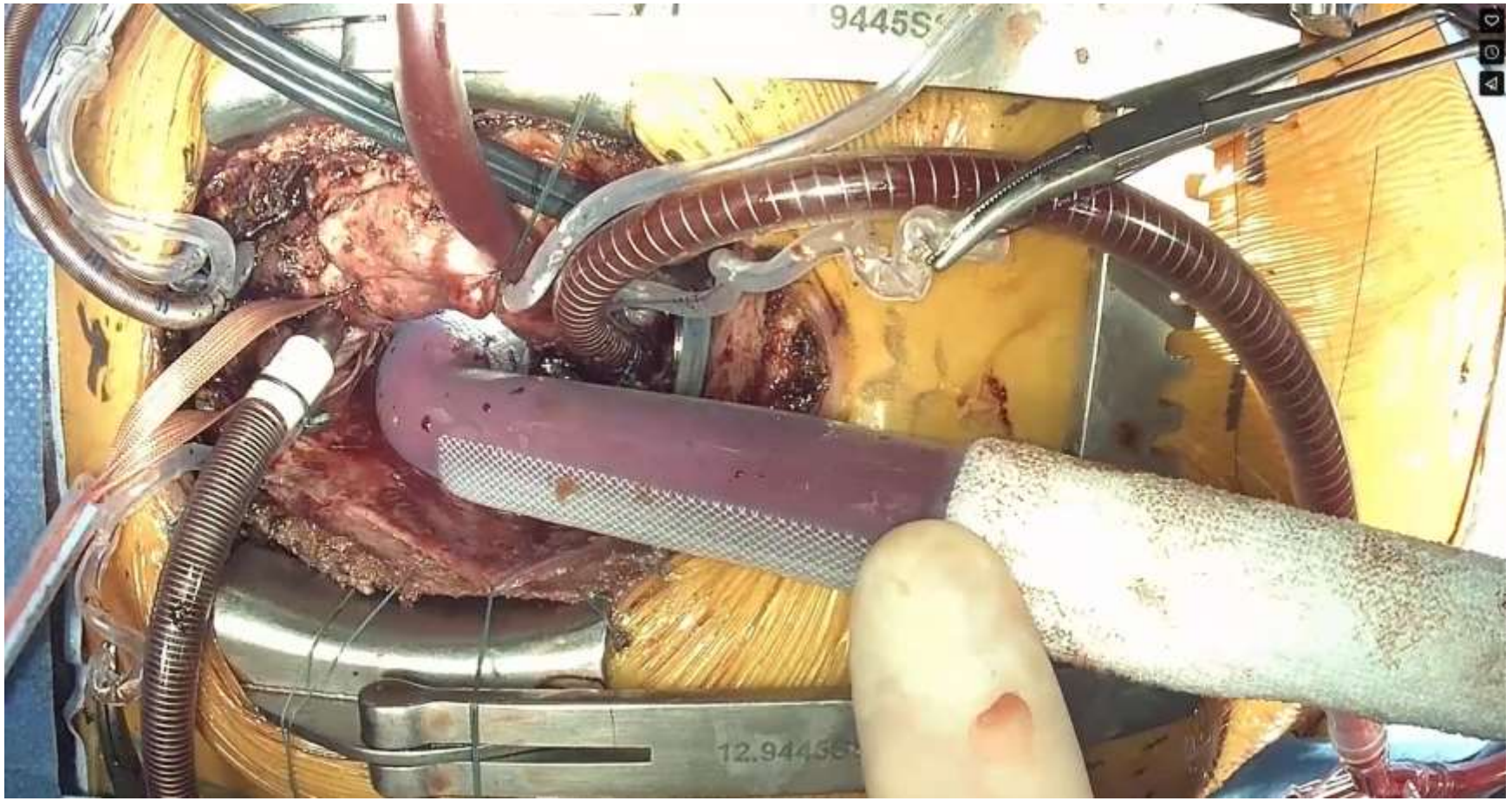

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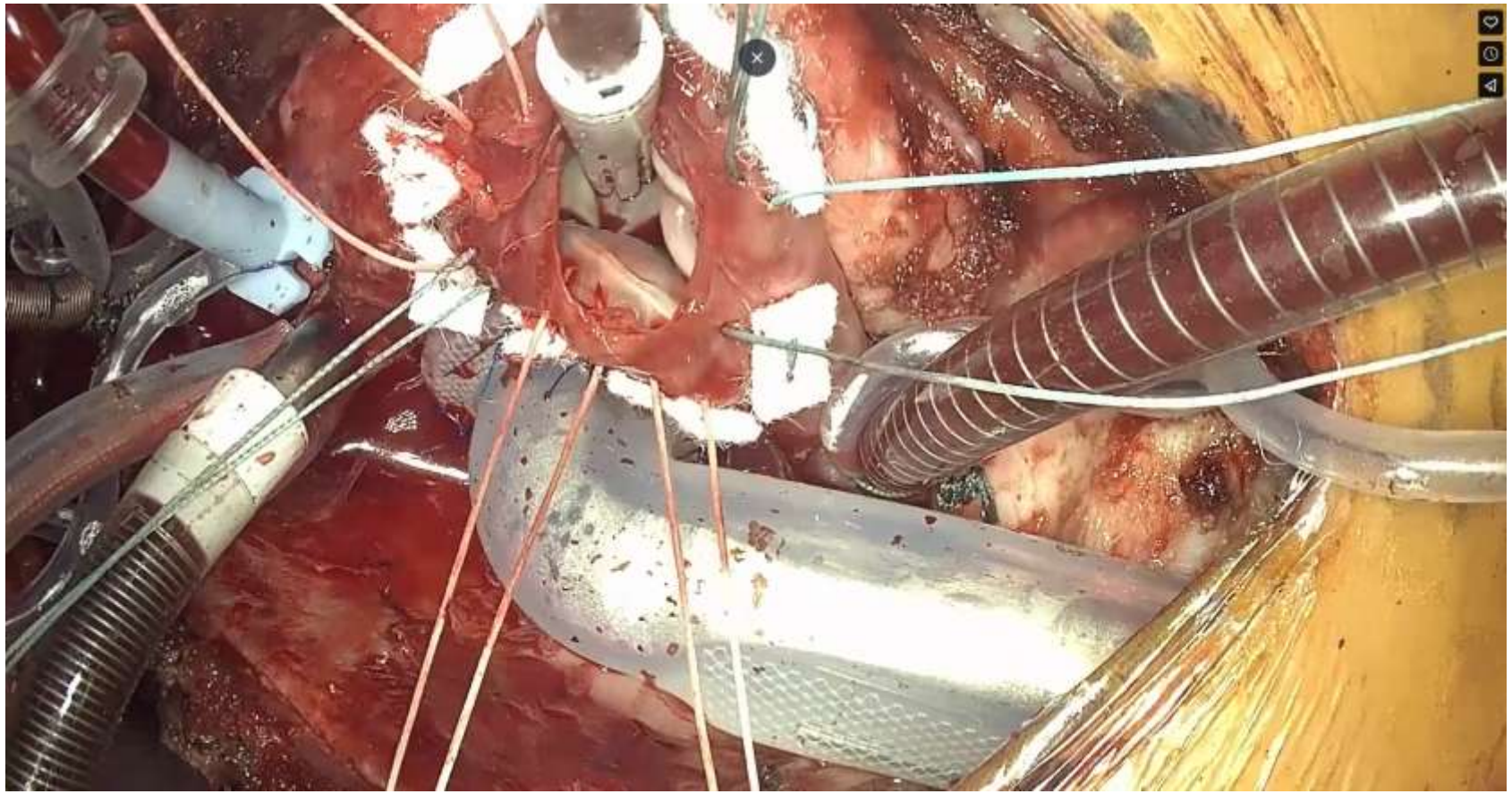

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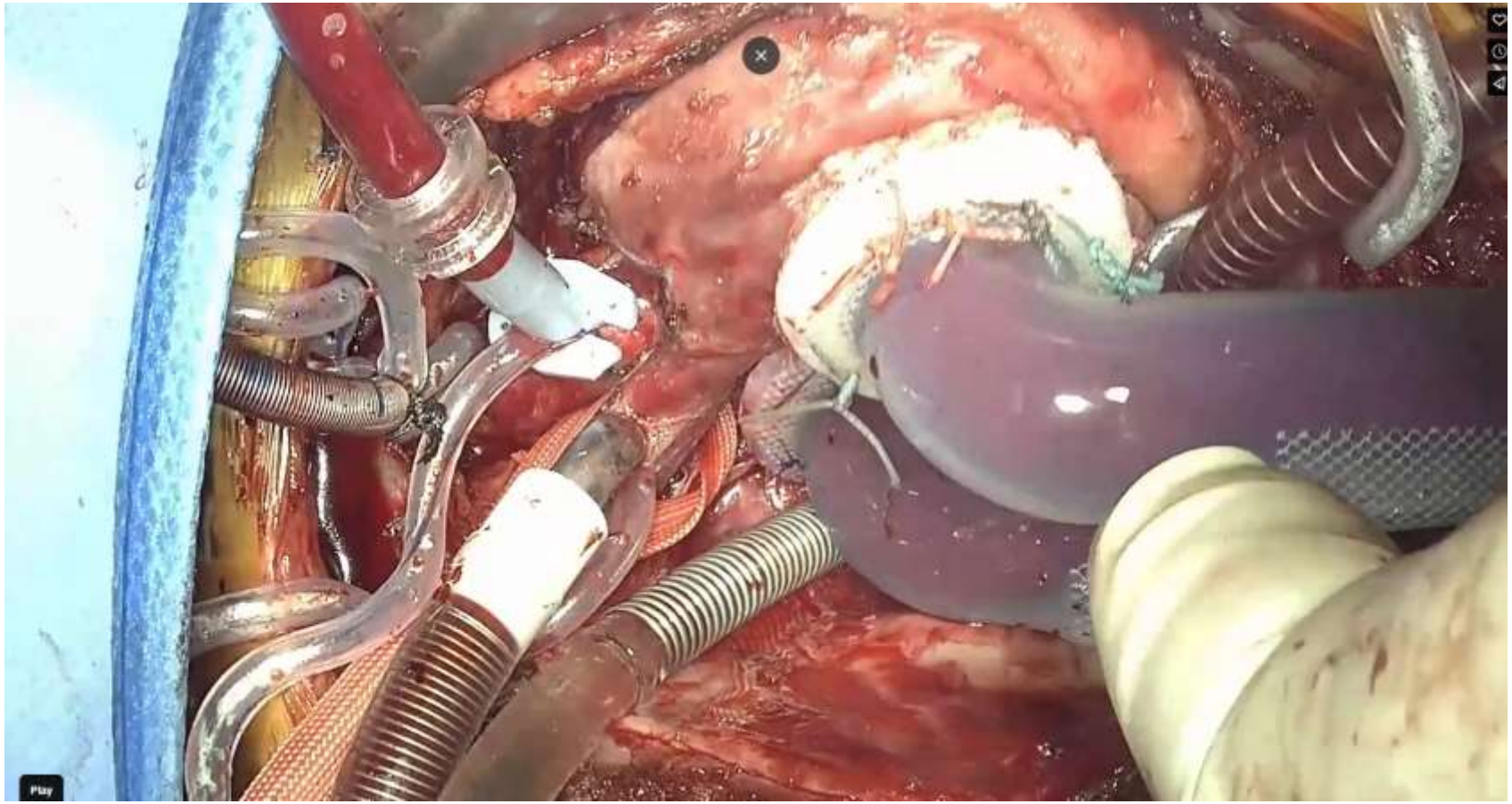

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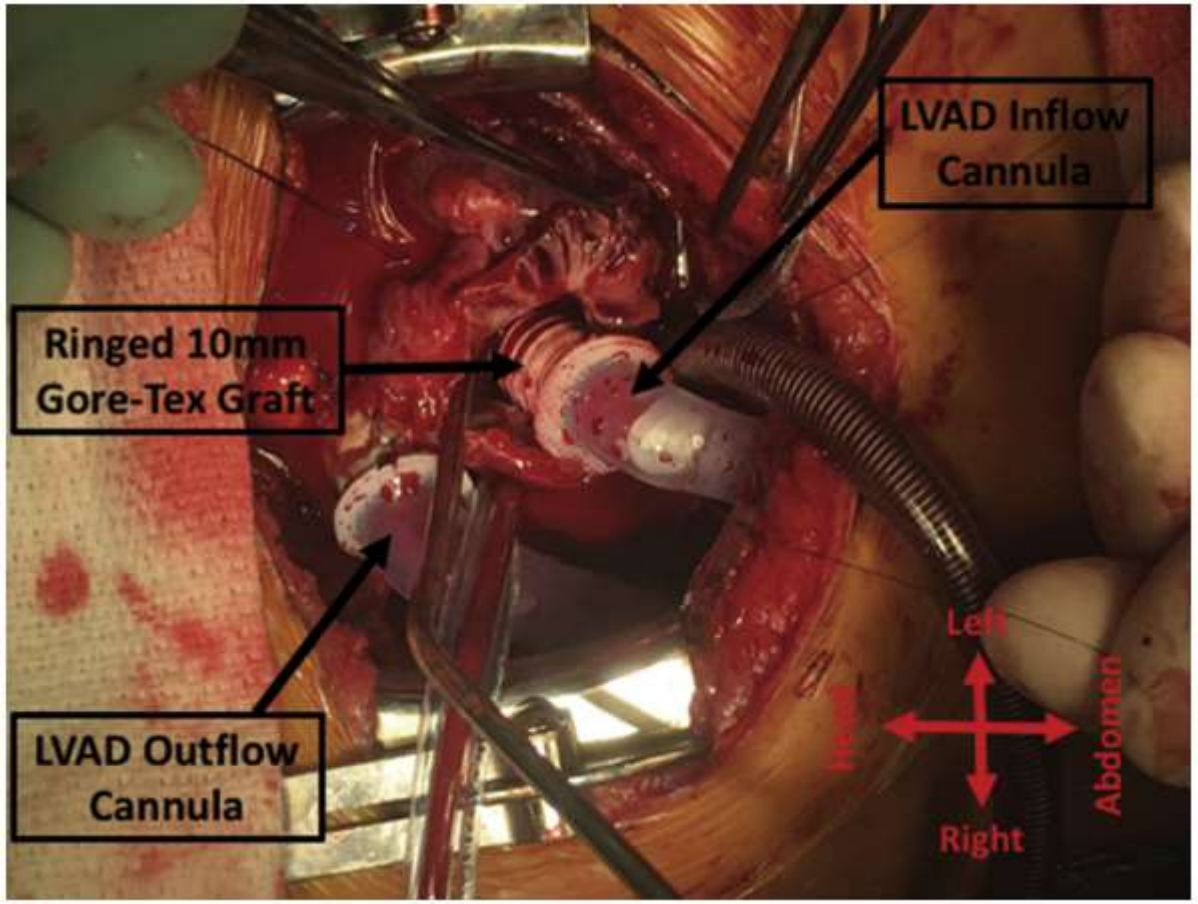
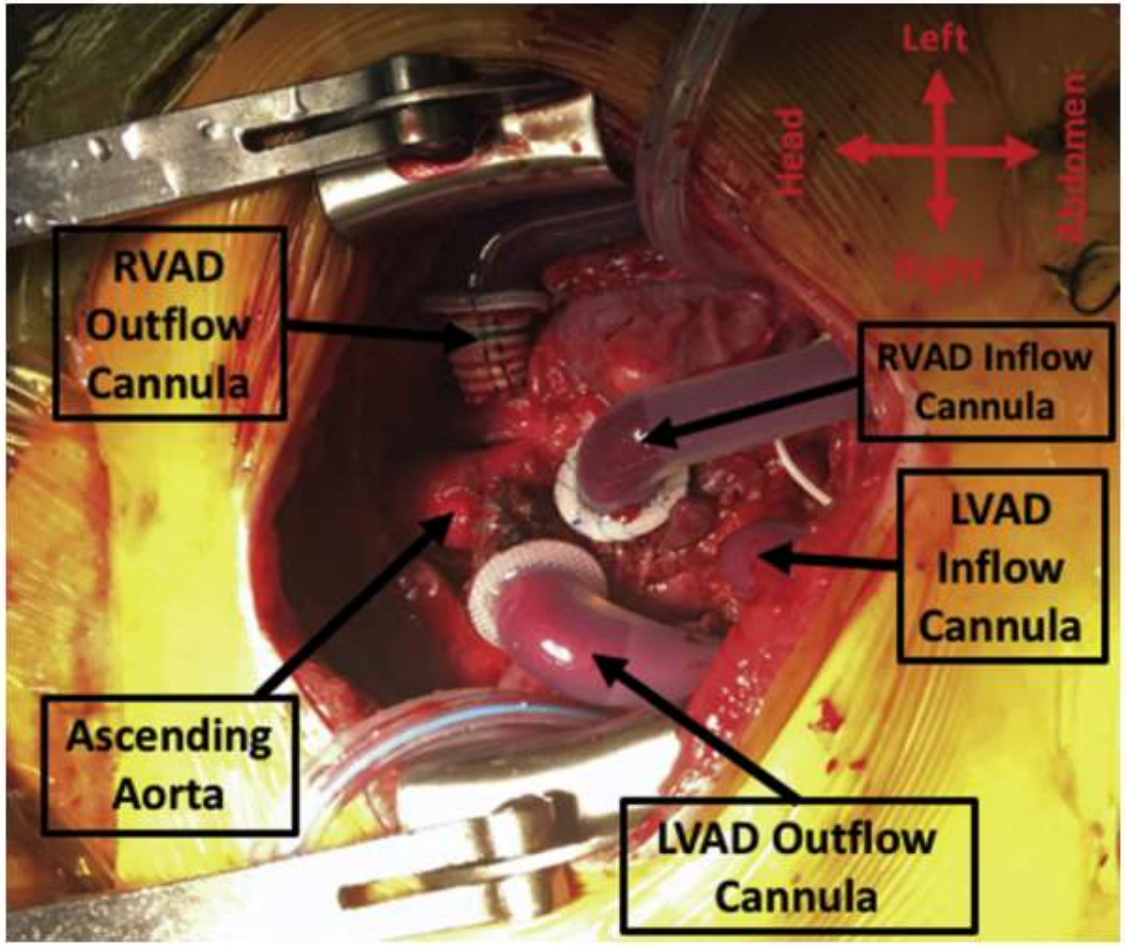



- 3mo with HCM supported on ECMO for 17d
- Went for LVAD
- Used 10mm ringed Gortex graph that traversed RA and anastomosed to ASD
- 6mm EXCOR inflow cannula

Dykes, 2017

# Challenge: Restrictive & Hypertrophic CM




- Several hours had signs of RV failure (high CVP, poor LVAD filling, RV dysfunction)
- Cannulated RA appendage

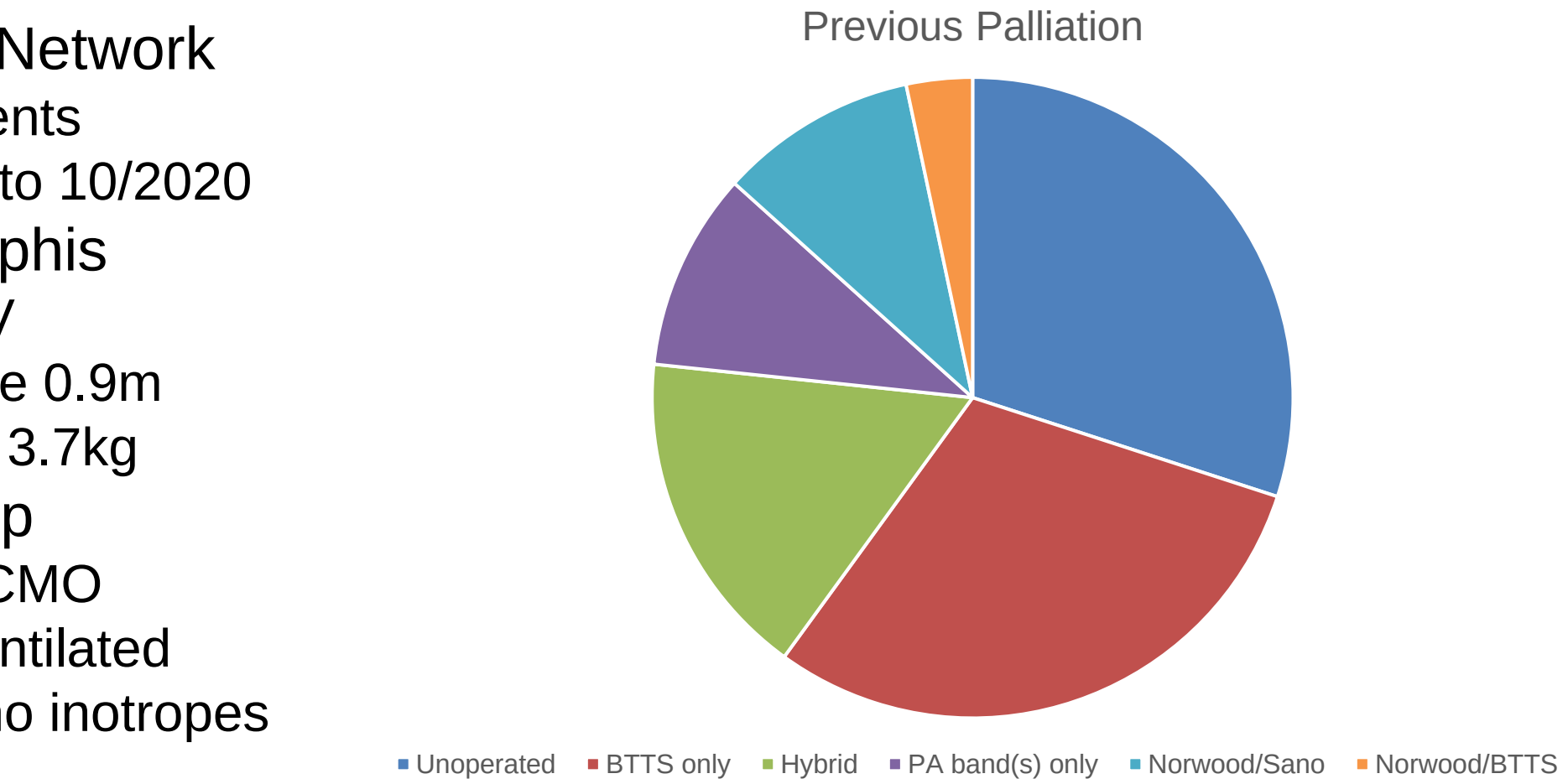
Dykes, 2017

# Challenge: Restrictive & Hypertrophic CM

- 2yo with restrictive CM, diminished fx
- Failed medical management
- LVAD
  - Inflow 6mm EXCOR cannula attached to 10mm ringed Gortex
- Supported for 8m

# Challenge: “Stage 1” for Single Ventricle

- ACTION Network
  - 30 patients
  - 3/2018 to 10/2020
- Demographis
  - 73% RV
  - Med age 0.9m
  - Med wt 3.7kg
- Sick group
  - 30% ECMO
  - 90% ventilated
  - 13% - no inotropes




Joong, 2022

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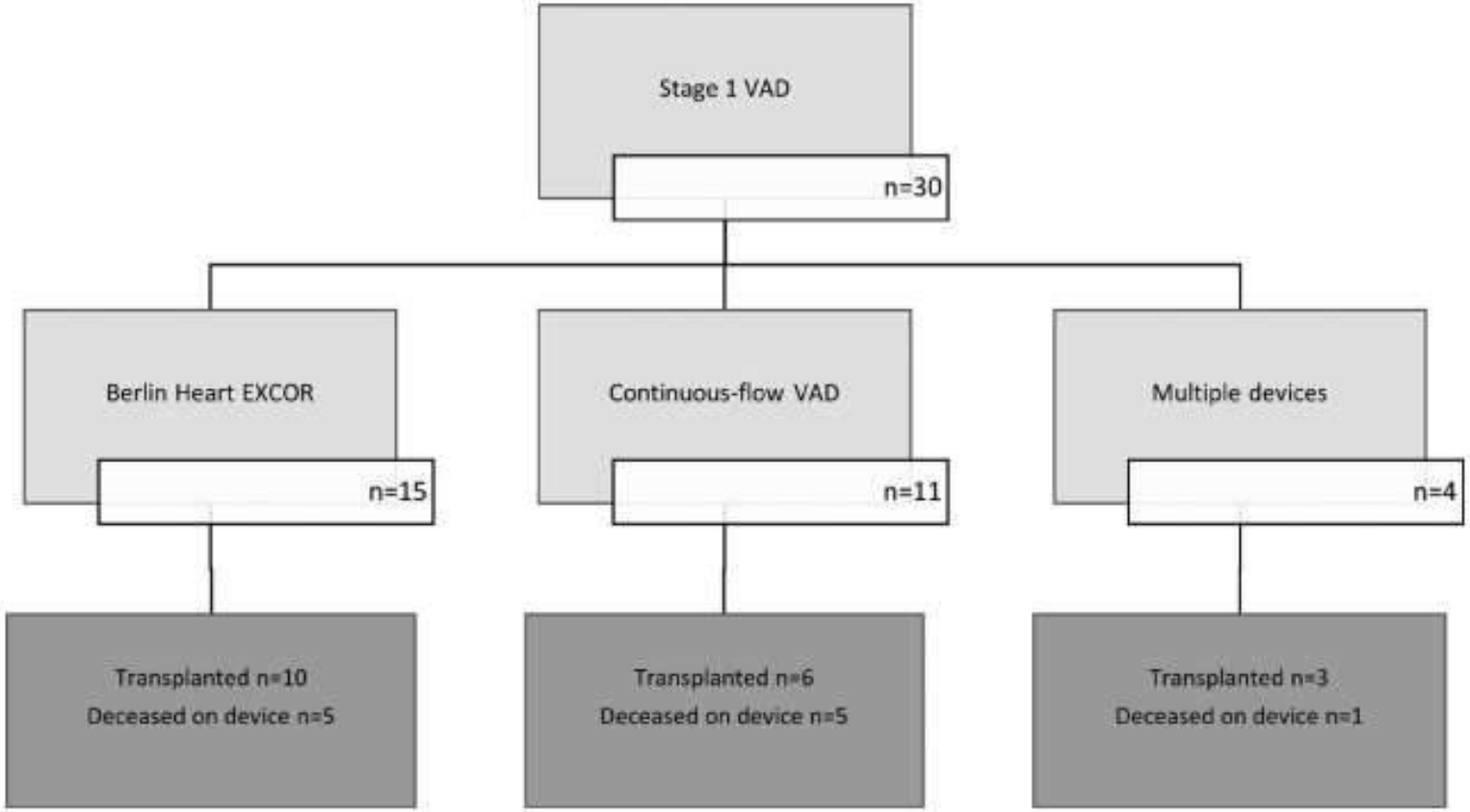
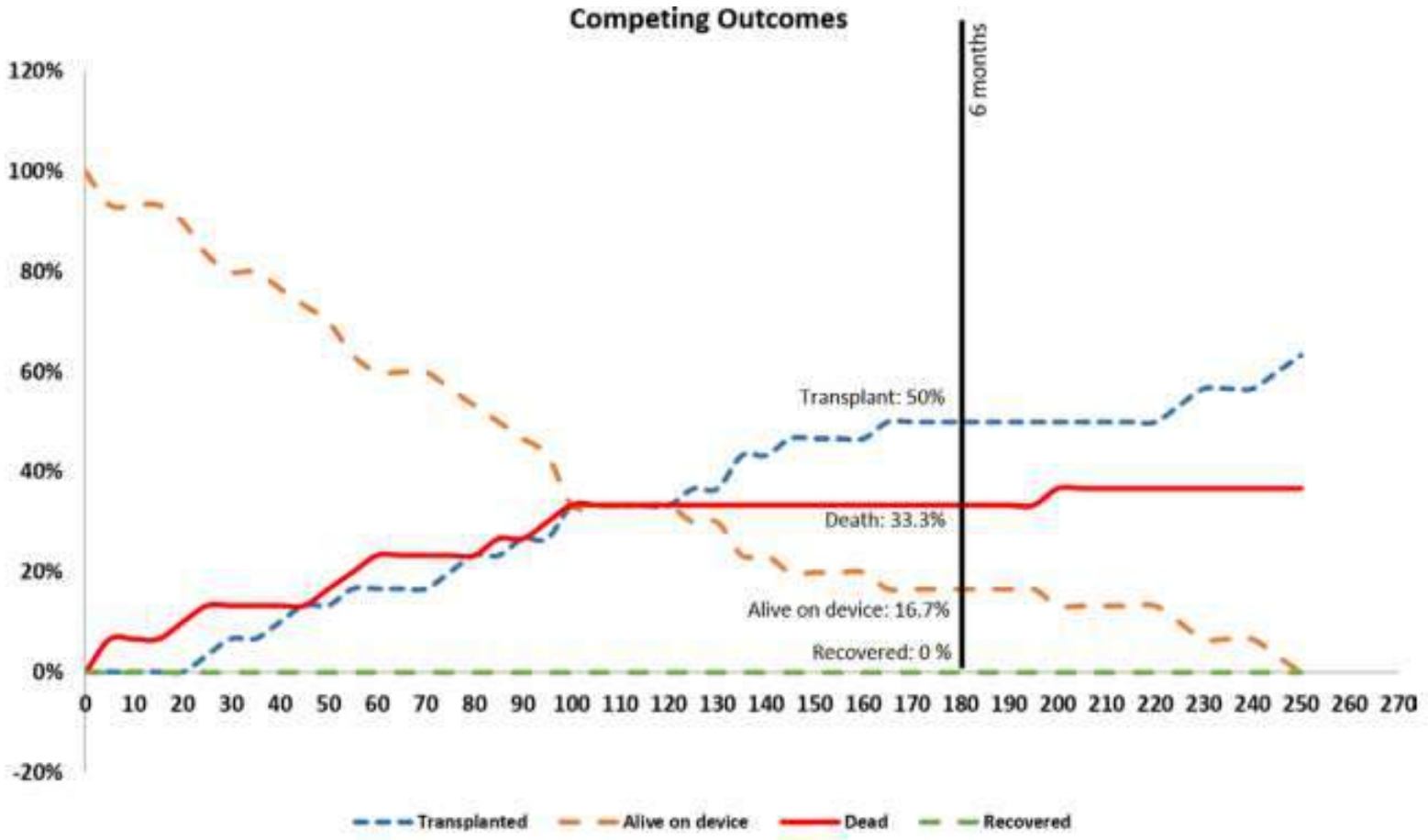



**Figure 1.** Flow diagram demonstrating patient outcome stratified by VAD type. VAD, ventricular assist device.

- 90% inflow in atrium
- 33% had + procedure
  - 3 Sano → shunt
  - 3 AVV repair
  - 3 atrial septectomy
  - 1 BDG
  - 1 PA bands
  - 1 arch

Joong, 2022

# Challenge: “Stage 1” for Single Ventricle



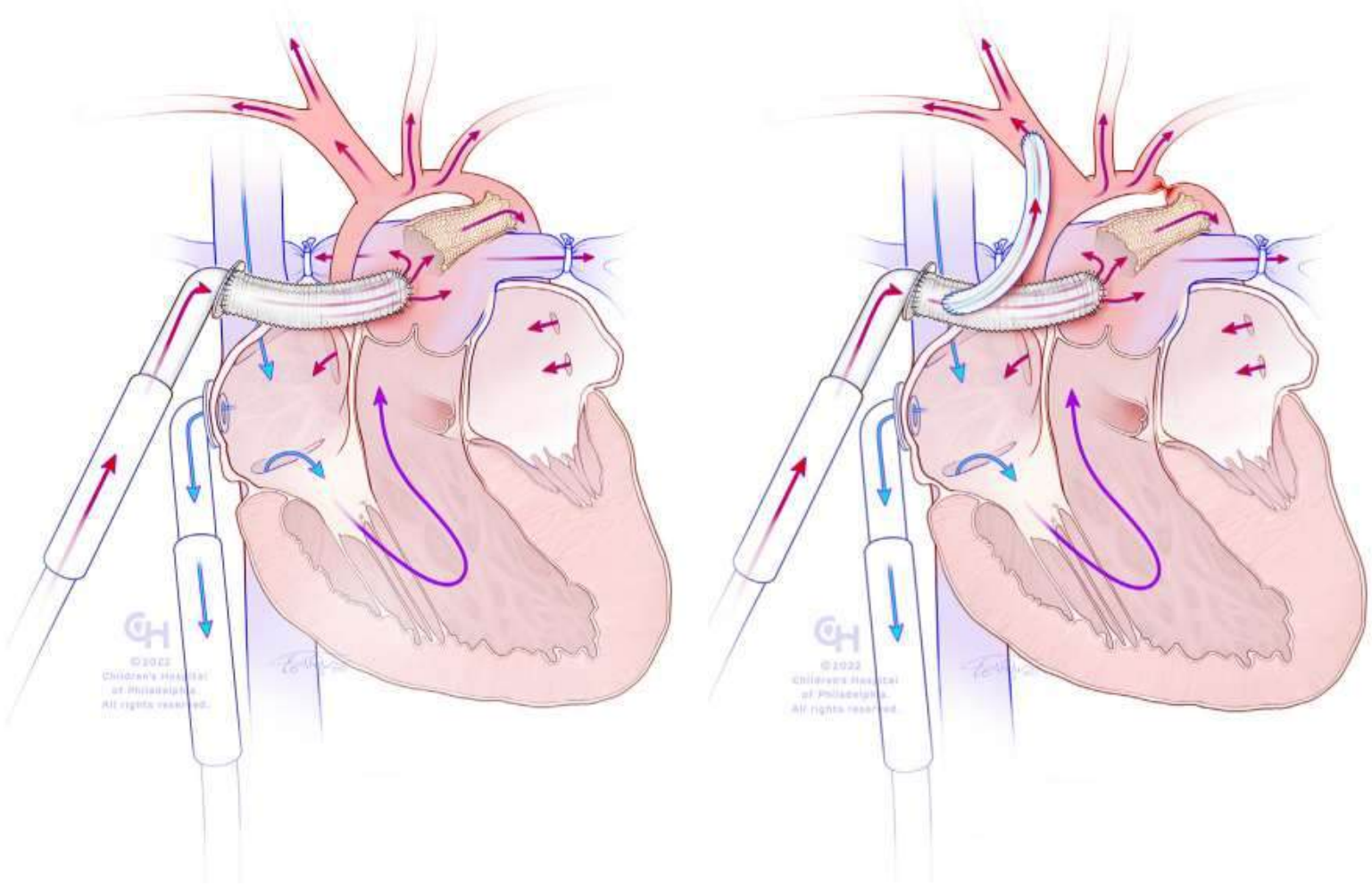

Complications by patient (80%):

- 5 ischemic strokes
- 1 hemorrhagic stroke
- 5 major bleed
- 13 major infection

Joong, 2022

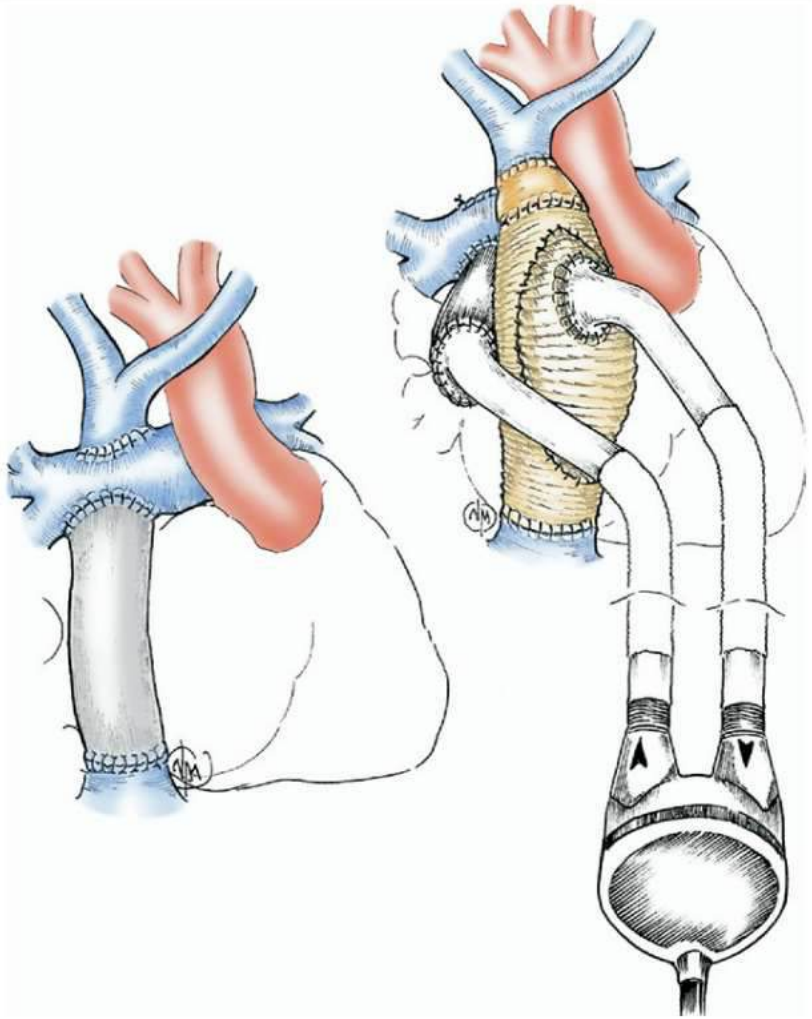
# VAD from the Start?

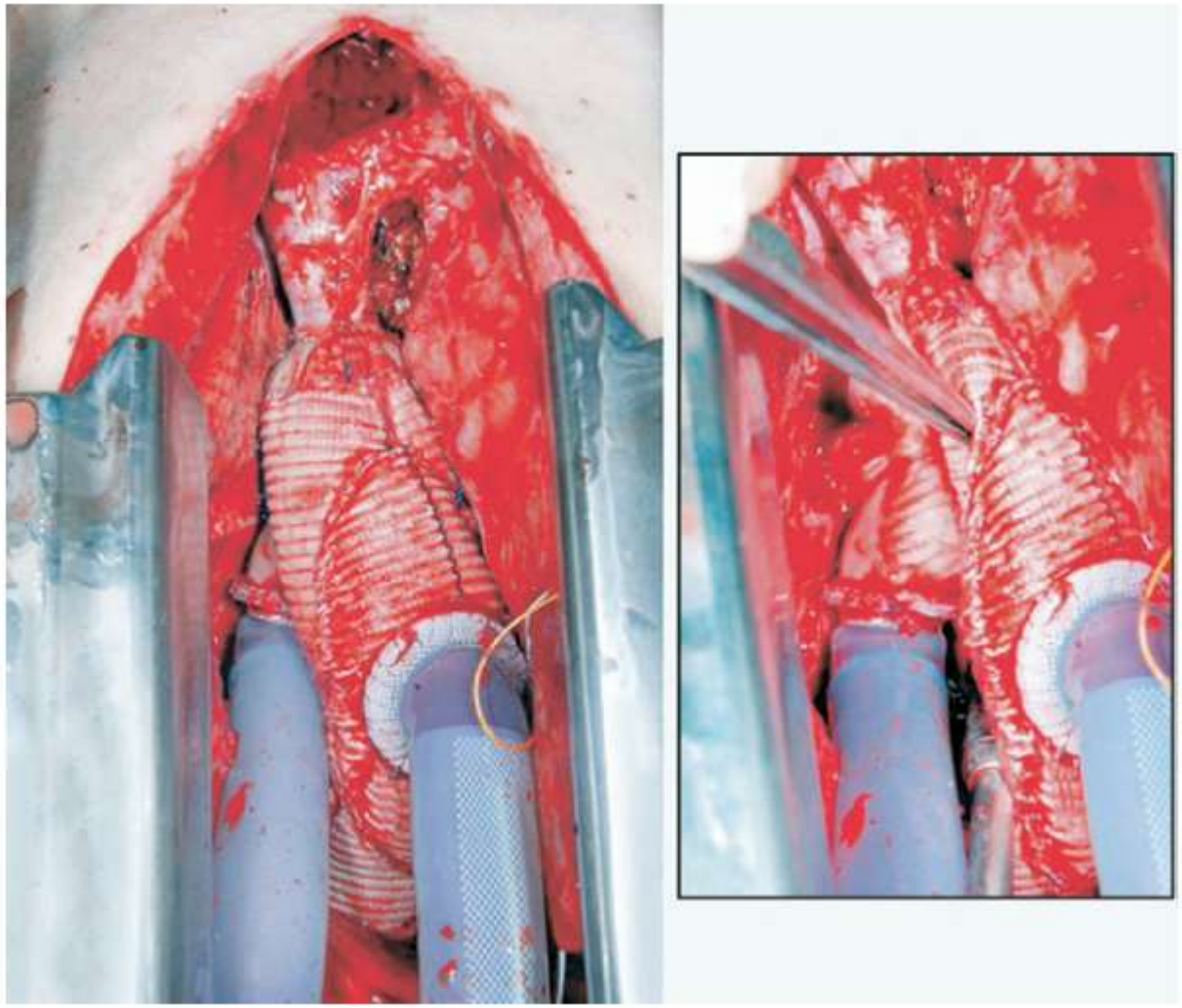
- Report on 3 patients off bypass
  - 1 & 2 died at tx
  - 3 survived through
- 2 more patients
  - 4th: stroke with atrial septal stent
  - 5th: on bypass atrial septectomy



Mavroudis, 2022

# Challenge: TCPC & Sub P VADs





Petre, 2008

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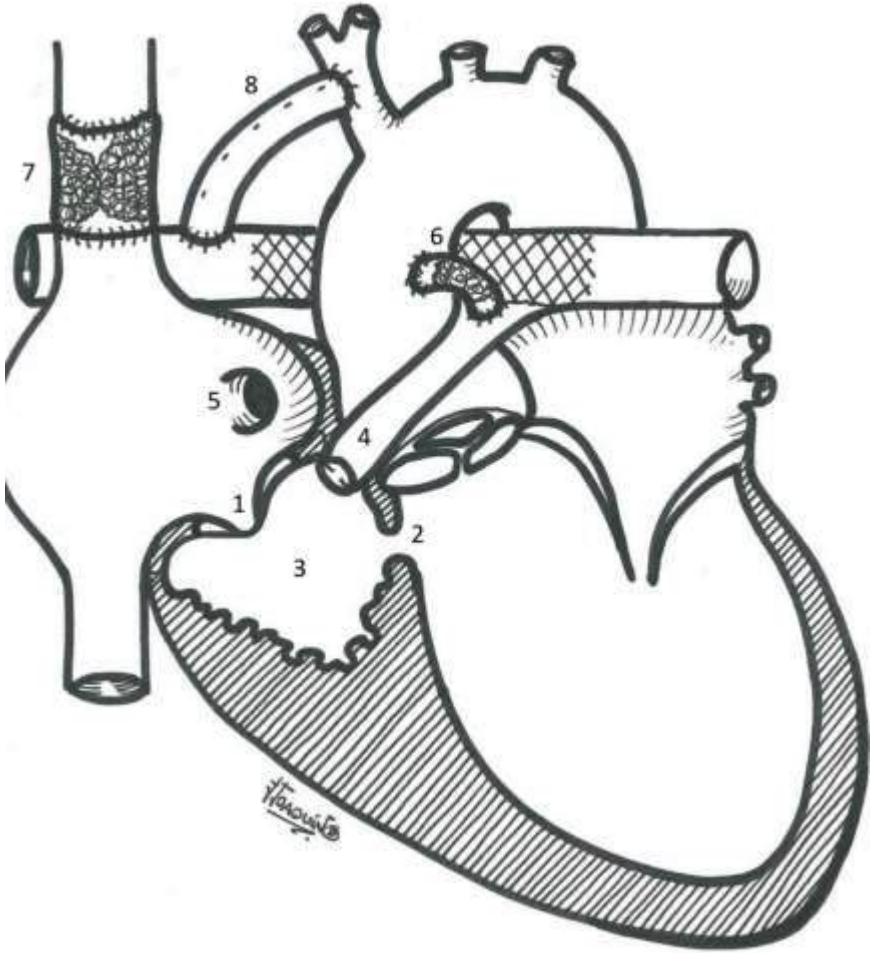


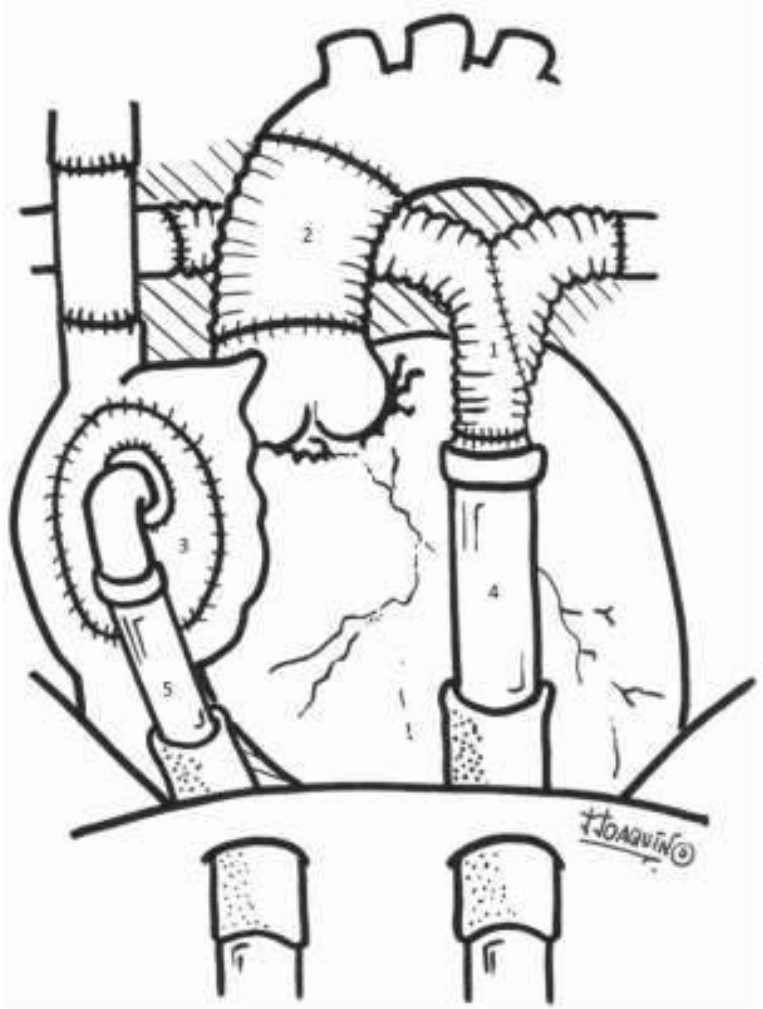

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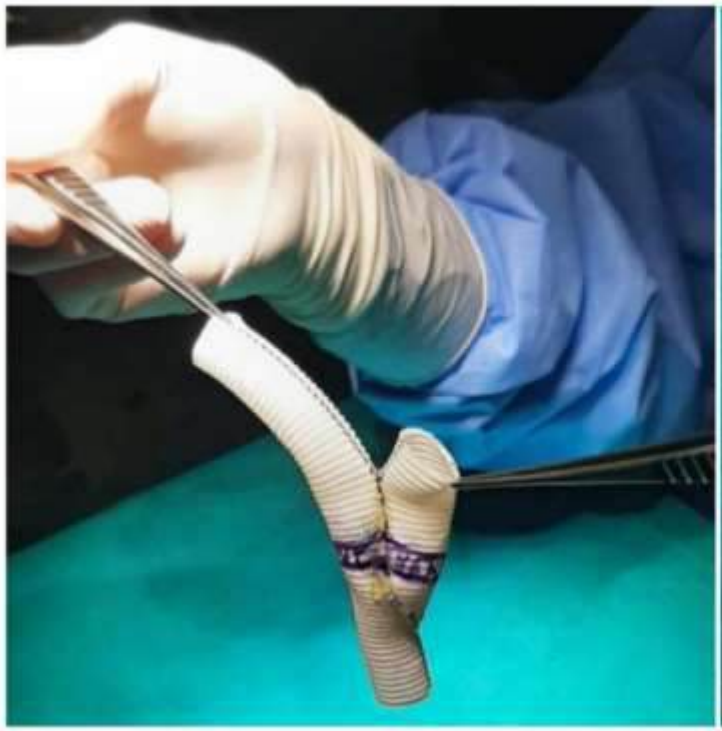

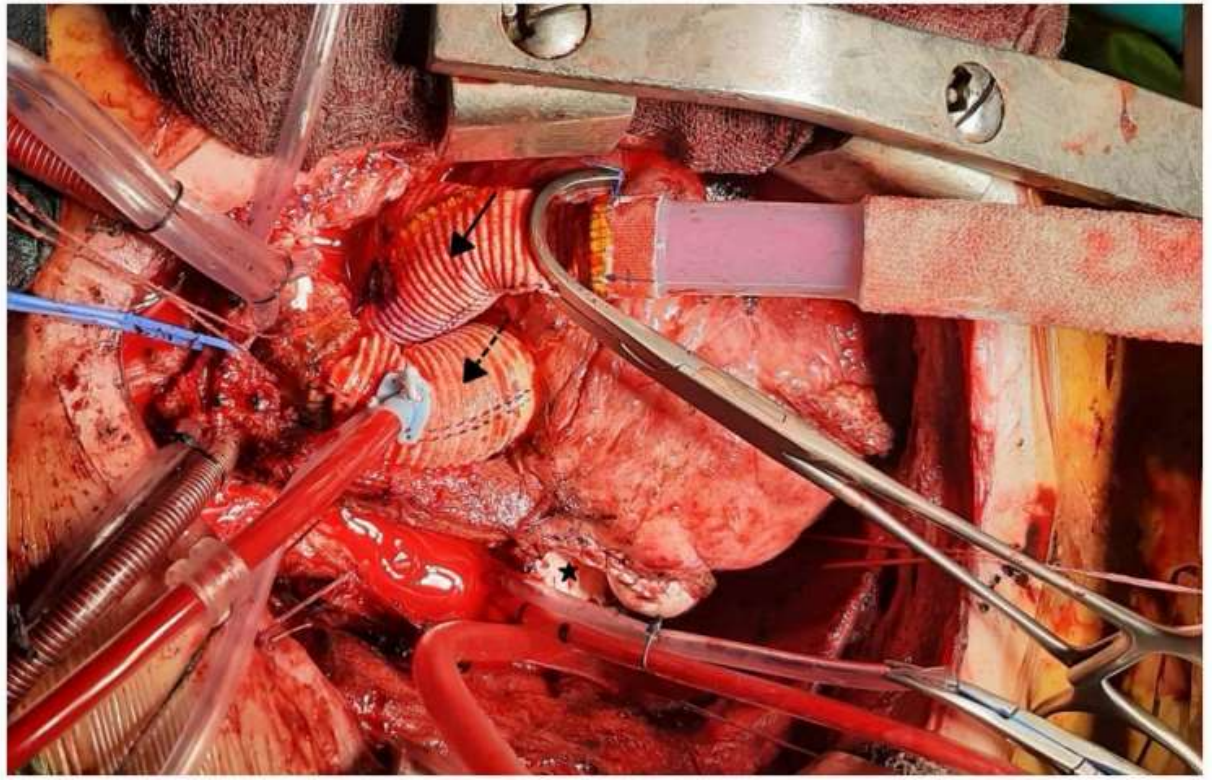

# Challenge: TCPC & Sub P VADs

- RegiVe Study
- Regimented f/u for 6m
- Regimented labs
- Cannula sizes

| Article number | Pump connector inner diameter [mm] | Inner diameter SVC [mm] | Inner diameter IVC [mm] | Distance SVC–IVC [mm] |
|---|---|---|---|---|
| C1418F-002m | 12 (50-, 60-, and 80-mL blood pumps) | 14 | 18 | 49 |
| C1620F-002m | | 16 | 20 | |
| C1822F-002m | | 18 | 22 | |

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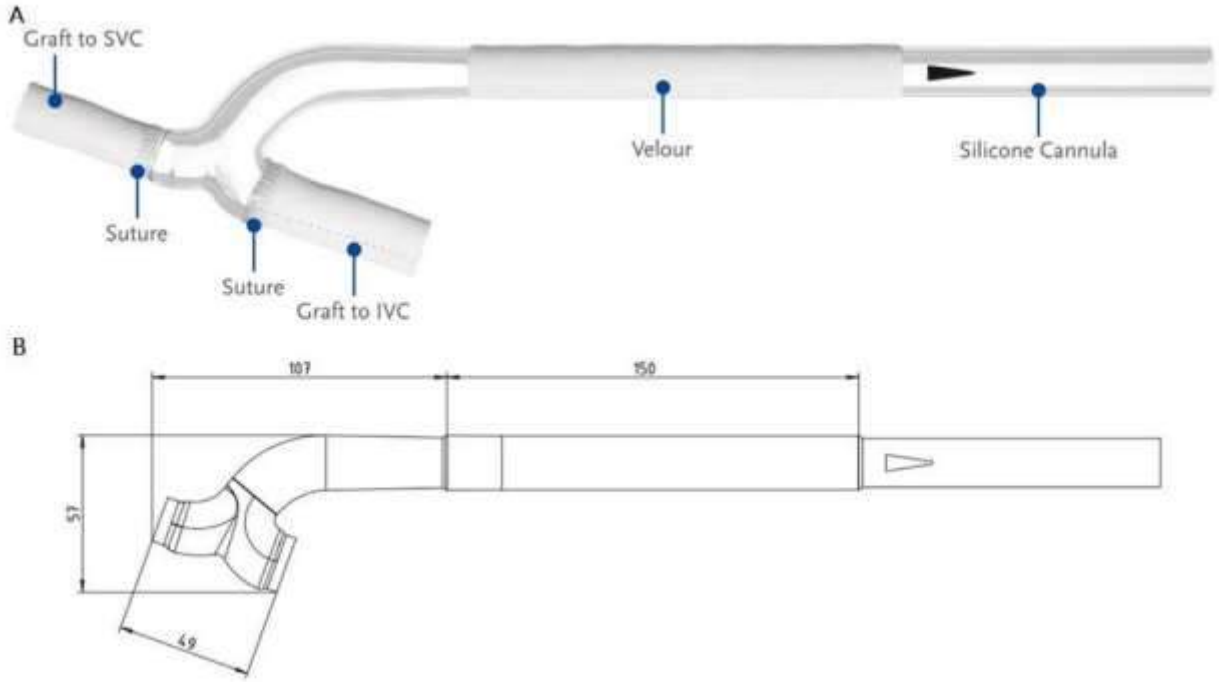


Karner, 2022

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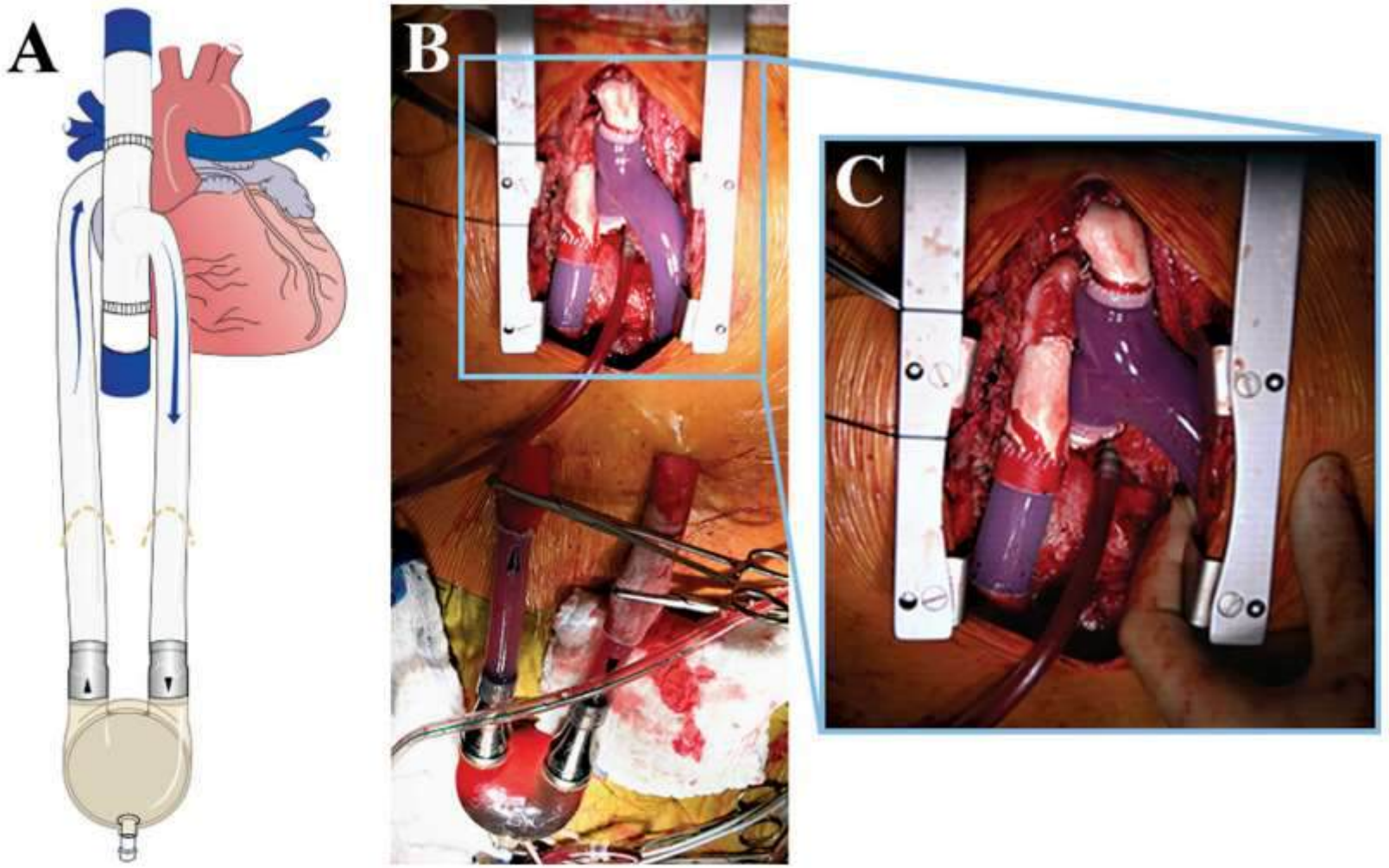


Dal Sasso, 2022

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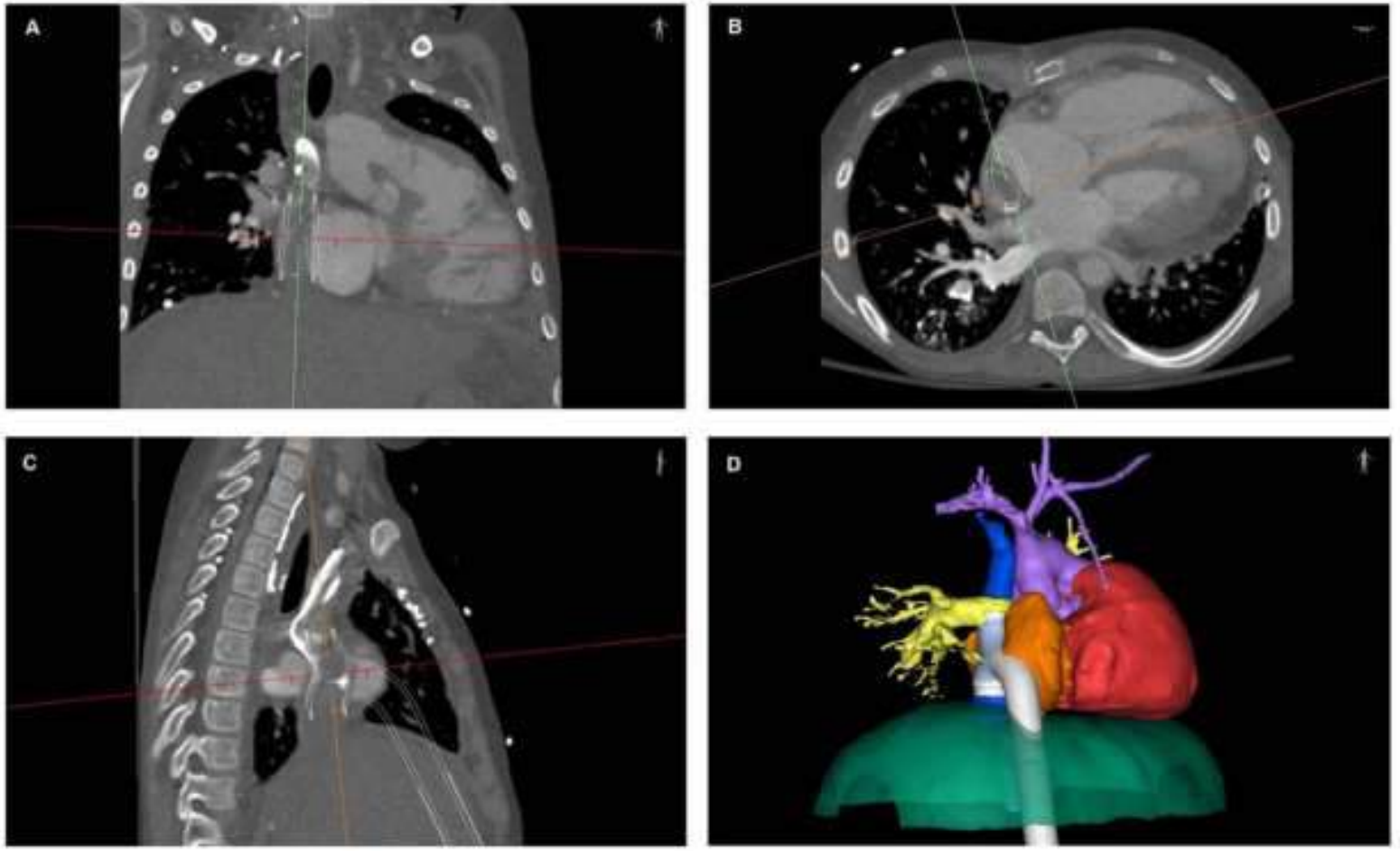


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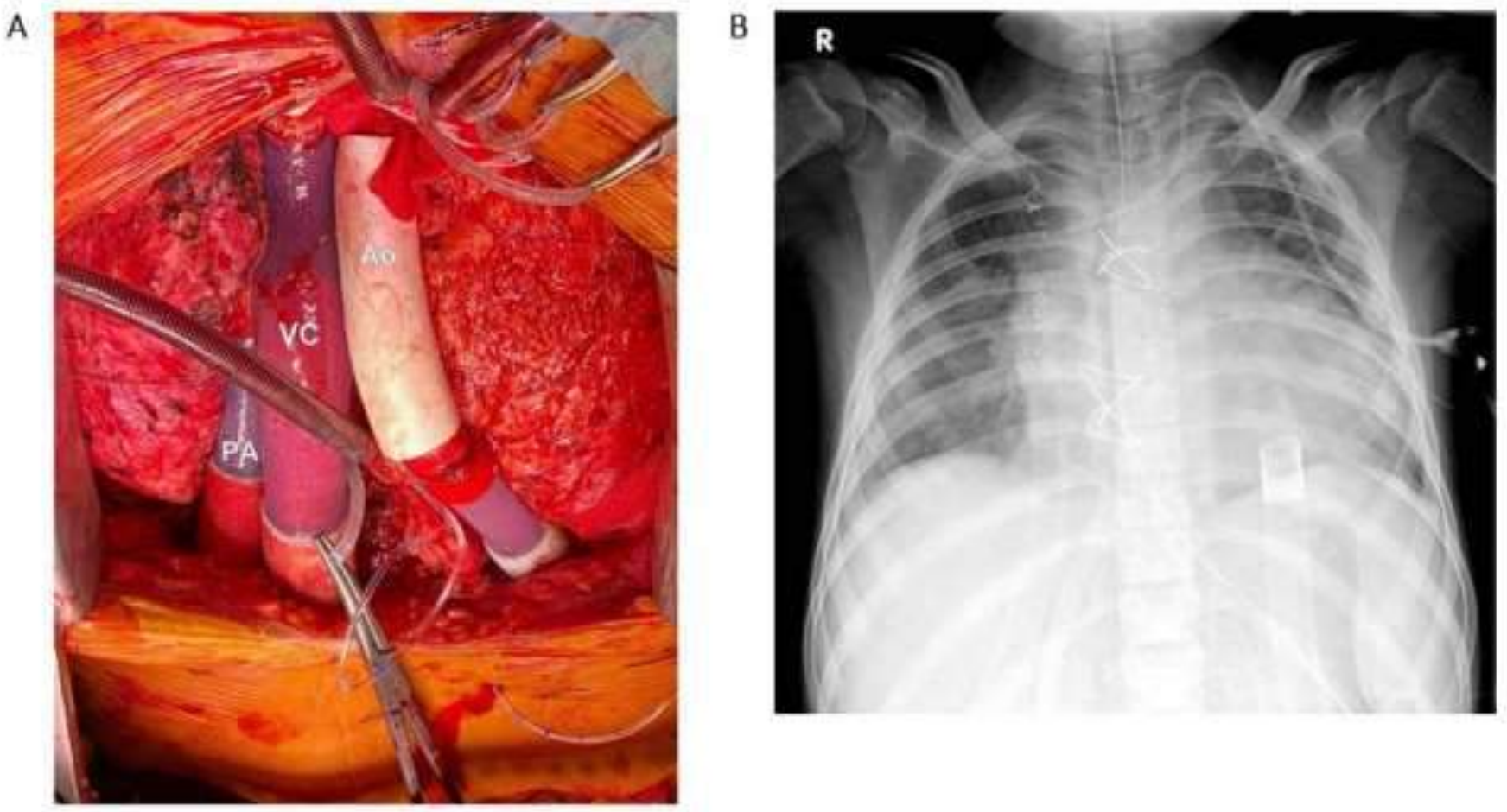


Karner, 2022

# The Future

- How should I know, I work in the ICU

# The Future

- How should I know, I work in the ICU
- At home
  - Training
  - Medications & lab monitoring
  - In person visits, televisits, in home visits
  - What interdisciplinary team members
- Fontans
- Babies

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